The Iowa State University Catalog

The Iowa State University Catalog is a two-year publication which lists all academic policies, and procedures. In addition, it includes information for fees, curriculum requirements and first-year courses of study for over 100 undergraduate majors, course descriptions for nearly 5000 undergraduate and graduate courses, and a listing of faculty members at Iowa State University.

New courses developed and offered since catalog publication can be found on the Web at www.iastate.edu/~catalog/exp/.

Every effort has been made to make the catalog accurate as of the date of publication, however, all policies, procedures, fees, and charges are subject to change at any time by appropriate action of the faculty, the university administration, or the Board of Regents, State of Iowa.

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Fall Semester 2003
Classwork begins
Monday, August 25
University holiday, offices closed
Monday, September 1
Thanksgiving break, classes recessed,
Monday through Friday, November 24-28
University holidays, offices closed
Thursday and Friday, November 27-28
Classes resume
Monday, December 1
Commencement
Friday and Saturday, December 19-20
University holidays, offices closed
Thursday and Friday, December 25-26

Spring Semester 2004
University holiday, offices closed
Thursday, January 1
Classwork begins
Monday, January 12
University holiday, offices closed
Monday, January 19
Spring break, classes recessed
Monday through Friday, March 15-19
Classes resume
Monday, March 22
Commencement
Friday and Saturday, May 7-8

Summer Session 2004
Classwork begins Session I
Monday, May 17
University holiday, offices closed
Monday, May 31
Classwork begins Session II
Monday, June 14
University holiday, offices closed
Monday, July 5
Commencement
Saturday, August 7

Fall Semester 2004
Classwork begins
Monday, August 23
University holiday, offices closed
Monday, September 6
Thanksgiving break, classes recessed
Monday through Friday, November 22-26
University holidays, offices closed
Thursday and Friday, November 25-26
Classes resume
Monday, November 29
Commencement
Friday and Saturday, December 17-18
University holidays, offices closed
Thursday and Friday, December 23-24

Spring Semester 2005
University holiday, offices closed
Friday, December 31
Classwork begins
Monday, January 10
University holiday, offices closed
Monday, January 17
Spring break, classes recessed
Monday through Friday, March 14-18
Classes resume
Monday, March 21
Commencement
Friday and Saturday, May 6-7

Summer Session 2005
Classwork begins Session I
Monday, May 16
University holiday, offices closed
Monday, May 30
Classwork begins Session II
Monday, June 13
University holiday, offices closed
Monday, July 4
Commencement
Saturday, August 6

Approved by the Board of Regents,
State of Iowa
Iowa State University is one of the most respected land-grant universities in the nation. Created by the Iowa General Assembly in 1858, the Iowa Agricultural College and Model Farm was designated the first land-grant college when Iowa became the first state to accept the terms of the federal Morrill Act in 1864.

The act allowed Iowa to sell federal land to finance a new college open to all, regardless of wealth, race or gender; offering a practical education in engineering, agriculture and military science as well as classical studies; and sharing research knowledge with all Iowans. Iowa State University officially opened in 1869 and was the first coeducational land-grant school.

In 1903, the nation’s first cooperative agricultural extension program was launched when Iowa State professors worked with farmers and county governments to establish demonstration farms and institutes.

It is our institutional commitment to the founding land-grant principles that has produced alumni who are leaders in their professions, research that has forever changed our society and knowledge-based information that has assisted the citizens of our state, nation and world community.

Mission, Role and Scope Statement
(Approved by the Board of Regents, State of Iowa, November 1989; also see www.iastate.edu/~president/2005/plan/mision.html)

Mission Statement
Iowa State University of Science and Technology is a public land-grant institution serving the people of Iowa, the nation, and the world through its interrelated programs of instruction, research, extension, and professional service. With an institutional emphasis upon areas related to science and technology, the University carries out its traditional mission of discovering, developing, disseminating, and preserving knowledge.

Iowa State University provides high quality undergraduate programs across a broad range of disciplines, as befits the institution’s stature as a university. In its dedication to excellence in learning, the University strives to instill in its students the discernment, intellectual curiosity, knowledge and skills essential for their individual development and their useful contribution to society. A common goal of undergraduate education is to assure that all students, regardless of disciplinary major, acquire literacy in science and technology, an understanding of humane and ethical values, an awareness of the intellectual, historical, and artistic foundations of our culture, and a sensitivity to other cultures and to international concerns. Consonant with its role as a teaching and research institution, Iowa State University has a strong commitment to graduate education that, at both the master’s and doctoral levels, emphasizes the development of professional, research, and scholarship skills.

As an integral part of the learning process, Iowa State University fosters the discovery and dissemination of new knowledge by supporting research, scholarship, and creative activity. The University also uses existing knowledge to address problems and issues of concern to the state of Iowa in particular, as well as to the national and global community. The University’s endeavors in discovery and innovation are supported by public and private resources and are conducted in an environment of open scientific inquiry and academic freedom.

Engagement through extension, professional service, and continuing education activities is achieved through innovative and effective outreach programs that provide the people of Iowa, and beyond, with practical knowledge and information derived from leading discovery, innovation, and learning/instructional efforts at Iowa State University and elsewhere. Through engagement, the University stimulates and encourages progressive change.

Iowa State University enrolls academically qualified students who represent diverse age groups, socioeconomic levels, racial ancestors, ethnic heritages, and international cultures, and who provide a gender balance. Through the use of a variety of educational opportunities, advanced instructional technologies, and student services, the University supports the development of both traditional and nontraditional students, preparing them for citizenship and lifelong learning in a rapidly changing world.

Finally, Iowa State University participates in international efforts to alleviate world hunger and poverty, to prepare students and faculty to be productive and responsible citizens of the world, and to contribute to increased cultural, educational, economic, scientific, and socio-political interchange and understanding between and among Iowans and other members of the world community.

Through its mission, Iowa State University supports the Board of Regents, State of Iowa, in becoming an exemplary model of governance and stewardship of resources, and the best enterprise of public education in the United States.

Role Statement
The role of Iowa State University is defined by the institution’s status as the state of Iowa’s land-grant university and by its relationship to the other institutions of higher education within Iowa.

• Iowa State University must strive to develop and maintain learning, discovery, and engagement programs that fulfill the responsibilities of a major land-grant institution.

• Iowa State University shares with the other public institutions of higher education within Iowa the joint responsibility of providing a full range of high quality educational opportunities. Coordination among these institutions with respect to programs, clientele, and geographic areas is necessary to ensure that the priority needs of all Iowans are addressed and to avoid unnecessary duplication.

• Iowa State has a statewide system for extension education and information dissemination.

• Iowa State continues to be a leading higher education institution with institutional emphasis on science and technology.

• Consistent with its historic role, Iowa State University contributes to the economic development of the state of Iowa by attracting public and private organizations seeking proximity to leading authorities in particular fields, by participating in technology transfer, and by assisting efforts to strengthen and diversify the economic base of Iowa.

• Iowa State University assumes responsibility for helping to protect, maintain and improve Iowa’s natural resources through the discovery and diffusion of knowledge and technology.

Scope Statement
Consistent with the University’s role and mission statements, the current scope of Iowa State University is described below.

• Iowa State University of Science and Technology, a broad-based university with an orientation towards science and technology, has sufficient scope and depth in its learning, discovery, and engagement functions to enable it to continue to be a distinguished land-grant university. In addition to its undergraduate and graduate work in the physical, biological, mathematical, and social sciences, it will maintain and develop strong undergraduate programs in the arts and humanities, and will offer such master’s and Ph.D. programs in this area as are justified to meet the needs of the state of Iowa and to maintain the overall strength and desirable balance of the University as a whole.
In Iowa State University's professional programs, principal emphasis will be given to the maintenance and development of strong programs in the sciences, agriculture, engineering, veterinary medicine, design, education, business, and family and consumer sciences. Interdisciplinary programs are offered that seek to combine the perspectives and methods of more than one discipline to better address the questions and problems confronting Iowa, the nation, and the world. The international efforts of Iowa State University are to be expanded and enhanced.

Iowa State University will offer no major undergraduate or graduate programs in law, library science, human medicine, dentistry, pharmacy, nursing, hospital administration, occupational therapy, physical therapy, or speech pathology.

Future programs will be determined by the continuing assessment of existing programs and of developing needs. Programs will be curtailed or eliminated when the assessment of need and resources dictates that the resources could be better used for other programs. The University approaches the addition of new programs with considerable caution. Generally, new programs are fashioned out of existing programs in response to developing needs. But if the University is to remain vital, it must be prepared and able to develop, at appropriate times, new programs that are within its general mission and that meet the changing needs of the students and society.

Iowa State's Values

As Iowa State University works toward creating an environment where continual learning serves the promises of a better world, all members of the university community are called upon to act in harmony with core values. Also see www.iastate.edu/~president/2005/plan/core.html

- Land-grant values: access to education and success; learning, encompassing practical and liberal education; discovery, encompassing basic and applied research; engagement, encompassing service and outreach
- Excellence
- Quest for knowledge
- Shared leadership
- Integrity
- Commitment
- Collaboration
- Mutual respect
- Inclusiveness
- Global perspective

Nondiscrimination and Affirmative Action Policy

Iowa State University is committed to developing and implementing a program of nondiscrimination and affirmative action, a responsibility the university accepts willingly because it is the right and just thing to do. Because an educational institution exposes the youth of Iowa and of the nation to a multitude of ideas that strongly influence their future development, it is an area of our society where removing barriers is critical. ISU insists on promoting the concept of inclusion and participation.

This commitment is part of a larger commitment to developing a safe and supportive climate for all members of the ISU community in classrooms and laboratories, in offices, in the residence hall system, and throughout the campus. Iowa State University recognizes that a nondiscriminatory environment complements a commitment to academic inquiry and intellectual and personal growth.

The goal is to provide a nondiscriminatory work environment, a nondiscriminatory living and learning environment and a nondiscriminatory environment for visitors to the campus. Iowa State University herein recommits itself to comply with all federal and state laws, regulations, and orders, including the policies of the Iowa Board of Regents, State of Iowa, which pertain to nondiscrimination and affirmative action. All administrators and personnel providing input into administrative decisions are directed to ensure that all decisions relative to employment, conditions of employment and access to programs and services will be made without regard to race, color, age, religion, national origin, sexual orientation, sex, marital status, disability, or status as a U.S. Vietnam Era Veteran.

Exceptions to this directive may be made in matters involving bona fide occupational qualifications, business necessity, actions designed to eliminate workforce underutilization, and/or where this policy conflicts with federal and state laws, rules, regulations, or orders. Iowa State University does not and will not tolerate unlawful discrimination. Iowa State will recruit, hire, train and promote persons without regard to race, color, religion, sex, national origin, age, disability, veteran status, marital status, or sexual orientation. Iowa State University will base employment decisions so as to further the principle of equal employment opportunity and diversity.

No otherwise qualified person will be denied access to, or participation in, any program, activity, service, or the use of facilities on the basis of factors previously enumerated. Reasonable accommodation will be made to facilitate the participation of persons with disabilities in all such activities consistent with applicable federal and state laws, orders and policies.

Further, all supervisory personnel will be responsible for maintaining an environment that is free of racial, ethnic or sexual abuse and harassment. The university has adopted policies and procedures on Racial and Ethnic Harassment and Sexual Harassment. Copies of these policies and procedures may be obtained from the Affirmative Action Office, at the address listed below. Acts by anyone that adversely affect another person’s employment, conditions of employment, academic standing, receipt of services, and/or participation in, or enjoyment of, any other activity, will be regarded as a violation of university policy and thereby be subject to appropriate disciplinary action. Retaliation against persons filing complaints, for bringing the violation of this policy forward for review, or for assisting in a review, pursuant to a filed complaint or grievance, is prohibited.

Iowa State University’s commitment to nondiscrimination and affirmative action is of the highest priority and is to be adhered to as such. It applies to all university-sponsored programs and activities as well as those that are conducted in cooperation with the university.

Iowa State University has designated Carla Espinoza as the affirmative action officer and assigns overall program responsibility to her as the Director of Affirmative Action. Questions regarding complaints and/or compliance with affirmative action or equal opportunity should be directed to:

Carla Espinoza
Iowa State University
Ames, IA 50011-2038
515-294-7612.
Iowa State’s Points of Pride
-The world’s first electronic digital computer was developed at Iowa State by math and physics professor John V. Atanasoff and graduate student Clifford Berry, in the late 1930s. Their invention, the ABC computer, has been called the most important technological innovation of the 20th century.
-The university is a leader in virtual reality research and its most advanced virtual reality theater, the C6, is the nation’s first six-sided theatre that totally immerses the user in images and sound.
-Iowa State’s faculty are recognized for their scholarly efforts. Fifty serve as editors of national or international academic professional journals and almost 300 serve on editorial or advisory boards of such journals.
-Iowa State is a member of the prestigious Association of American Universities, which has a membership of only 62 major research universities in the United States and Canada.
-Iowa State’s learning communities program for undergraduate students is one of the top five such programs in the nation.
-The university is consistently listed among the top schools for enrolling National Merit Scholars.
-Every state and more than 100 foreign countries are represented in Iowa State’s student body.
-Iowa State students have a reputation for winning national and international awards. Over the past two years they have won such contests for apparel design, NASA food technology, news writing, and music composition.
-Iowa State is nationally ranked for its beautiful campus and its central campus has been honored by the Association of Landscape Architects as one of only three university Centennial Medallion sites in the nation.
-Iowa State’s 400 works of art on campus make its collection the largest in any public university in the nation.
-Iowa State’s Reiman Gardens has been recognized for having the nation’s most outstanding public rose garden.
-Iowa State holds the record for making the world’s largest Rice Krispie Treat, according to the Guinness Book of World Records. Mildred Day, an Iowa State alumnus, helped create the recipe for the popular snack food.
-Iowa State graduate Cael Sanderson’s perfect collegiate wrestling record of 159 wins has been recognized by Sports Illustrated as the second most impressive feat in college sports history.

Strategic Plan—To Become the Best Land-grant Institution in the Nation.
The aspiration to become the nation’s best land-grant university was set forth in the strategic plans that have guided Iowa State University since 1990, and Iowa State’s plan for 2000-2005 continues this commitment. In addition, Iowa State’s strategic plan reflects the expectations of the Board of Regents, State of Iowa, Strategic Plan and its four key result areas of quality, access, diversity, and accountability.

Goal 1: Learning—Enhance learning through exceptional learner-centered teaching, services, and enrichment opportunities.
Iowa State believes that learning is at the heart of our university. It occurs in many contexts and by all members of the community. As a land-grant institution, Iowa State University is among the world leaders in providing postsecondary access. However, access to success through Iowa State University will mark our commitment to enhancing learning, and it will be accomplished by providing exceptional learner-centered teaching, services, and enrichment opportunities; and by paying attention to lifelong learning needs.

Goal 2: Discovery—Promote discovery and innovation characterized by preeminent scholarship, including increasingly interdisciplinary and collaborative activities.
Iowa State believes that discovery and innovation characterized by preeminent scholarship encompassing research, creative activities, teaching/learning, and extension/professional practice, will mark our commitment to discovery, thereby enhancing our national and international distinction. Institutional agility and interdisciplinary collaboration will allow Iowa State to undertake bold visionary initiatives with special attention to ethics and social, economic, and environmental responsibility.

Goal 3: Engagement—Engage with key constituencies through synergistic sharing and partnership of knowledge and expertise to address needs of communities and society.
As Iowa’s engaged land-grant university, Iowa State will synergistically deploy its knowledge and expertise toward increased response and productive involvement in improving Iowa’s communities and the larger society, at home and abroad. This will be marked by our commitment to sharing—to enrich and to learn, two-way partnerships with internal and external constituencies to achieve shared goals and to demonstrate the public purposes of Iowa State University.
The laws of the United States and of the State of Iowa provide for resident academic instruction, research, and extension education, and for the management of Iowa State University of Science and Technology. The university and two other state educational institutions of higher learning are governed by the Board of Regents, State of Iowa, which is composed of nine members nominated by the Governor of Iowa and confirmed by the Senate of Iowa. The immediate regulation and direction of the academic, research, and extension activities of the university are delegated by the Board of Regents, State of Iowa, to the president and faculty of the university. The board appoints an executive director with overall responsibility for the administration of the central office of the board located in Des Moines.

**Board of Regents, State of Iowa**

Owen J. Newlin, President

Gregory S. Nichols, Executive Director

**Terms expire April 30, 2003**

Neala R. Arnold................Bettendorf

David J. Fisher...........West Des Moines

Dr. Clarkson L. Kelly, Jr ....Charles City

**Terms expire April 30, 2003**

David G. Neil ..............LaPorte City

Owen J. Newlin ..............Des Moines

Deborah A. Turner ..............Mason City

**Terms expire April 30, 2007**

Amir I. Arbisser..............Davenport

Mary Ellen Becker...............Oskaloosa

Sue Erickson Nieland.........Sioux City

**Accreditation**

Iowa State University is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

Higher Learning Commission of the North Central Association of Colleges and Schools

30 N. LaSalle Street, Suite 2400

Chicago, IL 60602-2504

(800) 621-7440; (312) 263-0456;

Fax: (312) 263-7462

www.higherlearningcommission.org

**Officers of Administration**

Gregory C. Geoffroy, Ph.D.

President of the University

Benjamin J. Allen, Ph.D.

Vice President for Academic Affairs and Provost

Warren R. Madden, M.B.A.

Vice President for Business and Finance

Thomas L. Hill, Ph.D.

Vice President for Student Affairs

Catherine E. Wotecki, Ph.D.

Dean of the College of Agriculture

Labh Hira, Ph. D.

Dean of the College of Business

Mark C. Engelbrecht, M. Arch.

Dean of the College of Design

Walter H. Gmelch, Ph.D.

Dean of the College of Education

James L. Melsa, Ph.D.

Dean of the College of Engineering

Carol B. Meeks, Ph.D.

Dean of the College of Family and Consumer Sciences

Peter F. Rabideau, Ph.D.

Dean of the College of Liberal Arts and Sciences

Norman F. Cheville, DVM, Ph.D.

Dean of the College of Veterinary Medicine

James R. Bloedel, M.D., Ph.D.

Vice Provost for Research and Advanced Studies

Stanley R. Johnson, Ph.D.

Vice Provost for Extension

Howard N. Shapiro, Ph.D.

Vice Provost for Undergraduate Programs

Peter D. Englin, Ph.D.

Dean of Students

Olivia M. Madison, M.A.,

Dean of Library Services
Admissions and Registrar

Office of Admissions
Director: Marc Harding, B.A.

Office of the Registrar
Registrar: Kathleen M. Jones, M.S.
Associate Registrars: Larry Dau, B.S.; Laura Doering, M.S.

Admission

When to Apply
Applicants for the fall semester are encouraged to apply during the fall of the year preceding their entry to Iowa State University. Applications for other terms should be submitted well in advance of the desired entry date. Application deadlines are available at www.admissions.iastate.edu.

Completed applications for admission to the professional curriculum in the College of Veterinary Medicine, together with the required supporting transcripts, must be received by an established deadline. See Index, College of Veterinary Medicine, Application and Admission.

How to Apply
Applications for admission are available on the Web at www.admissions.iastate.edu.

Applicants seeking admission for the fall semester may be notified of the action taken on their applications as early as the September preceding enrollment, upon receipt of all application materials. Applicants for other terms will be notified on a rolling basis after receipt of all materials. Admission offers are issued for a specific term and are valid only for the term specified.

Visits to the Campus
Visitors to Iowa State University are always welcome!

The Office of Admissions, located in Alumni Hall, is open Monday through Friday from 8 a.m. until 5 p.m., and most Saturday mornings from 9 a.m. until noon when classes are in session. Counselors are available to speak with prospective students and their families about admission, financial aid, housing, student life, academic programs and opportunities. Visitors are offered student-guided walking tours of the campus.

Prospective students and parents are encouraged to visit the campus and the Office of Admissions. Arrangements for a campus visit or registration for “Experience Iowa State,” a special open house program, can be made at www.admissions.iastate.edu or by contacting the Office of Admissions, Alumni Hall, Iowa State University, Ames, Iowa 50011-2011; phone 515-294-5836 or 800-262-3810; fax 515-294-2592; or admissions@iastate.edu.

Admission requirements are stated in the Iowa Administrative Code. Admission policies are established by the Faculty Senate. Any Admission decisions are made by the admissions officers in accordance with the entrance requirements as set forth in the Iowa Administrative Code as well as the admission policies established by the Faculty Senate.

Undergraduate Admission into Degree Programs Directly from High School
Students who seek admission must meet the following requirements and also any special requirements for the college or curriculum of their choice.

Applicants must submit an application for admission, the appropriate application fee (check www.admissions.iastate.edu for current application fee information). In addition applicants must have their secondary school provide an official transcript of their academic record, including credits and grades, rank in class, and certification of graduation.

Applicants must also arrange to have their scores from either the ACT Assessment (ACT) or the Scholastic Assessment Test (SAT I) reported to Iowa State directly from the testing agency. Applicants whose first language is not English should also provide the results of a Test of English as a Foreign Language (TOEFL), if their scores on the ACT or SAT are not adequate to place them into freshman composition courses at Iowa State. Applicants may be required to submit additional information or data to support their applications.

a. Graduates of approved Iowa high schools who have the subject-matter background required by Iowa State University and who rank in the upper half of their graduating class will be admitted. Students who do not rank in the upper half of their graduating class may be considered for admission to the university on an individual basis if they achieve the following combination of high school rank and ACT or SAT I scores:

High School Rank (99% is high) ACT Composite Score SAT I Combined Score
49-47% 20 930
46-45% 21 970
44-42% 22 1010
41-39% 23 1050
38% or below 24 1090

Those who do not meet these requirements but who have a high school rank of 20% or above may be given the opportunity to enroll for a trial period during a preceding summer session to establish their qualifications for fall admission. Those who have a high school rank below 20% (and an ACT below 24) will be denied admission.

b. Nonresidents of Iowa, including international students, may be held to higher academic standards, but must meet at least the same requirements as resident applicants.

c. Applicants who are graduates of nonapproved high schools will be considered for admission in a manner similar to applicants from approved high schools, but additional emphasis will be given to scores earned on standardized examinations.

d. Applications may be considered from students who did not graduate with their high school classes. They will be required to submit all academic data to the extent that it exists and achieve scores on standardized examinations which will demonstrate that they are adequately prepared for academic study.

e. Students with satisfactory academic records may be admitted, on an individual basis, for part-time university study while enrolled in high school or during the summers prior to high school graduation.

f. Exceptional students may be admitted as full-time students before completing high school. Early admission is provided to serve persons whose academic achievement and personal and intellectual maturity clearly suggest readiness for college-level study.

High School Preparation Required for Admission
Graduation from an approved high school shall ordinarily precede entrance into Iowa State University.

Students who wish to enter Iowa State University directly from high school (or transfer from another college or university with less than 24 semester hours of graded transferable college credit) must meet the level of academic performance described above and show evidence of the following high school preparation:

English/Language Arts
Four years, emphasizing writing, speaking, and reading, as well as an understanding and appreciation of literature

Mathematics
Three years, including one year each of algebra, geometry, and advanced algebra
Science
Three years, including one year each of courses from two of the following fields: biology, chemistry, and physics

Social Studies
Two years

Additional Entrance Requirements for the College of Liberal Arts and Sciences
In addition to the high school preparation requirements described above, students applying to the College of Liberal Arts and Sciences must have completed an additional year of social studies, for a total of three years, and two years of a single foreign language.

Students who do not meet the high school course preparation requirements listed here, but who are otherwise well qualified, may be admitted after individual review of their applications.

Undergraduate Admission into Degree Programs by Transfer from Other Educational Institutions
Students who seek admission must meet the following requirements and also any special requirements for the college or curriculum of their choice.

Applicants must submit an application form for admission, together with the appropriate fee (see [www.admissions.iastate.edu](http://www.admissions.iastate.edu) for current application fee information) and request that each college they have attended send an official transcript of record to the Office of Admissions. Failure to provide transcripts from all colleges or universities attended may result in denial of the application or dismissal from the university. If less than 24 semester hours of graded transferable college credit will be completed prior to entry at Iowa State University, applicants must also request that their official high school transcript and ACT or SAT I scores be sent to the Office of Admissions. Other transfer applicants are encouraged to provide high school academic information. Students who do not do so may be asked to take course placement examinations during orientation.

Applicants whose first language is not English should provide the results of a Test of English as a Foreign Language (TOEFL). The TOEFL may be waived if their scores on the ACT or SAT are adequate for placement in Iowa State freshman composition courses.

a. Transfer applicants with a minimum of 24 semester hours of graded transferable credit from regionally accredited colleges or universities, who have achieved for all college work previously attempted the grade point average required by Iowa State for specific programs, will be admitted. A 2.00 grade point average (on a 4.00 grading scale) is the minimum transfer grade point average requirement. Some programs may require a transfer grade point average higher than this minimum. Higher academic standards may be required of students who are not residents of Iowa, including international students.

Applicants who have not maintained the grade point average required by Iowa State University for specific programs or who are under academic suspension from the last college attended generally will be denied admission.

b. In addition to meeting the minimum transfer grade point average requirement described above, applicants who have completed fewer than 24 semester hours of graded transferable college credit prior to their enrollment at Iowa State must also meet the admission requirements for students entering directly from high school.

c. Transfer applicants under disciplinary suspension will not be considered for admission until information concerning the reason for the suspension has been received from the college assigning the suspension. Applicants granted admission under these circumstances will be admitted on probation.

d. Transfer applicants from colleges and universities not regionally accredited will be considered for admission on an individual basis, taking into account all available academic information.

Transfer Credit Practices
Iowa State University endorses the Joint Statement on Transfer and Award of Academic Credit approved by the American Council on Education (ACE) and the American Association of Collegiate Registrars and Admissions Officers (AACRAO). The current issue of Transfer Credit Practices of Designated Educational Institutions, published by AACRAO, is an example of a reference used in determining transfer credit.

The acceptance and use of transfer credit are subject to limitations in accordance with the educational policies of Iowa State University.

a. Students from regionally accredited colleges and universities.
Credit earned at regionally accredited colleges and universities is acceptable for transfer, except for the following, which may not be accepted, or may be accepted to a limited extent:

—credit in courses determined by Iowa State University to be of a developmental, vocational, or technical nature

—credit in courses or programs in which the institution granting the credit is not directly involved.

No more than 65 semester or 97 quarter credits earned at two-year colleges can be applied to a bachelor’s degree from Iowa State University. While there is no limit to the number of credits that may be transferred from a four-year institution, the last 32 semester credits must be completed at Iowa State University.

b. Students from colleges and universities which have candidate status.
Credit earned at colleges and universities which have become candidates for accreditation by a regional association is acceptable for transfer in a manner similar to that from regionally accredited colleges and universities if the credit is applicable to the bachelor’s degree at Iowa State University.

Credit earned at the junior and senior classification from an accredited two-year college which has received approval by a regional accrediting association for change to a four-year college may be accepted by Iowa State University.

c. Students from colleges and universities not regionally accredited.
When students are admitted from colleges and universities not regionally accredited, they may validate portions or all of their transfer credit by satisfactory academic study at Iowa State, or by examination. The amount of transfer credit and the terms of the validation process will be specified at the time of admission.

In determining the acceptability of transfer credit from private colleges in Iowa which do not have regional accreditation, the Regents Committee on Educational Relations, upon request from such institutions, evaluates the nature and standards of the academic program, faculty, student records, library, and laboratories.

In determining the acceptability of transfer credit from colleges in states other than Iowa which are not regionally accredited, acceptability practices indicated in the current issue of Transfer Credit Practices of Designated Educational Institutions will be used as a guide. For institutions not listed in the publication, guidance is requested from the designated reporting institution of the appropriate state.

d. Students from foreign colleges and universities.
Transfer credit from foreign educational institutions may be granted after a determination of the type of institution involved, its recognition by the educational authorities of the foreign country, and an evaluation of the content, level, and comparability of the study to courses and programs at Iowa State University. Credit may be granted in specific courses or assigned to general areas of study. Extensive use is made of professional journals and references which describe the educational systems and programs of individual countries.

Additional Transfer Credit Policies
a. Students with credit obtained during military service.
Credit will be awarded for successful completion of technical or specialized schools attended while on active duty with the armed forces to the extent that the material is applicable toward degree requirements at Iowa State University. Application for such credit is made at the Office of Admissions, which follows many of the recommendations in the American Council on Education (ACE) publication A Guide to the Evaluation of Educational Experiences in the Armed Services.
b. Students with credit obtained through non-college sponsored instruction. Credit will be awarded for successful completion of learning acquired from participation in formal courses sponsored by associations, business, government, industry, and unions to the extent that the material is applicable toward degree requirements at Iowa State University. Application for such credit is made at the Office of Admissions, which follows many of the recommendations in the American Council on Education (ACE) publication The National Guide to Educational Credit for Training Programs.

c. Students with credit obtained through correspondence courses. Although Iowa State does not offer correspondence courses, college level courses taken by correspondence from accredited colleges or universities are acceptable for transfer at the undergraduate level if the courses taken are those that do not require laboratory study.

d. College Level Examination Program (CLEP). Iowa State University will award credit for each of the following 12 examinations, for test scores equivalent to a "B" grade: Principles of Accounting, American Government, Biology, Calculus, Humanities, Principles of Macroeconomics, Principles of Microeconomics, Natural Sciences, Introductory Psychology, Social Sciences and History, Introductory Sociology, Trigonometry. Iowa State will also award credit equivalent to a grade of "C" or "B" (grade determines amount of credit awarded) for two CLEP foreign language exams: French Language and Spanish Language.

Application of CLEP credit to a degree program varies with the department, so students should consult with their department before they register for CLEP examinations. Additional information is available at www.iastate.edu, Index, Credit by Examination.

e. Students with “test-out” credit. Students who have earned credit at other colleges or universities through Advanced Placement (AP), College Level Examination Program (CLEP), or International Baccalaureate (IB) examinations may qualify for credit at Iowa State University. Scores from these examinations should be sent directly to the Office of Admissions; credit will be awarded provided the scores satisfy Iowa State’s requirements.

Credit earned at another college through locally designed test-out examinations may transfer to Iowa State University if accompanied by at least 12 transferable semester credits earned through coursework taken at that institution.

Articulation/Transfer Agreements

a. Iowa Regent Universities General Education Articulation Agreement. Iowa State University participates in an articulation agreement with the other two Iowa Regent universities concerning the acceptance of their general education programs into the Iowa State University College of Liberal Arts and Sciences. Under the terms of this agreement, students who have satisfied general education requirements at the University of Northern Iowa or in the College of Liberal Arts at the University of Iowa may transfer to Iowa State’s College of Liberal Arts and Sciences with their general education requirements met (with the possible exception of the foreign language and library requirements).

b. Associate of Arts (A.A.) Articulation Agreement with Iowa public community colleges. Students who plan to enter the College of Liberal Arts and Sciences at Iowa State University with an associate of arts degree from an Iowa public community college, and who have at least 60 prescribed semester (90 quarter) credits acceptable for transfer and at least a 2.00 cumulative grade point average, will be considered to have met the general education requirements of the college (with the possible exception of the foreign language and library requirements).

c. Vocational-technical credit from Iowa public community colleges. Iowa State University will accept up to 16 semester (24 quarter) credits earned in vocational-technical courses where the sending Iowa public community college will accept such courses toward its associate of arts or associate in science degree. Certain vocational-technical courses at Iowa community colleges may be articulated to Iowa State University as academic credit. The hours earned in these articulated courses would transfer in addition to the 16 semester hour vocational-technical maximum. Please refer to the course equivalency guides on the Web (www.iastate.edu) or contact the Office of Admissions for more information.

d. AP and CLEP credit from Iowa public colleges and universities. Iowa State University has an agreement with the Iowa public colleges and universities which allows credit earned through AP and CLEP examinations to transfer directly to Iowa State University if accompanied by at least 12 transferable semester credits earned through coursework taken at the sending institution.

Nondegree Undergraduate

Students who wish to attend Iowa State University to take undergraduate courses but who do not plan to seek an undergraduate degree from Iowa State University should apply as nondegree undergraduate students. Credit taken under the nondegree undergraduate classification is applicable for undergraduate degree purposes for those who are later admitted as degree-seeking undergraduate students. Credit obtained under the nondegree undergraduate classification may not, however, be applied toward a graduate degree.

Students enrolled in the Intensive English and Orientation Program (IEOP) are classified as nondegree students in the College of Liberal Arts and Sciences, and usually are not permitted to enroll in academic courses until they have satisfied requirements for admission as degree-seeking students. Permission to enroll in one academic course in addition to full-time intensive English study may be granted under special circumstances.

Reentering Students

Reentering students are those who have previously attended Iowa State University and are returning after an absence of at least one full year. See Index, “Academic Renewal Policy” and “Reentry.”

International students need to reapply after an absence of one full semester, exclusive of summer session. International reentries must also contact the International Education Services office to request the necessary visa application forms.

Reentering graduate students do not need to complete a reentry form but should notify their department and the Office of the Registrar of their intent to reenter Iowa State University. See Index, “Reentry” for more information.

Residency

Classification of Residents and Nonresidents for Admission and Tuition Purposes

These criteria are contained in the Policy Manual, Board of Regents, State of Iowa and the Iowa Administrative Code: Board of Regents, State of Iowa.

Graduate Assistants

Students with graduate assistantships of 1/4-time or more are assessed Iowa resident tuition and fees. Nonresident students with graduate assistantships of 1/4-time or more retain their nonresidency classification, but are assessed resident tuition and fees as long as the graduate assistantship is continued.

The spouse of a 1/4-time or more graduate assistant who is a nonresident is eligible for resident tuition and fees during the period of the assistantship appointment. Iowa residency is not granted, but a waiver of nonresident tuition and fees is in effect. When the graduate assistantship ends, the tuition and fee waiver for the spouse is terminated. (Board of Regents, State of Iowa, Minutes March 15, 1995, p. 801)

General

A. A person enrolling at one of the three state universities shall be classified as a resident or nonresident for admission, tuition, and fee purposes by the registrar or someone designated by the registrar. The decision shall be based upon information furnished by the student and other relevant information.

B. In determining resident or nonresident classification, the issue is essentially one of why the person is in the state of Iowa. If the person is in the state primarily for educational purposes, that person will be considered a nonresident. For example, it may be possible that an individual could qualify as a resident of Iowa for such purposes as voting, or holding an Iowa driver’s license, and not
meet the residency requirements as established by the Board of Regents, State of Iowa, for admission, tuition, and fee purposes.

C. The registrar, or designated person, is authorized to require written documents, affidavits, verifications, or other evidence deemed necessary to determine why a student is in Iowa. The burden of establishing that a student is in Iowa for other than educational purposes is upon the student. A student may be required to file any or all of the following:

1. A statement from the student describing employment and expected source of support.
2. A statement from the student’s employer.
3. A statement from the student’s parents verifying nonsupport and the fact that the student was not listed as a dependent on tax returns for the past year and will not be so listed in future years.
4. Supporting statements from persons who might be familiar with the family situation.
5. Iowa state income tax return.

D. Change of classification from nonresident to resident will not be made retroactive beyond the term in which application for resident classification is made.

E. A student who gives incorrect or misleading information to evade payment of nonresident fees shall be subject to serious disciplinary action and must also pay the nonresident fees for each term previously attended.

F. Review committee. These regulations shall be administered by the registrar or someone designated by the registrar. The decision of the registrar or designated person may be appealed to a university review committee. The finding of the review committee may be appealed to the Board of Regents, State of Iowa.

Guidelines

The following guidelines are used in determining the resident classification of a student for admission, tuition, and fee purposes:

A. A financially dependent student whose parents move from Iowa after the student is enrolled remains a resident provided the student maintains continuous enrollment. A financially dependent student whose parents move from Iowa during the senior year of high school will be considered a resident provided the student has not established domicile in another state.

B. In deciding why a person is in the state of Iowa, the person's domicile will be considered. A person who comes to Iowa from another state and enrolls in any institution of postsecondary education for a full program or substantially a full program shall be presumed to have come to Iowa primarily for educational reasons rather than to establish a domicile in Iowa.

C. A student who was a former resident of Iowa may continue to be considered a resident provided absence from the state was for a period of less than 12 months and provided domicile is reestablished. If the absence from the state is for a period exceeding 12 months, a student may be considered a resident if evidence can be presented showing that the student has long-term ties to Iowa and reestablishes an Iowa domicile. A person or the dependent of a person whose domicile is permanently established in Iowa, who has been classified as a resident for admission, tuition, and fee purposes, may continue to be classified as a resident so long as domicile is maintained, even though circumstances may require extended absence of the person from the state. It is required that a person who claims Iowa domicile while living in another state or country will provide proof of the continual domicile as evidence that the person:

1. Has not acquired domicile in another state;
2. Has maintained a continuous voting record in Iowa; and
3. Has filed regular Iowa resident income tax returns during absence from the state.

D. A student who moves to Iowa may be eligible for resident classification at the next registration following 12 consecutive months in the state provided the student is not enrolled as more than a half-time student (6 credits for an undergraduate or professional student, 5 credits for a graduate student) in any academic year term, is not enrolled for more than 4 credits in a summer term for any classification, and provides sufficient evidence of the establishment of an Iowa domicile.

E. A student who has been a continuous student and whose parents move to Iowa may become a resident at the beginning of the next term provided the student is dependent upon the parents for a majority of financial assistance.

F. A person who is moved into the state as the result of military or civil orders from the government for other than educational purposes, or the dependent of such a person, is entitled to resident status. However, if the arrival of the person under orders is subsequent to the beginning of the term in which the student is enrolled, nonresident fees will be charged in all cases until the beginning of the term for which resident classification is sought.

G. A person who has been certified as a refugee or granted asylum by the appropriate agency of the United States, who enrolls as a student at a university governed by the Board of Regents, State of Iowa, may be accorded immediate resident status for admission, tuition, and fee purposes where the person:

1. Comes directly to the state of Iowa from a refugee facility or port of debarkation, or
2. Comes to the state of Iowa within a reasonable time and has not established domicile in another state.

Any refugee or individual granted asylum not meeting these standards will be presumed to be a nonresident for admission, tuition, and fee purposes and thus subject to the usual method of proof of establishment of Iowa residency.

H. An alien who has immigrant status establishes Iowa residency in the same manner as a United States citizen.

I. At the Regent institutions, American Indians who have origins in any of the original peoples of North America and who maintain a cultural identification through tribal affiliation or community recognition with one or more of the tribes or nations connected historically with the present state of Iowa, including the Iowa, Kickapoo, Menominee, Miami, Missouri, Ojibwa (Chippewa), Omaha, Otoe, Ottawa (Odawa), Potawatomi, Sac and Fox (Sauk, Meskwaki), Sioux, and Winnebago (Ho Chunk), will be assessed Iowa resident tuition and fees. (Board of Regents, State of Iowa, Minutes October 15-16, 1997, p. 299)

Facts

A. The following circumstances, although not necessarily conclusive, have probative value in support of a claim for resident classification:

1. Reside in Iowa for 12 consecutive months, and be primarily engaged in activities other than those of a full-time student, immediately prior to the beginning of the term for which resident classification is sought.
2. Reliance upon Iowa resources for financial support.
3. Domicile in Iowa of persons legally responsible for the student.
4. Former domicile in the state and maintenance of significant connections therein while absent.
5. Acceptance of an offer of permanent employment in Iowa.
6. Other facts indicating the student’s domicile will be considered by the universities in classifying the student.

B. The following circumstances, standing alone, do not constitute sufficient evidence of domicile to affect classification of a student as a resident under these regulations:

1. Voting or registration for voting.
2. Employment in any position normally filled by a student.
3. The lease of living quarters.
4. Admission to a licensed practicing profession in Iowa.
5. Automobile registration.
6. Public records; for example, birth and marriage records, Iowa driver’s license.
7. Continuous presence in Iowa during periods when not enrolled in school.
8. Ownership of property in Iowa, or the payment of Iowa taxes.
Exams will be considered for course credit if they meet the following criteria. Generally, students scoring 3 or better on the tests are judged to be equivalent to the content of the course.

**International Baccalaureate Examinations**

The International Baccalaureate Program, offered at many high schools in the United States and abroad, allows students the opportunity to take examinations for credit at the college level. These examinations are offered at standard and higher levels.

Iowa State University awards credit for most higher level examinations and some standard level examinations. Students must receive a minimum score of 4 to qualify for academic credit in most subject areas. Some departments require a minimum score of 5.

Correspondence concerning the International Baccalaureate Program should be addressed to the Office of the Registrar to verify a student's status for a summer session.

**Credit by Examination (CBE)**

It is Iowa State University policy to grant academic credit by examination in many of the undergraduate courses listed in the university bulletin. Credit is awarded primarily in the introductory level classes in mathematics, natural, physical, and social sciences, and the liberal arts. Students with superior high school backgrounds or those with college-level proficiency in certain subject areas are strongly encouraged to investigate and attempt testing in the CBE programs available.

**Types of CBE Programs**

Students may earn academic credit in any of four ways and have that credit recorded on their academic record when they enroll. Programs accepted at Iowa State include the Advanced Placement (AP) Program, the International Baccalaureate (IB) Examinations, departmental examinations, and the College Level Examination Program (CLEP).

**Advanced Placement (AP) Program of the College Board**

This program allows students, while still in high school, to take examinations for credit at the college level. Iowa State University awards credit or advanced placement through the Advanced Placement Program in art, biology, chemistry, computer science, economics, English, environmental science, foreign languages, geography, government and politics, history, mathematics, music, physics, psychology, and statistics. High school counselors and teachers will assist with testing arrangements.

Generally, students scoring 3 or better on the exams will be considered for course credit based on departmental review of the exams. In some departments, only scores of 4 or better will be considered for credit.

Correspondence concerning the College Board Advanced Placement Examinations should be addressed to the College Board Advanced Placement Examinations, P.O. Box 977-IS, Princeton, New Jersey 08541, or visit their website at www.collegeboard.org/ap/students/index.html.

**Departmental Examinations**

Students may take locally constructed departmental examinations for undergraduate credit in specified subject areas for which they and the department feel they have the necessary preparation. These exams are generally administered by the department which offers the course (for exceptions, see CLEP offerings below). Students interested in taking departmental (or CLEP) examinations should contact the appropriate department for specific information on the exam covered by the exam and the exam itself. A nonrefundable fee is charged for each departmental examination requested. If an acceptable exam score is achieved, a grade of T will be reported to the Office of the Registrar. The T grade represents performance equivalent to a C or better in the course. T grades are not used in computing students' grade point averages; however, the credit does become part of their official academic record and may be applied toward their graduation requirements.

A list of the most frequently requested exams and the date(s) and time(s) they are administered each semester is published on the Schedule of Classes web site at www.iastate.edu/~catalog/schedule. Most examinations for credit are prepared by the departments offering the courses. In some cases, the examination used is part of the College Level Examination Program (CLEP), where the content of the CLEP test has been judged to be equivalent to the content of the course.

**College Level Examination Program**

CLEP is available on computer only. Iowa State University will award up to six semester credit hours for each of these three CLEP tests (Social Sciences and History, Humanities, and Natural Sciences) if the test score places the student at a “B” grade level. Iowa State University does not accept the CLEP tests in either College Mathematics or English Composition. In addition, the College of Engineering does not allow credit earned from CLEP Social Sciences and History, Humanities, and Natural Sciences tests to be used in their students’ degree programs.

CLEP tests accepted at Iowa State University at a “B” grade level include American Government (Pol S 215); Principles of Accounting (Acct 284 and 285; engineering majors should consult with their academic advisor before registering for this examination); Biology (Biol 109, not for biology or engineering majors); Introductory Psychology (Psych 101); Introductory Sociology (Soc 134); Principles of Macroeconomics (Econ 102); Principles of Microeconomics (Econ 101); Trigonometry (Math 141); and Calculus (Math 165). Students must receive a score equivalent to a “B” grade to qualify for credit.

In addition, Iowa State University will award up to 14 semester credit hours for CLEP French Language and up to 16 semester credit hours for CLEP Spanish Language, depending on the student’s score, which ranges from a “C” grade equivalent for Span 101 or Frnch 101 to a “B” grade equivalent for Frnch 202 and Span 202. Please note that native or near native speakers of French or Spanish may not test out of the beginning or intermediate levels in these languages.

A nonrefundable fee is charged for each CLEP test requested, and all requests should be made one week prior to the test date. CLEP tests are administered by the Student Counseling Service Testing Office Monday through Friday. For information on whether to take any of the CLEP tests, contact the department that offers the course. To obtain information on any of the CLEP tests, contact the Testing Office, 2030 Student Services Building, Iowa State University, Ames, Iowa 50011, or send e-mail to scscleplep@iastate.edu. To print a copy of the institutional CLEP registration form, go to www.iastate.edu, Index, Testing (Student Counseling Service). Then click on the link “CLEP Testing.”

**Admissions and Registrar**

**Policies and Procedures Governing CBE Tests**

1. Departmental and CLEP tests are offered to newly admitted or currently enrolled students at Iowa State University. Former and future students will receive credit only if they enroll sometime during the twelve months immediately following the test(s).

2. Permission to take a departmental examination is obtained from the department. Students may be denied permission because (a) the nature of the course is such that proficiency cannot be measured by such a test, (b) the student does not appear to have adequate background to pass the examination for the course, or (c) the student would not otherwise be allowed to enroll in the course. Students may appeal such a denial to the dean of the college in which the department is administered and subsequently to the provost.

3. Students may ordinarily attempt a CBE test only once in any course or area. Under special
4. Departmental examinations and CLEP subject tests cover only a single course and students may not test out of independent study or special topic courses.

5. There is a nonrefundable fee for all departmental and CLEP tests. The fee is set by the Board of Regents, State of Iowa, and is subject to change.

6. Departmental examinations are usually given just prior to, or within two weeks of, the beginning of fall and spring semesters. For more information, students should contact the department that offers the class. CLEP tests are given year round.

7. Credit for the CLEP examinations Social Sciences and History, Humanities, and Natural Sciences is not evaluated as equivalent to any specific course and cannot be used in place of specific course requirements for the major. All colleges (except Engineering, which does not accept these tests) allow these CLEP general credits to be used for either general requirements (not in Liberal Arts and Sciences) or elective credit. Students are responsible for checking with their academic advisers to determine whether such credit is to their benefit.

8. Listed below are policies for transferring CBE from another college or university to Iowa State University:

a. AP or CLEP credit which is earned at an Iowa public college or university may be transferred directly to Iowa State University provided it is accompanied by at least 12 semester credits earned in residence at the sending institution. AP or CLEP credit which is earned at any other college or university may not be transferred directly to Iowa State. However, the scores from these examinations may be sent to Iowa State University from the testing agency, and credit will be awarded based on Iowa State’s AP and CLEP policies.

b. IB credit earned at another college or university may not be transferred directly to Iowa State University. However, the scores from IB examinations may be sent to Iowa State from the testing agency, and credit will be awarded based on Iowa State’s IB policies.

c. Credit earned at another college or university through local test-out examinations may be transferred directly to Iowa State University provided it is accompanied by at least 12 semester credits earned in residence at the sending institution.

9. Credit earned from CBE will be posted to the student’s academic record at the end of the term. CBE credits will be counted toward the projected year in school classification used to establish registration start dates.

10. Some professional programs do not accept T (test-out) credit in preprofessional courses. Students who anticipate applying to such programs should inquire about the acceptability of such credit before registering for such CBE tests.

11. Credit established at Iowa State University will usually transfer to other colleges and universities; however, the final decision rests with the institution reviewing the transcript.

Office of New Student Programs

Orientation
The purpose of orientation is to help new undergraduate students make a smooth transition to Iowa State University. At orientation, students plan their academic programs, take tests to ensure placement in appropriate courses, register for classes, learn about university policies and procedures, and prepare for their personal and social adjustment to the university. The university Orientation Committee, composed of Iowa State University students, faculty, and staff, is responsible for the orientation programs; the undergraduate colleges of the university, in cooperation with the Office of New Student Programs, have responsibility for the implementation of orientation programs for new students and their families.

The Orientation Committee conducts an extensive orientation program during the summer, with additional programs held prior to each term. Special orientation sessions are conducted for transfer students during the spring. Special orientation programs are also held for nontraditional students, international students, and graduate students. New students receive a written invitation to attend an orientation program before their first semester at the university. Family members are encouraged to accompany students.

Summer Orientation
Summer orientation is a two-day program scheduled in June. As early as January, new students and their family members are asked to select a convenient time from among a number of orientation sessions that are scheduled during June. In addition to preparing their class schedules for fall semester, new students with their family members participate in guided tours of the university, attend informational meetings about policies and procedures at the university, and meet formally and informally with faculty, staff, and other new students and their families. These sessions, held in a comfortable, informative atmosphere, lessen existing anxieties, assist each person in the development of a clearer understanding of the challenge of the university environment, and make it possible for new students—with support from their family members—to begin to make the academic and social decisions that are faced by all students at the university.

Cyclone Aides, Iowa State undergraduate students with widely varying backgrounds and interests, help acquaint new students and their families with the university.

Housing and meals are available at campus residence halls for a nominal fee. Cyclone Aides live in the residence halls with the new students and are available at all times for informal discussion.

Destination Iowa State
The Destination Iowa State program is held on the Thursday, Friday, and Saturday before classes begin fall semester. The program helps new students develop academic, computer, and social strategies to ensure a successful transition to Iowa State University.

WelcomeFest
WelcomeFest activities are scheduled during the first week of fall semester to welcome students to campus. All students, including transfer students, are invited to participate in WelcomeFest.
Continuing Education and Communication Services

Iowa State University remains true to the land-grant tradition of extending knowledge far beyond campus borders. Annually thousands of students enroll in ISU courses without setting foot in Ames. In addition to the traditional method of instructors traveling to classrooms off campus, technology has provided new ways for Iowa State University faculty to reach students. ISU offers distance education courses over the Iowa Communications Network (ICN), by videotape, CD-ROM and DVD, and online.

Courses are the same as those offered on campus, carry residential credit, and are taught by ISU faculty members. Credit earned in off-campus courses becomes a part of the academic record at Iowa State University and may be used to meet degree requirements in the same manner as credit earned on campus.

ISU Continuing Education personnel provide leadership and support to faculty in their efforts to identify the needs of Iowans and to reach and satisfy adult learners who wish to earn college credit without attending classes on campus. The Continuing Education staff also helps off-campus students access student services and information at Iowa State University.

For a list of courses and programs available, or to request specific courses and programs, visit www.lifelearner.iastate.edu, or contact Continuing Education in Ames (515) 294-6222 or (800) 262-0015. You may also contact any of the ISU Extension offices across the state.

Some off-campus credit courses are offered to serve the special interest or needs of a particular group. Often courses are offered to fulfill certification or degree program objectives. The programs currently offered off campus by Iowa State University are:

**College of Agriculture**
The faculty of the College of Agriculture offers two master's degrees off-campus. For more information call (515) 294-1438 or (900) 747-4478.

**Master of Agriculture**
Statewide via the Iowa Communications Network; U.S. and Canada via videotape, CD-ROM and online

Prepare for a proactive role in addressing and responding to personal, professional, and societal issues and challenges in a changing agriculture and food system. Position yourself for emerging opportunities within or outside your current employment. Individuals enroll in the Master of Agriculture program for a variety of reasons from career advancement, to teacher certification renewal, to professional development, to personal interests.

The core 13 credits emphasize leadership development, technological change, use of statistics, economic issues, and sustainability issues. You select another 15 credits in consultation with your graduate committee to meet your individual interests. The capstone of the program is a creative component of four credits. The degree is 32 total credits. The program began in 1979. Up to 10 credits of approved transfer courses may be used.

**Master of Science in Agronomy**
U.S. and Canada via CD-ROM and online

Designed for professionals who are working in industry and government, the degree ensures you have an advanced knowledge of agronomic systems and superior problem-solving skills. The computer-based program, begun in 1998, emphasizes practical, professional, and technical skills involved in crop management, soil and water management, and integrated pest management.

The curriculum consists of 12 courses plus one-credit workshop and a three-credit creative component, for a total of 30 credits. The workshop is the only course that requires attendance on campus—three or four days one summer. The course prerequisites for admission to the program are limited to fundamental agriculture courses, recognizing that many potential students will not have majored in agronomy as undergraduates. Generally, students who have completed a degree from a College of Agriculture will meet the requirements.

**College of Business**
A Master of Business Administration is offered in Des Moines as part of ISU’s initiative in the capital city.

**Master of Business Administration**
On-site evenings in Des Moines

The Des Moines MBA program debuted fall 1999. For information, send to busgrad@iastate.edu or call (515) 294-8188 or (877) ISU-MBA.

**College of Design**
The Department of Community and Regional Planning offers several undergraduate courses as part of an agreement with Iowa community colleges. The department also offers an off-campus master's program. For more information, call (515) 294-0220.

**2+2+2 Community and Regional Planning transfer program**
Statewide via the Iowa Communications Network (ICN) and DVD

The agreement offers a “two plus two plus two” plan, where you earn a two-year associate degree from a community college, take two Iowa State courses as a part of that community college curriculum, and then complete a bachelor’s degree in as little as two years after transferring to the ISU Department of Community and Regional Planning.

Community and regional planning is a professional field of study aimed at assessing the socio-economic and physical environments of communities and planning for their future. About two-thirds of ISU community and regional planning graduates work in local, state, or federal governments or for regional planning councils. An increasing number also pursue graduate studies in planning or related fields.

**Master of Community and Regional Planning**
Statewide via the Iowa Communications Network (ICN) and DVD

The off-campus program is designed to enhance the skills and broaden opportunities for working professionals in the field of planning. Complete a core curriculum and courses in an area of concentration. Concentration areas include transportation and land use planning, housing and social planning, community economic development, environmental planning and design. Students with an undergraduate degree in a field other than planning, but currently working in the field of planning, are encouraged to apply.

**College of Education**
The College of Education tries to identify needs of educators across the state and provide courses and programs to meet those needs.

**Certificate of Advanced Studies State of Iowa Superintendent Certification**
Statewide via the Iowa Communications Network

A post master’s curriculum of 30 credit hours provides training for the school superintendent license. The program emphasizes leadership skills; child and adolescent development; curriculum and instruction; school law and ethics; resource management; community relationships; and data-driven decision-making. Courses are scheduled on Friday evenings and Saturdays. For information, call (515) 294-4871.
Master of Education in Educational Leadership, emphasis in preparation for leadership
Statewide to selected Area Education Association sites
A master’s program of 36 credits, called PREparation for LEADership (PreLEAD) leads to licensing as a school administrator. Courses are structured to build leadership skills in organizational processes, scope and framework of schools, and interpersonal dimensions. PreLEAD students attend a two-year program of night and Saturday classes, or commit to three summers of intensive preparation. Students are paired with practicing administrators, experiencing firsthand the leadership roles for which they are training. For information, call (515) 294-4871.

Master of Education in Higher Education
On-site at Des Moines Area Community College (DMACC), Ankeny
The Teaching and Learning for Community Colleges (TL2C2) is for mid-career faculty who have a passion for providing teaching and learning leadership. TL2C2 helps community college faculty maximize their effectiveness as educators, as well as the students’ potential for learning. The 30 credit-hour program leads to a master’s degree in higher education with an emphasis in community colleges, or applies up to 30 credit hours towards a Ph.D. in the Educational Leadership and Policy Studies department. For information, call (515) 294-1241.

College of Engineering
ISU engineers have offered college credit courses via distance learning since 1969 when Iowa State University sent reel-to-reel tapes to industry sites. Today, courses for practicing engineers are delivered by more advanced technology methods. For more information, call (515) 294-4740 or (800) 854-1675 or send to ede@iastate.edu.

Certificate in Electric Power Systems
U.S. and Canada via videotape and streaming media and CD-ROM
The Department of Electrical and Computer Engineering debuted this graduate-level certificate program in fall 2002. The nine-credit certificate provides advanced information for power engineering specialists in government, private industry, and academia.

Certificate in Information Assurance
U.S. via videotape, streaming media, and National Technological University (NTU)
To increase technology proficiency and policy issues critical to the security of information infrastructure, Iowa State faculty developed a graduate certificate program for those who have a bachelor of science in computer science, computer engineering, or a closely related field. The program was launched in fall 2001. It is designed to meet the needs of information system security specialists in government, the private sector, and educational institutions. The certificate consists of four computer engineering courses.

Master of Engineering in Systems Engineering
U.S. and Canada via videotape and streaming media
The systems engineering program extends the ability of engineers to work across disciplinary boundaries. It also develops the management capabilities needed in today’s work environment. Engineers, regardless of undergraduate discipline, can develop the analytical abilities needed to design, evaluate, and build complex systems involving many components and demanding specifications. The degree is 30 semester-credit hours, including 27 credits of formal course work distributed among four broad groups: systems engineering core courses, elective engineering courses, area of specialization courses, and elective non-engineering courses. The final three credits are a creative component.

Master of Science in Computer Engineering
Master of Science in Electrical Engineering
U.S. and Canada to industry sites via videotape and streaming media
The College of Engineering at Iowa State University, in cooperation with the University of Iowa and local industries, offers two off-campus Master of Science programs. Each program totals 30 graduate credits; a thesis or non-thesis option may be selected. Areas of specialization within the program include communications and signal processing, computer systems architecture, electric power and energy systems, information systems security and networking, microelectronics and photonics, nondestructive evaluation and electromagnetics, software systems, systems and controls, and VLSI design.

Master of Science in Mechanical Engineering
U.S. and Canada to industry sites via CD-ROM and streaming media
The graduate program offers study in design and research in fluid mechanics, turbomachinery, fluid power, controls, heat transfer, machines and systems, materials and manufacturing processes, thermodynamics and energy utilization. Instrumentation, design of experiments, and computational methods may be applied to any of these areas. The program is 30 credits. It has a thesis and non-thesis option.

College of Family and Consumer Sciences
Many off-campus programs from Family and Consumer Sciences were originally developed to meet the needs of students in Iowa. Iowa State is now converting courses to online delivery and working with other universities in the Great Plains. For more information, call (515) 294-5982 or (877) 891-5349 or send to mfcsinfo@iastate.edu.

Master of Family and Consumer Sciences
Statewide via the Iowa Communications Network and online
Delivered off-campus since 1994, the non-thesis Master of Family and Consumer Sciences is designed for working professionals to enhance skills in a current position and increase chances for promotion. The comprehensive degree requires a minimum of 18-21 credits in two or more of the College of Family and Consumer Sciences departments. With electives, the degree program totals 36 credits.

Master of Family and Consumer Sciences with specialization in Family Planning
Certificate in Family Financial Planning
U.S. and Canada online
Financial planners are increasingly in demand as Americans seek advisors to help manage their income, assets, and debts. In response to this demand, Iowa State joined other universities to create interinstitutional programs. You seek admission from one of the participating institutions and take online courses from Iowa State and other universities. The program is 42 credits of set courses. Courses cover various disciplines including financial counseling, housing and real estate, retirement planning, and employee benefits. The program has no thesis component, but requires a practicum and capstone course that focuses on case studies. The graduate certificate is 18 credits of the master’s program. Graduates of the master’s and certificate programs are eligible to take the Certified Financial Planner™ exam.

Certificates in
— Dietetics Communication and Counseling
— Dietetics Management
— Advanced Medical Nutrition Therapy
Statewide via the Iowa Communications Network and online
The courses are designed for working professionals. Each certificate program is 11 credits. You may even start with a graduate certificate and then apply the courses to the Master of Family and Consumer Sciences degree with a dietetics specialization. Acquire both theoretical and applied knowledge in the certificate programs.
Expand and update your content knowledge with courses offered in a three-week summer resident setting and online fall and spring semesters. This new delivery method for a longstanding, prestigious graduate program was initiated in summer 2002. Either master’s program is a total of 30 credits.

College of Liberal Arts and Sciences
The political science, mathematics, and statistics departments offer graduate-level programs off-campus. The Bachelor of Liberal Studies degree is the only bachelor’s completion degree offered off-campus.

Bachelor of Liberal Studies
On-site at Des Moines Area Community College (DMACC), Ankeny and via distance learning deliveries
The Bachelor of Liberal Studies (BLS) is a general studies degree in the liberal arts. It provides the opportunity to earn a degree with the flexibility to choose courses based on your interest and goals. Instead of a traditional major, you select course work from three of the following five distribution areas: humanities, communications and arts, natural sciences and mathematical disciplines, social sciences, and professional fields.

The BLS degree is offered with similar requirements by all three Iowa regent universities, and provides a framework to assemble all the educational opportunities you may have locally available into a coherent four-year educational program. Up to three-fourths of the total degree requirements can be transferred from accredited institutions. For information, call (515) 294-4831.

Certificate of Public Management
Master of Public Administration
Statewide via the Iowa Communications Network and on-site in Des Moines
The programs are designed to prepare or improve the performance level of mid-career public managers and administrators in federal, state, and local government and in related areas of other organizations. Become skilled at conducting research and preparing thorough research summaries. Identify and address complex political questions, taking into account related ethical, legal, economic, and social issues.

The degree program is 37 credits including core and methods courses central to both the theory and practice of public management, a concentration area for specialization, and a creative component. Select from concentration areas of public management; public policy analysis; and public budgeting and finance. The 15-credit certificate program includes at least nine credits from core and methods courses. The remaining six credits are selected from a list of electives. For information, call (515) 294-7256.

Master of School Mathematics
Statewide via the Iowa Communications Network
The Master of School Mathematics program is designed for current secondary mathematics teachers. The degree program is built on three objectives: enhanced knowledge of algebra, geometry, calculus, statistics, and discrete mathematics; effective strategies for creating a student-centered classroom emphasizing problem solving; and computing technology in learning and teaching mathematics.

The program is 36 semester credits and includes a creative component. A Master of School Mathematics fulfills the 'master's degree in an area of endorsement' requirement listed under the certification rules for a professional teacher’s certificate. For information, call (515) 294-8169 or send to msm@math.iastate.edu.

Master of Science in Statistics
U.S. via videotape to employees of companies who sign a letter of agreement
The Department of Statistics offers courses and the degree option only to employees of companies who sign a letter of agreement. Students at these companies earn exactly the same degree as the students on campus and fulfill the same program requirements, including the written master’s exam, creative component, and a final oral exam.

In 1994, the statistics department signed an agreement with General Motors Corporation to deliver a Master of Science to GM employees. Since then, 3M, Mayo Clinic, Wells Fargo, and John Deere have signed agreements with Iowa State. For information, call (515) 294-3440 or send to statistics@iastate.edu.

Continuing Education Units
ISU Continuing Education awards Continuing Education Units (CEUs) for short courses, workshops, and other educational activities sponsored by Iowa State University, which do not carry academic credit. A given activity may award CEUs to some participants and academic credit to others, under the following policies:

1. The activity must be administered through Iowa State University Continuing Education.
2. The dual arrangement must have received prior approval by the department head or chair, upon recommendation of the course instructor, and the department curriculum committee.
3. Learners may enroll for either CEUs or for credit, but not for both.
4. Credit enrollees must meet the same academic standards they would have to meet if the course did not also award CEUs.
5. Assignments for credit students must be clearly articulated. Substantial sequential learning experiences and careful evaluation of outcomes are required for academic course credit; these standards will not be reduced to accommodate the participation of CEU learners. Whenever graduate credit is offered, course prerequisites will be enforced and not routinely waived.

Once CEUs have been awarded, Iowa State cannot and will not convert CEUs to academic credit. A student may switch from CEU to credit during an offering only at the discretion of the course instructor.
Tuition, Fees and Expenses

All fees, tuition, expenses, and policies listed in this publication are effective as of summer session 2003 and are subject to change without notice by Iowa State University and the Board of Regents, State of Iowa. Tuition and fees are based on credit load at 5:00 p.m. on the 16th day of class. This is the last day for adjustments downward in tuition and fee assessment.

For the most complete information see www.iastate.edu/~registrar/fees

Tuition

Enrollment is not complete until fees are paid. Tuition is charged at the per credit rate as given below. Maximum charges start at 12 credits for undergraduate and veterinary medicine students. Maximum charges start at 9 credits for graduate students.

Students who are not residents of Iowa pay a higher tuition rate each semester. Nondegree undergraduate students and noncollegiate students pay the same fees as undergraduates. Tuition and fees are assessed in accordance with regulations of the Board of Regents, State of Iowa. Information about these regulations are found in this catalog under Admissions and Registrar.

Fees

Following are the descriptions of several commonly assessed fees for Iowa State University students. The list is not inclusive. All fees are subject to change without notice.

Activity, Services, and Building Fee

All students will be charged a $161 activity and services fee per fall and spring semester, $80.50 per summer semester, except for students exclusively registered for the following: distance education courses; courses for which no tuition is assessed; continuous registration status courses; and high school students enrolled under the Post-Secondary Enrollment Options Act. Students who are exempt from the activity fee may elect to pay the fee, which allows them to pay student admission rates to concerts, lectures, debates, and athletic events.

An adjustment to the activity fee is applied according to the tuition adjustment schedule for students who withdraw or change to an exempt status as defined above.

Application: The application fee for undergraduates is $30, for graduate students is $20 and $50 for international students. This is a nonrefundable fee and must accompany the application for admission. This fee does not apply to special students or workshop applicants, and is subject to change without notice.

Camp: A special tuition rate is assessed to students participating in camp programs. The undergraduate assessment is $181 per credit and the graduate rate is $280 per credit. Summer camp programs entitled to the special rate are Anthropology and Geology. Students will be charged other fees in addition to tuition for enrolling in these programs. To obtain total fee information, students should contact the director of the individual program.

Change of Schedule: Starting the sixth day of classes an $8 fee is charged for course drops, additions, and section changes. One fee is assessed for multiple changes processed at the same time for the same term.

Computer: All students will be charged a computer fee each semester. Full-time students enrolled in the College of Engineering (including Biomedical Engineering and Systems Engineering) are charged $202 per semester. Full-time students in the Department of Computer Sciences or undergraduates in the major of Management Information Systems are charged $161 per semester. All other full-time undergraduate students are charged the standard computer fee of $94 per semester. Full-time graduate students are charged a $75 per semester computer fee. Students enrolled less than full-time are assessed prorated computer fees according to the number of credits for which they are enrolled. For students who withdraw, the adjustment schedule for tuition will also be used for computer fees. Students enrolled exclusively in any one of the following categories will not be assessed computer fees: high school students enrolled under the Postsecondary Enrollment Options Act, or courses for which no tuition is assessed.

The credit adjustment schedule for reduction from a full load to light classification is 100 percent through the third week, with no refunds after the third week.

Students who change their major will be charged the full computer fee for the major into which they transfer if the change occurs before the end of the third week. If the change occurs after the third week, then no change in the computer fee assessment will occur.

Continuing Education and Communication Services (CECS): Undergraduate students pay $181 per credit with a maximum charge of $2,171; graduate students pay $280 per credit, with a maximum of $2,519. Students enrolled in MBA courses pay $318 per credit with a maximum of $2,960. (MBA fees based upon the 2002-2003 academic year and are subject to change.) Nonresident students who enroll in a combination of on- and off-campus courses are assessed the nonresident rate for all credits. The tuition applies to both credit and audit enrollments.

Registration Fee Schedule Per Semester

<table>
<thead>
<tr>
<th></th>
<th>Resident</th>
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<tbody>
<tr>
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<td>(9 or more credits)</td>
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<td>Veterinary Medicine</td>
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<tr>
<td>(12 or more credits,</td>
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<tr>
<td>entered prior to Fall</td>
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<tr>
<td>2002)</td>
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<td>Veterinary Medicine</td>
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<tr>
<td>(12 or more credits,</td>
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<tr>
<td>entered Fall 2002 or</td>
<td></td>
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<tr>
<td>later)</td>
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</tbody>
</table>

For students enrolled for less than a full course load see the Fee Schedule Per Credit list on the following page of this catalog.

Most students are assessed a minimum 2-credit fee.

Additional information:
- Saturday MBA and Des Moines MBA classes: assessed the graduate rate plus $74 per credit supplemental tuition fee (supplemental tuition fee subject to change without notice).
- Audits and zero credit courses: assessed according to contact hours; maximum charge for zero credit courses is three credit hours.
- R credits: assessed for the minimum fee only if no other credits are taken.
- Continuous registration fee for graduate students: $70.
- Partial credits (.5): assessed on the next larger whole number of credits, e.g., 6.5 credits is assessed as 7 credits.
- Summer session: based on per credit as indicated in the fee schedule.
- Tuition assessment for study abroad credits: up to a maximum of 12 credits, is above and beyond tuition for other courses taken during the same term.
Developemental Mathematics: Students enrolled in Math 10-30 courses will be charged $362. This is a separate fee which is charged in addition to other fees and tuition. Students will be charged the developmental math fee each term they are enrolled in a Math 10-30 course.

Graduation Fee: Undergraduate and graduate students are charged a $20 graduation fee the term they receive their degree.

Health Facility: All students are charged an $8 Health Facility Fee each semester except for students exclusively registered for the following: distance education courses; courses for which no tuition is assessed; continuous registration status courses; and high school students enrolled under the Postsecondary Enrollment Options Act. For students who withdraw or change to an exempt status as defined above, the refund schedule for tuition will be used for the health facility fee. These exceptions do not apply to international students (except where noted) or graduate students on “C Base” assistantships.

Health Fee (Student Health): An $80 student health fee, which partially finances the services of the Thielin Student Health Center, is charged to all students each semester. This fee is not assessed to students enrolled for four credits or less or students exclusively registered for the following: distance education courses; courses for which no tuition is assessed; continuous registration status courses; weekend MBA courses; Lakeside Laboratory courses; and high school students enrolled under the Postsecondary Enrollment Options Act. (These exemptions do not apply to international students (except where noted) or graduate students on “C Base” assistantships.) Students who are exempt from the health fee may participate in the Health Plus Plan.

Students who withdraw or change to an exempt status as defined above will receive a credit adjustment of 100 percent during the first three weeks, with no credit adjustment after the third week. Students who add courses at any time during the semester will be assessed the student health fee if applicable according to the guidelines stated above.

Students who carry the ISU sponsored insurance must also be assessed the student health fee. If spouse or domestic partner is covered under the insurance plan, the spouse (domestic partner) must also be covered under the Health Plus Plan.

Health Insurance: All international students and their accompanying dependents must enroll in the ISU Student and Scholar Health Insurance Program. ISU requires nonimmigrant international students and their dependents to purchase and maintain coverage through the ISU health insurance plan for the duration of their tenure at the university. Insurance plans purchased outside the university may be used for supplemental coverage, but cannot be substituted for the ISU plan. Students not assessed the mandatory Student Health Fee and spouses of students are eligible to participate in the Health Plus Plan. Contact the Student Health Insurance Office at 515-294-4820 for more information.

Late Fee Payment: If payment of the minimum due is not made by the deadline printed on the billing statement, all fees become due immediately. A one-percent finance charge will be assessed on the total amount due at that time. These students will also have a hold placed on their registration until payment of the total amount due has been made.

Late Registration: Undergraduate students who do not complete their registration before the first day of classes are charged a $20 late registration fee. Graduate students who do not complete their registration before the first day of classes are charged a late registration fee of $20 during the first week of classes, $50 the second week of classes, and $100 the third week of classes or anytime later.

New Student Programs: A nonrefundable fee of $131 is assessed to all new degree-seeking undergraduates (including new direct from high school and new transfer students). The fee covers full costs associated with orientation and Destination Iowa State programming, including publications, mailings, programming, and student assistants who provide services to students and their families during orientation and Destination Iowa State.

Private Music Instruction: The音乐 fee is charged to students receiving private music instruction and is in addition to regular tuition. The fee offsets the costs of one-on-one instruction. One credit of instruction is $90; while the fee for 2 credits is $130.

Senior: A $2 fee covers the cost of special senior activities. This fee is optional and is assessed spring term only.

Special Course Fees: Some courses have expenses above the cost of tuition that enhance the instruction. These fees may cover the cost of field trips, use of equipment, materials or supplies, or professional support. Applicable special course fees are listed with the specific course in the Schedule of Classes available at www.adp.iastate.edu/cgi-bin/class. Special course fees also appear on each student’s schedule detail available on AccessPlus.

### Effective Summer 2003, Fall 2003 & Spring 2004 Fee Schedule Per Credit

<table>
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<tr>
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<td>12131</td>
<td>4925</td>
<td>13181</td>
</tr>
</tbody>
</table>

*Resident rate charged for 4 credits or less for Fall, Spring and Summer Semesters
Sponsored International Student: This fee is assessed to the sponsor of international students as a way to compensate for the special record keeping, billing requirements, correspondence, and the deferred payment option extended to sponsoring agencies. The current fee will be 5 percent of the total tuition charge billed the sponsor. In succeeding years, the fee may be raised after 90 days advance notice to the sponsoring agency.

Study Abroad: Tuition assessment for study abroad credits, up to a maximum of 12 credits, is above and beyond tuition for other courses taken during the same term.

Transcript: Students may obtain an official transcript of their student academic record for $7. An additional $2 service charge for each transcript is assessed for same day service.

Workshops: The fee for one-credit workshops, with no other course enrollments, is $181 for undergraduate students and $280 for graduate students.

Catalog $5
Diploma Replacement $20
Identification Card Replacement $20
Returned Check Charge/Returned Direct Debit $20
Masters Thesis $15
Ph.D. Thesis $70

Fee Payment
The Receivables Office bills students for tuition, room and board, and various other university charges. A statement of charges will be mailed to the first of each month to students at their in-session or interim address. It is the student’s responsibility to ensure the Office of the Registrar has a correct mailing address. The billing statement is also available on the student’s account on AccessPlus on the first of each month. Students may pay their university bill by direct debit through AccessPlus.

Students who do not receive a billing statement before the term begins and are unable to use AccessPlus to view their bill, should contact the Receivables Office to learn the amount of their account balance due. Failure to receive a billing statement or view their account on AccessPlus will not exempt students from late penalties or from having a hold placed on their registration.

If payment of the minimum due is not made by the deadline printed on the billing statement, all fees become due immediately. A one-percent finance charge will be assessed on the total amount due at that time, and a “hold” will be placed on the student’s registration until payment of the total amount due has been made.

If a student’s registration has been canceled for nonpayment of fees, he or she may be reinstated with written permission from their college.

Deferred Payment
Students who do not pay their first payment in full by the due date will automatically select the deferred option, and will be charged a $20 administrative fee. Summer fees may be deferred for a $15 administrative fee.

University fees are payable in three installments for fall and spring semesters. Payments for fall semester will be due August 20, September 20, and October 20. Payments for spring semester will be due January 20, February 20, and March 20. Summer fees may be due May 20, June 20 and July 20. If any of the payment dates fall on a holiday, Saturday or Sunday, the payment is due the next day the university is open for business.

Twelve-Month Payment Plan
Under the Twelve-Month Payment Plan, students pay the academic costs for fall and spring semesters in 12 installments beginning April 20 and ending the following March 20. A $50 enrollment fee is due with the first monthly payment. All payments are deducted from the student’s designated bank account. For more information about the Twelve-Month Payment Plan, contact the Receivables Office.

Past Due Accounts
Students with past due accounts receivable charges prior to the beginning of classes will be dropped from enrollment if these past due accounts are not paid before the first day of classes.

Refunds
Refunds are available for students who cancel or withdraw their registration within the appropriate time period. To cancel their registration, students must notify the Office of the Registrar before the first day of classes to avoid tuition assessment. Beginning on the first day of classes, it will be necessary for students to formally withdraw from the university to terminate their registration. More information about canceling registration and withdrawing from classes can be found at www.iastate.edu/~registrar/registration/registration.cfm

Tuition adjustments for all students are made for withdrawals of registration according to the following schedule:

<table>
<thead>
<tr>
<th>Student Pays</th>
<th>Withdrawal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>Before first day of classes</td>
</tr>
<tr>
<td>10%</td>
<td>During class days 1-8</td>
</tr>
<tr>
<td>50%</td>
<td>During class days 9-20</td>
</tr>
<tr>
<td>75%</td>
<td>During class days 21-40</td>
</tr>
<tr>
<td>100%</td>
<td>After the fortieth day of classes</td>
</tr>
</tbody>
</table>

Students who wish to appeal tuition and fee assessment for withdrawals should contact the fees section of the Office of the Registrar. Decisions of the Office of the Registrar will be based on the existence of extenuating circumstances beyond the control of the student.

Students who wish to appeal the decision of the Office of the Registrar must do so in writing within 10 calendar days after receiving the decision. Such appeals will then be reviewed by the Tuition Appeals Review Committee. Students who wish to appeal the decision of the Tuition Appeals Review Committee may make a request to do so in writing to the Office of the Provost.

Fee refund for students who drop into light classification (less than full-time): 100 percent if change is made during first three weeks. No adjustment is made after the third week.

Appropriate prorated adjustments in the refund schedule are made when partial term courses are involved.

Workshop and Short Courses Refunds: Students who drop workshops or short courses of one or two weeks on or before the first class meeting receive a 100% tuition adjustment for the course. No tuition adjustment will be made after the first day of classes. Students who drop three-week courses receive a 100% adjustment if they drop on or before the first day of classes; a 90% adjustment if they drop on the second day of classes, and no adjustment after the second day of classes.
The Office of Student Financial Aid staff helps families afford Iowa State University. Grants, scholarships, loans, and part-time employment opportunities are available in various combinations to pay the difference between the amount the student and his or her parents can reasonably be expected to provide and the cost of attending Iowa State University.

All state and federal aid programs are subject to review by their respective governing agencies and may be changed without notice.

Eligibility for many forms of financial aid is determined by the Free Application for Federal Student Aid (FAFSA). These applications are available from high schools or online at www.fafsa.ed.gov by November of each year. Students should submit the FAFSA by mid-February prior to the fall term of enrollment, in order to receive priority consideration. A new application must be completed each academic year. Applications must be received no later than March 1. Applications received after March 1 will be awarded as funds are available. New students enrolling spring semester or summer session should complete the current year’s aid application to apply for any available financial aid. To be eligible for financial aid, a student must be a U.S. citizen or permanent resident, enrolled on at least a half-time basis, and making satisfactory academic progress toward a degree. If signed copies of the student’s and parents’ income tax returns are requested, they should be sent directly to the Office of Student Financial Aid.

Students may use their financial aid for study in other countries if they have clearance for the transfer of credit to their degree programs and have made financial aid arrangements prior to departure. For further information, contact the Study Abroad Center, 256 Memorial Union, or the Office of Student Financial Aid, 210 Beardshea Hall.

Financial aid programs generally consist of three types: gift aid (scholarships and grants), loans, and part-time employment. Laws, regulations, and policies governing these programs are subject to change.

I. Gift Aid

A. Scholarships

1. ISU Scholarship/Grants. These awards are based on financial aid eligibility as determined by the FAFSA. A student must complete the FAFSA to be considered. Many of these awards are based on academic or other special talent in addition to financial eligibility.

2. Entering freshman can obtain information on the Web at www.iastate.edu/~fin aid info.

3. College and Departmental Scholarships. Students are encouraged to contact the scholarship chair in their department or college. Scholarships based on academic achievement and/or financial need are available in most areas of study, but students may need to complete separate applications to be considered.

4. Military Officer Education (ROTC) Scholarships: Army. The Military Science Department offers 4-, 3-, and 2-year Army ROTC scholarships to qualified students on a competitive basis in virtually any academic discipline. These scholarships provide payment of tuition, all required fees (except student health), books and supplies allowance, and a monthly cash subsistence allowance. For applications or additional information, contact the Military Science Department at 132 Armory or call 515-294-1852.

Navy. The Naval Science Department offers several scholarship programs to qualified students. The scholarships cover payment of tuition, fees, books, and a monthly stipend. Information is available from the Naval Science Department, 3 Armory, or by calling 515-294-6050.

Air Force. The Air Force offers Air Force ROTC scholarships for periods of 2, 3, or 4 years, with up to 1 additional year for qualified applicants in selected majors. The scholarships provide payment of tuition and fees. In addition, scholarship cadets receive between $2,500-$4,000 monthly subsistence allowance and $510 per year book allowance. Express scholarships are also available to students qualified in certain technical academic majors. Details on scholarship qualification, application procedures, and eligibility are available from the Department of Air Force Aerospace Studies, 515-294-1716.

5. Other Scholarship Sources: Students are encouraged to pursue funds from agencies and private organizations on campus and in their hometowns. An excellent resource is the Financial Aid Web site: www.iastate.edu/~fin aid info.

B. Grants

1. Federal Pell Grant. The maximum annual award under this program is $4,000. All undergraduate applicants for financial aid must apply for the Federal Pell Grant by completing the FAFSA. These forms are available from high school counselors, the Office of Student Financial Aid, or online at www.iastate.edu/~fin aid info.

2. Federal Supplemental Educational Opportunity Grant. An eligible undergraduate student may be awarded a grant of $100 to $4,000 on the basis of financial need. A student must complete the FAFSA in order to be considered.

3. Iowa Grant. Iowa residents demonstrating financial need may be eligible for a $1,000 Iowa Grant. Students must complete the FAFSA to be considered.

4. Officer Education (ROTC) Financial Assistance Grants. All students enrolled in Advanced ROTC (third and fourth years) in the Army, Navy, and Air Force programs are provided a monthly stipend. For further information, contact the appropriate ROTC department in the Armory.

5. Tuition Assistance Grant for Undergraduate Foreign Students. Undergraduate foreign students who are faced with financial hardship resulting from unforeseen circumstances may apply for this grant. The maximum award is $700 per academic year. Apply to the Office of International Education Services, 252 Memorial Union.

6. International Student Financial Aid. International students may contribute a small voluntary fee to this fund. These monies will be used to assist international students who have unforeseen financial emergencies. For further information, contact the Office of International Education Services, 252 Memorial Union.

II. Loans

A. Federal Perkins Loan. An eligible undergraduate student may borrow up to $4,000 per year, depending on financial need and the availability of funds. A maximum total of $40,000 may be borrowed for undergraduate and graduate programs combined. Interest of 5 percent on the unpaid balance begins with repayment of the loan principal 9 months after ceasing at least half-time enrollment. A student must complete the FAFSA in order to be considered for a Federal Perkins loan.

B. University Long-Term Loans (ULTL). Private donors contribute the funds for these loans, which are awarded on the basis of need to undergraduate and graduate students. The interest rate of 5 percent begins with repayment of principal 6 months after ceasing at least half-time enrollment. Deferment provisions are available in some instances. A student must complete the FAFSA in order to be considered.

C. Federal Health Professions Loans and Scholarships. These programs are limited to those students accepted for enrollment in the College of Veterinary Medicine. The loan funds have a 5 percent interest rate. Deferment and cancellation provisions are available in some instances. The FAFSA is required, and parental information must be provided, regardless of age or dependency of the student.

D. University Emergency Loans. The Emergency Loan Program is intended to meet students’ unplanned and unexpected education-related expenses. These loans are not available to students who are enrolled only in off-campus courses. Applicants must demonstrate that they have a verifiable means by which to repay their loans by the due date. Interest on emergency loans will begin on the
date the loan is processed in the Treasurer’s Office and is computed at the simple monthly rate of .75 percent of the unpaid balance (an annual percentage rate of 9 percent). Emergency loan applications can be obtained at the Office of Student Financial Aid, Room 0210, Beardshear Hall. Students should allow 48 hours for processing the emergency loan application.

E. William D. Ford Federal Direct Loans. Several types of Federal Direct loans are available to students.

1. The Federal Direct Subsidized Stafford Loan and the Federal Direct Unsubsidized Stafford Loan are low-interest loans made by the government to help pay for education after high school. Subsidized Direct Stafford loans will have all interest charges paid by the federal government while the student is enrolled in school on at least a half-time basis. The interest on the unsubsidized Direct Stafford loan will be the responsibility of the student and can be paid while the student is in school or added to the outstanding loan balance for payment after graduation.

All students are strongly advised to discuss their loan indebtedness with a financial aid adviser before combining several types of loans.

2. Federal Direct Unsubsidized Stafford Loan for Independent Students. To be eligible, a student must be either an independent undergraduate student or a graduate/professional student. Completion of a FAFSA form is required. Eligible freshman and sophomore students may borrow up to $5,500 per year, with a $23,000 undergraduate maximum for all years combined. Graduate students may be eligible for up to $12,500 per year, with a $65,500 maximum, including all undergraduate loans.

For new borrowers, the interest rate is a variable rate which is tied to the 91-day treasury bill plus 1.7 percent. The interest rate is fixed annually and is capped at 8.25 percent. Repayment does not begin until six months after graduation. Students are strongly advised to counsel with a financial aid adviser as increased loan indebtedness occurs.

3. Federal Direct PLUS Loan. The interest rate for Federal Direct Parent Loans for Undergraduate Students (PLUS) is tied to the 91-day treasury bill rate plus 3.1 percent, with maximum interest being 9 percent. Through the Federal Direct PLUS program, parents may borrow the entire cost of education, less the amount of any financial aid the student is receiving. There is no limit on loan indebtedness, although a credit analysis will be conducted before funds can be disbursed.

F. Alternative Loans. Private financial institutions provide these loan funds, which are approved on the basis of a credit analysis. Amounts, interest rates, and repayment terms will vary, depending upon the financial institution selected. Interest will begin to accumulate immediately, although forbearance of the interest and principal can be made until after graduation. Some programs will require the student to obtain a creditworthy cosigner. A FAFSA form is not required to apply for this loan.

III. Part-time Employment
A variety of employment opportunities are available for students to earn a portion of their educational expenses.

A. Federal Cooperative Education Program. This program combines classroom learning with paid work experience designed to develop students into the federal government’s future professionals and managers. The federal government seeks highly motivated, flexible, and creative students to fill co-op assignments across the country in laboratories, offices, forests, parks, hospitals, and in ocean and space programs in a wide variety of occupational fields. There are two different types of work schedules: alternate periods of work and study (full-time student one semester and full-time worker the next) or part-time (parallel periods of work and study). Students interested in the Federal Cooperative Education Program can contact the director of ISU Career Planning and Placement Services by calling 515-294-9490.

B. Internship Programs. Most college departments offer internship programs to enhance the student’s education and career preparation by integrating classroom theory with on-the-job performance. These programs enable students to test career and professional goals; develop confidence, maturity, and work-related skills; and establish professional contacts and interests. Contact the respective department for specific program information.

C. Work-Study Programs. Both federal and state funds subsidize need-based programs that permit students to be employed on campus or off campus in nonprofit agencies. A portion of the student’s total earnings is paid by federal, state, or institutional funds, and the remainder is paid by the employing department. Students apply for Work-Study by completing a FAFSA by the priority deadline, and indicating that they wish to work. Part-time job listings are available at the following URL: www.iastate.edu/~fin_aid_info/Employment.

D. University Student Employment. University employment is available to all students who are U.S. citizens or to those international students who have obtained a work permit. Wages are paid 100 percent by the employing department. Many students who live in university residence halls apply for work in the residence hall food service to help meet the cost of room and board. Students interested in food service employment may apply directly to the assistant director of residence in charge of food service, Residence Department, Friley Hall, Iowa State University, Ames, Iowa 50012. Part-time job listings are available at the following URL: www.iastate.edu/~fin_aid_info/Employment.

E. Off-Campus Employment. The off-campus employment program seeks part-time employment opportunities for students who would like to work while they are in school. Restaurants, hotels, service stations, and retail stores are examples of local employers that list positions with the Student Employment Center. These jobs are available to any ISU student, graduate or undergraduate, regardless of financial need. Job listings can be found at www.iastate.edu/~fin_aid_info/Employment.

IV. Other Financial Aid
Many other forms of financial aid are available to students who qualify, including Vocational Rehabilitation, Veterans Benefits, and Department of Human Services programs. For further information on these programs, contact the appropriate government office.
**Student Housing and Dining**

**Director of Residence:** Randy Alexander

**Director of ISU Dining:** Jonathan Lewis

**Associate Directors:** Virginia Arthur, (Residence Life); Darryl Knight (Facilities Operations); Gregory Lee (Administrative Services); Carol Petersen (Residential Dining); Karen Larson (Catering)

**Assistant Directors:** James Judy (Facilities Planning); Doug Gruenewald, (Academic Services)

The university provides residence hall housing facilities for more than 7000 single undergraduate students. In addition, more than 1,000 apartments are available on campus for families and for single students.

Each student who accepts his or her admission to the university will receive a housing contract. Priority for housing for new students is based upon the date on which housing contracts and the accompanying $135 prepayment are received in the Department of Residence Administrative Office. Acceptance of admission to the university is necessary before a housing contract will be accepted.

Address correspondence concerning on-campus housing and dining to the Administrative Office, Department of Residence, 2419 Friley Hall, Iowa State University, Ames, Iowa 50012. E-mail: halls@iastate.edu (residence halls), dining@iastate.edu (dining), frederiksenCourt@iastate.edu (Frederiksen Court apartments) or apartments@iastate.edu (University Family Housing), or phone toll free: (800) 854-9050. Additional information may be obtained at www.iastate.edu/dor.

**Undergraduate Residence Halls**

Most of the rooms in residence halls are planned for double occupancy; however, some rooms accommodate three persons. In addition, a limited number of single rooms are available. All rooms are furnished with extra-long twin beds, inner-spring mattresses, chests of drawers, individual study desks, chairs, cable television connections, and Ethernet connectivity. Students provide their own bed linens, throw rugs, blankets, pillows, towels, and study lamps (except in Maple, Willow, and Larch Halls, where study lamps are furnished). Students are responsible for maintaining the cleanliness and order of their own rooms.

Home-style meals are provided for all residents in the halls. Students living off-campus may also purchase a meal plan by visiting the Administrative Office at 2419 Friley Hall. Dining Dollar$s are part of the meal plan and can be used at any residence C-store, Hawthorn Market & Cafe, or for additional meals or services at any residence dining facility.

A single student who resides in an under-graduate residence hall must sign a contract for room and board for the academic year or the remainder thereof, if contract is signed after fall semester begins. All charges are subject to change. The rate for the academic year 2002-03 was $5,020 for a basic double occupancy room and full meal plan.

Students may move out of the residence halls at any time during the academic year upon payment of room and board for the term of occupancy plus forfeiture of the prepayment and a charge of 20 percent of the remainder of the contract if the student remains enrolled. For additional information concerning the residence hall contract, students should contact the Administrative Office (2419 Friley Hall) before making the final decision.

In addition to the basic necessities, several special services are available for use by residents. These include house dens for informal get-togethers and relaxation, lounge areas for meeting and entertaining guests, vending areas for snacks, hall desks with fax and copy machines, entertainment and recreational equipment, mail delivery and check-in and check-out location within the residence halls, indoor and outdoor recreation areas and intramural equipment owned by student government, fitness centers, laundry facilities in each hall, special study areas in each complex, private dining rooms for specially-prepared house and organization dinners, meeting rooms and offices for student organizations, computer labs, and parking lots assigned to the residence halls.

The residence halls are organized geographically into three neighborhoods: Towers, Richardson Court, and Union Drive. The students in each of these neighborhoods elect a group of executive officers to be responsible for coordinating neighborhood events and activities. Each neighborhood funds and maintains a social program, an intramural program, and numerous committees that supplement the total social and educational development of the individual residents. The three neighborhoods, in addition to having their own individual student governments, also are joined in an Inter-Residence Hall Association (IRHA) with an all-residence hall parliament; they jointly sponsor the KURE FM stereo radio station, Residence Hall Week, weekly movies, scholarships, leadership conferences, and more.

Each neighborhood is further organized into smaller living groups called houses. These houses of 40 to 60 members are the foundation of Iowa State University’s residence hall program. Members of the houses elect their own officers, and the majority of programs is planned on a house participation basis. Participation in the house program is a great way for students to receive full benefit from the residence hall experience.

Students may choose to live in coed houses. These houses have male and female students living at opposite ends of the house or on separate levels of the house. They have separate bathroom facilities, but share lounge facilities and house activities.

Learning communities, which bring together students who have similar academic goals, are also available in the residence halls. These communities offer a collaborative living and learning environment, increased student/faculty interaction, social and academic networks essential to student success, and a sense of membership in the ISU community.

Currently, the following learning communities are available: ACES (Agriculture Community Encourages Success); ABE (Agricultural and Biosystems Engineering); Animal Ecology; BEST (Biology Education Success Team); BLT (Business Learning Teams); CCLC (Cross-Cultural Learning Community); Common Threads (Textiles and Clothing); Computer Engineering Learning Teams (CELTS); Computer Science; Design Exchange; FSHN (Food Science and Human Nutrition); Honors; HDFS (Human Development and Family Studies); LEAD (Leadership Through Engineering Diversity); MLC (Multicultural Learning Community); and WiSE (Women in Science and Engineering). A leadership-themed house is also available. For the most up-to-date information on learning community opportunities at Iowa State, see www.iastate.edu/~learncommunity/.

**Undergraduate and Graduate Single Student Apartments**

Frederiksen Court is one of the newest communities at Iowa State, providing on-campus apartments to single graduate and upper-class undergraduate students. The apartments include such amenities as central air-conditioning, living room and bedroom furniture, microwave, dishwasher, and garbage disposal, as well as a washer and dryer in each apartment. The Frederiksen Court Community Center is the center of activity at Frederiksen Court. It features meeting rooms and lounge space, a fitness center for residents, office equipment for resident use, and a retail dining facility at Hawthorn Market and Cafe. Hawthorn Market & Cafe offers hot meals, snacks, beverages, and convenience items.

The apartments, which are available in two- and four-bedroom layouts, accommodate four persons of the same gender. Rent for academic year 2002-03 was $3,229 for a two-bedroom and $3,826 for a four-bedroom. Rent includes electricity, water, garbage pickup, basic phone service, basic extended cable, and Ethernet, and rent is conveniently paid as part of the resident’s university bill.
University Family Housing
The university provides 760 apartments in University Village and Schilletter Village. The 2002-03 academic year rates for these apartments were $431-492 per month for University Village, and $462-509 per month for Schilletter Village. The apartments are furnished with stove and refrigerator, and central air conditioning units are included in the University Village apartments. Rental rates include cable television, high-speed Internet connectivity, water, and garbage removal service. Residents pay for their own gas, electricity, and telephone.

To be eligible for a University Family Housing apartment, residents must be registered for classes during the semester of move-in.

A number of University Village apartments also are available to single students. Single students must be either a graduate student or at least 23 years of age.

Off-campus Housing for Students
Availability and cost are factors to be considered when living off campus. Sleeping rooms in older houses, apartments, and duplexes make up the bulk of off-campus housing.

The Off Campus & Adult Student Services, B6 Memorial Union, keeps a listing of off-campus rental units. Other housing may be obtained through real estate agents, local newspapers, or by contacting individual owners.

It is best that the student come to Ames well in advance of the time he or she plans to begin academic work, as many units are rented 3 to 6 months in advance. The single occupancy room rental rates average $200 to $500 per month. Average rental rate per student sharing an apartment or house would be in the $250 to $400 range per month. Board for students living in off-campus rooms may be obtained in residence hall dining rooms, private restaurants, or the Memorial Union.

A meal plan is available in the Department of Residence to off-campus students that provides any one meal per day, Monday through Friday, while classes are in session. Information may be obtained from the Administrative Office, Department of Residence, 1215 Friley Hall, Iowa State University, Ames, Iowa 50012-0003.

Fraternities and Sororities
Of the 51 fraternity and sorority chapters on the Iowa State University campus, 43 have chapter houses, and provide housing for about 1,800 undergraduate students. The seven historically Black Greek fraternities and sororities do not provide residential facilities for members, but are active in scholastic, service, and social projects.

The chapter house facilities are similar to a private residence: living room, den, kitchen, dining room, laundry room, etc. The staff in the Office of Greek Affairs, a department in the Dean of Students Office, provide advising, programs, and services for the Greek chapters and organizations. Local alumni work with each fraternity and sorority to ensure that the chapter structure meets all the state and local building, safety, and fire codes that are required with incorporation under the State Law of Iowa.

The average cost of living in a fraternity or sorority chapter house ranges from $300 less to $300 more per year than living in the residence halls, or an off-campus apartment. The cost includes room, board, and social dues. Fees average $50 for a pledging fee and $150 for the initiation fee.

Men may move directly into a fraternity house at the beginning of an academic year if they pledge a chapter that has a house. Typically, they continue living there throughout their college years. Women pledging a sorority during formal recruitment or informally throughout the year generally live in the residence halls for the academic year. However, as space becomes available in a chapter house, sorority members often move into the house as sophomores or upper-class women.

If a student moves into a chapter house from the residence halls and has to break a contract, the student will forfeit the deposit and owe a percentage of the cost of the contract. Most of the chapters compensate a student to a degree. Because the compensation amount differs among houses, a student should communicate with the chapter before changing residences.
The University Library

Dean of Library Services: Olivia M.A. Madison, M.L.A.

General Information--(515)-294-3642
Library Hours--(515)-294-4849

The University Library provides a wide array of print, non-print, and electronic information resources, which are housed in the main Parks Library, the e-Library, the Veterinary Medical Library, and four subject-oriented reading rooms (design, economics and sociology, mathematics, and physical sciences). The library's extensive collections support research and study for all ISU graduate programs, with the strongest support at the Ph.D. level. These collections are nationally recognized for their strengths in basic and applied fields of biological and physical sciences. Library holdings include more than 2,300,000 volumes and approximately 20,000 serial subscriptions. The library encourages use of its collections and many services, and assistance is provided at eight public service desks. These desks include the Reference Desk, Reserve and Media Services, Interlibrary Loan/Document Delivery, the Circulation Desk, the Periodical and Newspaper Room, the Microforms Center, Special Collections, and the Map Room. In addition, instruction in the use of library resources is offered to graduate and undergraduate students.

The library's e-Library, accessed through the Internet, provides access to the local online catalog; indexing and abstracting databases; electronic journals and books; and selected Internet sites. Assistance in using this vast body of electronic resources is available at the Reference Desk and through individually arranged appointments with reference librarians.

The Parks Library has a limited number of semiprivate study rooms available for faculty, graduate students and professional and scientific staff. They are intended for research and other scholarly activities that require extensive use of library material. Normally, assignments are made for a semester at a time.

Student Counseling Service

Director: Terry Mason, Ph.D.
Associate Director: Michelle P Clark, Ph.D.


The Student Counseling Service (SCS) assists students in enhancing their academic and personal well-being with a staff of professional psychologists and counselors. Services are available to help students sort through their feelings, strengths, and options to develop new perspectives and coping skills.

Available services include individual counseling, relationship/couples counseling, career counseling and exploration, substance abuse assessment, and learning disabilities screening. Group counseling is also available for a variety of issues including adult children of alcoholics, depression, eating disorders, self-esteem and relationships, problem solving, and relaxation/stress management. SCS also offers a number of outreach programs and workshops.

Counseling services are offered at no cost to ISU students. However, a nominal fee for testing may be required. Counseling is strictly confidential. SCS staff will not release any information to anyone outside of the Student Counseling Service without the written permission of the client, unless an imminent harm condition exists.

In addition to providing counseling and outreach services to students, SCS provides training and consultation to faculty and staff to assist them in addressing the psychological needs of students.

SCS hours are Monday through Friday 8 a.m.-5 p.m. The Student Counseling Service phone number is 515-294-5056.

Thielen Student Health Center

Physicians: Mark Blaedel, M.D.; Charlotte Cleavenger, D. O.; Robin Engstrom, M.D.; Rebecca Fritzsche, M.D.; Mallar Gore, M.D.; Pauline Miller, M.D.; Cosette Scallon, M.D.; Marc Shulman, M.D.; Lee Wilkins, M.D.

Thielen Student Health Center is located on the corner of Sheldon Avenue and Union Drive, just west of Beyer Hall. Services include doctor and nurse consultations, physical exams, laboratory and x-ray services, sports medicine and physical therapy, immunizations, pharmacy, diet and nutrition consultation, fitness consultation, computerized health risk appraisal, stress management, wellness assessment, workshops, free and confidential HIV testing, and referral services.

The student health fee partially finances the services of the Thielen Student Health Center and is charged to all students taking 5 or more credits each semester. Those taking 4 or fewer credits may access services at reduced cost by paying the health fee. Spouses/domestic partners of students who opt to pay the health fee also have access to services. Students with less than 5 credits who elect not to pay the health fee may still be seen at the Thielen Student Health Center, but will be charged for the services provided. International students and their spouses/domestic partners are required to participate and pay the health fee.

The health fee is not a substitute for health insurance. It is a prepayment plan that complements the student's individual insurance coverage.

Clinic hours:
Monday and Tuesday, 8 a.m.-8 p.m.
Wednesday, 9 a.m.-6 p.m.
Thursday and Friday, 8 a.m.-6 p.m.
Saturday, 8 a.m.-12 noon.

Hours vary during breaks. Patients are seen by appointment. Each patient has the option of seeing the provider he/she requests.

The Thielen Student Health Center operates on an appointment/assessment system. Students are encouraged to call ahead for an appointment. For urgent medical needs, no appointment is needed to come to the clinic. Those students will be assessed by a staff nurse to determine whether they need to see a physician immediately, or if they should make an appointment for later in the day. Students with urgent medical needs will see a physician right away. Those with less urgent needs will see a physician at a later time. For more information, call 515-294-5801.
Service is available for emergency problems after regular clinic hours at Mary Greeley Medical Center Emergency Room. The cost is the responsibility of the student and/or the student’s insurance plan. All records are confidential. Student records are not available without the student’s written permission.

**Career Services Offices**

Director: Beverly S. Madden, M.S., 0570 Beardshear Hall  
Agriculture: Michael Gaul, M.S., 141 Curtiss Hall  
Business: Steven Kravinsky, M.S., 208 Carver Hall  
Design: Margaret Hutcheson, M.Ed., 297 College of Design  
Education: Toni Humpfer, M.S., E105 Lagomarcino Hall  
Engineering: Larry Hanneman, M.S., 301 Marston Hall  
Family and Consumer Sciences: 132 MacKay Hall  
Liberal Arts and Sciences: Steven Kravinsky, M.S., 208 Carver Hall  
Veterinary Medicine: Elizabeth Reidesel, DVM, 2270E Veterinary Medicine

Career services are provided in each college to assist students, undergraduate and graduate, and alumni with their career-related needs. A broad range of programs and services are offered including online registration, position listing and interview scheduling; résumé referral; coordination of co-op and internship programs; workshops and seminars on career exploration, résumé preparation, letter writing, job search techniques, interview skills, applying to graduate and professional schools, and adjusting to the first job.

Each year career services sponsor six college career-information days plus the graduate and professional school day, an international opportunities festival, the social services career day, and a summer job fair. Extensive career and job search information is provided online. Each college career services office serves as a point of entry for students, alumni, and employers to the entire ISU network of coordinated, decentralized career services.

**Student Answer Center**

www.answer.iastate.edu/  
Students who have questions but are not sure where to find an answer may contact the Student Answer Center located on the ground floor of Beardshear Hall. A staff member will answer campus-related questions on the spot or provide referrals to other university departments as needed. Information may include registration instruction, financial aid status, or classroom directions. Students can pick up forms, information brochures, campus maps, or use one of the computers to access AccessPlus or e-mail. Answers to frequently asked questions also are available at www.answer.iastate.edu/. Questions can be sent by e-mail answercenter@iastate.edu or by phone 515-294-4469.

**International Education Services**

www.public/iastate.edu/~international_info/  
Study Abroad Center: www.iastate.edu/~study-abroad/  
Director: Dennis Peterson, M.A.  
Assistant Director, International Students and Scholars: Brenda Thorbs-Weber, Ph.D.  
Assistant Director, Study Abroad Center: Trevor Nelson, Ed.D.  
Coordinator of International Services: Rebecca Matters  
Coordinator of Administration: Deborah Vance, M.B.A.  
Senior Program Coordinator: Chistine Gemignani, M.A.  
Program Assistant: Arliss Penner  
International Education Services (IES) is committed to courteous, accurate, timely service and informative programs for international students and visiting scholars, Americans seeking overseas opportunities, and citizens of Iowa interested in international education. IES staff members orient and advise internationals on university procedures, community resources, U.S. visas and personal concerns. Persons interested in study and/or work abroad find a wealth of information at the IES Study Abroad Center. The Center maintains information on scholarships, health and safety abroad, world cultures, and travel, as well as over 200 ISU programs and thousands of opportunities through other institutions. Staff assist not only students, but also faculty and staff traveling abroad. Project Assist provides logistical and other support to faculty developing new group study abroad programs. IES intercultural programs, such as the Culture Corps, Friendships International, Conversational English and activities developed with the International Student Council and dozens of international student organizations, bring international students and Americans together for mutual learning. We welcome volunteers to join these and other programs.

**Dean of Students Office**

www.dso.iastate.edu/  
Dean of Students: Peter Englin, Ph.D., Student Services Building  
Assistant Dean of Students: Vernon A. Wall, M.S., B6 Memorial Union  
Assistant Dean of Students: Alisa Frandsen, M.Ed., B6 Memorial Union  
Assistant Dean of Students: Grace Weigel, M.S., Student Services Building  
Assistant Dean of Students: Sharon McGuire, Ph.D., Student Services Building  
Academic Success Center  
Assistant Dean of Students: Sharon McGuire, Ph.D., Student Services Building  
Manager Disability Resources: Bea Awoyin, M.S., Student Services Building  
Coordinator, Disability Resources: Todd Herriott, M.S., Student Services Building  
Coordinator, Supplemental Instruction: Kari Hensen, M.S., Student Services Building  
Greek Affairs  
Assistant Dean of Students: Alisa Frandsen, M.Ed., B6 Memorial Union  
Judicial Affairs  
Assistant Dean of Students: Grace Weigel, M.S., Student Services Building  
Program Assistant: Bethany Schuttinga, M.S., Student Services Building  
Lesbian, Gay, Bisexual, and Transgender Student Services  
Dean of Students: Peter Englin, Ph.D., Student Services Building  
Margaret Sloss Women’s Center  
Director: Penny Rice, M.S., Sloss House  
Minority Student Affairs  
Associate Dean of Students & Minority Affairs: Cindy Christmas, M.S., Student Services Building  
Program Assistant: Irma Wilson-White, B.A., Student Services Building  
Program Assistant: Grlf Kolberg, B.A., Student Services Building  
Program Assistant: Yanira Pacheco, B.A., Student Services Building  
Parents Association (ISUPA)  
Bethany Schuttinga, M.S., Student Services Building  
Recreation Services  
Director: Mike Harvey, M.S., 2220 State Gymnasium  
Associate Director: Scott White, M.S., 2220 State Gymnasium
Staff members in the various units of the DSO provide assistance for students with their personal adjustment to college, with academic problems, or with interpretation of university or legal policies and procedures. Assistance services are also provided for students in particular populations, such as: those with disabilities; adult and off-campus students; lesbian, gay, bisexual, and transgender students; first-generation college students; and women students. Educational programs and workshops in the areas of leadership, time management, and interpersonal skills are presented on an ongoing basis and when requested by campus groups. Recreation Services provides a wide variety of intramural and recreational activities for all skill levels. Activities and programs for and about women are facilitated by the Women's Center. The Student Activities Center (SAC) registers and provides services and programs for student organizations and Greek Affairs coordinates fraternity and sorority chapters.

**Academic Success Center (ASC)**
The Academic Success Center encompasses several academic assistance programs. The services available at the ASC include the following: resources for students with disabilities; course-specific Tutoring Services and Supplemental Instruction; general assistance through the Learning Lab, providing individual consultations for those with needs related to study skills/time management; and a one-credit study skills class (Psychology 131). All programs are focused on helping students learn how to learn and achieve their academic goals. For more information visit the web site at www.dso.iastate.edu/dept/asc/.

Disability Resources (DR) coordinates support services that students may need in order to reach their fullest academic potential. The DR staff members provide accommodations and serve as a resource within the university community concerning students who have physical or learning disabilities. DR provides assistance, information, support, counseling, education, referral, and awareness to students, faculty, staff, the Ames community, and the state of Iowa. Call 515-294-6624, TTY 515-294-6635, for further information.

The mission of Tutoring Services is to enhance academic growth and success. Tutoring is the process by which students can get more individualized instruction for undergraduate courses offered at ISU. Tutoring recruits and screens tutors, works out convenient times to meet, collects fees, and pays tutors. For information call 515-294-6624.

Supplemental Instruction (SI) is a free academic assistance program for difficult selected 100 and 200 level courses. Peer SI leaders who have demonstrated competence in the course, attend classes and conduct biweekly sessions to help students learn and study the course material. A complete schedule can be viewed on the Web.

The Learning Lab is a “learning how to learn” center. A service to students, the Learning Lab helps them with tips on how to succeed in the classroom. The Learning Lab is staffed with psychology graduate assistants who work with students to pinpoint areas in their study strategies that might need improvement.

A one-credit study skills course, Psychology 131, that addresses academic success strategies as well as a variety of reading and study strategies and tactics from time management to test taking is offered each semester. Class size is limited to allow for group interaction as well as individual attention.

**Greek Affairs**
The Office of Greek Affairs oversees ISU’s fraternities, sororities, and affiliated Greek organizations. Greek Affairs provides advising, consultation, and educational services to the fraternities and sororities at Iowa State. Professional staff and graduate assistants work with student leaders, members, and chapter advisers to provide support to the chapters and to advise Collegiate Panhellenic Council, Interfraternity Council, National Pan-Hellenic Council, Greek Week, Fall Blood Drive, Spring Blood Drive, Order of Omega, Junior Greek Council, and other student organizations and activities affiliated with the Greek Community.

The 49 fraternities and sororities at Iowa State University have approximately 2,600 student members (1,600 men and 1,100 women), or about 12 percent of the undergraduate student population. The Greek Affairs staff and local alumni work with each fraternity and sorority to ensure that the chapter is meeting the educational objectives of the university, their national affiliates and the developmental needs of the students. Fraternities and sororities have been active at Iowa State University since 1875. For more information visit B6 Memorial Union, call 515-294-1023, or visit the web, www.dso.iastate.edu/dept/greekaffairs/.

**Judicial Affairs**
The Office of Judicial Affairs is responsible for the university’s Centralized Judicial System. Representatives from the Office of Judicial Affairs interpret university policies and conduct student disciplinary hearings for academic and nonacademic violations of the ISU Student Disciplinary Regulations. As members of the Iowa State University community, all students have certain rights and responsibilities. When an alleged violation of the Student Disciplinary Regulations occurs, a representative from the Office of Judicial Affairs investigates the complaint, interprets general university regulations and guidelines, conducts student discipline hearings which ensure the standards of due process, and consults with faculty, staff, and students regarding student conduct issues.

Student discipline hearings are conducted in accordance with the rules and regulations as set forth in university policies and procedures. Disciplinary hearings are administered by a member of the Judicial Affairs staff or by members of the All-University Judiciary (AUJ) committee. The Office of Judicial Affairs serves as a resource for anyone with
questions regarding a student conduct issue and is located in the Dean of Students Office, 1010 Student Services Building; 515-294-1021; or www.public.iastate.edu/~deanstdt_info/a.

Lesbian Gay Bisexual Transgender Student Services (LGBTSS)
LGBTSS is a safe space for all members of the ISU community to explore aspects of sexual orientation and gender issues in an open nonjudgmental atmosphere. LGBTSS is committed to providing information and education that enhances the educational experience and overall quality of student life on campus.

LGBTSS, its staff, and advisory board work to provide assistance and support and to promote visibility and diversity through programming, a variety of services, and referral. In achieving its mission, LGBTSS strives to promote full inclusion of LGBT persons and their allies at ISU and to eliminate homophobia, heterosexism, and sexism on campus.

Programs and services of LGBTSS include the speakers bureau, peer-facilitated support groups, Lavender Graduation, Small Victories Celebration, National Coming Out Days, events, supporting campus LGBT organizations, the Safe Zone sticker project, the lending library, and brochures and workshops on various LGBT issues. For more information: 1010H Student Services Building, (515) 294-5433, lgbtss@iastate.edu, or www.dso.iastate.edu/lgbtss.

Margaret Sloss Women's Center
The Margaret Sloss Women's Center promotes the educational, personal and career development of all women in the ISU/Ames community. Along with other departments, the Women's Center shares the university's responsibility of creating a safe and supportive environment for all individuals. The purpose of the Women's Center is to promote and sustain women through assistance, programs and information, and referral services. The Women's center provides:

- A clearinghouse of information including a lending library, resource files, a calendar of events, and a variety of videos and audio tapes.

- Educational programming that focuses on helping students, staff, and faculty thrive in an academic environment by motivating them toward a greater understanding of, and involvement with, women's issues. Educational programs presented in residence halls, departments and organizations include workshops on a variety of topics – some require one gender audiences: self-esteem, images of women in the media, eating disorders, sexual harassment, date rape drugs and sexual assault, dating violence, what men can do to reduce the violence against women, gender roles and stereotypes, homophobia and sexism, men and masculinity, and more).

- Coordination and co-sponsorship of special events including Women's Week, National Coming Out Day, Sexual Assault Awareness Week, and Women's History Month. Throughout the year, the Women's Center also sponsors a number of speakers on current issues, hosts conferences, and coordinates support and discussion groups.

- Assistance and support for women who work toward changing situations, which adversely affect them, both individually and institutionally.

- A space for women to meet, study, eat, network, discuss, find support, watch a video or just relax.

- A place to gain experience and/or credit as a journalism or design intern, practicum student, student programmer, board member, or volunteer.

- Other services include an electronic breast pump, lockers to rent, free condoms, meeting rooms for campus and community organizations, kitchen facilities, a TV and VCR.

The Women's Center is open Monday through Friday, 8 a.m.-5 p.m. and is housed in the Sloss House, located between Curtiss Hall and the Memorial Union. Call 515-294-4154 or view www.dso.iastate.edu/dept/mswc.

Office of Minority Student Affairs
Minority Student Affairs was established to assist the university in keeping it's commitment to equal educational opportunity. MSA is responsible for the leadership in retention and graduation of undergraduate ethnic minority students by identifying climate, cultural, educational and financial barriers to their success. Minority Student Affairs staff work closely with all units of the University to achieve the following objectives:

- Increase the number of ethnic minority students entering and graduating from Iowa State University.

- Ensure access, choice, and persistence with all departments and organizations interested in the development and growth of students.

- Maintain liaison and coordinate programs with all departments and organizations interested in the growth and development of students.

- Develop students for a future beyond their undergraduate college experience – professionally, intellectually and culturally.

- Provide leadership for diversity awareness education.

These objectives assist in the achievement of the Office of Minority Student Affairs' mission. This is accomplished through the following programs:

Academic Program for Excellence (APEX)
Summer Challenge, Carver Academy Program, George Washington Carver Scholarships, the Minority Student Affairs Emergency Loan Program, Early success Program – (ESPI), Ethnic cultural celebrations – Hispanic Heritage Month, Black History Month, Asian American Celebrations, and the symposium on the American Indian.

Parents Association (ISUPA)
All parents of ISU undergraduate students are automatically considered to be members of the ISU Parents Association. The ISUPA serves as a link between the University and parents and families. Its mission is to serve and inform parents and to enhance the quality of student life at Iowa State.

There are no membership fees in the ISUPA; it is funded exclusively by contributions and fund-raisers, like the annual tuition raffle. The ISUPA Board of Directors, comprised of 36 parents, along with members of the Dean of Students Office staff, sponsors programs which include:

- Family Handbook, distributed to all new ISU parents at June orientation

- Parents Advisory Line (PAL), 1-800-772-8546, toll free assistance for parents

- Parent Calling Project, phon-a-thon to new ISU parents each autumn

- Family Weekend, the annual fall event largely funded by the ISUPA

- Involvement in ISU admissions events

For more information on the ISUPA, call the Dean of Students Office, 294-6054 or view www.dso.iastate.edu, then Web site Index, Parents Association.

Recreation Services
Recreation Services is dedicated to the provision of quality recreational opportunities for the campus community. Programs include intramural sports, sport clubs, informal recreation, outdoor recreation, special events, fitness programs, and recreation facility management. Assistance for other recreational services is provided.

The informal recreation program includes the opportunity for recreational sports activity in Beyer Hall, State Gymnasium, Forker Building (east campus). Lied Recreation/Athletic Center, outdoor tennis courts near the Forker Building, recreation fields east of the Towers and Maple-Willow-Larch Residence Halls, and the Southeast Field Complex east of the football stadium. Two regulation golf holes north of the Armory are open for ISU recreation golf use at no charge. The Ames/ISU Ice Arena is also available for drop in open skating or organized events.

The Group Fitness program provides nearly 60 classes per week for staying fit. The types of aerobics classes available include: high/low impact, step, toning and aqua. We also offer personal trainers for those that would like to have one on one assistance with their workout. The Rec Miler Program is designed to help students stay interested and involved in a regular exercise program. Participants have the flexibility to choose their own activities and can exercise at their own pace and convenience. Participants keep track of their recreational mileage for each month. To get mileage credit, progress slips must be deposited in the Rec Miler’s boxes at the

Student Services
2003-2005
Recreation Services Office, 2220 State Gym, or at the Lied Recreation/Athletic Facility. Monthly totals for each participant are posted at State Gym.

Participants may earn awards for specific milestones. Aerobic activities for Rec Miler credit include: bike, walk, basketball, handball, cross country skiing, stationary bike, fitness class, jump rope, soccer, jog/run, swim, racquetball and tennis.

The outdoor recreation program is composed of four basic elements: the camping-outdoor equipment checkout program; the organized trip program; basic instruction activity workshops; the Resource Center and Library. All of these programs and activities are designed to provide opportunities for natural environment experiences.

The sports club program is designed to serve individual interests in different sports club activities and is student-oriented in every aspect. Sports clubs offer team or individual recreational opportunities. Following are the sports clubs: archery, badminton, ballroom dance, baseball, bowling, boxing, canoe and kayak, cycling, equestrian, fencing, flying, hapkido, hockey, judo, karate, kum do, lacrosse, motorcycle, mountaineering/rock climbing, painting, pool, racquetball, rifle and pistol, rodeo, rollerhockey, rugby, running, sailing, scuba, shotokan karate, ski and snowboard, skydivers, soccer, table tennis, tae-kwon-do, tennis, trap and skeet, triathlon, ultimate frisbee, unicycle, volleyball, water polo, water ski and weightlifting.

These clubs offer instruction and competition at the local and intercollegiate levels. The club members set dues, and most clubs receive financial subsidy from the Government of the Student Body to enable students to participate regardless of their financial situation.

The Intramural Sports Program involves competition among participants who enter as teams or individuals and play according to specific schedules. There are more than 50 intramural sport activities ranging from football to innertube water basketball and curling. Activities include men’s, women’s and co-rec divisions. Numerous special events add spice to the recreation program. These activities are of an endless variety and usually take place in a short time span. In general, they encompass demonstrations, performances, special contests, mass group participation, social occasions, excursions, displays, or special instruction.

Other physical, cultural, and social recreation programs are sponsored in coordination with various departments, organizations, and groups on and off campus. For further information concerning campus recreation activity, contact the Recreation Services Office, 2220 State Gym, or call (515) 294-4980, or www.recservices.iastate.edu.

Student Activities Center

The Student Activities Center is committed to student involvement and retention. Its programs and services, including leadership development and organization participation, strive to ensure student success. These practical experiences work toward enhancing the quality of student life. With over 600 organizations from which to choose, students learn about themselves and appreciate the diversity in others. The staff of the Student Activities Center is dedicated to utilizing their knowledge and experience to provide unique living and learning opportunities for all Iowa State students.

The Student Activities Center is responsible for registering the 600+ student, campus, and community organizations. The staff provides consultative services to student leaders, members, and advisers of organizations on an individual and group basis. They also provide training workshops and facilitate retreats for student groups. This office produces Newsline, an online newsletter distributed twice each semester to presidents and advisers of registered student organizations.

The Student Activities Center also annually publishes the Student Organizations Resource Manual (SORM), which informs the campus community about university policies and procedures that affect student organizations. The SORM is available online at the Student Activities Center web site which also includes information on the university’s event and activity authorization process. The staff of the Student Activities Center also advises students involved in the Government of the Student Body (GSB) and VEISHEA. For more information visit the Student Activities Center, B6 Memorial Union, 294-1023, or view www.sac.iastate.edu.

Student Assistance Services

When student life at Iowa State becomes overwhelming or situations arise when students need some advice, the staff of Student Assistance Services is ready to help. The Dean of Students Office staff provide resources for students to work through issues including:

- Academic concerns
- Personal concerns
- Personal and family emergencies, and
- Formal grievance procedures.

Assistance in understanding and navigating the University judicial systems and other university policies and procedures is also provided. Personalized referrals to other University resources and services are key in providing proactive and comprehensive assistance to students. Consultation and assistance is provided in an atmosphere of confidentiality and concern for each student’s personal well being and educational objectives. For more information visit 1010 Student Services Building, call (515) 284-1020, or see Web site Index at www.dso.iastate.edu.

Student Legal Services (SLS)

Student Legal Services is a cost-free legal aid office available to any student currently enrolled at Iowa State and registered student groups. SLS is staffed by full-time, practicing attorneys who are available to consult with students and offer advice with respect to most legal problems. While SLS is a part of the Dean of Students Office, its financial support comes from the Government of the Student Body (GSB). The types of cases most often handled by the staff of the SLS include:

- Family Law and Divorce
- Criminal Law
- Landlord-Tenant Problems
- Off-Campus Employment Problems
- Consumer Issues
- Administrative Issues

However, SLS cannot actively represent students in controversies involving student vs. student, student vs. ISU, and ISU student judicial matters and does not handle the following cases: fee generating cases; felony defense; Federal Court matters; cases involving excessive time. More information is available at SLS, B11 Memorial Union, (515) 294-0978, see Web site Index at www.dso.iastate.edu.

Student Support Services Program (SSSP)

SSSP is a federal funding program, provides academic support to eligible students and is designed to increase the retention and graduation rates of low-income individuals who are first generation college or individuals with disabilities. The needs of the students who are accepted into SSSP are thoroughly assessed through testing and counseling. SSSP participants receive personal and career counseling, along with academic advice, tutoring, and assistance in receiving financial aid.

Participants in SSSP are encouraged to work with an SSSP student mentor to become acclimated to the ISU environment. These relationships also encourage participants to fully access ISU resources. Study skills improvement sessions and basic skills instruction are provided in the areas of math and writing. In addition, cultural enrichment (i.e. theatre, dance, and musical events) and educational (leadership conferences, graduate/professional, etc.) activities are planned. These services are provided free of charge to eligible students after they are accepted into the program. SSSP is located in the Student Services Building; call (515) 294-0210 or view Web site Index at www.dso.iastate.edu.

Vocational Rehabilitation

The State of Iowa Division of Vocational Rehabilitation Services Office provides services to students who based on medical documentation, have a disability and it is a substantial impediment to employment. Rehabilitation services may include the following: medical assessment; vocational evaluation; counseling and guidance; special adaptive equipment or devices; financial assistance toward training; job placement assistance. No direct fees are charged, but there may be some costs through involvement with services. For more information, contact Vocational Rehabilitation, 515-294-5059, Room 1045, Student Services Building, or see www.dso.iastate.edu/dept/vocrehab.
Student Life

Child Care

Child Care Resources, a unit of Human Resource Services, supports Iowa State University families by linking them with programs and services that can help meet their child care needs. The university child care consultant is available to assist families in accessing services available both on the campus and in the community.

Child care programs located on campus include:
- Center for Child Care Resources: Assistance in locating community child care services, 1038 Pammel Court, 515-294-8833 or 1-800-437-8599
- University Community Childcare at Pammel Court, 891 Pammel Court, 515-294-8838
- The Comfort Zone: Daycare for kids who don’t feel so good, 1019 Pammel Court, 515-294-3233.
- Flex-Care: Part time care for children of ISU students, 1052 Pammel Court, 515-294-2471.
- University Child Care Center at Veterinary Medicine, 1700 Christensen Drive, 515-294-2273.
- ISU Child Development Laboratory School, Palmer HDFB Building, 515-294-3040.

For more information about child care options, contact the university child care consultant at 515-294-8827.

Forensics: Individual Events

ISU Forensics, the Iowa State speech team, participates in several kinds of competitive speech activities. Please contact Speech Communication Program at 515-294-7670 for further information.

Honor Societies

Alpha Epsilon—Agricultural Engineering
The purpose is to promote the high ideals of the engineering profession, to give recognition to those agricultural engineers who manifest worthy qualities of character, scholarship, and professional attainment, and to encourage and support such improvements in the agricultural engineering profession that make it an instrument of greater service to humanity. Membership is based on scholarship, leadership, and character.

Alpha Kappa Delta—Sociology
Members share interest in the field of sociology, research of social problems, and such other social and intellectual activities as will lead to improvement in the human condition.

Alpha Lambda Delta/Phi Eta Sigma—Freshmen
First-year students who achieve at least a 3.5 GPA for one or more semesters their first year may be members of these national honor societies. These societies encourage superior scholastic attainment among students in their first year at institutions of higher education.

Alpha Pi Mu—Industrial Engineering
Members are chosen for character, achievement, and scholarship in industrial engineering. The group provides social and educational interaction for industrial engineering.

Alpha Upsilon Alpha—Education
An educational honorary that recognizes and encourages scholarship and leadership in the field of reading.

Alpha Zeta—Agriculture
Members must have completed three semesters of study in the College of Agriculture or Veterinary Medicine and be in the upper two-fifths of their class. Meetings are held to foster high standards of scholarship, character, and leadership. Alpha Zeta sponsors lectures, service projects, and promotes the agricultural programs at ISU.

Beta Alpha Psi—Accounting
A national honorary for students in accounting.

Beta Beta Beta Biological Honor Society
A national organization for students in the biological sciences with a purpose to recognize undergraduates with exceptional scholarship, leadership and character.

Beta Gamma Sigma
Honor society for collegiate schools of business.

Cardinal Key—Senior Leadership
The Senior Honor Society of Cardinal Key recognizes those persons who have been outstanding leaders in college life, who have rendered noteworthy service to Iowa State, who are of high moral character, and who rank high scholastically. Members are selected by application and interview.

Chi Epsilon—Civil Engineering
The purpose is to develop the profession of civil engineering through the interaction of members, fellow civil engineering students, and faculty. Scholarship, character, practicality, and sociability are the fundamental requirements for membership.

Chi Sigma Iota-Iota Sigma Upsilon
To promote scholarship, research, professionalism, leadership and excellence in counseling, and to recognize high attainment in the excellence in counseling, and to recognize high attainment in the pursuit of academic and clinical excellence in counseling.

Epsilon Pi Tau—Education in Technology
Members are selected from the upper one-fourth of the juniors, seniors, and graduate students in industrial technology. The group strives to promote skill, social and professional efficiency, and research.

Golden Key—All University
A national nonprofit academic honors organization, Golden Key is dedicated to recognizing and encouraging scholastic achievement in all undergraduate fields of study and to uniting collegiate faculty and administrators.

Iota Sigma Pi—Females in Chemical Sciences
An organization open to female students in the chemical sciences which provides functions for members to socialize and discuss science issues in chemistry.

Kappa Delta Pi—Education
In an effort to promote excellence in and recognize outstanding contributions to education, Kappa Delta Pi maintains a high degree of professional fellowship among its members, quickens professional growth, and honors achievement in educational work. Membership invitations are extended to second semester sophomores, juniors, and seniors with a GPA of 3.25 or above.

Kappa Omicron Nu, Gamma Chapter
Objectives of the honor society are to promote graduate study and research, and to stimulate scholarship and leadership toward the well-being of individuals and families throughout the world. Top 10 percent of junior and top 20 percent of senior students maintaining at least a B average, and outstanding graduate students in family and consumer sciences, are eligible for selection. Research within the college is shared at monthly meetings.

Kappa Tau Alpha—Journals
Kappa Tau Alpha is the national society dedicated to the recognition and promotion of scholarship in the field of journalism. Members are selected from the upper 10 percent of the senior class. Graduate students and faculty who qualify are also eligible for membership.
Keramos National Ceramic Engineering Honor Fraternity
A national honorary that recognizes students with outstanding academic achievement and encourages interaction between students and alumni.

Mortar Board
Members are recognized for superior academic achievement and community service.

National Society of Collegiate Scholars
To recognize and celebrate high achievement in all academic disciplines, to provide opportunities for personal growth and leadership development, and to organize and encourage learning opportunities through community service.

Omega Chi Epsilon—Chemical Engineering
Membership is open to chemical engineering juniors in the top 20 percent of their class, or seniors in the top 30 percent. The purpose is recognition and promotion of high scholarship, original investigation, and professional service in chemical engineering.

Order of Omega—Fraternity and Sorority Honorary
A national Greek honorary, the Order of Omega was founded at Iowa State in 1957. Criteria for membership include character; scholarship; leadership; service to the individual chapter, the Greek system, the university, and the Ames community.

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Phi Kappa Phi—All University
This national honor society recognizes and encourages superior scholarship in all academic disciplines. Membership is open to qualified undergraduates and graduates by invitation and occasionally to faculty and alumni.

Phi Sigma Theta
Phi Sigma Theta is dedicated to recognizing and rewarding academic achievement, and encouraging community service, leadership, and continued academic excellence.

Phi Upsilon Omicron—Family and Consumer Sciences
Members are selected from junior and senior family and consumer sciences students who have demonstrated academic excellence and professional leadership qualities. Membership is a means of furthering professional goals. Outstanding graduate students are also eligible for selection.

Pi Mu Epsilon—Mathematics
Pi Mu Epsilon is the national mathematics honorary society whose purpose is the promotion of scholarly activity in mathematics among students and staff. Members are students and faculty who have completed at least two years of college-level mathematics with honor (at least 3.33 GPA) and have maintained an overall GPA of at least 3.0.

Pi Sigma Alpha
Pi Sigma Alpha is the national honor political science honor society.

Pi Tau Sigma—Mechanical Engineering
Members are juniors and seniors in the upper ranks of their classes in mechanical engineering. Meetings and social functions are held to recognize and encourage outstanding scholastic achievement.

Psi Chi—Psychology
This national honor society in psychology recognizes and honors individuals maintaining high scholarship and documented interest in psychology.

Sigma Alpha—Women in Agriculture
Promotes women in all facets of agriculture.

Sigma Gamma Epsilon—Geological Sciences
The objectives of this national honorary society are the scholastic and scientific advancement of its members and the promotion of friendships and assistance among colleges, universities, and scientific schools devoted to the advancement of the earth sciences. Membership is intended for those scientists and students of science whose primary concern is the study of the earth.

Sigma Gamma Tau—Aerospace Engineering
Sigma Gamma Tau is the national honorary for aerospace-aeronautical engineering students who have displayed outstanding scholarship, leadership, and personal characteristics. Members are selected from the upper fourth of the junior class and upper third of the senior class who have maintained a 3.00 or better cumulative grade point average.

Sigma Lambda Chi—Construction Engineering
The purpose is the recognition of outstanding students in construction engineering. Upperclass students in construction engineering may be initiated into the society providing they have an overall scholastic average in the upper 20 percent of their class.

Sigma Xi—Research
Sigma Xi, the scientific research society, is a broad-based scientific honor society with over 500 chapters and clubs at universities and nonacademic scientific institutions. Sigma Xi awards associate membership to undergraduates and graduate students who have demonstrated research potential through participation in an original scientific research activity. Full membership in Sigma Xi recognizes a significant scientific research contribution.

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Lectures
Throughout the academic year the Committee on Lectures brings to the campus a number of speakers eminent in national and international affairs, the sciences, and the arts. In addition to giving formal lectures, a number of these speakers meet with students informally for discussions. Through these lectures and discussions the students are given a well-rounded presentation on subjects and areas affecting their culture, educational and economic philosophy, and scientific development. Past speakers include scholars E.O. Wilson and Stephen J. Gould; activists Gloria Steinem and Anita Hill; actor and comedian Bill Cosby; poet Maya Angelou; and astronaut Sally Ride.

The Institute on World Affairs is an annual series of speakers and on a topic of international interest held in the fall. Spring semester, the Institute on National Affairs is held with a topic of national concern as its focus. Focus, an annual fine arts festival with emphasis on student creativity in the arts, is held in the spring. The Committee on Lectures also sponsors or co-sponsors dramatic, dance, and musical events.

Students are encouraged to contact the lectures program office and become involved in the planning of these events.

Memorial Union
The Iowa State Memorial Union is regarded as the heart of campus life and the campus center of informal education at Iowa State University. It is the meeting place and headquarters for most student organizations and houses several university offices. Dances, exhibits, films, concerts, lectures, banquetes, and other campus gatherings are accommodated in its meeting rooms and ballrooms.

A food court with eight food vendors and a variety of choices, catering service, and a 24-hour vending area provide food service to the university community. The Maintenance Shop hosts some of the finest in blues, jazz, rock, and folk music performances at night and is a deli during the day. The Recreation Center offers autoscore bowling, billiards, pinball, and video games, and a large screen television.

Art is a way of life in the Union that includes special film showings, galleries, and a browsing library that offers reading, music, and video materials. The Workspace studios are staffed and equipped for individuals who wish to express themselves creatively.

A small, quiet chapel is available for services, weddings, or meditation. In addition, four wireless-equipped study lounges are available to students.

Campus visitors may choose to stay overnight in the guest rooms on the third, fourth, and fifth floors. The Memorial Union also has a convenience store, automatic teller machines, a TicketMaster outlet, the University Book Store, a copy center, a full service post office, and an attached 640 car parking ramp.

Opened in 1928 as a proud memorial to the Iowa State men and women who served in the Armed Forces during World War I, the Memorial Union is now a living memorial to all Iowa Staters who have served in the United States military.

Motor Vehicles and Bicycles
Students are permitted to own and operate motor vehicles - automobiles, motor scooters, and motorcycles. However, motor vehicles are in no way necessary for an Iowa State University student. Iowa State University is primarily a pedestrian campus. Those who operate a motor vehicle or bicycle on campus must abide by the rather extensive traffic and parking regulations. Fines are levied for infractions of these regulations. All motor vehicles and bicycles owned or operated by students on university property must be registered with the Parking Division Office located in the Armory. Copies of the traffic and parking regulations also are available at this office.

Music Activities
Iowa State is a regular stop on the arts and entertainment circuit. CY Stephens Auditorium is where the arts come alive, from renowned classical music ensembles, ballets, musicals, operas, and plays to jazz, folk and pop concerts. Hilton Coliseum, with a capacity of over 14,000, hosts family shows and concerts - including rock and roll, country and alternative music, to name just a few.

The ISU Department of Music presents over 100 concerts each year - many of them free - in the Martha-Ellen Tye Recital Hall on central campus and at Stephens Auditorium. The Music Department concert series includes faculty recitals, guest artist performances, and student ensemble concerts. ISU students also have lots of opportunities to study music and to participate in musical ensembles - including five choral ensembles, seven bands, ISU Symphony Orchestra, and numerous chamber groups. Nearly one-fourth of all undergraduate students participate in some aspect of music while attending ISU. In addition, carillon concerts featuring the “The Bells of Iowa State” are heard on central campus daily throughout the academic year.

Sigma Alpha Iota (professional music fraternity for women), Kappa Kappa Psi and Tau Beta Sigma (professional band fraternity), and several professional organizations for music educators are represented on campus.

Religious Life
Iowa State University is a state-supported, nonsectarian institution, but it recognizes the importance of spiritual life and cooperates with the many off-campus groups that fulfill the religious needs of the community.

Most of the larger denominations have places of worship within easy walking distance of the campus. Several denominations have attractive student centers and conduct extensive student programs under the direction of professionally trained persons. A number of campus student organizations also address the religious needs of many students.

Theatre and Dramatics
The Iowa State University Theatre, Department of Music, produces a season of at least five major presentations each year. The season’s bill endeavors to offer a variety of theatrical fare, including a musical, well-known dramatic literature and unusual and lesser-known plays. Practical experience in all phases of theatrical production is open to all interested, registered students within the university. The season is partially subsidized by an allocation from the Government of the Student Body; therefore, all students paying activity fees may purchase tickets to a performance at the reduced student price.

Other theatre-sponsored programs include student-produced plays, readers theatre programs, Theta Alpha Phi (a national dramatics honorary), the ISU Theatre Lab productions, the Minority Theatre Workshop, and the ISU Studio Theatre program.
Research is an important activity at Iowa State University. Faculty members engage in research pursuits as well as teaching. Graduate students, and in some cases undergraduates, play an active part in this search for new knowledge.

Support for research at Iowa State University comes from state and federal appropriations as well as from contracts and grants involving the federal government and nonfederal organizations. As part of its total program, the university also operates extension services, special laboratories, centers, and institutes.

Official Research, Outreach, and/or Instructional Centers and Institutes at ISU as Recognized by the Board of Regents, State of Iowa, are listed below. Additional information concerning any of these organizations and student research opportunities they support may be obtained from their administrative offices.

Agricultural Marketing Resource Center (AgMRC)  
www.agmrc.org/  
Mary S. Holz-Clause, Co-Director  
Donald M. Hofstrand, Co-Director  
1111 NSRIC/294-5227

Airworthiness Assurance Center of Excellence (AACE)  
www.cnde.iastate.edu/cnde/programs.html  
Lisa Brasche, Interim Director  
115 Applied Sciences Complex II/294-5227

Ames Center for Animal Health (ACAH)  
www.vetmed.iastate.edu/services/institutes/acah.asp  
James Roth, Professor-in-Charge  
2160 Vet. Med./294-1850

Analog and Mixed-Signal VLSI Design Center  
vlsi.ee.iastate.edu/  
Robert J. Weber, Director  
Dept. of Electrical and Computer Engineering, 2215 Coover Hall/294-8723

Bridge Engineering Center (BEC)—part of CTR  
www.ctre.iastate.edu/research.htm  
Terry Wipf, Manager  
2901 South Loop Drive, Suite 3100/294-9501

Carrie Chapman Catt Center for Women & Politics  
www.iastate.edu/~cccott/  
Dianne Bystrom, Director  
309 Catt/294-3181

Center for Academic Information Technology (AIT)  
www.ait.iastate.edu/  
Dorothy Lewis, Director  
291 Durham Center/294-3402

Center for Advanced Technology Development (CATD)  
www.catd.iastate.edu/  
Mark Laurenzo, Interim Director  
151 Applied Sciences Complex II/294-4644

Center for Agricultural & Rural Development (CARD)  
cardsrv1.card.iastate.edu/  
Bruce Babcock, Director  
578 Heady/294-1183

Center for Agricultural History & Rural Studies  
www.iastate.edu/~history/erenaghis.htm  
Douglas Hurt, Director  
618 Ross/294-5620

Center for Building Energy Research (CBER)  
Michael Pate, Director  
2028 Black Engineering/294-9691

Center for Catalysis  
George A. Kraus, Director  
2759 Gilman Hall/294-7794

Center for Crops Utilization Research (CCUR)  
www.ag.iastate.edu/centers/ccur/  
Lawrence Johnson, Director  
1041 Food Sciences Building/294-0160

Center for Designer Crops  
Basil Nikolau, Interim Director  
2210 Molecular Biology Bldg./294-9423

Center for Designing Foods to Improve Nutrition (CDFIN)  
www.fcs.iastate.edu/fsnh/research/cdfin.htm  
Colin Scanes, Interim Director  
1127 Human Nutritional Sciences Bldg.  
294-8489

Center for Excellence in Science and Mathematics Education  
www.educ.iastate.edu/scimath/  
Brian Hand, Director  
N157 Lagomarcino/294-7010

Center for Family Policy  
www.fcs.iastate.edu/policy/default.htm  
Mary Winter, Director  
126 MacKay/294-5982

Center for Family Research in Rural Mental Health—part of ISBR  
Carolyn Cutrona, Interim Director  
2625 N. Loop Drive, Suite 500/294-4518

Center for Food Security and Public Health  
www.vetmed.iastate.edu/services/institutes/cfsph/  
James A. Roth, Director  
2160 Vet Med/294-7189

Center for Historical Studies of Technology & Science  
Alan Marcus, Director  
635 Ross/294-5956

Center for Industrial Research & Service (CIRAS)  
www.ciras.iastate.edu/  
Ron Cox, Director  
Suite 2620, 2272 Howe Hall/294-3420

Center for Integrated Animal Genomics  
Max F. Rothschild, Co-Director and Susan Carpenter, Co-Director  
2255 Kildee/294-6202 and 1136 Vet Med  
294-5158

Center for Interfacial Materials & Crystallization  
Glenn Schrader, Manager  
3033 Sweeney/294-0519

Center for International Agricultural Finance (CIAF)  
Neil Harl, Director  
478 Heady/294-2210

Center for Nondestructive Evaluation (CNDE)—including the FAA Aviation Systems Reliability Program  
www.cnde.iastate.edu/cnde.html  
R. Bruce Thompson, Director  
115 Applied Sciences Complex II/294-8152

Center for Physical & Computational Mathematics (CPCM)  
www.iprt.iastate.edu/cpcm.html  
Bruce Harmon, Interim Director  
311 TASF/294-8902

Center for Plant Genomics  
www.plantgenomics.iastate.edu/  
Patrick Schnable, Director  
G405 Agronomy/294-0975

Center for Plant Responses to Environmental Stresses  
www.plantstress.iastate.edu/  
Charlotte Bronson, Interim Director  
351 Bessey/294-2264

Center for Plant Transformation and Gene Expression  
www.planttransformation.iastate.edu/  
Patrick Schnable, Director  
G405 Agronomy/294-0975

Center for Portland Cement Concrete (PCC)  
Pavement Technology—part of CTR  
www.ctre.iastate.edu/research.htm  
Dale Harrington, Director  
2901 South Loop Drive, Suite 3100/294-8103
<table>
<thead>
<tr>
<th><strong>Research Organizations</strong></th>
<th>2003-2005</th>
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| **Center for Survey Statistics and Methodology** | www.stat.iastate.edu/general/overview.html (Survey Section)  
Sarah M. Nusser, Director  
219 Snedecor/294-9773 |
| **Center for Sustainable Environmental Technologies (CSET)** | webbook2.ameslab.gov/default.htm  
Robert C. Brown, Director  
288 Metals Development/ 294-3759 |
| **Center for Teaching Excellence (CTE)** | www.cte.iastate.edu/  
Corley Brooke, Director  
207 Lab of Mechanics/ 294-2906 |
| **Center for Technology in Learning and Teaching** | www.ctlt.iastate.edu/  
Niki Davis, Co-Director  
N108 Lagomarcino/294-3147 |
| **Center for Transportation Research and Education (CTRE)** | www.ctre.iastate.edu/  
Steven Andrlie, Director  
2901 South Loop Drive, Suite 3100/294-8103 |
| **Computational Fluid Dynamics Center** | John Tannehill, Manager  
2901 South Loop Drive, Suite 3100/294-8103 |
| **Electric Power Research Center (EPRC)** | www.eprc.iastate.edu/  
Vijay Vitali, Director  
1126 Coover/294-8963 |
| **Engineering Research Institute (ERI)** | James Melsa, Director  
104 Marston/294-5933 |
| **Family and Consumer Sciences Research Institute (FCSRI)** | Mary Winter, Director  
128 MacKay/294-5982 |
| **Food and Agricultural Policy Research Institute (FAPRI)** | www.fapri.org/  
Bruce Babcock, John Beighin, Co-Directors  
507 Heady/294-1183 |
| **Information Assurance Center (IAC)** | www.isi.iastate.edu/infas.html  
Doug Jacobson, Director  
2419 Coover/294-8307 |
| **Institute for Design Research and Outreach (IDRO)** | www.design.iastate.edu/framer.php3?list=idro  
Mark Engelbrecht, Director  
134 College of Design/ 294-7427 |
| **Institute for Food Safety and Security, The** | Catherine Woteki, Interim Director  
138 Curtiss/294-2518 |
| **Institute for International Cooperation in Animal Biologics (ICAB)** | www.vetmed.iastate.edu/services  
institutes/icab/icab.htm  
James Roth, Executive Director  
2160 Vet. Med./294-7632 |
| **Institute for Physical Research & Technology (IPRT)** | www.iprt.iastate.edu/  
Tom Barton, Director  
311 TASF/294-2770 |
| **Institute for Social & Behavioral Research (ISBR)** | www.isbr.iastate.edu/  
Carolyn Cutrona, Interim Director  
2625 N. Loop Drive, Suite 500/294-4518 |
| **Interdisciplinary Research Institute for Survey Science (IRISS)** | Kirk Wolter, Director  
219 Snedecor/294-9773 |
| **Iowa Beef Center** | John Lawrence, Director  
406 Heady/294-6290 |
| **Iowa Energy Center (IEC)** | www.energy.iastate.edu/  
Floyd Barwig, Director  
2521 Elwood Drive, Suite 124/294-8819 |
| **Iowa Pork Industry Center** | www.extension.iastate.edu/ipic/  
John Mabry, Director  
109 Kidlee/294-4103 |
| **Iowa Small Business Development Center (SBDC)** | www.iabunet.org/sbdc/index.cfm  
Lars Peterson, Interim Director  
137 Lynn Avenue/ 292-6351 |
| **Iowa State University Biotechnology Outreach Education Center (BOEC)** | www.biotech.iastate.edu/publications/BOEC/default.html  
Mike Zeller, Coordinator  
1320C MBB/294-9818 |
| **Iowa State University Industrial Assessment Center (IAC)** | www.public.iastate.edu/~cber/  
Greg Maxwell, Program Director  
2043 Black Engineering/294-3080 |
| **Iowa State University Pappajohn Center for Entrepreneurship, The** | www.isupjcenter.org/  
Steven T. Carter, Director  
300 Carver/294-8116 |
| **Laurence H. Baker Center for Bioinformatics and Biological Statistics** | www.plantsciences.iastate.edu/research.html  
Robert Jernigan, Director  
123 Office & Laboratory/294-7278 |
| **Leopold Center for Sustainable Agriculture** | www.ag.iastate.edu/centers/leopold/  
Fred Kirschenmann, Director  
209 Curtiss/294-3711 |
| **Materials Preparation Center (MPC)** | www.mpc.ameslab.gov/  
Lawrence Jones, Director  
126 Metals Development/ 294-5236 |
| **Meat Export Research Center (MERC)** | www.ag.iastate.edu/centers/merc/  
Joe Cordray, Contact Person  
194 Meat Lab/294-5310 |
| **Microanalytical Instrumentation Center (MIC)** | www.mic.iastate.edu/  
Marc Porter, Director  
41 Spedding/294-6433 |
| **Microelectronics Research Center (MRC)** | www.merc.iastate.edu/  
Vikram Dalal, Director  
133 Applied Sciences Complex I/294-7732 |
| **Midwest Agribusiness Trade Research & Information Center (MATRIC)** | www.card.iastate.edu/matric/home.html  
Bruce Babcock, Director  
578 Heady/294-1183 |
| **Midwest Forensics Resource Center (MFRC)** | David P. Baldwin, Director  
332 TASF/294-5783 |
| **Murray G. Bacon Center for Ethics in Business, The** | www.bus.iastate.edu/centers/Bacon/  
Tony Smith, Co-Director and  
James Werbel, Co-Director  
443 Catt/294-0055; 300 Carver/294-8116 |
| **NASA Food Technology Commercial Space Center** | www.ag.iastate.edu/centers/ftcsc/  
Tony Pometto, Director  
2901 South Loop Drive, Suite 3700/294-5383 |
| **North Central Regional Aquaculture Center (NCRAC)** | www.ag.iastate.edu/departments/aecl/  
nracc.htm  
Joseph Morris, Associate Director  
124 Science II/294-5280 |
| **North Central Regional Center for Rural Development (NCRCRD)** | www.ag.iastate.edu/centers/rdv/  
Cornelia Flora, Director  
107 Curtiss/294-8321 |
| **Plant Sciences Institute (PSI)** | www.plantsciences.iastate.edu/  
Stephen Howell, Director  
112 O & L/294-5255 |
University Extension
Iowa State University Extension builds partnerships and provides research-based learning opportunities to improve quality of life in Iowa. ISU Extension continues to lead the university-wide effort to engage Iowans with education and information about their issues and priorities.

Iowa State University is the state's land-grant institution with the mission of learning, discovery, and engagement. Historically, ISU Extension has led the university in its formal engagement mission to Iowans. With an active partnership and presence in every county, ISU Extension continues to engage the people of Iowa with education and information through six program areas: Agriculture and Natural Resources; Business and Industry; Communities; Families; 4-H Youth Development; and Continuing Education.

Agriculture and Natural Resources. ISU Extension provides research-based information and education to agricultural producers, landowners, and agribusiness personnel to enhance the value of Iowa's agricultural industry, increase rural vitality, and protect the state's natural resources.

Business and Industry. ISU Extension links Iowa businesses and manufacturers with ISU specialists and research, community resources, training, assessment, and technical assistance for increased productivity and competitiveness.

Communities. ISU Extension helps organizations and local governments develop and build their capacity to make Iowa communities better places to live and work.

Families. ISU Extension offers education for families, professionals, and volunteers to build healthy family environments through meaningful behavior change.

4-H Youth Development. ISU Extension offers hands-on learning and science-based programs to help youth gain skills, confidence, and positive self-esteem so they can become successful, caring adults.

Continuing Education and Communication Services (CECS). CECS leverages resources and adds value to the programs and related materials needed by lifelong learners. CECS leads the development and delivery of ISU credit and noncredit courses, outreach institutes, seminars, conferences, workshops, and ISU Extension program materials to learners around the world.
The Academic Advising Program

Iowa State University’s academic advisers are dedicated to enhancing each student’s academic and career aspirations.

Each student is assigned an adviser when he or she arrives on campus, usually a faculty member or professional adviser in the student’s academic department. If a major has not yet been declared, a member of the college faculty or staff will be assigned as adviser. The adviser can serve as a primary resource for the wide variety of university support services available to Iowa State University students, but it is the student’s responsibility to ask for assistance.

Advisers assist in the development of an academic program that meets students’ career objectives as well as curriculum requirements. Advisers can help students achieve their academic objectives by advising them about course requirements, recommended electives, and procedures for registration and schedule changes. It is the student’s responsibility, however, to be knowledgeable about Iowa State policies and procedures and the graduation requirements for his or her individual program and to ensure that these requirements are met. Advisers will help students to get the most out of their educational experience.

In most departments, students may change advisers. A student who wants to change advisers should check with the department regarding the adviser change procedure.

Learning Communities

www.iastate.edu/~learncommunity

Learning communities are a university-wide initiative providing students the opportunity to connect with peers who have similar academic goals. Students in learning communities typically take two or three courses together and may live together (or near each other) in the same residence hall. Although most of the learning communities are focused on first-year students, opportunities are available for sophomores, juniors, and transfer students.

In addition to developing academic and social networks, advantages of joining a learning community include: getting to know people and making friends in your major or area of interest, getting to know faculty and staff members, making a smooth transition from high school to college, making connections between in-class and out-of-class learning, applying classroom learning to real-world situations through hands-on experiences, exploring career opportunities, and having fun!

Most learning communities employ an upper-division student as a peer mentor who organizes various activities for the students, ranging from study groups to social events. We have found that students in learning communities are more satisfied with their overall experience at Iowa State, earn higher first-term grades, and are more likely to remain enrolled at Iowa State after one, two, and three years.

First-year students are offered the opportunity to sign up for learning community courses during summer orientation. For learning communities who offer a residential living environment, students will receive information in the mail prior to summer orientation.

Any student interested in joining a learning community should contact the learning community coordinator for more information. A list of coordinators, along with current opportunities, can be found at www.iastate.edu/~learncommunity.

ISU AccessPlus Information System

accessplus.iastate.edu

AccessPlus is a secure and confidential campus information system that is available via the World Wide Web. Students, employees, and affiliates view personalized menus from campus and home workstations. For public convenience, AccessPlus stations are available in the Memorial Union and at the Visitors Information Center. Students can use AccessPlus to register for classes using the Web Registration system. They can view and print current term schedules, class meeting rooms, class instructors, academic records, final grades, financial aid status, current university bill, academic adviser assignment and projected date of graduation. University employees use the system to view personal information such as pay history and insurance. Some employees also perform business-related functions. Information about and access to AccessPlus may be found at www.iastate.edu/~registrar/info/access.html or accessplus.iastate.edu.

Registration and Advising

Registration is a process by which students become officially enrolled in classes for a given term. Students who attend classes must complete registration and pay their assessed fees. Registration is not complete until all fees are paid, including board and room fees for those living in residence halls.

The registration process starts with an advising period, which begins two to five days prior to the first day of registration. Advisers provide important information to students that allow them to register for classes.

Dates for advising and registration are published in the university calendar on the Web at www.iastate.edu/~registrar/calendar, the ISU Directory, and the Iowa State Daily. The dates also are posted on departmental bulletin boards.

Continuing students register for the following term during the middle of the current term. For example, registration for spring term begins the middle of fall term; registration for summer session is completed during the previous spring at the same time as registration for fall semester.

Responsibilities

The registration process includes advising, enrollment in courses, and schedule changes. This process involves the student, the student’s adviser, and the student services staff of the student’s college, and in some cases, the dean of the college. Each is responsible for knowing and following the academic policies and procedures.

The student is responsible for knowing and adhering to university policies and procedures that apply to registration and schedule changes; checking the accuracy of his/her schedule on AccessPlus, including schedule adjustments (i.e., adds, drops, section changes); knowing the degree requirements of his or her major and/or curriculum; planning course schedules to meet those requirements; and monitoring the accuracy of the advisement/degree audit.

The adviser is responsible for consulting with advisees during the advising/registration period; providing information about student’s major and curriculum requirements; providing guidance in the student’s course selection; assisting in monitoring the advisement/degree audit for accuracy; and for notifying the college student services office with corrections to the advisement/degree audit.

The college student services staff is responsible for assisting new and reentering students with the registration process; resolving unusual scheduling problems; and updating the advisement/degree audit or solving problems concerning the advisement/degree audit.

The dean is responsible for making decisions with respect to requests for deviations from university policies, deadlines, etc. Students and staff should check with the college office to find out who is authorized to grant approvals or exceptions on behalf of the dean.
Registration Process
To register for classes, students need the following materials and information:

- Registration Worksheet, available for download at www.iastate.edu/~registrar.
- A RAN (registration access number) if required by their college.
- Course information from the Online Schedule of Classes at www.adp.iastate.edu/cgi-bin/class; or the Courses and Programs catalog, available on the Web or for a fee from campus bookstores.
- Other departmental information applicable to their curriculum, available from their adviser.

Students are expected to do the following in the advising and registration process:

1. Meet with their adviser, who will provide the following:
   a. advisement/degree audit
   b. guidance in course selection
   c. Registration Worksheet signature
   d. Registration Authorization Card, if applicable.

2. Choose specific sections of each course. Students are responsible for choosing their course sections. In most cases advisers will not be involved in selecting meeting times.

3. Review their registration start date/time information and any registration hold information on AccessPlus, under Current Information. Students in those colleges which require a four-digit registration access number (RAN) should meet with their adviser to obtain their Registration Authorization Card on which the RAN is printed.
   a. assigned date and time to register
   b. registration access number
   c. registration holds (prevents registration)

4. Register for courses using the AccessPlus registration system. Instructions are available at www.iastate.edu/~registrar/registration.

Registration Start Dates. Students are assigned a registration start date and time, which is the first day and time they can use the registration system. Registration start dates are assigned based on projected year in school classification (computed by combining total credits, current term credits, and current term test out credits). Then specific start dates within projected year in school are established by using the sum of total credits and current term test out credits. Students may choose to delay their registration until a later date, but courses will begin to fill on the first day of registration and any delay may reduce their course selection. A list of start dates (e.g., juniors) is available at www.iastate.edu/~registrar/registration.

AccessPlus Registration System. Students enter the system via AccessPlus by using university or social security number and university PIN. If required by their college, they also need to enter a registration access number (RAN).

The registration system provides messages after each entry indicating whether each request has been processed. Students also may review their current schedules at any time during registration. Students are held accountable for all changes made to their schedules.

All students are encouraged to register for courses through the AccessPlus registration system. However, students who are unable to use the system may register in person by processing their signed Registration Worksheet in the Registrar's Student Scheduling Office, 10 Alumni Hall.

Schedule Changes. Through the fifth day of classes, students may add courses or make other schedule changes using the registration system. For more information, see Index, Making Schedule Changes.

Classes are listed for each course in the Online Schedule of Classes at www.adp.iastate.edu/cgi-bin/class.

All changes processed before the first day of classes will be reflected on beginning class lists for instructors.

Registration holds. Students with holds on their registration will not have access to registration until the initiating offices have released the holds. Those who attempt to register before the holds have been released will receive a message indicating which offices have placed holds on their registration. Prior to their registration, students may check for holds on AccessPlus.

Credit limits. For fall and spring semesters, the credit limit is 18 credits for undergraduates and 15 credits for graduate students. For summer session, the limits are 12 credits for undergraduates and 10 credits for graduate students. Add requests beyond a student's credit limit will be denied. A student must drop credits before they may add another course. In some cases, the college dean may approve a higher or lower credit limit for individual students. Students may request a change in their credit limit by contacting their adviser. Advisers should notify the student's college student services office if the credit limit needs to be changed.

Restricted courses/sections. Some courses or sections are restricted to students who meet specific criteria including curriculum/major, college, and/or year in school. In addition, some sections may be restricted to new students to ensure that sufficient spaces are available when new students register during summer orientation. A department may waive a restriction for a student who has extenuating circumstances. The student must obtain the authorization from the department on a Schedule Change/Restriction Waiver form. The form is processed in the Registrar's Student Scheduling Office, 10 Alumni Hall.

Fees and Expenses. Students generally use AccessPlus to register for classes. Using the AccessPlus registration system is a privilege, which may be revoked if abuse is detected. Abuse includes, but is not limited to, creating and using an automated program to search for course openings and/or enrolling in a section with the intent of preserving space in that particular section for another student. The Office of the Registrar, college office, and/or advisers have the right to determine abuse and revoke privileges for any type of registration system abuse.

Permission Required courses/sections. To register for these sections, students must obtain authorization on a Schedule Change/Restriction Waiver form and process the approved form in the Registrar's Student Scheduling Office, 10 Alumni Hall.

Cancelled courses/sections. In some cases, courses or sections may be cancelled due to low enrollment or departmental staffing considerations. Students who are registered for a cancelled course or section will be notified by the Office of the Registrar, the department, and/or on their AccessPlus schedule.

Registration for disabled students. Disabled students who need assistance with any phase of registration should contact Disability Resources. (See Index, Disability Resources.)
Validating Enrollment
To validate their enrollment in each course at the beginning of the semester, students must attend the first or second meeting (first meeting if the class meets only once a week). Students who add a course after the term begins must attend the next class meeting. The instructor has the option to offer a registered place in the course to another student when a registered student fails to attend and also to obtain prior approval of the instructor. Those students must drop the course or they will receive an F grade.

Making Schedule Changes
Procedures for schedule changes vary by the time period of the semester. The effective date of a schedule change is the date on which the change is entered into the registration system. Schedule change periods are as follows:

Period 1 ends on the fifth day of classes of the full semester. Schedule changes during this period are free and do not require adviser signatures. Instructor or departmental approval may be required for adds or section changes in some courses during period 1. Course drops during this period do not count toward a student’s ISU course drop limit, and will not appear on a student’s grade slip or permanent record. Schedule changes during period 1 may be processed through the AccessPlus registration system or by presenting a Schedule Change/Restriction Waiver form to the Registrar’s Student Scheduling Office, 10 Alumni Hall.

Period 2 ends the third Friday of classes after the day midterm grades are due. During this period, schedule changes require signatures of adviser and instructor and are processed on a Schedule Change/Restriction Waiver form. A fee per visit is assessed for adds, drops, and section changes during this period. Course drops after period 1 count toward a student’s ISU drop limit and appear as an X on the grade slip and permanent record. A section change does not require a drop.

Period 3 follows period 2. Schedule changes during this period are permitted only for extenuating circumstances beyond the student’s control, require a written statement of support from both the instructor and the adviser, and must be approved by the dean of the student’s college.

Specific deadlines for adding and dropping half-semester courses are published in the university calendar. Appropriate adjustments to add and drop deadlines are made for other part-time courses. For partial term course deadlines, contact the Registrar’s Student Scheduling Office, 10 Alumni Hall.

Drop Limit
Students are limited in the number of courses they may drop during their academic career. (This refers to drops processed after the fifth day of classes of each semester.) Students who entered Iowa State University as freshmen are allowed to drop a maximum of five courses during their undergraduate career. If they entered at a level above freshman classification or in the College of Veterinary Medicine, they are allowed to drop a maximum of four courses. Courses dropped during their first term at Iowa State are not included in this limit, nor does the summer count as a term for this purpose. Students who enroll at Iowa State University as undergraduates after receiving a bachelor’s degree are permitted two drops.

Exceptions may be made for courses that must be dropped for reasons beyond the student’s control. These exceptions are granted only by the dean or other authorized person on the dean’s behalf in the student’s college.

The number of drops students have left is indicated on their grade report (available on AccessPlus) each term. Students are responsible for not exceeding their limit. Students who attempt to drop a course beyond the limit without special permission by the dean of the student’s college will continue to be enrolled in the course and will receive a grade at the end of the term.

Course Prerequisites
A prerequisite indicates the specific academic background or general academic maturity considered necessary for the student to be ready to undertake the course. Since an instructor has the prerogative to direct a student who lacks a stated prerequisite to drop the course, students are advised not to enroll in a course for which they lack a stated prerequisite without checking first with the course instructor. Permission of the instructor is understood to be an alternate to the stated prerequisites in all courses.

It is university policy that the instructor shall inform the students at the beginning of each course if students who have not met the prerequisite requirements must drop the course.

Course prerequisites are listed in the Online Schedule of Classes as well as in the Courses and Programs section of this publication.

Cancellation/Withdrawal
Students who decide not to attend classes before the date class work begins must cancel their registration to avoid tuition and fees assessment. Students who decide not to attend classes beginning the first day of class must withdraw from the university.

Registration Cancellation
A cancellation is processed when a student notifies the Office of the Registrar, prior to the day class work begins, of their decision not to attend classes for the current semester. All courses are removed and no tuition and fees are assessed.

Students may cancel their registration by contacting the Office of the Registrar at 460 Beardshall Hall, 515-294-1889. Students who call should request the name of the person taking the call and make a record of the name as well as the time and date called.

Withdrawal
Beginning the first day of classes, a withdrawal is processed when a student notifies their academic adviser and College of their decision not to continue attending courses for a semester. Per the student’s request, the “Request for Withdrawal” form is initiated and submitted by the College to the Office of the Registrar. The student is withdrawn from all courses based on the withdrawal date on the form, and tuition and fees are adjusted, if appropriate.

Student-Initiated Withdrawal
Students who find it necessary to leave the university before the end of a term, should follow the procedures described in this section. Otherwise, students’ records may be adversely affected and reentry or transfer to another institution may be difficult.

Students who are considering withdrawal from the university should immediately consult their academic adviser, who may be able to provide guidance for more advantageous alternatives.

A request for withdrawal during period 3, i.e., after the last day to drop a course without extenuating circumstances will not be approved except for circumstances that are beyond the student’s control. The dean of the student’s college must approve such requests. Students should check with their college office to find out who is authorized to grant approvals or exceptions on behalf of the dean.

Students should not expect to withdraw during or after the final examination week. In a situation beyond a student’s control, when examinations cannot be completed, arrangements should be made for incompetes rather than withdrawal during final exam week. Students who are on temporary enrollment and withdraw during period 3 will not be permitted to enroll the following term, except under extenuating circumstances.


**Procedures**

To withdraw from the university, students must do the following:

1. Complete a Request for Withdrawal form, with adviser's signature.
2. Request the approval and obtain the signature of the college in which they are enrolled. (If the request is approved, the withdrawal form will be forwarded to the Office of the Registrar where it will be recorded; the information is sent to the appropriate offices.)

The effective date of the withdrawal is the date on which it is approved by the college dean. Students should check with their college office to find out who is authorized to grant approvals or exceptions on behalf of the dean.

If students complete the withdrawal procedure, the courses they are taking will not be included on their permanent record nor counted as part of their drop allowance. Half semester courses completed prior to withdrawal will be included on their permanent record. Incompletes will not be accepted for withdrawals.

Withdrawal procedures must be followed otherwise instructors of the courses involved will assign whatever grades or marks they consider appropriate. Since these grades may be Fs, students are warned that failure to follow the prescribed withdrawal procedures may adversely affect a later application for reentry or transfer to another institution.

**University-Initiated Withdrawal**

**Basis for Interim or Permanent Medical Withdrawal**

The University may order involuntary withdrawal of a student if it is determined that the student is suffering from a mental disorder as defined by the current American Psychiatric Association Diagnostic Manual such that the disorder causes, or threatens to cause, the student to engage in behavior which poses a significant danger of causing imminent harm to the student, to others or to substantial property rights, or renders the student unable to engage in basic required activities necessary to obtain an education.

**Status of Conduct Proceedings**

If the student has been charged with violation of the Conduct Code, but it appears that medical reasons exist for the objectionable behavior, this medical withdrawal policy may be activated prior to issuance of a determination in the conduct process. If the student is ordered medically withdrawn from the University, such action terminates the pending disciplinary action. If the student is found not to be subject to medical withdrawal under this section, conduct proceedings may be reinstated.

**Interim Action**

The OJA (Office of Judicial Affairs) Administrator or the Dean of students may order interim medical suspension of a student where there appears to be an imminent threat of harm to self or others. If the student is suspended, within 48 hours of ordering interim medical suspension, the Dean of Students will schedule an interim hearing before the Medical Withdrawal Committee, consisting of the Director of Student Health (or designee), the Director of the Student Counseling Service (or designee), and the Dean of Students. The student and the OJA Administrator will have an opportunity to present information as to whether interim medical suspension should be continued or modified, and whether medical withdrawal should be considered.

The Medical Withdrawal Committee may order the student to be referred for an evaluation by a licensed mental health professional of the University's choosing if there is adequate reason to believe that a basis for medical withdrawal exists. The order of referral must be sent to the student and notify the student of the scheduled evaluation to occur no later than seven days from the date of the referral letter. The University will cover the cost of the evaluation. If a student fails to complete the evaluation, the University may continue interim medical suspension and may order restrictions on campus access until the evaluation is completed and reviewed by the University. The decision to continue interim medical suspension and for referral may be appealed within 48 hours, in writing, to the Vice President for Student Affairs. The student may be assisted by any two individuals of his or her choice in any hearing or appeal.

**Involuntary Medical Withdrawal**

If the medical evaluation supports medical withdrawal, a hearing will be scheduled before the Dean of Students, the Director of Student Health and a member of the Student Counseling staff. The student will have at least 48 hours to independently review the psychological or psychiatric evaluation prior to the hearing. The student and the OJA Administrator may present arguments for or against involuntary Medical Withdrawal. A written decision shall be rendered by the Medical Withdrawal Committee stating the reasons for its determination. The decision may be appealed, in writing to the Vice President for Student Affairs. A student who has undergone involuntary medical withdrawal must reapply, and may not reenter the University without providing competent medical evidence that the medical condition no longer exists, or is sufficiently under treatment so as to remove any substantial likelihood of recollection of the condition which caused medical withdrawal. The University may require the student, at the student's cost, to undergo a medical evaluation by a licensed mental health professional of the University's choosing. A medical withdrawal is not considered a disciplinary action, though a prior medical withdrawal may be considered in subsequent conduct hearings involving the student.

**Tuition and Fees Adjustments for Withdrawals**

Tuition and fees adjustments are made for withdrawals according to the following schedule for full term courses (appropriate adjustments will be made when partial term courses are involved):

<table>
<thead>
<tr>
<th>Withdrawal Date</th>
<th>Student Servs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days 1-8</td>
<td>10%</td>
</tr>
<tr>
<td>Days 9-20</td>
<td>50%</td>
</tr>
<tr>
<td>Days 21-40</td>
<td>75%</td>
</tr>
<tr>
<td>After 40th class day</td>
<td>100%</td>
</tr>
</tbody>
</table>

Students may appeal a tuition and fees assessment for withdrawal by obtaining a "Procedures for Appealing Assessed Tuition" form from the fees section in the Office of the Registrar. The Office of the Registrar will review appeals for possible tuition and fees adjustment for the semester in question only after the written appeal and appropriate support documentation are received from the student. Determinations will be made by the Office of the Registrar based on extenuating circumstances beyond the control of the student. The results will be sent to the student in writing.

Students may appeal the decision of the Office of the Registrar by writing an appeal letter to the Tuition Appeals Review Committee. This letter should be submitted to the Office of the Registrar within 10 calendar days after receiving the original decision. A final appeal of the Tuition Appeals Review Committee decision can be made by submitting a request in writing to the Office of the Provost.

**Room and Board Fee Refund**

Refund of the unused portion of the contract is based on the daily rate of the remaining room and board fee. If fees have been paid, a refund will be authorized. If fees have not been paid, a charge will be made for the used portion of the contract. A refund is not authorized for any student who leaves the residence halls after December 1 in fall semester or May 1 in spring semester.

Any student living off campus who has contracted for the meal plan to eat in a residence hall dining room and later terminates the contract will be refunded as above.

**Returning/Reentry to the University**

U.S. students who have been absent from Iowa State University less than 12 months may be admitted as a returning student. If more than 12 months have elapsed, a U.S. student must apply for reentry to the University. All international students must apply for reentry regardless of the time away from the university.

**Returning Students**

U.S. undergraduate and nondegree undergraduate students planning to return to Iowa State University after an absence of less than 12 months do not complete a reentry form;
however, international undergraduate and nondegree undergraduate students planning to return to Iowa State University after an absence of less than 12 months must complete a reentry form.

Returning U.S. students and graduate students should contact the Office of the Registrar to have their records updated and registration access created. Students should contact their advisers or major professor to select courses and begin the registration process.

Returning students who want to change their curricula should follow the same procedure as in-school students. Students who were dropped from enrollment at Iowa State University must obtain reinstatement by the Academic Standards Committee of the college that initiated the drop. (See below for policies that apply to requests for reinstatement.)

**Reentry Approval Process**

Generally, a request to reenter Iowa State University will be approved within the Office of the Registrar. However, the Office of the Registrar will refer the reentry form to the college to which a student plans to return if the student: (a) desires to change curriculum; (b) has a previous Iowa State University cumulative grade point average below 2.00; (c) was dropped from the university for unsatisfactory academic progress or was not otherwise in good standing; or (d) since leaving Iowa State University, has completed additional college study with less than a 2.00 grade point average. Also see Index, Reinstatement.

**Reentry Students**

Undergraduate and nondegree undergraduate (special) students who plan to attend Iowa State University after an absence of twelve months or more must complete a reentry form. Forms are available from www.iastate.edu/~registrar/info/reentry.html

Students with a bachelor’s degree who plan to take supporting graduate level coursework prior to applying for graduate degree admission should request a nondegree graduate admission application.

Students who have previously attended Iowa State University only as nondegree (special) students and who now seek to earn an undergraduate degree should request an undergraduate application.

International students must complete a reentry form. Forms are available from www.iastate.edu/~registrar/info/reentry.html. Financial certification of ability to cover all educational and living expenses will be required.

The reentry form should be completed and returned to the Office of the Registrar, 0460 Beardshear, well in advance of the term of reentry. Students who have attended another college or university since enrollment at Iowa State University must have an official transcript(s) of all course work attempted sent to the Office of Admissions, 100 Alumni Hall. Reentering students must also contact their departmental office/adviser to prepare a class schedule. Reentry must be approved prior to registration.

Iowa State University requests the information on the reentry form for the purpose of making a reentry decision. If the required information is not provided, the university may not consider the request to reenter.

In order to go on a field trip, students must first obtain permission from the instructors whose classes they will miss. If permission to miss class is not granted, students cannot be required to go on the field trip nor can they be penalized for missing the trip.

Special fees are often charged to cover the costs of field trips. Field trip fees are noted in the Schedule of Classes.

**Ownership of Course-related Presentations**

The presenter owns course-related presentations, including lectures. Individuals may take written notes or make other recordings of the presentations for educational purposes, but specific written permission to sell the notes or recordings must be obtained from the presenter. Selling notes by students without the required permission is a violation of the Student Disciplinary Regulations.

**Recording and Transmission of Classes**

Recordings and transmission of classes may take place for a variety of legitimate reasons, including providing educational opportunities for those who cannot attend classes on campus, assisting students with disabilities that impair classroom notetaking, and giving the instructor feedback on his or her classroom performance.

Because the lectures of faculty represent their intellectual labors, individuals are expected to request permission to make recordings of lectures and other classroom interactions.

Recordings may be used for the purposes of the particular class, although in some cases the recordings may be preserved and used for other classes as well.

**Credit Involving a Paid Activity**

Students may obtain credit for an activity, either on- or off-campus, for which they are also paid, provided the activity is academically relevant. In order for an activity to be defined as academically relevant, prior arrangements for receiving credit must be made with a faculty member in an appropriate department. The arrangements must include agreement on (1) the academic objectives which the activity is expected to achieve, and (2) the procedure by which the student’s learning will be assessed. This policy does not apply to registrations for R credit.

**Academic Dishonesty**

Academic dishonesty occurs when a student uses or attempts to use unauthorized information in the taking of an exam; or submits as his or her own work themes, reports, drawings, laboratory notes, or other products prepared by another person; or knowingly assists another student in such acts or plagiarism. Such behavior is abhorrent to the university, and students found responsible for academic dishonesty face expulsion, suspension, conduct probation, or reprimand. Instances of academic dishonesty ultimately affect all students and the entire university community by degrading the value of diplomas when some are obtained dishonestly, and by
lowering the grades of students working honestly.

Examples of specific acts of academic dishonesty include but are not limited to:

**a. Obtaining unauthorized information.** Information is obtained dishonestly, for example, by copying graded homework assignments from another student, by working with another student on a take-home test or homework when not specifically permitted to do so by the instructor, or by looking at your notes or other written work during an examination when not specifically permitted to do so.

**b. Tendering of information.** Students may not give or sell their work to another person who plans to submit it as his or her own. This includes giving their work to another student to be copied, giving someone answers to exam questions during the exam, taking an exam and discussing its contents with students who will be taking the same exam, or giving or selling a term paper to another student.

**c. Misrepresentation.** Students misrepresent their work by handing in the work of someone else. The following are examples: purchasing a paper from a term paper service; reproducing another person’s paper (even with modifications) and submitting it as their own; having another student do their computer program or having someone else take their exam.

**d. Bribery.** Offering money or any item or service to a faculty member or any other person to gain academic advantage for yourself or another is dishonest.

**e. Plagiarism.** “Unacknowledged use of the information, ideas, or phrasing of other writers is an offense comparable with theft and fraud, and it is so recognized by the copyright and patent laws. Literary offenses of this kind are known as plagiarism.” One is responsible for plagiarism when: the exact words of another writer are used without using quotation marks; the words of another are summarized or paraphrased without giving the credit that is due; the ideas from another writer are borrowed without properly documenting their source. Acknowledging the sources of borrowed material is a simple, straightforward procedure that will strengthen the paper and assure the integrity of the writer. The *English 104-105 Student Manual*, provides guidelines to aid students in documenting material borrowed from other sources, as does almost every handbook on writing style. Academic dishonesty is considered to be a violation of the behavior expected of a student in an academic setting as well as a student conduct violation. A student found responsible for academic dishonesty or academic misconduct is therefore subject to appropriate academic penalty; to be determined by the instructor of the course, as well as sanctions under the university *Student Disciplinary Regulations*.

If an instructor believes that a student has behaved dishonestly in a course, these steps are to be followed:

1. The instructor should confront the student with the charge of dishonesty and arrange a meeting with the student to discuss the charge and to hear the student’s explanation.

2. If the student admits responsibility for academic misconduct, the instructor shall inform the student (a) of the grade on the work in which the dishonesty occurred, and (b) how this incident will affect subsequent evaluation and the final grade.

Because academic dishonesty is also a student conduct violation under Section 4.2.1 of the Student Disciplinary Regulations, the instructor must report the incident in writing to the Dean of Students. After investigating the incident and discussing it with the instructor, the Dean of Students, or his/her designee, will meet with the student and depending on the severity of the offense as well as on the student’s past conduct record, may handle the matter through an administrative hearing or schedule a hearing before the All University Judiciary (AUJ). This hearing, conducted according to the procedures outlined in the *Student Disciplinary Regulations*, is to determine the disciplinary action to be taken. In any case, the student’s academic adviser will be informed of the incident but may not insert any record of it in the student’s academic file.

3. If the student claims to be not responsible for the alleged violation of academic misconduct, the instructor may not assign the student a grade for the work in question until the question of responsibility is resolved, unless circumstances require that an interim grade be assigned. The instructor shall consult with his or her department chair and report the incident in writing to the Dean of Students.

The Dean of Students will refer the case to the Office of Judicial Affairs for investigation. After reviewing the report and completing an investigation, the Office of Judicial Affairs will file a formal complaint against the student if it is determined that there is cause to believe academic misconduct occurred. The case may be adjudicated through an administrative hearing or referred to a hearing before the All University Judiciary (AUJ) depending on the nature and severity of the violation as set forth in the *Student Disciplinary Regulations*.

If the case is referred to the AUJ both the student and instructor will be invited to attend an AUJ hearing and present pertinent information. If the Administrative Hearing Officer (in a minor case) or the AUJ (in a major case) finds the student responsible for the charge of academic misconduct, the instructor will inform the student (a) of the grade on the work in which the dishonesty occurred, and (b) how this incident will affect subsequent evaluation and the final grade. The Administrative Hearing Officer or AUJ will determine the appropriate disciplinary action with respect to the nature of the violation.

If the Administrative Hearing Officer or AUJ finds the student “not responsible” for academic misconduct, the instructor will grade the student accordingly on the work in question and the student’s grade in the course will not be adversely affected. If the student is found responsible the student’s adviser will be informed of the decision but shall not insert any record of the action in the student’s academic file.

4. If a student either admits dishonest behavior or is found responsible for academic misconduct by the AUJ, the Office of Judicial Affairs (OJA) or AUJ may impose any of the following sanctions:

   **a. Disciplinary Reprimand**
   
   An official written notice to the student that his/her conduct is in violation of university rules and regulations.

   **b. Conduct Probation**
   
   A more severe sanction than a disciplinary reprimand, to include a period of review and observation during which the student must demonstrate the ability to comply with university rules, regulations, and other requirements stipulated for the probation period.

   **c. Suspension Deferred Suspension**
   
   The suspension is deferred subject to a definite or indefinite period of observation and review. If a student is found responsible for a further violation of the University *Student Disciplinary Regulations* or an order of a judiciary body, suspension will take place immediately.

   **• Defined Length**
   
   The student is dropped from the university for a specific length of time. This suspension cannot be for less than one semester or more than two years.

   **• Indefinite Suspension**
   
   The student is dropped from the university indefinitely. Reinstatement may be contingent upon meeting the written requirements of the AUJ and the student’s status. Normally, a student who is suspended indefinitely may not be reinstated for a minimum of two years.

   **d. Expulsion**
   
   The student is permanently deprived of the opportunity to continue at the University in any status.

5. A student accused of academic misconduct has the option to stay in the class or to drop the class if the drop is made within the approved time periods and according to the regulations established by the University. If the student chooses to drop the class, the student will be required to sign a statement of understanding that if the student is later found responsible for academic misconduct, then the student will receive an “F” for the course.
6. Procedures for appeal of either the All University Judiciary's conduct decision or the instructor's grade are outlined in the Student Information Handbook.

7. In instances in which the student admits responsibility or is judged to be responsible by OJA or the AUJ, a staff member of the Dean of Students Office will counsel with the student in an effort to deter any further such incidents.

8. Student records concerning academic dishonesty are maintained in the Dean of Students Office for a period of seven years, after which the file records are purged. These student records are confidential; nothing from them appears on a student's academic transcript.

9. In the event that an instructor is uncertain how to handle an incident of suspected academic dishonesty, the Dean of Students is available at any time to provide advice and assistance to the instructor in deciding a proper course of action to be taken.

10. Students enrolled in the College of Veterinary Medicine are bound by an honor code. A charge of academic dishonesty may be made by a student or instructor to the Interclass Honor Board chairperson according to the procedures outlined in the Honor Code, or the instructor may follow procedures outlined above. The Interclass Honor Board functions as the judiciary of the College of Veterinary Medicine for the allegations presented to it.

Other violations related to academic misconduct may include subsection 4.1.11 Misuse of Computers and subsection 4.2.20 Unauthorized Sale of Others' Intellectual Works. These subsections are located in the Iowa State University Student Disciplinary Regulations under section 4 of the Conduct Code.

Progressing Toward a Degree

Classification
An indication that a student is making progress toward a degree is the change in classification. Classification is determined by the number of credits completed and reported to the registrar, and is based on credit hours earned, not merely hours attempted. The grades F and NP and the marks I and X do not count in this classification system.

Classification in all colleges except Veterinary Medicine is as follows:

Sophomore: 30 credit hours earned
Junior classification: 60 credit hours earned
Senior classification: 90 credit hours earned

Students who have a bachelor's degree and are working toward another undergraduate degree, licensure, or admission to a specific graduate or professional program, may be classified as a senior.

Transfer students without a degree are classified on the basis of credits accepted by Iowa State University.

Veterinary medicine students are promoted from the first- to the second-, third-, and fourth-year classes based upon satisfactory completion of the required courses for each year. To be promoted to the second-year class, students must have a cumulative grade-point average of at least 1.67 for all courses in the first year of the veterinary medicine curriculum. To be promoted to the third- and fourth-year classes, students must have a cumulative grade point average of at least 2.00 for all courses in the professional curriculum.

A student who is attending Iowa State and decides not to work toward an undergraduate degree, will be classified as a special student. Admission requirements and academic standards regulations are the same as regular students. Credits taken as a special student are applicable for undergraduate degree purposes if the student is admitted later as a regular undergraduate. Credits obtained as a special student may not, however, be applied toward a graduate degree.

Students enrolled in the Intensive English and Orientation Program (IEOP) are classified as special students in the College of Liberal Arts and Sciences and usually are not permitted to enroll in academic courses until they have satisfied requirements for admission as regular students. Permission to enroll in one academic course may be granted under special circumstances.

Transfer of Credits
Credits presented from another institution are evaluated initially by the Office of Admissions to determine whether the courses are acceptable for transfer credit. Credits applied toward a degree will be determined by the student's college, based on relevance to the students' program requirements as well as the level of performance deemed necessary for successful progress in that program. Courses that are deemed important to a program but were earned with less than a C grade may or may not be approved for a program. This policy also applies to students already enrolled at Iowa State University. Grades earned in courses transferred to Iowa State University will not be used in calculating a transfer student’s Iowa State cumulative grade point average.

A student who is admitted as a transfer from another college or university is required to have at least a 2.00 cumulative grade-point average for all transferable work taken elsewhere. If, due to special circumstances, a student is admitted with less than a 2.00 average, that student has a transfer quality-point deficiency. This deficiency will be added to any deficiency accumulated at Iowa State University and will be used to determine whether satisfactory progress toward a degree is being made. To graduate, students must earn sufficient quality points above a 2.00 at Iowa State University to offset any transfer quality-point deficiency.

Students should consult with their academic advisers and the Office of Admissions before taking coursework at other colleges and universities to be certain it will be applicable to their program of study. Students who believe that any transfer credits have not been correctly evaluated should consult with their academic adviser and with the Office of Admissions. Questions concerning transfer credits applied toward a degree program should be referred to the academic adviser and college office.

No more than 65 semester or 97 quarter credits earned at two-year colleges can be applied to a bachelor's degree from Iowa State University. While there is no limit to the number of credits that may be transferred from a four-year institution, the last 32 semester credits must be completed at Iowa State University.

Iowa State University students who attend one of the other Iowa Regent universities under the Regent Universities Student Exchange Program will have the credits earned at the other university counted as resident credit and grades received included in their Iowa State University cumulative grade point average. For information on applying to the program see Index, Regent Universities Student Exchange Program.

Degree Planning
In addition to being properly registered, students are responsible for knowing the requirements for their degree and planning their schedule to meet those requirements. Each college has a procedure to determine whether a student will fulfill all degree requirements for graduation.

At each fall and spring registration, students receive an advisement/degree audit printout. This printout shows in a degree program format those courses that have been completed and those courses in which the student is currently enrolled. Also shown are the graduation requirements that have not been completed.

Students should use the information on this printout to help them select courses for the next term and to evaluate their progress toward their degree. Graduation evaluators in the Office of the Registrar use a similar printout during the term a student will graduate to evaluate a student's graduation status.

For information about how completed courses fulfill degree requirements or how other courses will apply toward their degree requirements, students should see their adviser.

Two Bachelor's Degrees
Students may receive two bachelor's degrees if the requirements for each major (curriculum) are met and the total number of semester credits earned is at least 30 more than the requirements of the curriculum requiring the greater number of credits. The same rule applies to degrees that are not awarded at the
same time. Students should have an academic adviser in each major (curriculum), with one adviser being designated as the registration adviser. Students should request approval to pursue two degrees by completing the form, Request for Double Major/Curriculum or Two Degrees. This form is available from advisers and classification offices. Each adviser will have access to the student’s information after this form has been processed. The appropriate department and college must approve each degree program.

Students who have earned advanced degrees and wish to earn a second Bachelor’s Degree may be eligible for a college waiver of certain basic and general education requirements. Students should contact the department offering the major for advice and appropriate planning.

**Double Major/Curriculum**
A double major is a program for a single degree in which all requirements for two or more majors (curricula) have been met. The majors (curricula) may be in different colleges or within the same college or department. The diploma and permanent record will designate all majors (curricula) that are completed at the same time.

To declare a double major (curriculum), students should complete the form, “Request for a Double Major/Curriculum or Two Degrees.” This form, available from advisers and classification offices, should be completed no later than the beginning of the senior year. One major (curriculum) should be designated as primary and the other secondary for purposes of record keeping, but the student’s rights and responsibilities are the same in both majors. The adviser of the primary major will serve as the student’s registration adviser, but both advisers will have access to the student’s information. Degree programs must be approved for each major (curriculum) by the appropriate department and college. One of the majors may subsequently be canceled using the same form.

In addition to their engineering degree, students in the College of Engineering may earn majors in other colleges of the university. A major must meet all requirements of the offering department or program and its college and contain a minimum of 15 additional credits beyond the requirements for a B.S. degree in engineering for each major area of study. Within the College of Engineering, only double degrees are permitted. Students with a primary major in another college who wish to take a second major in the College of Liberal Arts and Sciences are not required to meet the Liberal Arts and Sciences General Education requirements. They must, however, meet all requirements for the major, including complementary courses. Students in the B.S. curriculum in the College of Liberal Arts and Sciences do not have majors.

**Second Major (Curriculum) Completed after the Bachelor’s Degree**
After receiving a bachelor’s degree, a person may wish to complete all requirements for another major (curriculum). Approval of the department of the second major (curriculum) is needed before study for the program is begun. At the completion of the program a notation will be made on the permanent record (transcript), but no change will be made on the diploma received at the time of graduation. A degree program must be approved for the second major/curriculum by the department and by the dean’s office.

**Changing Curriculum or Major**
A student’s freedom to change their major, and the procedure that should be followed, depend on the student’s academic standing as well as on policies of individual colleges as approved by the provost.

1. If students are not on temporary enrollment and have never been dismissed and reinstated, they may change their major by consulting first with their adviser. (If, however, they have been on temporary enrollment in the past, they may also be subject to regulation 4, below.) Beyond that, they should follow these procedures:
   a. If the change involves majors within the same college, they should check with the college office to obtain instructions as to how to make the change.
   b. If the change involves majors in different colleges, they should obtain a Change of Curriculum/Major form and their file from their adviser, present these materials to the classification office of their present college, then to the classification office of the college to which they are transferring, and finally to the office of their new major.

2. Students on temporary enrollment must first obtain permission to enter the new major. Permission comes from the dean of the college responsible for that major in consultation with the department head. If permission is granted, students should then follow the procedures described above. If they are on temporary enrollment and want to transfer to another college in the university, they must do so before the last day to drop a course in period 2 (see Index, Making Schedule Changes).

3. Students who have been reinstated may not transfer to another college during the first term following reinstatement, and they may not at any time transfer back to the college that originally dismissed them without the permission of the academic standards committee of that college.

4. Students who transferred from one college to another while on temporary enrollment, may not transfer back unless they have the permission of the academic standards committee of the college from which they originally transferred.

**Declaring a Minor**
Many departments and programs in the university specify requirements for an undergraduate minor. A record of requirements completed appears on students’ transcripts. All minors require at least 15 credits, including at least 6 credits in courses numbered 300 or above taken at Iowa State. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement. Courses taken for a minor may not be taken on a pass-not pass basis. For additional information regarding policies which govern minors, see Index, Minor. To declare a minor, students must submit a completed Request for a Minor form to their college office at least one term before graduation. The minor may be from the catalog under which the student is graduating or a later catalog.

**Graduation**
Seniors must file a graduation application with the Graduation Office, 10A Alumni Hall, by the Friday of the first week of classes for students who plan to graduate in fall and spring semesters, and the last day of spring semester for students who plan to graduate in summer. Applications may be obtained from the adviser: college office; www.iastate.edu/~registrar/forms; the Student Answer Center, or the Graduation Office, 10A Alumni Hall. Students will be notified by mail approximately four weeks after the semester begins of their graduation status.

Individual college ceremonies take place at the end of fall and spring semesters. The formal commencement ceremony for graduate students takes place on the Friday at the end of the semester, and the undergraduate ceremony takes place on Saturday. A combined undergraduate and graduate college commencement ceremony takes place at the end of the summer term.

Final grade checks will be made approximately two weeks after the end of the semester and diplomas will be mailed to all successful degree candidates.

Students must ensure the following before they can graduate:

1. Registration for the term has been completed and the date of graduation is correct on the advisement/degree audit printout.

2. Sufficient credits, acceptable toward graduation, have been earned to meet the minimum requirements for their curriculum. (Some examples of credit not acceptable toward graduation are: elective credits beyond those allowed in a curriculum, credits earned in passing the same course more than once, more than four credits of Athletics 101, and credit in two courses for which the catalog states that only one may count toward graduation.)

3. Their major department has certified that the student has achieved an adequate level of proficiency in written communication.
4. A cumulative grade point average of at least 2.00 was earned in all work taken at Iowa State and have also met any special grade point averages required by their college, department, or program in specified groups of courses.

   a. Students admitted from another college or university with a quality-point deficiency, must have earned sufficient quality points above a 2.00 at Iowa State to offset their transfer grade point deficiency.

   b. Students who have taken work at another college or university prior to or after having been a student at Iowa State, must have submitted a transcript of all such college study attempted to the Office of Admissions. This work must average 2.00 or the deficiency of quality points will be assessed against the student. Failure to submit such a transcript is grounds for dismissal.

5. Incompletes in courses required for graduation have been removed by midterm of the term of graduation.

6. At least 32 credits have been earned in residence at Iowa State University, and the final 32 credits were taken at Iowa State. (Six of the last 32 credits may be transferred to Iowa State, with prior written permission of their major department.) Iowa State University must receive a transcript of all transfer work by midterm of the term of graduation.

7. Outstanding financial obligations owed the university have been paid in full. Students who owe an outstanding obligation to the university will have a hold placed on their records and they will not receive their diploma or transcript. If students have questions about this policy, they should contact the graduation section of the Office of the Registrar, 10A Alumni Hall.

**Evaluation of Academic Progress**

**Evaluation Procedures**

It is university policy that the instructor shall inform the students at the beginning of each course of the evaluation procedures planned for use in the course.

**Retention of Records**

Records of all graded work must be retained by the instructors until midterm of the semester following completion of a course or until all pending appeals and incompletes are resolved, whichever is later. Instructors leaving the university must file test and grade records with their department office before departure.

**Examinations**

Examinations are one of the most important ways an instructor assesses students' performance in a course. In order that examinations can be a useful part of the educational process, the following policies have been instituted:

1. One purpose of examinations is to help students' learning activity. Therefore, examinations shall be evaluated as soon as possible after they are given and the results shall be made available to the students.

2. All tests and examinations administered between the beginning of the term and final examination week shall be held during a regularly scheduled lecture or laboratory class period for that course. A department may request permission to administer a separately scheduled examination if all of the following criteria are met: (a) the course is multi-sectioned; (b) a common departmentally developed examination will be administered to all students in all sections at the same time; and (c) the test scores will be used as a basis for a uniform grading procedure for all sections of the course. Requests to hold separately scheduled examination must be made to the registrar and approved by the provost in time to be announced in the Schedule of Classes. Whenever a separately scheduled examination is administered, a regular class meeting during that week shall be omitted. Students who are unable to take a separately scheduled examination at the scheduled time because of a course conflict or other legitimate reason must notify the instructor in advance and must be given the opportunity to be examined at another time mutually convenient for the student and the instructor; the instructor shall determine whether to administer the same examination or an alternate examination, or use an alternate assessment procedure.

3. At the end of the semester, a week is set aside for final examinations or other term evaluations, with a period normally of two hours scheduled for each course. The following policies govern the responsibilities of students and faculty members during this week:

   a. Final exams in courses of two or more credits may not be given at a time other than that for which the exam is scheduled by the registrar. An instructor may not give a final exam prior to final exam week nor change the time of offering of the final examination as it appears in the final exam schedule.

   Permission to change the time for which an exam is scheduled may be given only by the dean of the college. If the instructor elects not to give a final exam, the class is required to meet at the scheduled final exam period for other educational activity such as a review of the course or feedback on previous exams.

   b. Final exam periods are determined according to the regularly scheduled meeting time of the class. However, certain courses are assigned special group exam times so that several sections of the same course may be tested together. If this results in conflicting group examination periods, students should inform the instructor in charge of the first of the two conflicting classes as listed on the final exam schedule within the special groups in question; that instructor is responsible for arranging a special examination or making some other adjustment.

   c. The final exam for a class that regularly meets in the evening must be held at the time the class would normally meet during the final exam week. If this exam conflicts with an evening group exam, the instructor responsible for the latter must arrange a special examination for any students who have a conflict.

   d. If unusual circumstances involve the need for students to change the time of their final examination, they must obtain the approval of the instructor of the course.

   e. If a student has three examinations scheduled on the same calendar day and wishes to change one to another day, the instructor of the course having the smallest number of students is responsible for arranging an alternate examination time for the student unless make-up exam times are available in one of the other courses.

   f. All faculty members are considered to be on duty throughout the entire final examination week and are expected to be available to students during that week for discussion of any matters pertaining to the final examination and final grade or to other aspects of the course.

**Dead Week**

The last week of fall and spring undergraduate classes has been designated Dead Week by the Government of the Student Body and Iowa State University. The intent is to provide students with time for review and preparation for final examinations. Therefore, no student organization registered with the Student Organization Office may hold meetings or sponsor events without the expressed permission of Program Coordinator of the Dean of Students Office. For academic programs, the last week of classes is considered to be a normal week in the semester except that in developing their syllabi faculty shall consider the following guidelines:

1. Mandatory final examinations in any course may not be given during Dead Week except for laboratory courses and for those classes meeting once a week only and for which there is no contact during the normal final exam week. Take-home final exams and small quizzes are generally acceptable. (For example, quizzes worth no more than 10 percent of the final grade and/or that cover no more than one-fourth of assigned reading material in the course could be given.)

2. Major course assignments should be assigned prior to Dead Week (major assignments include major research papers, projects, etc.). Any modifications to assignments should be made in a timely fashion to give students adequate time to complete the assignments.

3. Major course assignments should be due no later than the Friday prior to Dead Week. Exceptions include class presentations by students, semester-long projects such as a design project assignment in lieu of a final, and extensions of the deadline requested by individual students. Instructors are reminded that most students are enrolled in several
courses each semester, and widespread violation of these guidelines can cause student workloads to be excessive as students begin their preparation for final examinations. Students are reminded that their academic curriculum is their principal reason for being in college and they have a responsibility to study in a timely fashion throughout the entire semester.

The Grading System

Grades represent the permanent official record of a student's academic performance. The grading system at Iowa State operates according to the following regulations:

1. Student performance or status is recorded by the grades and marks described below. A student's grade point average is calculated on the basis of credits earned at Iowa State with the grades and quality points shown below. Credits earned with P, S, or T are not used in calculating the grade point average but may be applied toward meeting degree requirements. A cumulative grade point average of 2.00 is required for a bachelor's degree.

   Grades | Quality Points  
   --- | ---  
   A | 4.00  
   A– | 3.67  
   B+ | 3.33  
   B | 3.00  
   B– | 2.67  
   C+ | 2.33  
   C | 2.00  
   C– | 1.67  
   D+ | 1.33  
   D | 1.00  
   D– | 0.67  
   F | 0.00  

P—Passing mark obtained under the Pass-Not Pass system. See Index, Pass-Not Pass.

NP—Non-passing mark obtained under the Pass-Not Pass system. See Index, Pass-Not Pass.

S—Satisfactory completion of a course offered on a Satisfactory-Fail grading basis. May also be reported to indicate satisfactory performance in R (required-credit) courses, and in courses numbered 290, 490, 590, and 690.

T—Satisfactory performance (equivalent to a grade of C or better) in courses numbered 100-599) in a special examination for academic credit.

X—The course was officially dropped by the student after the first week of the term.

N—No report was submitted by the instructor. This is not a recognized grade or mark; it merely indicates the instructor has not submitted a grade and that a grade report has been requested.

I—Incomplete. An incomplete mark may be assigned when the student is passing at the time of the request, but special circumstances beyond the student's control prevent completion of the course. In general, failing the final exam or project or not submitting course work as a result of inadequate preparation or learning are not valid excuses.

The student and instructor must complete and sign an incomplete contract (Incomplete Mark Report form) that states the reason for the I, the requirements for resolving it, and the date by which it must be resolved, not to exceed one calendar year. The instructor then enters an I on the final grade report, attaches the form to the report, and submits both to the registrar.

If the student is not available at the end of the term to sign the Incomplete Mark Report form because of ill health or other reasons, the instructor may assign an incomplete mark and submit the form without the student's signature. The Office of the Registrar will record the incomplete mark and mail a copy of the form to the student. If the student chooses not to accept the incomplete, the student has until midterm of the following semester to contact his or her instructor and request a grade be submitted to the registrar. If the student has not contacted the instructor by midterm, the student must resolve the incomplete according to the conditions set forth in the Incomplete Mark Report form.

When a student completes the requirements specified on the Incomplete Mark Report form, the instructor submits the appropriate grade, which becomes part of the student's cumulative, but not term, grade-point average. The grade does not replace the I on the record. The I remains on the record for the applicable term.

A final course grade, once submitted to the registrar, may not be changed to an Incomplete except to correct an error at the request of the instructor and with the approval of the instructor's department head and the dean of the instructor's college. The instructor should send a card (Grade Report to the Registrar) reporting the change, and an Incomplete Mark Report form to the appropriate dean who will forward them to the registrar if the change is approved.

Incompletes in all courses must be resolved by the middle of the student's term of graduation. Repeating a course will not resolve an I mark. A mark of I will automatically change to a grade of F after one calendar year (whether or not the student was enrolled during the period).

2. To change a grade or mark already reported to the registrar, the instructor submits a change card (Grade Report to the Registrar). This card is used for resolving an I with a grade, for correcting an instructor error, or for the late report of a grade.

3. Midterm Grades. The registrar will collect C-, D, and F midterm grades and nonattendance notifications and report this information to students and their advisers using AccessPlus. In addition to returning the midterm list, the instructor is responsible for informing the class of the basis on which midterm grades have been submitted.

4. Grades in all courses attempted remain on each student's record. If a course is repeated, the record will show the grade obtained on the initial attempt as well as grades received on subsequent attempts.

5. The cumulative grade point average is calculated by dividing the total number of quality points earned by the total number of credits in all courses attempted. Grades of S, P, NP, and T are not counted in calculating the grade point average. If a course is repeated, the cumulative grade point average is calculated according to the process described in item 6a below.

6. Repeating Courses.

a. The most recent grade for a course a student repeats will be used in computing the student's cumulative grade point average rather than the previous grade(s), up to a limit of 15 credits. (This could result in a lowered grade point average if the second grade is lower than the first, or even loss of credit if the grade is lowered to an F) All grades will remain on the student's record.

b. Students may repeat any course for which an F grade or any passing grade except P or S was received, but they may not elect to repeat the course under the Pass-Not Pass system.

c. Beyond 15 credits of repeats, both grades will be included in computing the cumulative grade point average.

d. Courses should be repeated as soon as possible, preferably within three semesters in residence, because of changes that occur with course updating, change in course number, or revision in number of credits. Approval to repeat a course after more than three semesters have elapsed must be noted on a Designation of Repeated Course form, which can be obtained from departmental offices. This form must be signed by the head of the department offering the course and by the student's adviser, and then taken to the Office of the Registrar. This form must also be used in cases in which the course number or number of credits has changed. Deadlines for filing repeated course forms for full-semester and half-semester courses are published in the university calendar.

e. Transfer students may repeat courses at Iowa State University for which a D or F was received at another institution. They must process a designated -repeat form indicating they are repeating the course to reduce a transfer deficiency. Such repeated credits will count toward the 15-credit request limit and will affect only their transfer deficiency.

f. A student who has earned an F at Iowa State University may repeat the course at another institution and the credits earned may be applied toward graduation at Iowa State, but the grade earned will not be used in computing a cumulative grade point average.

7. Students who want to protest a grade submitted by an instructor should follow the procedures described in the section on Appeal of Academic Grievances.
**Academic Progress**

Each college has an academic standards committee that is responsible for monitoring the academic progress of all undergraduate students in that college, based on policies and minimum requirements set by the Faculty Senate Committee on Academic Standards and Admissions and ratified by the Faculty Senate. Individual college faculties may, with the approval of the Faculty Senate Committee on Academic Standards and Admissions, set additional requirements that are not lower than those established for the university. These additional requirements must be reviewed at least every third catalog by the college academic standards committee to determine if they should be continued. Requirements approved by the college academic standards committees will then be forwarded to the Faculty Senate Committee on Academic Standards and Admissions for final approval.

The college committees are responsible for actions involving individual students with respect to placing students on temporary enrollment, dismissing students from the university for unsatisfactory academic progress, and reinstating students who have been dismissed. For questions concerning interpretation and application of the rules governing academic progress, students should contact the chair or secretary of their college academic standards committee in the administrative office of their college.

The university's academic standards rules are presented below. In addition to taking action based on these rules, a college academic standards committee may also place a student on temporary enrollment or dismiss a student from enrollment in the university when, in the college committee's judgment, the student's academic performance or progress toward a degree is exceptionally deficient. Likewise, a college committee may, under exceptional circumstances, exempt individual students from the application of these rules.

Students who participate in the Regent Universities Student Exchange Program, or in a similar program where the credit taken at the other school will be considered as resident credit and the grades included in the student's ISU cumulative grade point average, are subject to Iowa State University's academic standards.

**Temporary Enrollment Status and Academic Dismissal**

Students are placed on temporary enrollment status as a warning that their academic progress is not satisfactory and that they must improve their academic performance to avoid dismissal from the university. Students who are placed on temporary enrollment should immediately seek assistance in academic improvement from such sources as academic advisers, instructors, the Student Counseling Service, and the Academic Success Center.

Students may be admitted to Iowa State University on temporary enrollment or may subsequently be placed on temporary enrollment as a result of unsatisfactory academic performance. Students on temporary enrollment status who do not meet the minimum requirements described below will be dismissed from enrollment in the university.

Decisions regarding temporary enrollment and academic dismissal are based on the student's cumulative quality-point deficiency. The number of deficient quality-points is determined by subtracting the total number of ISU quality-points from twice the number of ISU credits attempted. If a student enters Iowa State University with a quality-point deficiency, this deficiency will be added to any deficiency accumulated at Iowa State University to determine the cumulative quality-point deficiency. Example: Assume a student has attempted 65 credit hours of coursework, and has a cumulative grade-point average of 1.80. This student needs 130 quality points (i.e., 65 credit hours x 2.00 points) in order to have a zero quality-point deficiency. The student currently has earned 117 quality points (i.e., 65 credit hours x 1.80 grade point average*). Thus, the student currently is deficient by 13 quality points (i.e., 130–117).

Assume the student must remove this 13 quality-point deficiency over the next 30 credit hours. The student would need to earn 73 quality points (i.e., 30 credit hours x 2.00 quality points = 60 quality points) in order to not add to the deficiency. Thus, a grade-point average of 2.44 (i.e., 73 quality points/30 credit hours) for the next 30 credit hours is needed to remove the deficiency.

Students who are placed, or continued, on temporary enrollment at the end of the spring semester may enroll for the summer term without being placed in jeopardy of academic dismissal from the university at the end of that summer term. However, the cumulative quality-point deficiency at the end of the summer term will be used for temporary enrollment decisions. This is true for all students enrolled in the summer term.

Students considered for academic dismissal at the end of spring semester will be permitted to enroll for the summer term. The cumulative quality-point deficiency at the end of the summer term will be used to determine whether the student should be permitted to continue. The individual colleges determine if students reinstated for the spring semester will be permitted to utilize the summer term option. (Reinstated students should also see the section on Reinstatement.)

1. Students with fewer than 90 credits attempted or earned,* whichever is greater, will be placed on temporary enrollment at the end of any semester or summer term when their cumulative quality-point deficiency equals 10 or more quality points. At the end of any term in which a student is on temporary enrollment, the student will be:
   - a. dismissed from enrollment in the university if the cumulative quality-point deficiency has increased;
   - b. continued on temporary enrollment if the cumulative quality-point deficiency has not increased but remains 10 or more;
   - c. removed from temporary enrollment if the cumulative quality-point deficiency is now less than 10.

2. Students with 90 or more credits attempted or earned,* whichever is greater, will be placed on temporary enrollment at the end of any semester or summer term when they have any quality-point deficiency. At the end of the term in which a student is on temporary enrollment, the student will be:
   - a. dismissed from enrollment in the university if the cumulative quality-point deficiency has increased;
   - b. continued on temporary enrollment if the cumulative quality-point deficiency has not increased but remains greater than zero;
   - c. removed from temporary enrollment if the cumulative quality-point deficiency has been removed.

3. A student on temporary enrollment may transfer to another college within the university only with the permission of the department chair of the new department and dean of the new college. Transfer during period 3 (after the last day to drop a course) may be approved by the department chair of the new department and dean of the new college only under exceptional circumstances. The student will be subject to any additional specific academic requirements determined by the academic standards committee of the college to which the transfer is made.

4. A student who has transferred from a college while on temporary enrollment cannot transfer back unless permission is granted by the academic standards committee of the original college.

5. A student on temporary enrollment who withdraws during period 3 will not be permitted to enroll the following term, except under extenuating circumstances as judged by the college academic standards committee.

**Additional Academic Progress Regulations**

Colleges, departments, or programs may have special grade point requirements for admission, continuation, or graduation. These are presented in connection with statements of college and department curriculum requirements.

1. Business: In addition to the requirements listed above, students enrolled in the College of Business with 60 or more credits attempted or earned,* whichever is greater, will be placed on temporary enrollment at the end of any semester when they earn less than a 2.00 grade point average for that semester.

Students placed on temporary enrollment under provisions of this requirement will be dismissed from enrollment in the College of
Business if they fail to achieve, for the following semester, at least a 2.00 semester grade point average.

Summer term grades will be combined with the student’s grades for the prior term to compute a single semester grade point average to be used for temporary enrollment and academic dismissal decisions. Credit hours and quality points will be combined for the purpose of obtaining the average. When courses are repeated, both grades will be used in this computation.

Students considered for academic dismissal at the end of a spring semester under provisions of the preceding paragraphs will be permitted to enroll for the following summer session.

Students who are dismissed from the College of Business must seek admission to another college before the beginning of the following semester to stay enrolled in the university. Proof of admission to another college must be presented to the College of Business by the last business day before the beginning of the following semester. Students who fail to do so will be dismissed from the university.

2. Design: In addition to the requirements listed above, students in the College of Design who have attempted thirty (30) credits or more will be placed on temporary enrollment at the end of any semester in which their cumulative grade point average falls below 2.00. Students placed on temporary enrollment under the provisions of this requirement will be dismissed from enrollment in the college if they fail to achieve, for the following semester, at least a 2.00 grade point average for that semester.

Summer term grades will be combined with the student’s grades for the prior term to compute a single semester grade point average to be used for temporary enrollment and academic dismissal decisions.

Students considered for academic dismissal at the end of a spring semester under provisions of the preceding paragraphs will be permitted to enroll for the following summer session.

Students who are dismissed from the College of Engineering with 60 or more credits attempted or earned, whichever is greater, will be placed on temporary enrollment at the end of any semester when they earn less than a 2.00 grade point average for that semester. Students placed on temporary enrollment under provisions of this requirement will be dismissed from enrollment in the university if they fail to achieve, for the following semester, at least a 2.00 semester grade point average.

Summer term grades will be combined with the student’s grades for the prior term completed to form a single semester grade point average to be used for temporary enrollment and academic dismissal decisions. Credit hours and quality points will be combined for the purpose of obtaining the average. When courses are repeated, both grades will be used in this computation.

Students considered for academic dismissal at the end of a spring semester under provisions of the preceding paragraphs will be permitted to enroll for the following summer session.

4. Veterinary Medicine: Additional rules for minimum satisfactory progress are in effect.

5. Special students: Students matriculated in this classification category are governed by the regular academic progress regulations. Furthermore, by special action of their college academic standards committee, additional standards may be required.

Reinstatement

The procedures delineated in this section apply to students who were dismissed from Iowa State for academic reasons. Students who left Iowa State in good academic standing and who are seeking reentry should see Index, Reentry for more information.

1. Reinstatement is not automatic. A student who has been dismissed for academic reasons should contact the Dean’s Office in the college he or she wishes to enter for instructions specific to that college. The college Academic Standards Committee reviews each petition and other relevant information, and reinstatement is based upon that review. The student must identify the causes of his or her poor academic performance, and demonstrate that he or she has taken actions to avoid or eliminate these causes. The student must submit a plan for academic success.

2. A student can only be reinstated when at least one academic semester has elapsed since he or she was academically dismissed. The summer session is not a semester for the purpose of being out of school one semester.

3. Students who have been dismissed from enrollment two or more times is not eligible for reinstatement until at least two academic semesters have elapsed since his or her last academic dismissal.

4. A student who was dismissed by one college and subsequently reinstated by another college cannot transfer back unless permission is granted by the Academic Standards Committee of the original college. This procedure applies regardless of the student’s current academic standing.

5. To be considered for reinstatement to the university, a student must file a reentry form and submit a petition to the Academic Standards Committee of the college in which she or he desires to enroll at least 45 days before the beginning of the semester. (A student dismissed for the second time and requesting reinstatement in the College of Liberal Arts and Sciences must submit his or her petition 70 days before the beginning of the semester.)

6. As conditions of reinstatement, a student will reenter on temporary enrollment, and must accept whatever additional requirements are stipulated by the college Academic Standards Committee. Some examples may include full- or part-time status, specified credit hours, specific courses, specific GPAs, restriction on choice of major, and required counseling. Other conditions may also be imposed.

Student Appeal

1. Students may appeal a decision regarding their academic status if they believe that new information can be provided or extenuating circumstances exist that would alter the application of any rule in this section. The appeal should be made in writing to the Academic Standards Committee of the college in which the student is enrolled. The written appeal must include the reasons for the appeal and the evidence to substantiate these reasons.

The student should initiate the appeal process by contacting the secretary of the college Academic Standards Committee in the administrative office of her or his college immediately upon receipt of notification of the committee’s action, and at least ten calendar days before the beginning of the semester. The secretary will then inform the student of the deadline for submission of the written appeal.

2. If the student is dissatisfied with the committee’s action, he or she may submit an appeal in writing to the dean of her or his college within seven calendar days. The dean must respond in writing within seven calendar days of receipt of the appeal.

3. If the issue is not resolved within the college, further appeals may be made in writing to the provost and subsequently to the president of the university. Appeals beyond the college level will, however, be considered only if based on one or both of the following contentions: (a) appropriate procedures were not followed at the college level; (b) academic rules were not applied correctly at the college level.

Removal of Unmet High School Requirements

In some instances, students are admitted to the university and permitted to enroll with a limited number of unmet high school requirements. Any unmet high school requirement must be removed within one year (12 months) of enrollment at Iowa State University. The following procedures apply.

1. Students may remove their unmet requirements by satisfactorily completing the necessary ISU courses. Courses taken to remove deficiencies will be used in the student’s degree program as they normally would be used.
2. Students may also take coursework at another institution to remove their unmet requirements. However, students will be informed that evidence of satisfactory completion of the courses must be available to ISU officials by a specified deadline.

3. Students are required to remove their unmet requirements within one year of their enrollment at ISU, even though they may withdraw or drop out of school during the first year. The College of Liberal Arts and Sciences allows students until the end of their third year to remove unmet Foreign Language requirements.

4. The college Academic Standards Committee determines whether a student should be granted an extension due to extenuating circumstances.

5. Students will be permitted to register for each succeeding term at ISU during the year they are trying to remove unmet requirements. If the unmet requirements are not removed by the end of that year, the student’s registration will be canceled and a hold placed on their record.

Academic Renewal Policy

Students who are returning to Iowa State University to pursue an undergraduate degree after an extended absence may request permission to remove one or more of their complete academic terms from future degree and GPA considerations.

1. Eligibility. To be eligible for academic renewal consideration, students must meet these requirements:

   a. Students must not have enrolled at Iowa State University for five or more consecutive years.
   b. Students must not have graduated from Iowa State University.
   c. Students must currently be in good academic standing. (If the student was previously dismissed, he or she must be reinstated.)

2. Conditions. Academic renewal is based on the following conditions:

   a. All courses and credits that were taken during the chosen terms will be removed from consideration for GPA and degree requirements. Students may not combine courses from multiple terms to comprise the semester(s) or quarter(s) dropped. Degree requirements met during the dropped terms will ordinarily have to be repeated.
   b. Renewal may be applied only to academic terms completed prior to the students’ extended absence.
   c. All courses and grades for the chosen terms will remain on the students’ academic record.
   d. Designated repeats, drops and P/NP options will be reinstated for the terms dropped.
   e. Students who have used all of their drop options will be given one extra drop.
   f. Students may be granted only one academic renewal.

   To be eligible for a degree, students must complete a minimum of 24 credit hours at Iowa State after the granting of academic renewal.

3. Procedures.

   a. Students should discuss their desire to pursue academic renewal with an adviser in the college they wish to enter.
   b. Students should submit a petition for academic renewal to the Office of the Registrar. Students may obtain a petition from their college office.

Satisfactory Academic Progress for Financial Aid Recipients

In order to remain eligible to receive financial aid from the student aid programs listed below, a student must meet both quantitative and qualitative academic standards as described within this policy. These standards are minimum expectations; specific aid programs may require a higher level of progress. A student not in compliance will be unable to receive aid from these programs until the deficiency has been corrected. Progress toward a degree will be reviewed each term and enforced at intervals no longer than one year. The programs affected by this policy are:

   - Pell Grant
   - Robert C. Byrd Scholarship
   - Supplemental Educational Opportunity Grant (SEOG)
   - Iowa State University Grant
   - College Work-Study Program (CWSP)
   - Perkins Loan
   - Health Professions Student Loan (HPSL)
   - Federal Direct Subsidized Loan
   - Federal Direct Unsubsidized Loan
   - Federal Direct PLUS Loan
   - ISU Partnership Loan
   - University Long-Term Loan

1. All students must meet the quality standard for continued enrollment in order to remain eligible to receive financial aid. See Index, Academic Progress, Quality Standard.

2. The quantity standard for full-time undergraduate students is described below:

   a. Duration of eligibility. Students may receive federal and institutional aid for a maximum of six academic years or twelve semesters. Students who have not accumulated sufficient credit hours at the end of this time period to complete their course of study will not be eligible to continue to receive financial aid.
   b. Annual credit hours to be earned. An undergraduate student who receives financial aid from one or more of the programs cited above must complete credit at a rate at least equal to the scale below, where the numbers in the top row indicate academic years completed, and those in the bottom row indicate credit hours required:

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3. The quantity standard for all part-time students:

   a. The duration of eligibility for part-time students is the same as above, but adjusted by the rate of attendance. For example, a student with a maximum duration of six years who is attending school half-time would have the duration of eligibility adjusted to twelve years.
   b. Part-time students who are otherwise eligible for financial aid must maintain the academic standards or rate of completion as stated above, adjusted by the number of hours attempted at the time the financial aid was disbursed.

   9 to 11 credit hours = 3/4 time
   6 to 8 credit hours = 1/2 time

4. Regaining eligibility. If a student is denied financial aid because of failure to comply with the above standards, the additionally required credit must be earned at the student’s own expense at Iowa State University, or the student must transfer sufficient hours taken at another institution to make up the deficiency.

5. Transfer students. A student transferring to Iowa State University for the first time will be treated as a first-term student and will not be held responsible for previous terms or credit hours taken at former institutions. If a student attends Iowa State University, transfers to another institution, and then transfers back to Iowa State, the credits earned at the other institution will be added to the student’s total earned credit hours.

6. Noncredit courses. Noncredit courses may be converted to credit hours by translating weekly contact hours as defined by the Office of the Registrar.

7. Appeals. Students ineligible for financial aid as a result of this policy, or ineligible for any other reason, may appeal this decision by submitting in writing extenuating circumstances beyond their control that affected their progress to the director of the Student Financial Aid Office and/or the designated representative. Forms for this purpose are available on the Office of Student Financial Aid web site at www.iastate.edu/~fin_aid_info/. The appeal may be accompanied by a recommendation from the student’s academic adviser. If this appeal is denied, a further appeal may be made to a committee composed of the chair of the University Financial Aid Committee, the chair of the University...
Academic Advising Committee, and the director of Student Financial Aid. Appeals of other financial aid decisions, including loss of athletic grants-in-aid, shall also follow this procedure.

8. General Information and Definitions

a. Incompletes, repeated courses, withdrawals. A student who receives an Incomplete, repeats a course, or withdraws may continue to receive financial aid upon reentering the university as long as the student completes the required credit hours for each academic year and maintains the minimum quality-point standards. However, the duration of eligibility will not be extended for a student who withdraws or repeats a course. (See the section Duration of Eligibility.)

b. Exceptions to the policy.
(1) Professional students. For those students enrolled in the College of Veterinary Medicine, eligibility will be based on the academic criteria of the college.
(2) Special undergraduate students. These students are eligible for Stafford only, and must maintain a minimum GPA of 2.00.

c. Academic school year. This includes the summer session and regular semesters within any 12-month period. Credits earned during the summer session will be included when totaling credit hours earned each academic year.

d. Changes in program of study. The duration of eligibility will not be extended for a student who changes from one program of study to another. (See Duration of Eligibility, in the section, Satisfactory Academic Progress for Financial Aid Recipients.)

These academic progress criteria are defined in minimal terms. If the student earns only the minimum credit hours for financial aid eligibility, the student’s total eligibility for particular programs may be exhausted prior to degree completion. (See Duration of Eligibility and Credit Hour Earning Scale.) In addition, the student’s college or department may require more credit hours than required by this policy.

Sources of Help with Academic Problems
If students are having trouble in a course, the following persons and places may be able to provide help:

1. The instructor of the course may be able to help the student determine the problem with the course and recommend methods for improvements.

2. The student’s adviser may be able to recommend support services or remedial strategies.

3. Academic Success Center has a collection of services such as tutoring, supplemental instruction (SI), the academic success course, learning lab, disability resources, and workshops designed to help students reach their academic goals.

4. The office of the department that offers the course may have a list of persons qualified to provide tutoring services for the course. The locations of the department offices are listed in the front of the ISU Directory.

5. The Student Counseling Service provides professional counseling services for students with problems which affect academic performance. Tutoring may be arranged through Tutoring Services in the Dean of Students Office.

Scholastic Recognition
The university recognizes those students who are doing exceptionally well in several ways.

1. Dean’s List. Each semester the university issues a dean’s list made up of those students who have carried at least 12 hours of graded or S-F courses with a 3.50 grade-point average or above for the semester. Courses taken on a P-NP basis do not count as part of the 12-hour requirement. No dean’s list is issued for summer school.

2. Annual Recognition Ceremony. In the spring the university sponsors a ceremony at which high scholarship students in all classes are recognized.

3. Graduation with Distinction. Undergraduates who have a cumulative grade point average of 3.50 or higher at the beginning of their final term are graduated “with distinction” provided they have completed 60 semester credits of coursework at Iowa State University at the time they graduate. Of these 60 credits, 50 graded credits are required. This recognition appears on the student’s permanent record and diploma, and in the commencement program. Recognition for students graduating in veterinary medicine is based only on the grades earned while enrolled in that college. Candidates for the bachelor of liberal studies degree may be graduated with distinction providing that they (a) have achieved a cumulative grade point average of 3.50 or higher for all ISU credits; (b) have achieved a cumulative grade point average of 3.50 or higher for all other credits taken at the other Iowa Regent universities; and (c) have completed 45 semester credits of coursework at the three Iowa Regent universities at the time of graduation.

Academic Privileges and Opportunities
A. Credit by Examination
Academic credit may be earned by means of special examinations. The Credit by Examination (CBE) program is available to current Iowa State students as well as prospective and entering students. Students with college-level proficiency in particular areas are encouraged to investigate credit by examination early in their college careers. For more information, see Index, Credit by Examination.

B. Pass-Not Pass Grading
Students who want to broaden their education at Iowa State may choose to take a maximum of 9 semester credit hours on a Pass-Not Pass basis, meaning that only a P or NP will be recorded as their final grade in the course. The purpose of P-NP grading is to encourage students to take courses outside the usual program of study for their major and minor disciplines. The following policies apply:

1. Undergraduate students who have earned at least 40 semester credits and who are not on temporary enrollment at the beginning of the semester are eligible. A special student must obtain approval from their academic adviser and college dean.

2. Only elective courses may be taken on a P-NP basis. In specific majors, some restrictions may apply, so students should consult with their academic adviser.

3. Except for restrictions on its own undergraduate majors, a department may not deny the availability of any of its course offerings on a P-NP basis.

4. Courses offered on a satisfactory-fail basis may not be taken P-NP.

5. Students should register for a P-NP course in the same manner and at the same time that they register for their other courses. Students should then change to P-NP by processing a schedule change form with their academic adviser’s signature in the P-NP approval section of the form.

6. Students who elect to change back to a graded basis should process the change using the P-NP section of the schedule change form.

7. Changes to or from a P-NP basis must be made before the last day to drop (usually the Friday of week 10 of the term). If the change from P-NP to a graded basis is made after the first 10 class days of a semester (first five days of summer session), the course will count toward the total P-NP credits allowed.

8. Registration on a P-NP basis is not indicated on the instructor’s class list. Students will receive a P if their grade is D minus or better and an NP if their grade was F.

9. Neither P (earned grade of D minus or better) nor NP (earned grade of F) is counted in calculating a student’s grade point average (GPA).

10. Students who pass a course taken under the P-NP system may not repeat the course. When students have taken a course and received a grade, they may not repeat it for P-NP credit.

11. When students change their curriculum, any P credits that they have accumulated will be accepted by the new department if such credits are in courses normally accepted by the department.
12. Credits taken on a P-NP basis at another institution and transferred to Iowa State may be applied as electives in a student’s degree program if the credits are otherwise acceptable in that program. The number of P-NP transfer credits that can be accepted depends on the number permitted by the institution from which the student is transferring. If a student transfers more than nine semester P-NP credits, no additional Iowa State P-NP credits can be applied to the student’s degree program.

C. Auditing
To audit a course means to enroll in the course without receiving credit for it. The instructor must approve all audits and students must register for audits by day 10 of the semester. Students are assessed fees as though they were taking the course for credit, but the course does not count in determining full-time student status. Changing a course from credit to audit requires dropping the course for credit and adding it as an audit on a schedule change request form. If this occurs after day 5 of the semester, the drop will count toward the total allowable ISU drops.

Requests to audit a course will be honored only if there is space available in the course after the four-week registration period has ended. Once enrolled in a course, auditors have the same rights and privileges as any student taking the course for credit. Their names appear on the class list with a notation that they are auditing. To change the status of an audited course to a graded course, students must process the schedule change request form by day 5 of the semester. Audited courses do not appear on the student’s permanent record except by special request from the student and the student’s adviser with evidence showing that the student was actively involved in the course. Audited courses do not apply toward V.A. benefits.

An agreement to audit a 500 or 600 level course must be negotiated between the student and the course instructor. An audited course counts for only one credit in the graduate student’s allowable course load; however, fees will be assessed for the full number of credits for the course.

D. Independent Study
Most departments offer opportunities for independent study through a 490 course listing. Usually a minimum of 6 to 10 credits of coursework in the department is required before independent study is permitted. Students who are interested in this kind of experience in a particular department should check the catalog to determine the department’s prerequisites to register for 490. 490H sections are reserved for students in the University Honors Program.

Students should check with the department about procedures, in addition to meeting the prerequisites, for registering for 490. A written plan of study is prepared in advance with a faculty member who has agreed to supervise the student’s work, to evaluate progress and the final product, and to assign a grade. Initiation of the plan of study should occur prior to the semester in which enrollment is desired. Both the student and the instructor should agree on the number of credits for which the student will enroll, the amount and kind of work he or she will do for that credit, and the system by which she or he will be graded (A-F or S/F). Students should not expect to register for or add 490 credit without an instructor’s permission. Some colleges and/or departments have limits on the number of credits of 490 that may be applied toward graduation.

Appeal of Academic Grievances
Students who believe a faculty member (in his or her academic capacity) has behaved unfairly or unprofessionally may have their grievance reviewed through the procedure described below. A student may not initiate an appeal more than one year following completion of the course, and may not initiate the appeal of a course grade beyond midterm of the semester following completion of the course.

Prior to initiating a formal appeal, a student may wish to discuss the situation informally with the Dean of Students or designee, who can offer advice as to the most effective way to deal with it.

Grievances arising out of classroom or other academic situations should be resolved, if at all possible, with the student and the instructor involved. If resolution cannot be reached, or if the grievance involves sexual or racial harassment and the student prefers not to deal directly with the instructor, the student should discuss the grievance with the instructor’s department chair and submit it in writing to him or her. The department chair will investigate the grievance, including discussing it with the instructor involved and/or referring it to a departmental grievance committee. The department chair should respond in writing within five class days of receipt of the written notice of the grievance.

If the student is not satisfied with the resolution of the grievance proposed by the department chair, the student may appeal in writing to the dean of the instructor’s college. (In the case of a grievance involving a Graduate College policy or procedure, an appeal of the chair’s decision should be directed to the Dean of the Graduate College rather than to the dean of the instructor’s college.) The dean will hear the explanations of the department chair and instructor, and should respond to the student in writing within ten class days of receipt of the written notice of the appeal. If the grievance cannot be resolved with the dean, the student may forward a written appeal to the provost, who will convene a Committee to Review Student Grievances (see below) to consider the appeal within ten class days of receipt of the written notice of the appeal. Within five class days following the convening of the committee, the provost will make a decision with regard to the grievance and will transmit this decision in writing to the grievant, the dean, the department chair, and the instructor. An appeal of the provost’s decision may be made to the president of the university. The time limit specified at each level may be extended by mutual agreement of all parties concerned.

The Committee to Review Student Grievances is composed of faculty members named by the president of the Faculty Senate and students named by the president of the Government of the Student Body. The provost may serve as a chairperson for the committee, or may designate another chairperson for a specific grievance hearing. A minimum of two faculty members, two students, and the chairperson shall constitute a quorum for the convening committee.

Information Disclosure
Iowa State University is required by law to make available to enrolled students, prospective students, and their parents certain information about the University. The information disclosure is available at the following URL: www.iastate.edu/~disclosure. Students without electronic access can obtain the information from the Office of the Registrar, 214 Alumni Hall, 515-294-1840 or from the Office of Admissions, 100 Alumni Hall, 515-294-5836. A paper copy of the information will be provided upon request.

Student Records
Iowa State University maintains various records concerning students, to document their academic progress as well as to record their interactions with university staff and officials. In order that their right to privacy be preserved and to conform with federal law, the university has established certain policies to govern the handling of student records. All policies conform with FERPA, the Family Educational Rights and Privacy Act (also known as the Buckley Amendment).

Public Information
Certain information concerning students is considered to be open to the public upon inquiry. This public information is of two types: directory information and other information not included in the ISU Directory. Directory information includes local address, telephone number, and campus e-mail address; hometown, college, curriculum, year in school, and enrollment status. Other public information includes mailing address, date and place of birth, dates of attendance at Iowa State, expected date of graduation, names of advisers, awards and academic honors, Iowa State degree(s) and date(s) awarded, previous educational institutions attended, degrees received, dates of attendance, full- or part-time status, participation in officially recognized activities and sports, and weight and height of members of athletic teams.

Public information will be released by the registrar to anyone upon inquiry, unless students have requested that their information
not be released. A request to have public information withheld should be made at the Office of the Registrar, 214 Alumni Hall. If the request is granted, the registrar will notify the appropriate university offices.

It is the policy of the university to respect the privacy of students; therefore, only lists and labels containing names of students with directory information will be made available to members of the public. This directory information will be provided on a time-available basis for the cost of producing the information. Directories are also available in the bookstores for those persons needing directory information. Directory information is available on the World Wide Web using the online phonebook; and from printed directories, which may be purchased at the bookstores.

Confidential Information
With the exception of the information noted above, all student records are considered to be confidential and are open only to university personnel; to offices and agencies carrying out their accreditation and audit functions of university programs; to persons in compliance with a judicial order; to organizations conducting studies for or on behalf of educational institutions or agencies for the purpose of developing, validating, or administering predictive tests, administering student aid programs, and improving instruction; and to persons in an emergency in order to protect the health or safety of students or other persons.

The following policies govern access to student records:

1. Each type of student record is the responsibility of a designated university official, and only that person or the dean or director to whom that person reports has authority to release the record. The following is a list of the responsible officials:
   a. Academic records: registrar
   b. Admissions records: director of admissions
   c. Financial aid records: director of student financial aid
   d. Business records: university controller
   e. Traffic and security records: director, ISU Department of Public Safety
   f. Medical records: director, Thielien Student Health Center
   g. Counseling records and test scores: director, Student Counseling Service
   h. Actions of Academic Standards Committees: college deans
      i. Disciplinary records: dean of students
      j. Residence hall records: director of residence
      k. Placement records: college placement officers
   1. Evaluations for admission to ISU graduate or professional programs: deans or department chairs
   m. Special academic programs: faculty member in charge of the program and the dean of the college.

2. The responsible official may release records to university personnel who have a legitimate need for the information. “University personnel” includes students appointed to specified committees. A list of those persons who normally have access to each type of student record is available in 214 Alumni Hall.

3. All student records are reviewed periodically. Information concerning the frequency of review and expiration of specific records is available in 214 Alumni Hall.

4. Students have the right to review upon request any records that pertain directly to them, and may obtain a copy of the record for a fee. This provision does not apply to records to which the student has waived his or her right to review, nor does it apply to medical and counseling records.

5. A student may waive the right to review a specific record by submitting in writing a statement to this effect to the official responsible for that record.

6. A file containing copies of records pertinent to advising is maintained on each student for use by the student’s adviser. Ordinarily this file is kept in the possession of the adviser, but for convenience it may be stored elsewhere such as in the department office. When the student changes majors, or changes advisers within the same major, the file is transferred to the new adviser. Under the university’s student records policy, the student is considered to have the right of access to this file.

7. Medical and counseling records shall be released at the written request of the student to medical or psychological professionals outside the university or to university officials.

8. University personnel who have access to student records in the course of carrying out their university responsibilities shall not be permitted to release the record to persons outside the university, unless authorized in writing by the student or unless one of the exceptions stated earlier is involved.

9. Confidential information may be released to parents by obtaining the student’s written consent or by having the parent establish the student’s dependency as defined by the Internal Revenue Code of 1954, section 152, by furnishing a certified copy of the parent’s most recent federal income tax return.

10. Iowa high schools receive a freshman year report containing first year academic progress data of all their graduates attending Iowa State University for the purpose of evaluating and improving their instructional programs.

Review and Challenge of Records
A student may challenge the accuracy of handling of records maintained by the university on grounds that the records are inaccurate, misleading, or otherwise violate the privacy or other rights of the student. The university has established the following procedures to provide an opportunity for the student to correct or delete inaccurate records or to insert into the record a written explanation of the content.

Students who question their records should discuss the issue first with the individual staff person who established or maintains the records. Presumably most issues can be resolved at this level. If a satisfactory resolution cannot be reached, the student should submit the question to the head of the department in which the record is maintained.

The department head will discuss the issue with the staff person and the student challenging the record. If resolution cannot be
reached after meeting with the department head, the student may submit the question to the dean or director to whom the department head is responsible. The dean or director will investigate, and will respond in writing.

If the record has not been reconciled through these measures, the student may direct a written request to the president of the university. The president will convene an Ad Hoc Hearing Panel of Access and Confidentiality of Educational Records, composed of two faculty members, two students, and one administrator, appointed by the president for a period of one year, with the president or a designee serving as nonvoting chairperson. The student shall be given an opportunity to present to the panel evidence relevant to the issues raised, and the panel will issue a written response.

**ISUCard and Identification Number**
Each student is assigned a random university identification number on entry to the university. This number appears on the ISUCard that is provided to each student at the time of first registration. The ISUCard, may be required for some services and/or activities. At the time the ISUCard is issued each student also selects a personal identification number (PIN), which is required for electronic access to personal student information.

Loss of an ISUCard should be reported immediately to the ISUCard Office, where the lost card will be invalidated and replaced for a charge. Disciplinary sanctions may be imposed for improper use of the ID card or attempts to obtain, by fraudulent means, any form of identification.

**Social Security Number**
Social security numbers are collected from prospective and current students, for administrative coordination and record identification purposes only. Although procedures have been established by the registrar for assignment of an alternative number upon request, students who wish to be employed on campus or to receive financial aid are required by law to provide their social security numbers for administrative use. The social security number is a confidential record and is maintained as such by the university in accordance with the Family Educational Rights and Privacy Act.

**Policy on Student Names**
Iowa Regents universities have a common policy regarding student names and name changes. The name on the student record should be the student’s complete and legal name. In evaluating and processing all name change requests, the university reserves the right to require adequate and appropriate documentation as warranted.
# Designators-Course Abbreviations

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<th>Description</th>
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<td>Aer E</td>
<td>Aerospace Engineering</td>
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<td>ArtGr</td>
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<td>ArtId</td>
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<td>ArtIS</td>
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<td>AST</td>
<td>Agricultural Systems Technology</td>
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<td>Ath</td>
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<td>B M E</td>
<td>Biomedical Engineering</td>
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<td>B M S</td>
<td>Biomedical Sciences</td>
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<td>BBMB</td>
<td>Biochemistry, Biophysics, and Molecular Biology</td>
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<td>BCB</td>
<td>Bioinformatics and Computational Biology</td>
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<td>BPM I</td>
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<td>C E</td>
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<td>EEB</td>
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<td>FFP</td>
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<td>V Med</td>
<td>Veterinary Medicine</td>
</tr>
<tr>
<td>V MPM</td>
<td>Veterinary Microbiology and Preventive Medicine</td>
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<tr>
<td>V Pth</td>
<td>Veterinary Pathology</td>
</tr>
<tr>
<td>VDPAM</td>
<td>Veterinary Diagnostic and Production Animal Medicine</td>
</tr>
<tr>
<td>W Res</td>
<td>Water Resources</td>
</tr>
<tr>
<td>W S</td>
<td>Women's Studies</td>
</tr>
<tr>
<td>Zool</td>
<td>Zoology</td>
</tr>
</tbody>
</table>
Undergraduate and Professional Degree Programs

The university is organized into nine colleges, including the Graduate College. Seven colleges offer undergraduate degree programs, and the College of Veterinary Medicine offers the Doctor of Veterinary Medicine degree. For a listing of the more than 100 majors offered by the Graduate College, see the summary at the end of the Graduate College section of this publication.

Iowa State University is accredited by the Commission of Institutions of Higher Education of the North Central Association of Colleges and Schools.

The main undergraduate academic programs of each college are listed below, together with the degrees awarded upon completion. In many cases certain majors, minors, options, or electives allow for increased specialization within the programs. Programs which are administered jointly by two colleges are listed within both colleges.

College of Agriculture

Agricultural Biochemistry, B.S.
Agricultural Business, B.S.
Agricultural Education, B.S.
Agricultural Studies, B.S.
Agricultural Systems Technology, B.S.
Agronomy, B.S.
Animal Ecology, B.S.
Animal Science, B.S.
Dairy Science, B.S.
Dietetics, B.S.
Entomology, B.S.
Environmental Science, B.S.
Environmental Studies, B.S.
Food Science, B.S.
Forestry, B.S.
Genetics, B.S.
Horticulture, B.S.
International Agriculture, B.S.
Microbiology, B.S.
Nutritional Science, B.S.
Pest Management, B.S.
Plant Health and Protection, B.S.
Public Service and Administration in Agriculture, B.S.
Seed Science, B.S.
Zoology, B.S.

College of Business

Accounting, B.S.
Finance, B.S.
International Business, B.S.
Management, B.S.
Management Information Systems, B.S.
Marketing, B.S.
Production/Operations Management, B.S.
Transportation and Logistics, B.S.

College of Design

Architecture, B.Arch.
Art and Design, B.A., B.F.A.
Community and Regional Planning, B.S.
Graphic Design, B.F.A.
Interior Design, B.F.A.
Landscape Architecture, B.L.A.

College of Education

Early Childhood Education, B.S.
Elementary Education, B.S.
Environmental Studies, B.S.
Health and Human Performance, B.S.
Industrial Technology, B.S.
Secondary Education (See licensure programs offered by the colleges of Agriculture, Design, Education, Family and Consumer Sciences, and Liberal Arts and Sciences.)

College of Engineering

Aerospace Engineering, B.S.
Agricultural Engineering, B.S.
Chemical Engineering, B.S.
Civil Engineering, B.S.
Computer Engineering, B.S.
Construction Engineering, B.S.
Electrical Engineering, B.S.
Industrial Engineering, B.S.
Materials Engineering, B.S.
Mechanical Engineering, B.S.

College of Family and Consumer Sciences

Apparel Merchandising, Design, and Production, B.S.
Child, Adult, and Family Services, B.S.
Dietetics, B.S.
Early Childhood Education, B.S.
Family and Consumer Sciences Education and Studies, B.S.
Family Resource Management and Consumer Sciences, B.S.
Food Science, B.S.
Hotel, Restaurant, and Institution Management, B.S.
Housing and the Near Environment, B.S.
Nutritional Science, B.S.

College of Liberal Arts and Sciences

Advertising, B.A.
Anthropology, B.A., B.S.
Applied Physics, B.S.
Biochemistry, B.S.
Biological/Pre-Medical Illustration, B.A.
Biology, B.S.
Biophysics, B.S.
Botany, B.S.
Chemistry, B.A., B.S.
Communication Studies, B.A.
Computer Science, B.S.
Earth Science, B.A., B.S.
Economics, B.S.
English, B.A., B.S.
Environmental Science, B.S.
Environmental Studies, B.A., B.S.
Foreign Languages and Literatures

French, B.A.
German, B.A.
Spanish, B.A.
Genetics, B.S.
Geology, B.S.
History, B.A., B.S.
Interdisciplinary Studies, B.A., B.S.
International Studies, B.A., B.S.
Journalism and Mass Communication, B.A., B.S.
Liberal Studies, B.L.S.
Linguistics, B.A.
Mathematics, B.S.
Meteorology, B.S.
Music, B.A., B.Mus.
Performing Arts, B.A.
Philosophy, B.A.
Physics, B.S.
Political Science, B.A.
Psychology, B.A., B.S.
Religious Studies, B.A.
Russian Studies, B.A.
Sociology, B.A., B.S.
Speech Communication, B.A., B.S.
Statistics, B.S.
Technical Communication, B.S.
Women's Studies, B.A., B.S.
Zoology, B.S.

College of Veterinary Medicine

Veterinary Medicine, D.V.M.
Bachelor's Degree Requirements

To receive a degree, a student must meet the requirements of the curriculum in which the degree is to be awarded. Verification that the student has met those requirements is made by the dean of the college, who also has the authority to waive a requirement under exceptional circumstances.

A cumulative grade point average of at least 2.00 in all work taken at Iowa State University is required for graduation.

A student admitted as a transfer from another college or university is normally required to have a 2.00 cumulative average at the time of entrance. A student may, however, be admitted with a quality-point deficiency, but will be required to earn sufficient quality-points above a 2.00 at Iowa State to offset the quality-point deficiency at the time of entrance.

No more than 65 semester or 97 quarter credits earned at two-year colleges can be applied to a bachelor's degree from Iowa State University. There is no limit to the number of credits that may be transferred from a four-year institution.

A student who takes work at another college or university after having been enrolled at Iowa State must submit transcripts of all work attempted to the Office of Admissions at Iowa State. This work must average a 2.00 or the deficiency of quality points will be assessed against the student. Failure to submit such transcripts will be grounds for dismissal.

In unusual circumstances, the Academic Standards Committees of the respective colleges may review and give further consideration to the records of students who, except for grade-point average, have satisfactorily completed all graduation requirements. If the appropriate college Academic Standards Committee considers that the educational and professional needs of such a student have been satisfactorily met, or can be satisfactorily met by imposing further conditions, the committee may recommend to the dean of the college in order to meet the requirements of both the minor and the curriculum.

Minors

Requirements for an undergraduate minor are specified by many departments and programs in the university; a record of completion of such requirements appears on a student's transcript. Lists of undergraduate minors offered by each college appear in the college description. Minors offered by cross-disciplinary programs not administered by a single college include gerontology, and international studies. Undergraduate students in any college may elect to meet the requirements of any undergraduate minor offered in the university. Credits used to meet the minor requirements may also be used to satisfy the credit requirement for graduation and to meet credit requirements in courses numbered 300 or above. Some students may have to exceed the graduation credit requirement set by their college in order to meet the requirements of both the minor and the curriculum.

All minors require at least 15 credits, including at least 6 credits taken at Iowa State University in courses numbered 300 or above. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement. Courses taken for a minor may not be taken on a pass-not-pass basis. Specific requirements and/or restrictions are available from the department or program offering the minor.

English Proficiency Policy

Iowa State University believes that written communication is a fundamental skill of an educated person; therefore its graduates are expected to acquire reasonable competence in written communication during their educational careers. The following are designed to ensure that this competence is developed and maintained:

1. All students must earn credit in a sequence of basic composition courses (English 104 and 105) normally in the freshman year.

2. Continued development of communication skills following the freshman year is the responsibility of the student's major department. This development may be promoted by requiring and critically evaluating term papers and other written assignments as part of courses offered by the department and by encouraging students to enroll in advanced English composition courses that meet their particular needs.

3. Each department is responsible for certifying that its majors have achieved an adequate level of proficiency in written communication at the time of graduation.

English Requirement: Students Whose First Language is not English

Students whose first language is not English must demonstrate ability to study in an English-speaking university. Such students—beginning as well as those who transfer from other institutions—must take an English placement test when they arrive on campus. The test is administered by the English Department and is offered at the opening of each semester.

Students whose performance on this placement examination is satisfactory will follow the regular English requirements of their major department. Students who have deficiencies will enroll in special English classes, as determined by the test results.

Library Study

Independent study and investigation through the use of books and libraries enable students to grow intellectually and professionally in college and afterward. For this reason, all students receive instruction in the use of the University Library, including practice in how to locate the published literature of their respective fields of study.

U.S. Diversity and International Perspective Requirements

One of Iowa State University's goals is to prepare its students to meet the challenges of responsible citizenship and effective professional roles in a culturally diverse global community. To help achieve this goal, all undergraduate students must fulfill graduation requirements in these areas: U.S. Diversity and International Perspectives. The specific standards used to certify students’ fulfillment of these requirements vary from major to major, but all require three credits of course work (or the equivalent in some alternative academic experience) for each of the requirements. In most cases, courses used to meet the U.S. Diversity and International Perspectives requirements can also be used to fulfill general education requirements of the student's college or requirements of the student’s major. Students should consult with advisers for details of the requirements in particular majors.

The focus of the U.S. Diversity requirement is the multicultural society of the United States. Courses or alternative academic work used to meet the requirement address significant manifestations of human diversity and provide students with insights that enhance their understanding of diversity among people in the U.S. The focus of the International Perspectives requirement is the global community. Its objective is to promote students' understanding of cultural diversity and interdependence on a global scale. A period of immersion in a foreign culture is often a particularly effective way of meeting
these objectives, so Iowa State University encourages the use of study-abroad experiences as a means of fulfilling the International Perspectives requirement. International students, because they are “studying abroad” from their home country’s perspective, are normally deemed to have met the International Perspectives requirement.

Curriculum Requirements
The curriculum requirements, both in number of credit hours and specific courses, are guidelines for the student and his or her adviser in planning an academic program. The curriculum is subject to change and because of these changes, adjustments may need to be made.

Catalog in Effect
A student may choose to graduate under the catalog in effect at the time of graduation, or one of the two immediately preceding catalogs, provided it covers a period of his or her enrollment. Full requirements of the chosen catalog must be met except that adjustments will be made in instances where courses are no longer available or where programs have been changed.

Special Programs
Honors Program
The Iowa State University Honors Program is designed for students who have demonstrated the ability and motivation to assume more than the usual responsibility for their undergraduate education. The goal of the program is to enable Honors students to gain maximum benefit from their undergraduate education. Students who graduate in the Honors Program receive the Honors designation on their transcripts and on their baccalaureate diplomas.

Special educational opportunities. Students in the Honors Program determine their educational objectives and devise an individualized program of study to meet those objectives. An honors program may include substitutions for required courses, combinations of courses from several departments to form a new major or minor, Honors courses or seminars, independent study and research, and other forms of innovation. Information about Honors courses and seminars for the current academic year can be obtained from the Honors Program Office.

Other benefits. Members of the Honors Program have 24-hour access to the Honors building as a quiet place to study, use the computers, and visit with other Honors students. Students also have off-campus opportunities such as attending Honors seminars and Wingspread conferences. Full members—those with approved honors degree programs—receive extended loan privileges at the Library, priority scheduling, and the opportunity to apply for research funds.

Eligibility. Students who have a cumulative grade-point average of at least 3.35 become eligible to apply for admission to the Honors Program during their second semester in residence and continue to be eligible for admission as long as they have at least 48 semester credits remaining before graduation. Decisions with respect to admission are made by the college Honors Program committees.

Freshman Honors Program. Entering freshmen with outstanding high school records and academic ability may be eligible to participate in the Freshman Honors Program. The Freshman Honors Program, which is designed to introduce students to an honors education, consists of special honors sections of English 105 and Library 160, a Freshman Honors Seminar, and advising by specially selected honors advisers. Students may also choose to participate in the Mentor Program, designed to introduce students to the research arena. Participants select an area of interest and are matched with faculty members conducting research in that area. Admission to the Freshman Honors Program is limited and by invitation, and is based on past academic achievement, potential, and interest in an honors education.

Further information. Further information concerning the University Honors Program and the Freshman Honors Program can be obtained from the Honors Program Office in Jischke Honors Building.

Inter-institutional Programs
Students have the opportunity to complete two years of study at another institution and the last two years at Iowa State through coordinated programs offered by the College of Family and Consumer Sciences.

Dual-degree Programs
Students who complete the first three years in certain curricula at Iowa State and who satisfactorily complete the first year in a recognized medical, dental, veterinary medical, or law curriculum may then be awarded a bachelor’s degree from Iowa State. (See Index, Preprofessional Study.)

Iowa Lakeside Laboratory
Iowa Lakeside Laboratory is an off-campus teaching facility situated on a 140-acre campus on West Okoboji Lake in Northwest Iowa. It is run cooperatively by Iowa State University, the University of Iowa, the University of Northern Iowa, and Drake University. Each summer Iowa State University students can take up to three undergraduate and/or graduate courses in archaeology, biology, ecology, environmental science, and/or geology for credit at Lakeside (see course listings under Iowa Lakeside Laboratory). All Lakeside courses are small, full-immersion, field-oriented courses that run for 1-4 weeks. Lakeside also offers a variety of short courses for teachers and a series of nontechnical short courses on various aspects of the natural history of Iowa. Information about Lakeside courses as well as registration and housing information can be obtained from the Administrative Office, Iowa Lakeside Laboratory, 131 Bessey Hall.

Gulf Coast Research Laboratory
Through an affiliation with Gulf Coast Research Laboratory (GCRL) at Ocean Springs, Mississippi, Iowa State University provides opportunities for students to take courses and do research relating to marine environments during the summer. Credit taken at GCRL may be transferred back to ISU degree programs. Listings of courses taught at GCRL and research opportunities can be seen at www.coms.usm.edu/gindex.htm. Further information and application forms are available in early spring semester in 201 Bessey Hall.

The Washington Center Program
Iowa State University, in conjunction with The Washington Center, offers its students the opportunity to gain academic credit and first-hand professional work experience in the governmental, nonprofit, and private sectors through a summer- or semester-long internship in the nation’s capital. The Washington Center, the largest nonprofit organization of its kind, places students in a variety of internships and also offers a wide array of academic programs and seminars to complement their internship experience. Further information about the requirements can be obtained from Career Services, 0570 Beardshear Hall, 515-294-9490.

Regent Universities Student Exchange Program
Iowa State University students may take courses at either of the other two Regent universities for Iowa State resident credit. Regular, degree-bound students in good standing at any of the three Regent universities may attend another Regent university for a maximum of two semesters, and the credits earned at the other university will be counted as resident credit at the home institution. Approval for participation and credit in the exchange program must be obtained well in advance of registration since the department head must approve the acceptance of such credits if these are to apply to the major, and to ensure complete processing of the application between the cooperating universities. Further information and application forms for the exchange program are available from the Office of the Registrar.

National Student Exchange (NSE)
Iowa State University is a member of National Student Exchange. The NSE Consortium has 180 colleges and universities throughout the United States and Canada. Iowa State students with a cumulative GPA of at least 2.50 are eligible to apply. Credits earned as an NSE participant will be recorded on the students Iowa State transcript. Approval for credit in the NSE program should be sought from a students academic adviser in advance of registration. Detailed information and applications forms are available from:

National Student Exchange
2072 Student Services Building
(515) 294-6479
NSE@iastate.edu
www.iastate.edu/~nse
Departments of the College
Agricultural Education and Studies
Agricultural and Biosystems Engineering
Agronomy
Animal Science
Biochemistry, Biophysics, and Molecular Biology
Economics
Entomology
Food Science and Human Nutrition
Horticulture
Microbiology
Natural Resource Ecology and Management
Plant Pathology
Sociology
Zoology and Genetics

Students enrolled in the College of Agriculture are provided a broad-based education that includes coursework in communications; biological, physical, and social sciences; humanities; and technical subject matter. Opportunities for graduates include production agriculture, business and industry, public agencies, education, biological and environmental sciences, value-added processing, natural resource management, rural development, animal and human health professions, and graduate studies.

High School Preparation
Requirements for students entering from high school or transferring with less than 24 college credits into the College of Agriculture include four years of English; three years of mathematics which must include one year each of algebra, geometry, and advanced algebra; three years of science which must include one year each of biology and chemistry, or biology and physics, or chemistry and physics; and two years of social studies. No foreign language is required for admission to the College of Agriculture.

Majors in the College of Agriculture
A student has many majors from which to choose. Each major is unique but there are courses common to many. This is helpful to students in that they may transfer from one agriculture major to another before the second year with little, if any, loss of credits. Options and areas of specialization further define the majors and required coursework within some majors. In all cases, majors are designed to help students succeed in their chosen professions. Majors in agriculture are:

Primary Majors
Agricultural Biochemistry
Agricultural Business
Agricultural Education
Agricultural Studies
Agricultural Systems Technology
Agronomy
Animal Ecology
Animal Science
Emerging Global Diseases*
Dairy Science
Dietetics
Entomology
Environmental Science
Food Science
Forestry
Genetics
Horticulture
Microbiology
Nutritional Science
Plant Health and Protection
Public Service and Administration in Agriculture
Zoology

Secondary Majors
Environmental Studies
International Agriculture
Pest Management
Seed Science

A secondary major must be taken in conjunction with a primary major.

Minors
Agricultural Biochemistry
Agricultural Education and Studies
Agricultural Systems Technology
Agronomy
Animal Ecology
Animal Science
Entomology
Entrepreneurial Studies*
Environmental Science
Environmental Studies
Food Safety*
Food Science
Forestry
Genetics
Horticulture
International Agriculture
Microbiology
Nutrition
Pest Management
Plant Health and Protection
Zoology

*The College of Agriculture participates in these interdepartmental minors.

Special Programs
General Agriculture
General Agriculture is a starting place for students who wish to pursue careers in agriculture but who are unsure of which majors to choose. The Agriculture Student Services Office provides advising for general agriculture students until they select their majors.

Preventive Medicine
Students in the College of Agriculture may complete the requirements for admission to the College of Veterinary Medicine by enrolling in any major within the college. Because a solid foundation in the sciences is basic to the program in veterinary medicine, those majors that emphasize the sciences are usually more compatible with preventive veterinary medicine (see College of Veterinary Medicine section of this catalog for specific admissions requirements). Students who are undecided about choice of major may enroll in general preventive studies (Gen PV). These students will also enroll in an orientation course, which describes the various college majors. A Gen PV student has up to 1.5 semesters to select a major.

Preventive medicine students also have an opportunity, with careful planning, to complete the requirements for a bachelor of science degree in an individual curriculum within the College of Agriculture after admission to the College of Veterinary Medicine. This may be done by completing the prescribed course of study established by an individual major.

Students also may meet degree requirements of an individual major through the College of Agriculture Honors Program. Further details are available from an academic adviser or from members of the College of Agriculture Honors Committee.

Honors Program
The College of Agriculture Honors Program provides an opportunity for students of high ability to maximize their educational experience by individualizing their program of study. (See statement on Honors Program in the Colleges and Curricula section of this catalog). For more information, contact the chair of the College of Agriculture Honors Committee, or your department Honors contact person.

Off-Campus Programs
Coursework leading to a master of agriculture degree in professional agriculture and a master of science degree in agronomy are offered to students who choose to study off-campus; see Extended and Continuing Education for further information.
Study Abroad and International Travel Opportunities
Agriculture is being transformed into a highly interconnected global system; decisions made in one agricultural sector have profound impacts worldwide. It is important for students to develop an understanding and appreciation for the global system and the central role that U.S. agriculture plays in providing a safe and predictable food supply for a growing world population. The College of Agriculture provides study abroad and international travel opportunities in several locations around the world. For additional information, contact the Office of International Agriculture Programs in the College of Agriculture.

Internships and Cooperative Education Programs
Practical work experience can provide a unique learning opportunity that complements academic coursework. This experience is provided through internships or cooperative education programs. For additional information, contact a departmental adviser or internship coordinator.

College of Agriculture Core Curriculum and Electives
All curricula in the College of Agriculture lead to a bachelor of science degree. Each major has specific degree requirements for graduation. These include the College of Agriculture’s core curriculum. Students pursuing a primary major in another college and taking a second major in the College of Agriculture must fulfill the core curriculum requirements of the College of Agriculture and all the requirements of the second major. The College of Agriculture core curriculum follows.

Minimum Subject Area Credits

9.5 Interpersonal and public communication skills
6 credits of English composition with grades of C or better; 3 credits of speech fundamentals with grades of C or better; 0.5 credit in Lib 160

17 Mathematical, physical, and life sciences
3 credits of mathematics; 3 credits of statistics; 5 credits of physical science (e.g., chemistry, geological and atmospheric sciences, physics); 6 credits of life science (e.g., biochemistry, biology, botany, ecology, genetics, microbiology, physiology, zoology).

15 Humanities, ethics and social sciences
3 credits of ethics from an approved list; 3 credits of humanities; 3 credits of social sciences; 3 credits of U.S. diversity from an approved list; 3 credits of international perspectives from an approved list.

The College of Agriculture is committed to enhancing student proficiency in four areas:
1) ability to write, discuss and present subject matter within the major (communications), 2) ability to consider many dimensions of a problem and develop a solution (problem-solving), 3) ability to use computers for computation, document processing and communications, and 4) ability to analyze issues related to human impact on natural resources and the environment.

Courses required by each major, courses within the College of Agriculture’s core curriculum or free elective courses are used to develop these proficiencies. The specific requirements are:

Communications: Equivalent to 3 credits from one or more courses. Communication activities are incorporated into designated courses within each major field. The requirement is fulfilled by taking one or more of these communication-intensive courses.

Problem-solving: Equivalent to 3 credits from one or more courses. Problem-solving activities (disciplinary and multidisciplinary) are incorporated into designated courses within each major field. The problem-solving requirement is fulfilled by taking one or more of these problem-solving-intensive courses.

Computer proficiency: All College of Agriculture students must demonstrate computer proficiency according to procedures established by each department.

Environmental issues: Equivalent to 3 credits from one or more courses. Students are strongly encouraged to select course work in this area which will give them an appreciation of both ecological and human/societal dimensions of the environment.

Electives
Students use electives to broaden their education or to strengthen an area of specialization. Electives may be used to meet the requirements for a double major (see statement on double majors in this catalog). Those who wish to change their major, or who decide to graduate with a double major, must be enrolled for the last two semesters in the curriculum in which they expect to graduate. Students in ROTC may apply ROTC credits toward elective requirements.

Advising
Each student in the College of Agriculture works closely with an academic adviser who is associated with the major in which the student is enrolled.

All entering students and their parents are strongly encouraged to participate in the summer orientation program in which they will have the opportunity to meet and work with academic advisers in planning their first semester schedule of classes.

The advisers also assist students in making personal adjustments to university life, offer suggestions on academic and co-curricular choices, and provide information on career choices. Advisers make a special effort to adjust course schedules in accordance with students’ interests and capabilities.

A student may wish to prepare for admission to a professional program such as law, medicine, or veterinary medicine while pursuing a bachelor of science degree in the College of Agriculture. This may be accomplished through several majors; however, it is recommended that the student work closely with an academic adviser.

Each department prepares a guide to help students chart their long-term programs and to specify the exact requirements for graduation. Visit the college web site www.ag.iastate.edu.

Graduate Study
Graduate study in agriculture is conducted through the Graduate College. Details are found in the Graduate College section of this catalog.

Various departments in the College of Agriculture also participate in the following graduate-level interdepartmental offerings:

- Ecology and Evolutionary Biology
- Genetics
- Immunobiology
- Molecular, Cellular, and Developmental Biology
- Neuroscience
- Plant Physiology
- Professional Agriculture (off-campus)
- Technology and Social Change (interdepartmental minor)
- Toxicology
- Water Resources

For details, consult the Graduate College section of this catalog.
### Curriculum in Agricultural Biochemistry

Administered by the Department of Biochemistry, Biophysics and Molecular Biology.

#### Degree Requirements

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Requirements</th>
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<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills Engl 104, 105; Sp Cm 212; Lib 160</td>
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<tr>
<td>62-63</td>
<td>Mathematical, physical, and life sciences Math 165, 166, 265 or 266; Phys 221, 222; Chem 177, 177L, 178, 210 or 211, 211L, 321, 322, 322L, 331, 331L, 332; Biol 201, 202, 201L or 202L, 301, 302</td>
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<tr>
<td>15</td>
<td>Humanities, ethics, and social science 3 cr. in ethics from an approved list; 3 cr. in humanities; 3 cr. in social sciences; 3 cr. in U.S. diversity from an approved list; 3 cr. in international perspectives from an approved list</td>
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<tr>
<td>9</td>
<td>Agricultural sciences 9 cr. from an approved list available in the department. Two courses with environmental awareness emphasis will be chosen from an approved list.</td>
</tr>
<tr>
<td>11-13</td>
<td>Agricultural biochemistry BBMB 101, 102; 404, 405 or 501, 502; 411. Students wishing research experience in agricultural biochemistry are encouraged to enroll in BBMB 499</td>
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<tr>
<td>21.5-22.5</td>
<td>Electives</td>
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<td>128</td>
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#### Typical Program for the First Year

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<tr>
<td>4</td>
<td>General Chemistry—Chem 177M</td>
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<tr>
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<td>Laboratory in General Chemistry—177N</td>
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<tr>
<td>4</td>
<td>Calculus I—Math 165</td>
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<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
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<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology Laboratory—Biol 201L</td>
</tr>
<tr>
<td>1</td>
<td>Introduction to Biochemical Activities—BBMB 101</td>
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<td>3</td>
<td>General Chemistry—Chem 178</td>
</tr>
<tr>
<td>4</td>
<td>Calculus II—Math 166</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 105</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 202</td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology Laboratory—Biol 202L</td>
</tr>
<tr>
<td>1</td>
<td>Introduction to Biochemistry—BBMB 102</td>
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</table>

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>4</td>
<td>Microeconomics—Econ 101, 101L</td>
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<tr>
<td>R</td>
<td>Orientation in Economics/Agricultural Business—Econ 110</td>
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<td>3</td>
<td>Agricultural Science Course</td>
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<td>Mathematics I—Math 165 or 140 (or 150)</td>
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<tr>
<td>0.5</td>
<td>First-Year Composition I—Engl 104</td>
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<td>Library Instruction — Lib 160</td>
</tr>
<tr>
<td>3</td>
<td>Environmental Biology —Biol 123</td>
</tr>
</tbody>
</table>

### Curriculum in Agricultural Business

Administered by the Department of Economics. Students majoring in Agricultural Business often choose elective coursework leading to minors in the College of Business or in the College of Agriculture, or emphasizing specific areas within agricultural business such as finance, management, commodity analysis, research, agricultural sales and marketing, environmental economics, farm and ranch operations, international economics, agricultural extension, or government service.

#### Degree Requirements

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills Lib 160, Engl 104, 105 Engl 302 or Engl 309 or Engl 314 Sp Cm 212 or AgEds 311</td>
</tr>
<tr>
<td>17-18</td>
<td>Mathematical and computer science Math 165, 166 or Math 140 (or 150), 160; Stat 226, 326 Com S 103</td>
</tr>
<tr>
<td>4-5</td>
<td>Physical Sciences Chem 163-163L or Phys 111</td>
</tr>
<tr>
<td>6</td>
<td>Life and Environmental Sciences Biol 109 or 201 A Ecl 120 or Biol 123 or other credits that meet the environmental intensive requirement</td>
</tr>
<tr>
<td>12</td>
<td>Humanities, ethics and social science Courses in individual areas below may overlap but the total credits taken must equal 12 or more: Ethics International perspectives U.S. diversity Humanities Social science other than economics</td>
</tr>
<tr>
<td>12</td>
<td>Business Acct 294, 285; Fin 301 One of the following: Mgmt 310, 370, Mkt 340, MIS 330, POM 320, TrLog 360</td>
</tr>
<tr>
<td>3</td>
<td>Agricultural sciences electives</td>
</tr>
<tr>
<td>32-34</td>
<td>Economics and Agricultural Economics Econ 101, 101L, 102, 110, 235, 301, 302 or 353, 335, 492 Nine credits of the following: Econ 401, 402, 415, 430, 431 or 432, 437, 451, 455, 460, 466, 470, 472, 480 Five additional credits of Economics at the 300 level or higher Free electives</td>
</tr>
<tr>
<td>26-28</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

### Curriculum in Agricultural Education

Administered by the Department of Agricultural Education and Studies. Students majoring in Agricultural Education choose between two options: Teacher Certification or Communications.

#### Teacher Certification Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills Engl 104, 105, Lib 160, AgEds 311 (3 cr.); communications intensive requirement.</td>
</tr>
<tr>
<td>18-19</td>
<td>Mathematical, physical, and life sciences Chem 163, 163L or 177, 177L; Stat 104; Biol 201, 201L; Biol 202, 202L or BMBB 221; Math 104 or 150</td>
</tr>
<tr>
<td>18</td>
<td>Humanities, ethics, and social sciences Psyh 230; C I 333 and 406; American history elective (3 cr.); from approved lists: 3 cr. in ethics; 3 cr. in international perspectives; problem-solving intensive requirement.</td>
</tr>
<tr>
<td>1</td>
<td>Physical education Elective selected from PE, dance, health, and/or safety</td>
</tr>
<tr>
<td>35</td>
<td>Agricultural sciences and economics Agron 114 and 154; An S 114 and 114L, electives (3 cr.); AST 210; Hort 221; Econ 101, 235 and 330; Acct 284; 6 credits in courses 300-level or above to be chosen from agricultural systems technology, animal science, agronomy, agricultural economics, forestry, or horticulture; environmental intensive requirement.</td>
</tr>
<tr>
<td>31.5</td>
<td>Professional credits AgEds 110A, 211A, 310, 401, 402, 416, 417 (12 Cr.); C I 201, 204, 415, 426.</td>
</tr>
<tr>
<td>14-15</td>
<td>Electives</td>
</tr>
</tbody>
</table>
### Curriculum in Agricultural Studies

**Administered by the Department of Agricultural Education and Studies. Students are encouraged to develop one or more areas of concentration in agricultural sciences and economics.**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills—Engl 104, 105, Lib 160, AgEds 311, communication intensive requirement</td>
</tr>
</tbody>
</table>

**Mathematical, physical, and life sciences—** Chem 163, 163L or 177, 177L; Biol 201, 202; BMGB 221 or Phys 106; life science elective (3 cr.); demonstration or computer proficiency; Math 104 or 150; Stat 104; environmental intensive requirement

**Humanities, ethics, and social sciences—** Econ 101 or 102; psychology elective (3 cr.); ethics elective (3 cr.); international perspectives elective (3 cr.); U.S. diversity elective (3 cr.); humanities elective (3 cr.), problem-solving intensive requirement

**Agricultural sciences and economics—** 10 credits in a selected area of agricultural sciences and economics including 6 credits at the 300-400 level; 6 cr. each in two additional areas of agricultural sciences and economics; agricultural sciences and economics electives (10 cr.)

**Professional communications—** AgEds 110A, 211, 215, 315, 412 (6 cr.); select 21 cr. from JS MC 101, 321, 342, 347, Engl 205, 309, 310, 314, 415, 416, Mgmt 370, 371, Sp Cm 110, 212, 312, 323, 327, ComSt 102, 214, 310, 314, 317

**Electives**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>12-13</th>
</tr>
</thead>
</table>

**Total credits**

---

### Curriculum in Agricultural Systems Technology

**Administered by the Department of Agricultural and Biosystems Engineering. A minor in agricultural systems technology is available; the requirements appear under Agricultural Systems Technology, Courses and Programs.**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills—Engl 104, 105; Sp Cm 212 or AgEds 311; Eng 309 or 309L or 314; Lib 160</td>
</tr>
</tbody>
</table>

**Mathematical, physical, and life sciences—** Chem 163, 163L or 177, 177L; Math 104 or 150; Stat 104; Biol 109 or 201; life science elective (6 cr.); demonstration of computer proficiency; environmental intensive requirement

**Humanities, ethics, and social sciences—** Econ 101; humanities electives (3 cr.); AgEds 315; from approved lists: 3 cr. in ethics; 3 cr. in international perspectives; 3 cr. in U.S. diversity; problem-solving intensive requirement

**Agricultural sciences and economics—** AgEds 110B, 211, 215, 450; Agron 114, 164, 212; An S 114 and 114L, electives (6 cr.); Econ 235, 330; ENT electives (2 cr.); 300-400 level agricultural sciences and economics electives (9 cr.); electives from the College of Agriculture (2 cr.)

**Other required courses**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>3</th>
<th>32</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>Acct 284</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Total credits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Typical Program for the First Year

**Fall**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>0.5</th>
<th>Orientation—AgEds 110A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Probability and Matrices—Math 104 or Discrete Mathematics for Business and Social Sciences—Math 150</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Principles of MicroEconomics—Econ 101</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology I—Biol 201</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology Laboratory—Biol 201L</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Survey of the Animal Industry—An S 114</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Working with Animals—An S 114L</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
<td></td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>3</th>
<th>First-Year Composition—Engl 105</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Principles of Agronomy—Agron 114</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Introduction to Instructional Technology—C I 201</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Introduction to Agricultural Markets—Econ 235</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology II—Biol 202</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology Laboratory—Biol 202L</td>
<td></td>
</tr>
</tbody>
</table>

---

### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>0.5</th>
<th>Orientation—AgEds 110B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Survey of the Animal Industry—An S 114 and 114L</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Introduction to Probability and Matrices—Math 104 or Discrete Mathematics—Math 150</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Social science elective</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Introductory Biology—Biol 109</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
<td></td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>3</th>
<th>Principles of Agronomy—Agron 114</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Principles of MicroEconomics—Econ 101</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Life science elective</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Humanities elective</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 105</td>
<td></td>
</tr>
</tbody>
</table>

### Systems Technology and Management Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills—Engl 104, 105; Sp Cm 212 or AgEds 311; Eng 309 or 309L or 314; Lib 160</td>
</tr>
</tbody>
</table>

**Mathematical, physical, and life sciences—** Math 140 and 142, or 160, or 165; Stat 104; Chem 163, 163L; Phys 106 or 111; AST 115, 215; Biol 109; A E 271 or 272; Biol 123 or BBMB 221 or A Ecl 120

**Humanities, ethics, and social sciences—** Econ 101; from approved lists: humanities elective (3 cr.); 3 cr. in ethics, 3 cr. in international perspectives; and 3 cr. of U.S. diversity

<table>
<thead>
<tr>
<th>Cr.</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Agricultural sciences</td>
</tr>
<tr>
<td>3</td>
<td>Select from department approved list</td>
</tr>
</tbody>
</table>

**Agricultural systems technology**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Agricultural sciences technology AST 110, 210, 324, 330, 360, 373, 403 and 496 plus an additional 11 credits of AST courses at the 300 level or above</td>
</tr>
<tr>
<td>6</td>
<td>Other required courses Acct 284; Econ 330 or Mgmt 370 or Econ 336</td>
</tr>
</tbody>
</table>

**Areas of specialization**

**Production Agriculture:** Credits selected from department-approved list of agricultural science courses

**Agribusiness Management:** Credits selected from department-approved list

**Grain Operations:** Acct 285; AST 362; Econ 135; Mkt 340; a minimum of 6 credits from the following: An S 319; Econ 301, 332, 335; Ent 376; Mgmt 371; TrLog 360, 460

**Applied Technology:** Select credits from department-approved list for specialization in one of these areas: seed technology, soil and water conservation, food processing, safety, or precision agriculture. Other areas may be created with departmental approval.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>11-13</th>
</tr>
</thead>
</table>

**Free electives**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>128.5</th>
</tr>
</thead>
</table>

**Total credits**

---

### Prevetinary Studies

Preparation for admission to veterinary medicine may be accomplished through the agricultural studies curriculum.
Environmental Systems Technology Option

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
                  Engl 104, 105; Sp Cm 212 or AgEdS 311; Engl 302 or 309 or 314; Lib 160
40-42  Mathematical, physical, and life sciences
                         Math 140 and 142, or 160, or 165;
                          Stat 104; Chem 163, 163L, 164,
                           231, 231L; Phys 106 or 111; AST 115, 215; A E 271 or 272; Biol 201, 201L, 202, 202L;
                              Micro 201, 201L
15  Humanities, ethics, and social sciences
                  Econ 101; Hist 472; from approved lists: 3 cr. in ethics, 3 cr. in international perspectives; and
                        3 cr. of U.S. diversity
12  Agronomic sciences
                  Select a minimum of 12 credits from Agron 114, 154, 206, 260, 317, 354, 356, 360, 485
14  Environmental Sciences
                  Select a minimum of 14 credits from A Ecl 410, 513; Biol 312;
                               Bot 330, 487, 500, 564; Env S 123, 324, EnSci 401, 402, 404;
                                NREM 407
6  Environmental Studies
                  Select a minimum of 6 credits from: Env S 201, 293, 340, 380, 382, 450, 482, 491
22  Agricultural systems technology
                  AST 110, 120, 210, 324, 326, 333, 403, 425, 475 or 476, 496.
5-7  Free electives
128.5  Total credits

Curriculum in Agronomy

Students majoring in agronomy study crop science, soil science, and agricultural meteorology in one of three options: (1) general agronomy, (2) environmental science, (3) science. A minimum of 15 credits for the agronomy major and 9 credits for the agronomy minor must be earned at Iowa State.

General Agronomy Option

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
                  Engl 104, 105; Lib 160; Sp Cm 212 or AgEdS 311; Engl 302, 309, or 314
6  Mathematical sciences
                  Math 140; Stat 104; demonstration of computer proficiency
16  Physical sciences
                  Chem 163, 163L, 231, 231L; Geol 100, 100L; Phys 111
16  Biological sciences
                  Biol 201, 201L, 202, 202L; Micro 201; 3 cr. from the following: A Ecl 410, Agron 320, Biol 312,
                                BBMB 301, Ent 376, PI P 407

Environmental Systems Option

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
                  Engl 104, 105; Lib 160; Sp Cm 212 or AgEdS 311; 3 cr. elective from
                                Econ 302, 309, or 314
7  Mathematical sciences
                  Math 181 or 160; Stat 101 or 104; demonstration of computer proficiency
17  Physical sciences
                  Chem 163, 163L, 231, 231L;
                                Geol 100, 100L; Phys 111
13  Biological sciences
                  Biol 201, 201L, 202, 202L; Micro 201; 3 cr. from the following: A Ecl 410, Agron 320, Biol 312,
                                BBMB 301, Ent 376, PI P 407

Agriculture

59  Humanities, ethics, and social science
          3 cr. each in ethics, U.S. diversity, international perspectives, humanities, and social sciences (from approved list)
6  Economics and business
                  Econ 101; one course from the following: Acct 284, Econ 102, 235, 330, 336, Mgmt 370, Mkt 340
33  Agronomic sciences
                  Agron 105, 110, 114, 154, 206, 210, 230, 306, 310, 354, 354L, 356 or
                          392, 410, and 492 and 9 cr. of electives (no more than 2 cr. total from Agron 331, 370, 490, 491, and
                                   496 allowed to meet the 9 cr. requirement; Agron 320 may be used only as a biological science by
                                    Agronomy majors)
23.5  Free electives
128  Total credits

Typical Program for the First Year

Cr.  Fall
1  Experiencing Agricultural Systems Technology—AST 110
3  Fundamentals of Algebra—Math 140
5  First-Year Composition—Engl 104
3  General Chemistry—Chem 163, 163L
3  Agricultural science elective
Cr.  Spring
3  Technology Problems with Computational Laboratory—AST 115
3  Introductory Biology—Biol 109 or Principles of Biology—Biol 201
3  First-Year Composition—Engl 105
3  Trigonometry and Analytic Geometry—Math 142
3  Agricultural science elective
0.5  Library Instruction—Lib 160

Areas of specialization
Management: Acct 284; Econ 336; Mgmt 370; Mkt 340; a minimum of 12 credits from the following:
Acct 215, 285, 316; I Tec 231, 244, 360; Mgmt 371; MIS 330; Mkt 442, 446, 447
Precision Agriculture: Credits selected from departmental-approved list.
Technology: Math 166, E M 274, 324, 327; Phys 112; a minimum of 9 credits from the following:
E M 378, 417; I Tec 231, 244, 360; Mat E 362, 362L, Stat 401
10-13  Total credits

Mechanical Systems Option

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
                  Engl 104, 105; Sp Cm 212 or AgEdS 311; Engl 302 or 309 or 314; Lib 160
28-31  Mathematical, physical, and life sciences
                         Stat 104 or 101; Math 140 and 142, or 160, or 165; Chem 163, 163L;
                          Phys 106 or 111; AST 115, 215; A E 271 or 272; Biol 109; Biol 123 or
                              AST 120
15  Humanities, ethics, and social sciences
                  Econ 101; from approved lists: humanities elective (3 cr.); 3 cr. in ethics, 3 cr. in international perspectives; and
                        3 cr. of U.S. diversity
6  Agronomic sciences
                  Agron 114, 154
30  Agricultural systems technology
                  AST 110, 210, 330, 333, 335, 337, 360, 403, 435, 460, 496, plus an additional 3 credits of AST courses at the 300 level or above.

Typical Program for the First Year

Cr.  Fall
1  Experiencing Agricultural Systems Technology—AST 110
3  Fundamentals of Algebra—Math 140
5  First-Year Composition—Engl 104
3  General Chemistry—Chem 163, 163L
3  Agricultural science elective
Cr.  Spring
3  Technology Problems with Computational Laboratory—AST 115
3  Introductory Biology—Biol 109 or Principles of Biology—Biol 201
3  First-Year Composition—Engl 105
3  Trigonometry and Analytic Geometry—Math 142
3  Agricultural science elective
0.5  Library Instruction—Lib 160

Areas of specialization
Management: Acct 284; Econ 336; Mgmt 370; Mkt 340; a minimum of 12 credits from the following:
Acct 215, 285, 316; I Tec 231, 244, 360; Mgmt 371; MIS 330; Mkt 442, 446, 447
Precision Agriculture: Credits selected from departmental-approved list.
Technology: Math 166, E M 274, 324, 327; Phys 112; a minimum of 9 credits from the following:
E M 378, 417; I Tec 231, 244, 360; Mat E 362, 362L, Stat 401
10-13  Total credits
Science Option
The science option is recommended for individuals who want a stronger basic science orientation. See an agronomy adviser for specific recommendations.

Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orientation in Agronomy—Agron 110</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Principles of Agronomy—Agron 114</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College Algebra—Math 140</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>First-Year Composition—Engl 104</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Principles of Biology I—Biol 201 and 201L</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The Earth—Geol 100</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to Meteorology—Agron 206</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Chemistry—Chem 163 and 163L</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>First-Year Composition—Engl 105</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Library Instruction—Lib 160</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Principles of Microeconomics—Econ 101</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Humanities elective—approved list</td>
<td>3</td>
</tr>
</tbody>
</table>

Curriculum in Animal Ecology

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.5</td>
<td>Interpersonal and public communication skills</td>
<td>Cr.</td>
</tr>
<tr>
<td>15.5</td>
<td>Engl 104 and 105; Sp Cm 212; Lib 160; two additional 3-cr. courses in written or oral communication from an approved list; and communications-intensive requirement</td>
<td>27</td>
</tr>
<tr>
<td>11-14</td>
<td>Mathematical sciences</td>
<td>Aquaculture</td>
</tr>
<tr>
<td>16</td>
<td>Math 140 and 142, Math 160 or 165 or 181; Stat 101 or 104</td>
<td>A Ecl 321, 410, 410L, 411, 442; An S 319; Biol 301 or Gen 320; one course from Acct 284, Econ 101, Mkt 340; remaining credits to complete 27 total from approved list.</td>
</tr>
<tr>
<td>19</td>
<td>Physical sciences</td>
<td>Ecology</td>
</tr>
<tr>
<td>16</td>
<td>Chem 163, 163L, 164 or 177, 177L, 178; 231, 231L; Phys 106</td>
<td>A Ecl 410, 410L, 413; Biol 303; Bot 484; Biol 301 or Gen 320; one course from a Ecl 425, 515, Bot 306, 356, 505; Ent 370; one course from Agron 154, 206, Geol 100, 101; one course from Corn S 207, Math 166, 182, Stat 401; remaining credits to complete 30 total from approved lists.</td>
</tr>
<tr>
<td>15</td>
<td>Biological sciences</td>
<td>Fisheries and Aquatic Sciences</td>
</tr>
<tr>
<td>19</td>
<td>A Ecl 211, 310, 312; Biol 201, 201L, 202, 202L; NREM 110, 120</td>
<td>A Ecl 321, 361, 410, 410L, 411, 440; remaining credits to complete 27 total from approved list.</td>
</tr>
<tr>
<td>15</td>
<td>Humanities, ethics, and social science</td>
<td>Interpretation of Natural Resources</td>
</tr>
<tr>
<td>3 cr.</td>
<td>in humanities; 3 cr. in social sciences; from approved lists: 3 cr. in ethics, 3 cr. in U.S. diversity, and 3 cr. in international perspectives; and environmental-intensive and problem-solving intensive requirements.</td>
<td>A Ecl 330, 430; Bot 306, Ent 370; one course from Bot 356, and 484; three courses from A Ecl 361, 362, 363, 364; one course from Agron 154, 206, Astro 120, Geol 100, 101; 5 credits from approved list.</td>
</tr>
<tr>
<td>R</td>
<td>Practical experience requirement (NREM 104)</td>
<td>Prevetinary and Wildlife Care</td>
</tr>
</tbody>
</table>

Students majoring in Animal Ecology are required to choose one of the following options by the end of their sophomore year: Aquaculture, Ecology, Fisheries and Aquatic Sciences, Interpretation of Natural Resources, Prevetinary and Wildlife Care, or Wildlife.

Next, the document proceeds with a typical program for the first year and curriculum in animal science, detailing required courses and options. The document also includes a section on Prevetinary Studies, followed by information on the curriculum in animal science with a focus on science-related requirements and electives.
### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Orientation in Animal Science— An S 110</td>
</tr>
<tr>
<td>2</td>
<td>Survey of the Animal Industry— An S 114</td>
</tr>
<tr>
<td>1</td>
<td>Working with Animals— An S 114</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology Lab— Biol 201L</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics—Math 150</td>
</tr>
<tr>
<td>3</td>
<td>Elective</td>
</tr>
</tbody>
</table>

**Cr. Spring**

| 4   | General Chemistry—Chem 177 |
| 1   | General Chemistry Lab— Chem 177L |
| 3   | First-Year Composition—Engl 105 |
| 3   | Introduction to Statistics—Stat 104 |
| 3   | Elective |

**Curriculum in Dairy Science**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td></td>
<td>Engl 104, 105; Sp Cm 212 or AgEds 311; Lib 160; and communications intensive requirement</td>
</tr>
<tr>
<td>9-13</td>
<td>Mathematical and business sciences</td>
</tr>
<tr>
<td></td>
<td>AST 115 or Com S 103 or proficiency exam; Econ 101; Math 150; Stat (3 cr.)</td>
</tr>
<tr>
<td>8</td>
<td>Physical sciences</td>
</tr>
<tr>
<td></td>
<td>Chem 177, 177L; BBMB 221 or Chem 231 or 331</td>
</tr>
<tr>
<td>10-11</td>
<td>Biological sciences</td>
</tr>
<tr>
<td></td>
<td>Biol 201, 201L; Biol 301 or Gen 320, Micro 201 and 201L or FS HN 272; and environmental-intensive requirement</td>
</tr>
<tr>
<td>15</td>
<td>Personal development, human relations, and global awareness</td>
</tr>
<tr>
<td></td>
<td>3 cr. in humanities; 3 cr. in social sciences; from approved lists: 3 cr. in ethics, 3 cr. in international awareness, 3 cr. in U.S. multicultural awareness; and problem solving-intensive requirement</td>
</tr>
<tr>
<td>30</td>
<td>Professional dairy science</td>
</tr>
<tr>
<td></td>
<td>An S 110, 114, 114L, 211, 214, 214L, 311, 319, 331, 337, 352, 411, 434, plus a minimum of 6 credits from list maintained in department. A minimum of 15 credits in this category must be earned from courses taught in the Animal Science department at ISU.</td>
</tr>
<tr>
<td>41.5-46.5</td>
<td>Free electives</td>
</tr>
<tr>
<td>128</td>
<td>Total Credits</td>
</tr>
</tbody>
</table>

**Preventerst Studies**

Preparation for admission to veterinary medicine may be accomplished through the animal science curriculum.

**Curriculum in Dietetics**

Administered by the Department of Food Science and Human Nutrition.

The student is prepared for admission to dietetic internship programs and other professional experience programs approved/accredited by The American Dietetic Association. Courses included have been approved as meeting the academic requirements of the American Dietetic Association. There is a $30 fee for a statement of verification of completion of the approved program.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td></td>
<td>Engl 104, 105; Lib 160; ComSt 214 or Sp Cm 212</td>
</tr>
<tr>
<td>34-35</td>
<td>Mathematical, physical, and life sciences</td>
</tr>
<tr>
<td></td>
<td>3 cr. college-level math; Stat 101 or 104; Chem 163, 163L, 231, 231L; BBMB 301; Biol 201, 202; Micro 201; Zool 255, 256; 2 credits in laboratory: BBMB 311 or Zool 255L and 256L</td>
</tr>
<tr>
<td>11</td>
<td>Humanities and social science</td>
</tr>
<tr>
<td></td>
<td>Env S 201; Psych 101; select additional credits with at least 3 cr. in humanities.</td>
</tr>
<tr>
<td>3</td>
<td>Ethics</td>
</tr>
<tr>
<td>40</td>
<td>Food science and human nutrition</td>
</tr>
<tr>
<td></td>
<td>FS HN 110, 167, 203, 214, 261, 340, 360, 361, 362, 403, 411, 461, 463, 464, 466, 480</td>
</tr>
<tr>
<td>11</td>
<td>Management</td>
</tr>
<tr>
<td></td>
<td>HR 380, 380L, 391, 392</td>
</tr>
<tr>
<td>9-10</td>
<td>Free electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

*Additional requirement: Students must fulfill international perspectives, U.S. diversity, and ethics requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

---

**Typical Program for the First Year**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Orientation in Dairy Science— An S 110</td>
</tr>
<tr>
<td>3</td>
<td>Survey of the Animal Industry— An S 114, 114L</td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Principles of Biology Lab— Biol 201L</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics—Math 150</td>
</tr>
<tr>
<td>3</td>
<td>Elective</td>
</tr>
</tbody>
</table>

**Cr. Spring**

| 3   | General Chemistry—Chem 177 |
| 1   | General Chemistry Lab— Chem 177L |
| 3   | First-Year Composition—Engl 105 |
| 3   | Introduction to Statistics—Stat 104 |
| 3   | Elective |

**Preventerst Studies**

Preparation for admission to veterinary medicine may be accomplished through the dairy science curriculum.

**Curriculum in Entomology**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td></td>
<td>Engl 104, 105, 314; Sp Cm 212; Lib 160; and communications-intensive requirement</td>
</tr>
<tr>
<td>3</td>
<td>Mathematical and physical sciences</td>
</tr>
<tr>
<td></td>
<td>Stat 104</td>
</tr>
<tr>
<td>14</td>
<td>Life sciences</td>
</tr>
<tr>
<td></td>
<td>Biol 201, 201L, 202, 202L, 312; Micro 302</td>
</tr>
<tr>
<td>15</td>
<td>Humanities, ethics, and social science</td>
</tr>
<tr>
<td></td>
<td>Econ 101; 3 cr. in humanities; from approved lists: 3 cr. in ethics; 3 cr. in international perspectives; 3 cr. in U.S. diversity; and environmental-intensive requirement; and problem solving-intensive requirement</td>
</tr>
<tr>
<td>19</td>
<td>Entomology</td>
</tr>
<tr>
<td></td>
<td>Ent 110, 201, 211, 370, 374, 376; Ent 490E or P M 491; Ent electives; for students entering entomology with one year or more of college-level biological sciences courses, Ent 201 and 211 are waived, and the group requirement reduced to 16 cr.</td>
</tr>
</tbody>
</table>

Students majoring in Entomology are required to choose one of the following options by the end of their sophomore year: Agricultural and Horticultural Insect Management, or Insect Biology.

**Agricultural and Horticultural Insect Management Option**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Mathematics</td>
</tr>
<tr>
<td></td>
<td>Math 140, 141</td>
</tr>
<tr>
<td>16</td>
<td>Physical Sciences</td>
</tr>
<tr>
<td></td>
<td>Chem 163, 163L, 164, 231, 231L; Phys 106</td>
</tr>
<tr>
<td>6</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td></td>
<td>BBMB 301; Bot 320</td>
</tr>
<tr>
<td>12</td>
<td>Agricultural Sciences</td>
</tr>
<tr>
<td></td>
<td>Agron 114 or Hort 221; Agron 154 or 155, 317; PI HP 407</td>
</tr>
<tr>
<td>5</td>
<td>Entomology</td>
</tr>
<tr>
<td></td>
<td>Ent 283, 375</td>
</tr>
<tr>
<td>6</td>
<td>Social Sciences</td>
</tr>
<tr>
<td></td>
<td>Acct 215; Econ 135</td>
</tr>
<tr>
<td>14.5</td>
<td>Free electives</td>
</tr>
</tbody>
</table>
### Insect Biology Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Mathematics</td>
</tr>
<tr>
<td>28</td>
<td>Physical Sciences</td>
</tr>
<tr>
<td>112</td>
<td>Biological Sciences</td>
</tr>
</tbody>
</table>

#### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory in Principles of Biology—Biol 201L</td>
</tr>
<tr>
<td>4</td>
<td>General Chemistry—Chem 163 or 177</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory in General Chemistry—Chem 163L or 177L</td>
</tr>
<tr>
<td>4</td>
<td>Fundamentals of Algebra for Science and Higher Mathematics—Math 140 or Calculus and Differential Equations—Math 181</td>
</tr>
</tbody>
</table>

#### Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the entomology curriculum.

### Curriculum in Environmental Science

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Communication</td>
</tr>
<tr>
<td>11</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td>19</td>
<td>Physical sciences</td>
</tr>
<tr>
<td>7</td>
<td>Biological sciences</td>
</tr>
<tr>
<td>15</td>
<td>Humanities, ethics, and social science</td>
</tr>
<tr>
<td>29</td>
<td>Environmental science</td>
</tr>
<tr>
<td>34</td>
<td>Free electives</td>
</tr>
</tbody>
</table>

#### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Princ. Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Princ. Biology Lab Biol—Biol 201L</td>
</tr>
<tr>
<td>4</td>
<td>Gen Chem —Chem 177</td>
</tr>
<tr>
<td>1</td>
<td>Gen Chem Lab —Chem 177L</td>
</tr>
<tr>
<td>4</td>
<td>Calc. Life Sci. —Math 181</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Comp —Engl 104</td>
</tr>
<tr>
<td>16</td>
<td>Total</td>
</tr>
</tbody>
</table>

#### Curriculum in Food Science

Administered by the Department of Food Science and Human Nutrition.

### Food Science and Technology Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td>47-48</td>
<td>Mathematical, physical, and life sciences</td>
</tr>
</tbody>
</table>

#### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>1</td>
<td>Introduction to Insects—Ent 201</td>
</tr>
<tr>
<td>2</td>
<td>Insects and Society—Ent 211</td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
</tr>
</tbody>
</table>

#### Food Science and Industry Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
</tbody>
</table>

#### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>General Chemistry—Chem 177</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>4</td>
<td>Calculus I —Math 165 or 181</td>
</tr>
<tr>
<td>1</td>
<td>Orientation —FS HN 110</td>
</tr>
</tbody>
</table>

#### Consumer Food Science Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
</tbody>
</table>

#### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>General Chemistry—Chem 177</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Biology—Biol 201</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>4</td>
<td>Calculus I —Math 166 or 182</td>
</tr>
<tr>
<td>1</td>
<td>Orientation —FS HN 110</td>
</tr>
</tbody>
</table>

*Additional requirement: Students must fulfill international perspectives, U.S. diversity, and ethics requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.
Typical Program for the First Year

Cr.  Fall
5  General Chemistry—Chm 163, 163L
3  Principles of Biology—Biol 201
3  First-Year Composition—Engl 104
1  Orientation—FS HN 110
3  Elective

Cr.  Spring
3  Principles of Biology—Biol 202
3  First-Year Composition—Engl 105
4  Calculus II—Math 166, 182
1  Contemporary Issues in FS HN—FS HN 203
0.5  Library—Lib 160

Curriculum in Food Science and Technology-B.S./M.S.

Administered by the Department of Food Science and Human Nutrition.

Undergraduate Program:

Cr.  Degree Requirements*
9.5  Interpersonal and public communications skills
Engl 104, 105; Lib 160; ComSt 214 or Sp Cm 212

47.5  Mathematical, physical, and life sciences
Math 165 and 166 or 181 and 182; Stat 101 or 104; Chem 163, 163L; Biol 201, 201L; Agron 154

15  Humanities, ethics, and social science
3 cr. in humanities; Econ 101; 3 cr. in ethics from approved list; and 3 cr. in U.S. diversity and 3 cr. in international perspectives

28  Forestry courses
For 201, 202, 203, 204, 205, 206, 302, 451, 454; NREM 104, 110, 120

Students majoring in forestry are required to choose one of the following options at the end of their sophomore year: forest ecosystem management or wood products or urban and community forestry or natural resource conservation.

Options

Cr.  Options
26  Wood products
For 280, 452, 453, 481, 483, 485, 486, 487

34  Forest ecosystem management
Bot 356; For 280, 342, 452, 453; NREM 301, 345; Pl P 416; 6 credits from approved multiple use courses (see department for list)

39  Urban and Community Forestry
Bot 356; For 280, 452, 475, 476; Hort 344; Mgmt 370; Pl P 416; Soc 310, 464; C R P 253; 3 credits from approved multiple use courses (see department for list)

35  Natural Resource Conservation
A Ecl 330; Biol 202, 202L, 312; Bot 340, 356; For 453; NREM 301, 407; Soc 130 or 134; 6 credits from approved directed electives list (see department for list)

8.5-21.5  Free electives
128  Total credits

Graduate Program:

Cr.  Degree Requirements
30  Graduate-level coursework including research

Typical Program for the First Year

Cr.  Fall
5  General Chemistry—Chm 177, 177L
3  Principles of Biology—Biol 201
3  First-Year Composition—Engl 104

4  Calculus I—Math 165 or 181
1  Orientation—FS HN 110

Cr.  Spring
3  General Chemistry—Chm 178
3  Principles of Biology—Biol 202
3  First-Year Composition—Engl 105
4  Calculus II—Math 166, 182

1  Contemporary Issues in FS HN—FS HN 203
0.5  Library—Lib 160

Curriculum in Forestry

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
Engl 104, 105, 314; Lib 160; Sp Cm 212

25  Mathematical, physical, and life sciences
Math 140, 150, 151; Stat 101; Chem 163, 163L; Biol 201, 201L; Agron 154

15  Humanities, ethics, and social science
3 cr. in humanities; Econ 101; 3 cr. in ethics from approved list; and 3 cr. in U.S. diversity and 3 cr. in international perspectives

28  Forestry courses
For 201, 202, 203, 204, 205, 206, 302, 451, 454; NREM 104, 110, 120

Typical Program for the First Year

Cr.  Fall
5  General Chemistry—Chm 177, 177L
3  Principles of Biology—Biol 201
3  First-Year Composition—Engl 104

1  Orientation—FS HN 110

Cr.  Spring
3  General Chemistry—Chm 178
3  Principles of Biology—Biol 202
3  Fundamentals of Algebra—Math 140
3  Principles of Biology I—Biol 201
1  Principles of Biology Laboratory I—
Typical Program for the First Year

Cr. Fall
5  General Chemistry—Chem 177, 177L
3  First-Year Composition—Engl 104
4  Calculus—Math 165 or 181
0.5  Principles of Biology—Biol 201, 201L

Cr. Spring
4  General Chemistry—Chem 178, 178L
3  First-Year Composition—Engl 105
4  Calculus—Math 161 or 166 or 182
0.5  Principles of Biology—Biol 202, 202L

Curriculum in Horticulture

Students majoring in horticulture will select an option in which to specialize prior to reaching junior standing and will fulfill the requirements described below under Specialization Options. A minor is available. The requirements appear under Horticulture, Courses and Programs.

Cr. Degree Requirements

12.5  Interpersonal and Public Communication Skills
Engl 104, 105, 302 or 314; Lib 160; Sp Cm 212 or AgEdS 311; and a communications-intensive requirement (see department for procedure)

6-9  Mathematical sciences
Math 140 or 150 or 165 or 181; and Stat 101 or 104 or 227 or 401

13  Physical sciences
Chem 163, 163L or 177, 177L; and 231, 231L, or 331, 331L; and one course from the following group: Chem 164, 164L; 178, 178L; or Phys 106 or 111. A student must take either (1) Chem 163/163L and Chem 231/231L, series or (2) Chem 177/177L and 178/178L series and Chem 331/331L.

19-20  Biological sciences
Biol 201, 202; select 13-14 credits from the following group: Bot 320, 306, 484; Biol 312, Agron 230; Agron 260; Agron 317; Agron 354; Ent 370 or 376; Ent 375; Bot 404; PI P 407; For 416; PI HP 391; Biol 201L; Biol 202L; Gen 320 or Biol 301, 301L; Biol 302, 302L

15  Humanities, ethics, and social sciences
3 credit course from each of the following areas: humanities, ethics, social science, U. S. diversity, and international perspectives; see department for procedure in meeting problem-solving, environmental-intensive, and communication-intensive requirements.

3  Soil science
Agron 154 or 155

30  Horticultural sciences

Specialized Options

(a minor in an approved area of study may be substituted for the specialized option with permission of student’s advisor)

Environmental horticulture option:
Hort 424 must be among the courses that fulfill the horticultural sciences requirement. Biol 312 and 9 or more credits from the following group: AST 324, 425, Agron 260, Bot 304, 364, Ent 375, Env S 293, 330, 382, 491

Greenhouse production and management option:
Hort 233, 322, 332, 422, 434, and 435 must be among the courses that fulfill the Horticultural Sciences requirement. Actc 284, and 9 or more credits from the following group: Econ 101, 102; Actc 215, 228, AST 358; Com S 103, 107; Mkt 340; Ent 375; Mkt 442, 446, 447

Fruit and vegetable production and management option:
Hort 422, 461, and 471 must be among the courses that fulfill the Horticultural Sciences requirement. Actc 284, and 9 or more credits from the following group: FS HN 272, 471, 472, 472, 403, 405; Econ 101, 102, 330; Actc 215, 285; AST 358 or Com S 103 or 107; Mkt 340; Mkt 442, 446, 447

Horticultural communications and public education:
Students in this option must take Engl 314 under Interpersonal and Public Communications Skills and a communications-intensive requirement. BBMB 301 or 404, Math 166 or 182; and 5 or more credits from the following group: BBMB 311, 404, 405, 411; Bot 303; Chem 210 or 211, 316, 321, 322, 322L; Com S 107 or 205; Gen 410, 411; Biol 301, 301L, 302, 302L.

Turfgrass management option:
Hort 351, 351L, 451, 452, 483, 651 should be among the courses that fulfill the Horticultural Sciences requirement. Actc 284 and 9 or more credits from the following group: Actc 285; AST 324, 326, 358; Agron 206, 260, 356, 459; Com S 103 or 107; HRI 287, 288, 289, Mgmt 370, PI HP 206, 391; Ent 375

Electives

128.5  Total credits

An official minor will be accepted in place of a specialized option with the permission of the student’s advisor.

Typical Program for the First Year

Cr. Fall
3  Humanities or Free Elective
5  General Chemistry—Chem 163, 163L or 177, 177L
3  First-Year Composition—Engl 104 or 105
1  Orientation in Horticulture—Hort 110
0.5  Library Instruction—Lib 160
3  Fundamentals of Algebra for Science and Higher Mathematics—Math 140

Cr. Spring
3  General Biology—Biol 201
4  General Chemistry—Chem 164, 164L, 177, 177L (or Phys 106 or 111)
3  Humanities or social science from an approved list
3  Turfgrass management option—Bot 306, Ent 375 or Ent 376, PI P 407 or PI HP 391, Hort 233, 241, 253, 282, 283, 322, 345, 445, and at least 1 credit of Hort 391. Other recommended courses are Hort 332, 341, 342, 344, 346, 347, 351 and 351L. The student must then select a minimum of 15 credits from the following: Actc 284; Engl 303, 309; JLMC 220; Mgmt 471; AgEds 311; Sp Cm 312, 313. Up to 6 credits from the list below may be substituted for any of the 15 above credits. Actc 215, 285, 316; AgEds 402; AST 358; Com S 214, Engl 313, 416, 416; Fin 301; Mgmt 370, 371.

12  Science option:
Those who choose the Science Option must take Bot 320 for the biological sciences requirement. Math 166 or 181 for the mathematical sciences requirement; Chem 177, 177L, 178, 178L, 331, 331L, 332, 332L, Phys 111 and 112 for the physical sciences requirement. BBMB 301 or 404, Math 166 or 182; and 5 or more credits from the following group: BBMB 311, 404, 405, 411; Bot 303; Chem 210 or 211, 316, 321, 322, 322L; Com S 107 or 205; Gen 410, 411; Biol 301, 301L, 302, 302L.

14-18  Electives

2003-2005
Curriculum in International Agriculture
Administered by an Interdepartmental Committee. International agriculture can be taken only as a secondary major in conjunction with a primary major in the College of Agriculture. A minor is available to interested students regardless of their major.

Cr.  Degree Requirements
(Additional prerequisites may be required for some courses.)
12.5  Interpersonal and public communication skills
Engl 104, 105; Sp Cm 212 or AgEdS 311; Lib 160; electives (3 cr.) select from Engl 302 or 314, or Jl MC 205; and communications-intensive requirement (See primary major department for procedure to meet core requirements.)
19  Mathematics, physical, and life sciences
Math 150, Chem 163, 163L, or Chem 177, 177L; math or physical science electives select from BBMB, Chem, Com S, Math, Phys, or Stat (5 cr.); biological sciences electives select from Biol, Bot, Gen, Micro, PI HP or Zool (6 cr.) and demonstration of computer proficiency (See primary major department.)
15  Humanities, ethics, and social sciences
Soc 130 or 134, or Econ 101, Anthr 201; 3 cr. in ethics; 3 cr. in U.S. diversity; 3 cr. in International perspectives; environmental-intensive requirement; and problem solving-intensive requirement (See primary major department for intensive requirements.)

International Agriculture
Internship in International Agriculture or Study Abroad
Program or Foreign Language (6 cr.)
Select courses with international agriculture focus in any major in the College of Agriculture (9 cr.)
66.5  Primary major requirements and free electives
128  Total credits

Program for the First Year
Because international agriculture is a secondary major, the courses taken by the student during the first year will vary, depending on the primary major (see typical program for the primary major).

Curriculum in Microbiology
www.micro.iastate.edu
Administered by the Department of Microbiology.

Cr.  Degree Requirements
12.5  Interpersonal and public communication skills
Engl 104, 105; Engl 302 or Engl 309 or Engl 314; Sp Cm 212; Lib 160
10-12  Mathematical sciences
Stat 101 or 104 required; 2 semesters of math with at least one semester of calculus
26-29  Physical sciences
Chemistry—Chem 177, 177L, 178
Organic Chemistry—Chem 331, 331L, 332
Biochemistry—BBMB 404 and 405 (recommended) or 301 or 420
Physics: 8 credits from Phys 111, 112, 211, 222
16  Biological sciences
Biol 201, 201L, 202, 202L, and 301, 301L, 302, 302L
15  Humanities, ethics, and social sciences
Minimum of 3 credits each in courses in humanities and social sciences. Also, 3 credits each in ethics, international perspectives, and U.S. diversity courses selected from approved lists.
27  Microbiology
Required: Micro 110, 302, 310, 402, 404, 430, 450. Required labs - Micro 302L, 301L, 440. A minimum of 6 credits of microbiology lecture courses at a 300-level and above.
16-21  Electives
128  Total credits

Typical Program for the First Year
Cr.  Fall
3  General Chemistry—Chem 177
1  Library—Lib 160
R
Cr.  Spring
3  First-Year Composition—Engl 104
4  General Chemistry—Chem 177L
3  Principles of Biology—Biol 201
1  Library—Lib 160
R

Curriculum in Nutrition—B.S./M.S.
Administered by the Department of Food Science and Human Nutrition.

Undergraduate Program:
Cr.  Degree Requirements*
9.5  Interpersonal and public communication skills
Engl 104, 105, Lib 160, ComSt 214 or Sp Cm 212
51-58  Mathematical, physical, and life sciences
4 credits in calculus (2 semesters preferred), Stat 104 or 101; Chem 177, 177L, 178, 331, 331L, 332, 332L; Phys 111, 112; BBMB 404 and 405 or 420; Biol 201, 201L, 202, 202L; Micro 302, 302L; Zool 355
12  Humanities and social science
Env S 201; select additional credits with at least 3 cr. of humanities and 3 cr. in social science
3  Ethics
Curriculum in Pest Management

Administered by the departments of Agronomy, Animal Ecology, Entomology, Forestry, Horticulture, and Plant Pathology. Must be taken as a secondary major in conjunction with a primary major. Students with primary majors in other than the sponsoring departments also are encouraged to enroll in the pest management program. Additionally, a minor in pest management is available; requirements appear under Pest Management, Courses and Programs.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td>6</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td>9</td>
<td>Physical sciences</td>
</tr>
</tbody>
</table>

Curriculum in Plant Health and Protection

Administered by the Departments of Agronomy, Entomology, Forestry, Horticulture, and Plant Pathology. A minor in plant health and protection is available; the requirements appear under Plant Health and Protection, Courses and Programs.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td>6-10</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td>12-13</td>
<td>Physical sciences</td>
</tr>
<tr>
<td>19-20</td>
<td>Biological sciences</td>
</tr>
</tbody>
</table>

Curriculum in Public Service and Administration in Agriculture

Administered by the Department of Sociology.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Interpersonal and public communication skills</td>
</tr>
<tr>
<td>18</td>
<td>Mathematical, physical and life sciences</td>
</tr>
</tbody>
</table>

Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cr. Fall</td>
<td>General Chemistry—Chem 177, 177L</td>
</tr>
<tr>
<td>4</td>
<td>Principles of Biology—Biol 201, 201L</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>4</td>
<td>Calculus</td>
</tr>
<tr>
<td>1</td>
<td>Orientation—FS HN 110</td>
</tr>
</tbody>
</table>

| Cr. Spring | Principles of Biology—Biol 202, 202L |
| 3-4 | Calculus or Elective |
| 3 | General Chemistry—Chem 178 |
| 0.5 | Library—Lib 160 |
| 1 | Contemporary Issues in FS HN—FS HN 203 |

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-17</td>
<td>Biological sciences</td>
</tr>
<tr>
<td>15</td>
<td>Humanities, ethics, and social science</td>
</tr>
<tr>
<td>17</td>
<td>Agricultural sciences</td>
</tr>
<tr>
<td>20-21</td>
<td>Plant health and protection</td>
</tr>
</tbody>
</table>

Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>General Chemistry—Chem 177, 177L</td>
</tr>
<tr>
<td>4</td>
<td>Principles of Biology—Biol 201, 201L</td>
</tr>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>4</td>
<td>Calculus</td>
</tr>
<tr>
<td>1</td>
<td>Orientation—FS HN 110</td>
</tr>
</tbody>
</table>

| Cr. Spring | Principles of Biology—Biol 202, 202L |
| 3-4 | Calculus or Elective |
| 3 | General Chemistry—Chem 178 |
| 0.5 | Library—Lib 160 |
| 1 | Contemporary Issues in FS HN—FS HN 203 |

<table>
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<tr>
<th>Cr.</th>
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<tbody>
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<td>17</td>
<td>Agricultural sciences</td>
</tr>
<tr>
<td>20-21</td>
<td>Plant health and protection</td>
</tr>
</tbody>
</table>
### Curriculum in Seed Science

Administered by the Department of Agricultural and Biosystems Engineering, Agronomy, Horticulture, and Plant Pathology. Must be taken as a secondary major in conjunction with a primary major. The seed science program is designed for students with career interests in one or more aspects of the seed industry. Areas of study include: seed production, conditioning, pathology, physiology, quality control, and marketing, as well as seed plant designs.

**Degree Requirements**

- **Interpersonal and public communication skills** *(Engl 104, 105; Sp Cm 212 or AgEdS 311; Lib 160; Engl 302 or 309 or 314 or Sp Cm 312; and a communications-intensive requirement (see department of primary major for procedures))

- **Mathematical, physical, and life sciences**
  - Math 140 or 150; Stat 101 or 104; Chem 163, 163L; BBMB 221 or Chem 231, 231L; Phys 106 or 111, or Chem 164, 164L; Biol 201, 201L; Biol 202, 202L; Ent 376; Gen 320 or Biol 301; Agron 317; PI P 407; and demonstration of computer proficiency (see department of primary major for procedures)

- **Humanities, ethics, and social science**
  - 3 cr. of humanities, social sciences, ethics (from an approved list), U.S. diversity (from an approved list), and international perspectives (from an approved list); environmental intensive requirement (see department of primary major for procedures); and problem-solving intensive requirement (see department of primary major for procedures)

### Typical Program for the First Year

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>3</td>
<td>Introductory Biology—Biol 109</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics for Business and Social Sciences I—Math 150</td>
</tr>
<tr>
<td>3</td>
<td>Rural Institutions and Organizations—Soc 130</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Microeconomics—Econ 101</td>
</tr>
<tr>
<td>R</td>
<td>Orientation to Public Service and Administration in Agriculture—Soc 110</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 105</td>
</tr>
<tr>
<td>3</td>
<td>Principles of Macroeconomics—Econ 102</td>
</tr>
<tr>
<td>3</td>
<td>American Government: Institutions and Policies—Pol S 215</td>
</tr>
<tr>
<td>3</td>
<td>Fundamentals of Speech Communication—Sp Cm 212</td>
</tr>
<tr>
<td>3</td>
<td>Agricultural Science</td>
</tr>
<tr>
<td>0.5</td>
<td>Library Instruction—Lib 160</td>
</tr>
</tbody>
</table>

### Curriculum in Zoology

Administered by the Department of Zoology and Genetics.

**Degree Requirements**

- **Communications** *(Engl 104, 105; an advanced English writing course (Engl 302-318); oral communication (AgEdS 311, Sp Cm 212); Lib 160)*

- **Math**
  - Must include at least one course from both calculus and statistics chosen from Math 160, 165, 166, 181, 182; Stat 101 or 104, 401, 402, 403

- **Computer studies**
  - 3 credits in computer science or computer applications chosen from an approved list. See department for list.

**Typical Program for the First Year**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>Opportunities in Zoology—Zool 110</td>
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<tr>
<td>3</td>
<td>First-Year Composition—Engl 104</td>
</tr>
<tr>
<td>4</td>
<td>General Chemistry—Chem 177</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory in General Chemistry—Chem 177L</td>
</tr>
<tr>
<td>4</td>
<td>Calculus—Math 165 or 181</td>
</tr>
<tr>
<td>3</td>
<td>General Biology—Biol 201</td>
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<tr>
<td>1</td>
<td>Laboratory in General Biology—Biol 201L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>First-Year Composition—Engl 105</td>
</tr>
<tr>
<td>3</td>
<td>General Chemistry—Chem 178</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory in General Chemistry—Chem 178L</td>
</tr>
<tr>
<td>4</td>
<td>Calculus—Math 161 or 166 or 182</td>
</tr>
<tr>
<td>3</td>
<td>General Biology—Biol 202</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory in General Biology—Biol 202L</td>
</tr>
</tbody>
</table>
College of Business

Departments of the College
Accounting
Finance
Logistics, Operations and Management
Information Systems
Management
Marketing

Objectives of the Curricula in Business
The instructional objective of the College of Business is to provide a high quality professional education in business. Such an education should provide the student with: (1) an appreciation of the evolution of the profession and an awareness of the ethical, global, technological, economic, political and social forces shaping its future; (2) an understanding of the major functional areas of business with the opportunity for specialization for a career in business; (3) an ability to recognize and appreciate the affect of diversity in the workplace; (4) an opportunity for advanced study.

A comprehensive education in business includes a broad foundation in the liberal arts, courses in the major functional areas of business activity, proficiency in analytical methods, and the ability to identify problems and arrive at logical solutions. In addition, a professional education is designed to inspire students to assume business and community leadership.

The curricula in business are accredited by the International Association for Management Education (AACSB), the national business accrediting agency.

Organization of Curricula
The undergraduate curricula in business are divided into two phases: a general education (pre-business) program and a professional program. The pre-business requirements provide a broad foundation in the liberal arts. The professional program includes two parts: (1) the business core which provides a common body of knowledge in all the functional areas in business, and (2) a major curriculum. The seven major curricula offered for the degree bachelor of science (B.S.) are accounting, finance, management, management information systems, marketing, production/operations management, and transportation and logistics. The College also offers a secondary major in international business. An opportunity to take elective courses is also a part of the curricula.

Bachelor of Science
The bachelor of science (B.S.) degree offers a high quality professional education in business. It prepares students for professional careers in specialized functions of business and government. Candidates for this degree must satisfy the requirements established by the College of Business and also the requirements for individual majors specified by the departments of the College. All candidates for the B.S. degree are required to complete one of the following majors: accounting, finance, management, management information systems, marketing, production/operations management or transportation and logistics.

Required High School Preparation
Students entering the pre-business curriculum must present evidence of the following high school preparation:

- Four (4) years of English/Language Arts, emphasizing writing, speaking, and reading as well as an understanding and appreciation of literature.
- Three (3) years of mathematics, including one year each of algebra, geometry, and advanced algebra.
- Three (3) years of science, including one year each of courses from two of the following fields: biology, chemistry, and physics.
- Two (2) years of social studies.

Admission Standards to Professional Programs
All new entering students are enrolled in a pre-business curriculum. To enter the professional program in the College of Business, students must complete a minimum of 30 credits including Engl 104, Engl 105 and the following foundation courses or their equivalents: Math 150, Com S 103, Econ 101, Stat 226, Acct 284. Any unmet high school requirements and Engl 101 courses must also be complete. See Curriculum in Business.

In addition, all students (except Management Information Systems students) must achieve an Iowa State University cumulative grade point of 2.5 or a grade-point average of 2.5 in the foundation courses. Management Information Systems students must achieve a 2.75 grade point average in one of these areas. Admission into the professional program is a prerequisite for pre-business students to gain admission into upper-level business classes. Students that have not achieved guaranteed admission may be considered on a case-by-case basis.

Students who meet the following four requirements qualify for early admission to the professional program: Eligibility to apply for the Honors Program, completion of any unmet high school requirements, completion of any required Engl 101 courses, and declaration of a specific major. Students who meet these criteria must initiate the application for admission to the professional program.

If using the foundation courses for admission to the Professional Program, both transfer grades and Iowa State University grades are used to compute the grade point average. If foundation courses are taken at Iowa State University they must be repeated at Iowa State University. With the exception of Acct 285 and MIS 330, pre-business students do not have access to business core classes. To facilitate registration, students may be conditionally admitted during the semester in which they complete the admission requirements.

Admission requirements are subject to change. Applications and the current requirements for admission to the College of Business are available from the Undergraduate Programs Office or on the web at www.bus.iastate.edu/undergrad/ in the College of Business.

Academic Standards and Graduation Requirements
Policies for students enrolled in the College of Business may be obtained from the Undergraduate Programs Office or on the web at www.bus.iastate.edu/undergrad/ in the College of Business. Students are responsible for knowing and adhering to these College of Business policies as well as the university regulations found in this catalog. The following policies are in effect for students graduating from a professional curriculum in business with a B.S. degree under the 2003-2005 catalog: (1) A minimum of 124.5 semester credits are required. (2) At least 50 percent of the required business credits must be earned at Iowa State. All 300 level and higher business credits must be earned at a four-year college. (3) At least 50 percent of the 124.5 credits required for graduation must consist of general education (non-business credits). (4) A minimum of 12 credits of the last 32 credits earned in residence must be applied to the business core and/or the major. (5) The major departments reserve the right to determine the appropriate section of the degree program to which transfer credits will be assigned. (6) Students must achieve English proficiency by earning a grade at C or better in two of the three required English courses. (7) A student must earn a grade of C or higher in a minimum of 30 credits applied to the business core and the major. (8) A student must earn at least 42 credits of 300 level and higher coursework from a four-year institution. (9) Business majors may not take business courses Pass-Not Pass (P/NP). (10) General education courses may not be taken P/NP.
Curriculum in Business

Leading to the degree of bachelor of science with a major in accounting, finance, management, management information systems, marketing, production/operations management or transportation and logistics. The College also offers a secondary major in international business. Total credits required: 124.5

Pre-business Curriculum

Cr. 18-21 Business Major

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Business Core</th>
</tr>
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<tbody>
<tr>
<td>3</td>
<td>Acct 285</td>
</tr>
<tr>
<td>3</td>
<td>Fin 301</td>
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<tr>
<td>3</td>
<td>Mgmt 370</td>
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<tr>
<td>3</td>
<td>Mgmt 478</td>
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<td>3</td>
<td>MIS 320</td>
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<tr>
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<td>POM 320</td>
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<tr>
<td>3</td>
<td>TrLog 360</td>
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Select one: 18

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Acct 383, 384, 386, 387, 485, 497</td>
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</table>

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Fin 310, 320</td>
</tr>
</tbody>
</table>

12 Select from Fin 330, 361, 380, 415, 424, 425, 445, 462, 472 of which six credits must be at the 400 level.

3 Select from Acct 383, 384, 386, 387, 488 or any 400 level Acct; or any Fin course listed above.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Mgmt 371</td>
</tr>
<tr>
<td>3</td>
<td>Mgmt 377</td>
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<td>3</td>
<td>Mgmt 414</td>
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<tr>
<td>3</td>
<td>Mgmt 471</td>
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6 Select from department-approved list

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Management Information Systems</th>
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<tbody>
<tr>
<td>18</td>
<td>Com S 201, MIS 331, 432, 433, 435</td>
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<tr>
<td>3</td>
<td>Select from department-approved list</td>
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</table>

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Mkt 443, 444, 447</td>
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</tbody>
</table>

6 Select from Mkt 343, 410, 442, 446, 448, 449

3 Select from department-approved list

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Production/Operations Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>POM 420, 422, 424</td>
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</table>

9 Select from department-approved list

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Transportation and Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>TrLog 460, 461</td>
</tr>
</tbody>
</table>

12 Select from the following courses, two of which must be from the following list:

- TrLog courses: TrLog 462, 463, 466, 468, 469, POM 420, 422, 424, or MIS 434.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Non-business electives. Select from the following courses, two of which must be from the following list:</td>
</tr>
<tr>
<td>9.5-12.5</td>
<td>Select from the following courses, two of which must be from the following list:</td>
</tr>
</tbody>
</table>

CPA Note: See Accounting Curriculum for information on additional requirements for students who wish to be candidates for the CPA exam.

Advising System

Students in the pre-business curriculum in the College of Business will be advised by a pre-business adviser. The adviser assists students to develop an academic program, access pertinent university resources and meet their educational objectives. Following admission to the professional program students will be assigned a faculty adviser. The faculty adviser assists students in understanding the requirements of the major, career paths in the major, and in choosing electives to complement the major. In addition to the faculty adviser, professional program advisers in the Undergraduate Programs Office are available to assist students in program planning, registration and to review graduation requirements.

Honors

Entering freshmen who meet one of the following criteria, and have a minimum English ACT of 24, will be invited to apply for membership in the Freshman Honors Program: earned an ACT composite of 30, or ranked in the top 5% of their high school classes; or selected as a National Merit or National Achievement finalist.

Internships

Credit and non-credit internships in business may be approved for College of Business students in all majors including pre-business. Credit hours and requirements vary. Arrangements must be made in the College prior to the beginning of the internship. An internship adviser will assist students in making these arrangements.

Double Majors

Undergraduates with a major in the College of Business may complete another major in the College of Business. Those desiring a second major outside the college should refer to the catalog section of the appropriate college and department for the second major requirements.

Undergraduates with a primary major outside the College of Business wanting a second major in business must meet the admission requirements for the professional program as well as complete the following requirements: the business core courses, the major specialization, Econ 102, Acct 215 and Math 151.

All students pursuing double majors or double degrees within the College of Business are required to have 15 credits of coursework in each major that is not used in the other major.
Curriculum Changes
Iowa State University students wishing to change their curriculum to the College of Business must attend a curriculum change meeting. See Changing Curriculum or Major for more details on this process. Students on temporary enrollment will not be allowed to change curriculum to the College of Business during period three. See Making Schedule Changes.

International Business Secondary Major
A student in the College of Business may earn a secondary major in International Business. The requirements for this major include 12 credits in international business courses, one year of the same university-level foreign language (minimum 6 credits) and an approved international experience (minimum 3 months). Students who pursue this secondary major will be required to complete the requirements for a primary major in Business. Fifteen of the 18 credits required for the International Business major may not be used for the primary major.

Minor
The College of Business offers a structured minor in general business to students outside the College. Requirements for the minor are Acct 285, Fin 301, Mgmt 370, MIS 330, Mkt 340, POM 320, and TrLog 360. The minor must include at least 6 credits in courses numbered 300 or above taken at Iowa State University with a grade of C or higher. Students wishing to earn a minor in business must meet the admissions requirements of the College of Business professional program (see admission standards to professional programs). All requirements and prerequisites for the requirement must be taken for a grade.

Students with a major in the College of Business may qualify for a minor specialization in one of the college's departments by taking at least 15 credit hours in the minor specialization, nine hours of which may not be used to satisfy any other department, college, or university requirement. The minor must include at least 6 credits in courses numbered 300 or above taken at Iowa State University with a grade of C or higher. Students with declared majors have priority over students with declared minors in courses with space constraints.

Students with a major outside the College of Business are eligible for a general business minor only—not a specialization in a business department.

Entrepreneurial Studies
Cross-Disciplinary Minor
The College of Business participates in a cross-disciplinary minor in Entrepreneurial Studies. This minor is only available to business and non-business majors. Requirements for the minor include Mgmt 310, 313, and 9 credits from an approved list. The approved list is available in the Undergraduate Programs Office in the College of Business and on the web at www.iastate.edu/majors_minors/entrepreneurstudy.htm. The minor must include at least 6 credits in courses numbered 300 or above taken at Iowa State University.

Nondegree Seeking Students
Students who wish to take courses in the College of Business, but are not seeking an undergraduate degree, should apply to the college as nondegree seeking students. Nondegree seeking students are eligible to take up to 9 credits in 300-level and above business courses without meeting the college's admission requirements. Students who desire to take more than 9 credits, however, must meet the College's professional program admission requirements and have approval of a department chair. Nondegree seeking students must meet all course prerequisites.

Upper Division Courses for Students Outside the College
Students from outside the College of Business are eligible to take up to 9 credits of 300-level and above business courses without meeting the college's admission requirements, as long as they meet course prerequisites. Students who desire to take more than 9 credits, however, must meet the college's professional program admission requirements.

Graduate Study
Four programs are offered at the graduate level: a master of business administration (M.B.A.) program, a master of accounting (M.Acc.), a master of science (M.S.) in business, and a master of science in information systems (M.S.I.S.). These programs are intended to meet three sets of educational objectives.

The M.B.A. is the professional management education program for those pursuing careers in business. The purpose of this professional program is to provide professional business education by preparing students to understand the impact of technology on business organizations in a global environment. The M.B.A. program consists of a 48-credit curriculum leading to a nonthesis, noncreative component master of business administration. Students may pursue a specialization in accounting, agribusiness, finance, human resource management, information systems, manufacturing and quality or marketing.

The masters of accounting (M.Acc.) is a 32-hour degree. The program requires 15 hours of graduate accounting courses, at least 9 hours of nonaccounting graduate electives, a communications course and an international course from an approved list, and a 2-hour creative component. The M.Acc. is appropriate for any student wanting to pursue a variety of accounting careers. Additionally, the program is designed to help interested candidates meet the 150-hour education requirement for CPA certification in Iowa.

The masters of science in information systems (M.S.I.S.) is a 32-credit (minimum) curriculum designed around three interrelated areas - Foundation, IS, and electives. All students are expected to be familiar with basic computing skills before they enter the program. The M.S.I.S. will educate students on applying IS theory and concepts to modern IS development through classes that enable them to learn and use the latest software in application projects. Students graduating from the program will have advanced technical and managerial skills to develop and manage information systems projects.

The M.S. program, consisting of 30 minimum credits, is oriented toward further business specialization at the master's level for students with undergraduate degrees or academic backgrounds in business. The program is intended to serve those students who desire specialized study of an area within business. Students in the program must complete a thesis. This program is also a suitable vehicle for students planning to pursue a Ph.D. in business.

Double degree programs are offered with architecture (M.Arch./M.B.A.), community and regional planning (M.B.A./M.C.R.P.), and statistics (M.B.A./M.S.-Statistics). Various departments in the College of Business participate in the following graduate level interdepartmental offerings: Industrial Relations (interdepartmental program), Information Assurance (interdepartmental program) and Transportation (interdepartmental major). The College of Business also offers a business administration minor to students with majors outside the college.
The College of Design strives to provide each student with a broad educational background and preparation in a specific environmental design or art discipline. Each program is designed to develop knowledge and appreciation of the physical and cultural environment, to stimulate creative thinking and analysis, and to prepare students for participation in a wide variety of careers.

The college’s undergraduate curricula are structured along three areas: general education, general design education, and discipline-specific education. General education and general design education are composed to ensure that students receive a well-rounded undergraduate education and exposure to allied design disciplines. The intense, discipline-specific course sequences focus on developing students’ ability and knowledge in their major. Within the major area, students advance creative and professional skills through classroom and studio work; critiques of student projects; discussion with professional practitioners, and field studies.

The college’s programs also encompass many opportunities for individualized study and extracurricular activities such as visiting lectures and symposia, workshops, gallery exhibits, practicum and internship programs, field trips, and international study programs.

Graduates of the college are employed in private firms, government, industry, and education, or are self-employed as designers or artists. Opportunities for graduates include careers as architects, landscape architects, community and regional planners, graphic designers, interior designers, studio artists, arts administrators, art educators, and environmental designers.

The College’s world wide web site includes additional information:
www.design.iastate.edu

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### Undergraduate Curricula

#### Majors
- Architecture
- Art and Design
- Community and Regional Planning
- Graphic Design
- Interior Design
- Landscape Architecture

#### Secondary Majors
- Environmental Studies*
- International Studies*
- Transportation*

#### Minors
- Design Studies
- Entrepreneurial Studies*
- Environmental Studies*
- Gerontology*
- International Studies*
- Technology and Social Change*

*The College of Design participates in these interdepartmental secondary majors and minors.

### Graduate Curricula

The College of Design offers graduate study in the areas shown below. Graduate study is conducted through the Graduate College. Details are found in the Graduate College section of this catalog.

#### Majors
- Architecture
- Architectural Studies
- Art and Design
- Art Education
- Community and Regional Planning
- Graphic Design
- Integrated Visual Arts
- Interior Design
- Landscape Architecture
- Transportation Planning*

#### Double Degree Programs
- Architecture/Community and Regional Planning
- Community and Regional Planning/Landscape Architecture
- Architecture/Business
- Community and Regional Planning/Public Administration

#### Minors
- Gerontology*

*The College of Design participates in these interdepartmental graduate programs.

### High School Preparation

Courses in fine arts and design that develop visualization and freehand drawing abilities are highly recommended though not required for entrance. Students planning to enroll in an academic program of the College of Design must complete the following high school course requirements: 4 years of English to develop communication skills, critical reading and writing ability, including coursework in composition and literature, and, up to 1 year of speech and/or journalism; 3 years of mathematics to develop problem solving skills, including 1 year each of algebra, geometry, and advanced algebra; 3 years of science, including at least two of the following: 1 year of biology, 1 year of chemistry, or 1 year of physics; 2 years of social studies, including at least 1 year of U.S. history and 1 semester of U.S. government.

### Special Requirements

Students admitted into the departments of Architecture and Landscape Architecture are enrolled in preprofessional programs. Admission into the professional programs requires a separate application after completing the preprofessional program, depends on available resources, and is subject to review by faculty committee. Applicants must complete a specified core of courses and are reviewed on the basis of a portfolio of original work, scholastic performance, and a written essay.

Students enrolled in all curricula in the Department of Art and Design must complete a set of basic course requirements before entering a specific program of study. Admission into the graphic design and interior design programs depends on available resources and is subject to review by a faculty committee. Applicants are reviewed on the basis of a portfolio of original work, scholastic performance, and a written composition.

### Advising

Each student receives personal assistance from an academic adviser within the student’s curriculum area. Students enrolled in the college’s preprofessional programs are advised by professional advisers. Once admitted to professional programs, students are assigned to faculty advisers. Advisers help students develop a program of study, access pertinent university resources, as well as provide information on career choice.

The college’s career services office works with students to develop their career goals as well as prepare and search for employment.

### Honors Program

The College of Design participates in the Honors Program which provides opportunities for outstanding students to individualize their programs of study. See Index, Honors Program.

### Requirements in the College of Design

All students in the College of Design are expected to meet the following requirements of the college.
**General Education**

**Minimum Credits.**

- **6** Biological sciences, physical sciences and mathematics
  Includes courses in the fields of agronomy, astronomy and astrophysics, biology, botany, chemistry, civil engineering, computer science, geology, mathematics, physics, statistics, and zoology.

- **9.5** Communications
  Engl 104*, 105*, Lib 160.
  Includes courses in the fields of English (composition), and speech communication (interpersonal and rhetorical).

- **6** Humanities
  Includes courses in the fields of classical studies, English (literature), foreign languages, history, philosophy, religious studies, as well as history/theory/literature courses in dance, music, theater, journalism, African American studies, American Indian studies, environmental studies, Latino/a studies, women's studies, and university studies.

- **6** Social sciences
  Includes courses in the fields of African American studies, American Indian studies, anthropology, economics, environmental studies, geography, human development and family studies, Latino/a studies, political science, psychology, sociology, and women's studies.

- **9** Selected from the above areas.
  Six credits must be at the 300 level or above.

- **36.5** Minimum credits

See departmental curricula for specific course requirements within the general education areas.

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**General Design Education**

**Cr.**

- **3** History requirement:
  A history course in the College of Design but outside the student's curriculum area.

- **6-9** Options in studio, history, theory, criticism, and methods
  At least two studio, history, theory, criticism, and/or methods courses in the College of Design but outside the student's curriculum area.

- **9-12** Total credits (at least 3 credits must be at the 300 level or above)

*To meet requirements for graduation, a minimum grade of C– must be received.

**Minor in Design Studies**

The undergraduate minor in Design Studies is constructed to facilitate design awareness among interested students and to provide a vehicle for interdisciplinary study within the College of Design. This minor is open to all undergraduate students at Iowa State University.

This minor requires fifteen credits of course work: three credits of history selected from College of Design course offerings and twelve additional credits selected from College of Design course offerings.

At least six of the fifteen credits must be taken at Iowa State University in courses numbered 300 or above. At least nine of the fifteen credits must not be used to meet any other college or university requirements except the credit requirement for graduation.

Students enrolled in the College of Design may not use courses in their major to satisfy this minor.

**Curriculum in Architecture**

The department offers undergraduate and graduate degree programs:

A 140-credit undergraduate professional program, preceded by a 29.5-credit preprofessional program, leading to the bachelor of architecture degree.

A three-part 100-credit program leading to the master of architecture. Applicants holding B.S. or B.A. degrees in architecture or environmental design are given advanced standing in this program. For applicants holding professional degrees in architecture (B.Arch. or M.Arch.), a 30-credit post-professional course of study is available.

A 30-credit graduate program leading to the degree master of science in architectural studies, a research oriented degree.

For more complete graduate program descriptions see Graduate Study under Architecture in the Courses and Programs section.

Students are advised to seek faculty counsel regarding a career in architecture. In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit US professional degree programs in architecture, recognizes two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Masters degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

**Preprofessional Program**

<table>
<thead>
<tr>
<th><strong>First Year</strong></th>
<th><strong>Cr.</strong></th>
<th><strong>Fall/Spring</strong></th>
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<tbody>
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<td></td>
<td></td>
<td>Arch 102</td>
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<td>Elective</td>
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<td>0.5</td>
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**Professional Program**

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<td>Arch 401</td>
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<td>Arch 482</td>
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<td>3</td>
<td>Arch HTC 582 option*</td>
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<tr>
<td></td>
<td>3</td>
<td>Communication option*</td>
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<tr>
<td></td>
<td>3</td>
<td>Elective**†</td>
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<tr>
<td></td>
<td>6</td>
<td>Arch 402**</td>
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<td></td>
<td>3</td>
<td>Professional option**†</td>
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<tr>
<td></td>
<td>3</td>
<td>Arch HTC option*</td>
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**Fifth Year**

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<td>Arch 485</td>
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<td>Professional option*†</td>
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<td>College option*</td>
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<tr>
<td></td>
<td>Elective*</td>
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<td></td>
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<tr>
<td>6</td>
<td>Arch 404**</td>
<td>3</td>
<td>College option*</td>
<td>3</td>
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<tr>
<td>3</td>
<td>Professional option*†</td>
<td></td>
<td>Elective*</td>
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<tr>
<td>15</td>
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</tbody>
</table>
*Choose from a faculty approved list of courses.

**Curriculum in Art and Design—B.F.A.**

Leading to the degree bachelor of fine arts degree. Total credits required: 120.5.

This curriculum offers two concentrations for the student: visual communications and studio research.

Admission into the art and design B.F.A. curriculum is subject to completion of a minimum of 24.5 credits including Art 108,109, 110, 130, Art H 181, Engl 104 and 105, Lib 160, 6 credits in general education coursework, and 15 credits in recommended studio coursework. A portfolio review will take place at the end of the second year to guide the student into the appropriate BFA concentration.

Transfer students with studio credits from other colleges and universities must present a portfolio of work done in those courses in order to have the credits apply toward studio requirements. Students are advised to present this portfolio of work upon admission and prior to registration for classes.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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<tr>
<td>36.5</td>
<td>General education</td>
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<tr>
<td>6 min.</td>
<td>Biological and physical sciences and mathematics</td>
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<td></td>
<td>Select from Astro 120, 150, Biol 109, 123, 201, 202, Bot 102, 202, Chem 160, 163, 163L, Com S 103, 107, Geol 100, 101, Gen 260, Math 104 or 150, 105, 140, 141, 151, Mteor 206, Phys 101, 106, Stat 101, 104, Zool 155, 258, or any higher level course in these disciplines for which these courses are prerequisite</td>
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<td>9.5 min.</td>
<td>Communications</td>
<td>6</td>
<td>Engl 104 and 105</td>
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<tr>
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<td>Select from CmDis 286, ComS 101, 102, Sp Cm 212</td>
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<td>Lib 160</td>
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<tr>
<td>6 min.</td>
<td>Humanities</td>
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<tr>
<td>6 min.</td>
<td>Social sciences</td>
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<td></td>
<td>Select from Anthr 201, 202, 306, Econ 101, 102, Pol S 215, 230, 241, 251, Psych 101, 220, Soc 130 or 134, or any higher level course in these disciplines for which these courses are prerequisite, or select from Am In 210, Env S 201, 223, HD FS 102, 239, 276, 283, 349, 367, 370, 373, 377, 378, 380, 395, JI MC 101, 105, 320, 453, 474, 476, W S 201, 301, 321, 323, 327, 346, 350, 385, 386, 401</td>
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<tr>
<td>9 min.</td>
<td>Selected from the above areas and/or from CmDis 275, 286, ComS 101, 102, 214, 310, 311, 314, 317, 318, Engl 205, 219, 220, 302, 303, 304, 305, 306, 309, 310, 314, 315, 316, Fin 351, 357, Mgmt 370, Mkt 340, Sp Cm 212, 305, 312, 321, 322, 323, 325, 327, Six credits must be at the 300 level or above.</td>
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<tr>
<td>6 min.</td>
<td>General design education*</td>
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<tr>
<td></td>
<td>History of Design—Art H 181**</td>
<td>3</td>
<td>Select from Dsn S 129, or other approved course from Arch, Art H, C R P or L A.</td>
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<td>Art and design core</td>
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<td>Visual Foundations I and II—Art 108, 109</td>
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<td>Orientaion to Art and Design—Art 110</td>
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<td>Drawing I and II—Art 130, 230</td>
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<td>History of Art I and II—Art H 280, 281</td>
<td>6</td>
<td>Art history selections (300 level or above)</td>
<td></td>
</tr>
</tbody>
</table>

**Visual Communications Concentration**

(Note: Portfolio review at end of second year)

6 Visual Communications Foundation
ArtIS 301—Foundations of Visual Literacy
ArtIS 310—Sources of Visual Design

6 min. Art History
Select from Art H 300-400 level courses

2 Art 499 BFA Seminar and Exhibition

10 Electives

120.5 Total credits
Curriculum in Art and Design—B.A.

Leading to the degree bachelor of arts degree. Total credits required: 120.5.

This curriculum offers two concentrations: Art and Culture, and Art and Design History and Theory. Both concentrations are combined with an applied career minor or approved program.

Admission into the art and design B.A. curriculum is subject to completion of a minimum of 24.5 credits including Art 108, 109, 110, 130, Engl 104 and 105, Lib 160, 3 credit selected general design education course, and 6 credits in general education coursework.

Transfer students with studio credits from other colleges and universities must present a portfolio of work done in these courses in order to have the credits apply toward studio requirements. Students are advised to present this portfolio of work upon admission and prior to registration for classes.

Credit selected general design education course, and 6 credits in general education coursework.

**The general design education studio, history, theory and criticism courses requirement of 6 credits will be fulfilled within the art and design options or within the approved program.**

Curriculum in Community and Regional Planning

Leading to the degree bachelor of science. Total credits required: 128.5.

Areas of specialization include: land use and transportation, community design and development, rural and environmental planning. Students can also work with their advisors to design their own areas of specialization.

Curriculum in Graphic Design

Administered by the Department of Art and Design. Leading to the bachelor of fine arts degree. Total credits required for graduation: 123.5. Curriculum is planned for students preparing to enter the professional field of graphic design.

Consideration for admission into the graphic design curriculum requires completion of at least one year of study at ISU. Admission is based on department resources and will be determined by overall cumulative grade point average following completion of 23 credits including the following courses: Art 108, 109, 110, 130, ArtGr 177, Art H 181, Engl 104 or 105, and 6 credits of general education. A portfolio review also will be a significant factor in the admission review process.

On admission to the program, the faculty strongly recommend the purchase of a laptop...
Art and design core
6 Visual Foundations I and II—Art 108, 109
R Orientation to Art and Design—Art 110
6 Drawing I and II—Art 130, 230
6 History of Art I and II—Art H 280, 281
50 Graphs and design concentration
2 Introduction to Graphic Design—ArtGr 177
3 Design Through Photography—ArtIS 229
6 Graphic Design Studio I and II—ArtGr 270, 271
4 Graphic Technology I and II—ArtGr 275, 276
1 Graphic Design Internship
Seminar—ArtGr 277
6 Graphic Design Studio III and IV—ArtGr 370, 371
6 Graphic Design History/Theory/Criticism I and II, ArtGr 378, 388
2 Graphic Design Materials and Processes—ArtGr 372
6 Graphic Design Studio V and VI—ArtGr 470, 471
2 Graphic Design Professional Presentation—ArtGr 472
3 Graphic Design Professional Practices—ArtGr 481
6 Select three 2-credit options from approved program list. One option will be taken with ArtGr 370, 371, 470
3 Select from: Art and Design in Europe—ArtGr 485
12.5 Total credits

Curriculum in Interior Design
Administered by the Department of Art and Design. Leading to the bachelor of fine arts degree. Total credits required for graduation: 127.5. Curriculum is planned for students preparing to enter the professional field of interior design.

Admission is based on departmental resources and will be determined by rank order, based on three factors: A. Overall cumulative grade point average following completion of 27 credits including the following courses: Art 108, 109, 110, 130, ArtID 160, 160S, Art H 181, Engl 104 or 105, and 6 credits of general education; B. A written composition and C. Portfolio review. Transfer students with studio credits from other colleges and universities must present for departmental review a portfolio of work done in these courses in order to have the credits apply toward studio requirements. Students are advised to present this portfolio of work upon admission and prior to registration for classes. Admission of transfer students is contingent on available places in the program.

Cr. Degree Requirements
General education total
6 Biological and physical sciences and mathematics
Math 104, 140, or 140 or 150.
Select from Astro 120, 150, Biol 109, 123, 201, 202, Bot 102, 202, Chem 160, 163, 163L, Com S 103, 107, Geol 100, 101, Gen 260, Math 104 or 150, 105, 140, 141, 151, Mteor 206, Phys 101, 106, Stat 101, 104, Zool 155, 258, or any higher level course in these disciplines for which these courses are prerequisite.

9.5 Communications
Engl 104 and 105
Lib 160
Select from CmDis 286, ComSt 101, 102, Sp Cm 212

6 Humanities

6 Social sciences
Select from Anthr 201, 202, 256, Econ 101, 102, Pol S 215, 230, 241, 251, Psych 101, 230, Soc 130 or 134, or any higher level course in these disciplines for which these courses are prerequisite, or select from Am In 210, Env S 201, 223, HD FS 102, 239, 276, 283, 349, 367, 370, 373, 377, 378, 380, 396, Jl MC 101, 205, 320, 453, 474, 476, W S 201, 301, 322, 327, 346, 350, 352, 386, 401

12.5 Total credits

Curriculum in Interior Design
Administered by the Department of Art and Design. Leading to the bachelor of fine arts degree. Total credits required for graduation: 127.5. Curriculum is planned for students preparing to enter the professional field of interior design.

Admission is based on departmental resources and will be determined by rank order, based on three factors: A. Overall cumulative grade point average following completion of 27 credits including the following courses: Art 108, 109, 110, 130, ArtID 160, 160S, Art H 181, Engl 104 or 105, and 6 credits of general education; B. A written composition and C. Portfolio review. Transfer students with studio credits from other colleges and universities must present for departmental review a portfolio of work done in these courses in order to have the credits apply toward studio requirements. Students are advised to present this portfolio of work upon admission and prior to registration for classes. Admission of transfer students is contingent on available places in the program.
Curriculum in Landscape Architecture

The department offers a 5-year curriculum, requiring 149.5 credits, leading to the degree of bachelor of landscape architecture. These credits are distributed between a one-year preprofessional program of 32.5 credits and a 4-year professional program of 117 credits.

Admission into the professional program depends upon available resources and is subject to the approval of a faculty committee at the completion of the preprofessional program. Applicants must complete a specified core of courses and are reviewed on the basis of a portfolio of original work, scholastic performance, and a written essay.

**Preprofessional Program**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Cr.</th>
<th>Fall</th>
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<tbody>
<tr>
<td>6</td>
<td></td>
<td>Landscape Architectural Design and Visualization—LA 101</td>
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<td>Introduction to Landscape Architecture—LA 141</td>
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<td>First-Year Composition—Engl 104</td>
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<td>3</td>
<td></td>
<td>Environmental Biology—Env S 123</td>
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<tr>
<th>Preprofessional Program</th>
<th>Second Year</th>
<th>Cr.</th>
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<tr>
<td>6</td>
<td>Midwestern Landscape Studies—LA 201</td>
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<td>2</td>
<td>Investigating Landscape Form, Process and Details—LA 281</td>
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<td>3</td>
<td>Native Plants of the Midwest—LA 221</td>
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<td>Cultural Landscape Studies—LA 272</td>
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</tbody>
</table>

**Program Requirements**

**Curriculum in Landscape Architecture**

The department offers a 5-year curriculum, requiring 149.5 credits, leading to the degree of bachelor of landscape architecture. These credits are distributed between a one-year preprofessional program of 32.5 credits and a 4-year professional program of 117 credits.

Admission into the professional program depends upon available resources and is subject to the approval of a faculty committee at the completion of the preprofessional program. Applicants must complete a specified core of courses and are reviewed on the basis of a portfolio of original work, scholastic performance, and a written essay.

**Preprofessional Program**

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<th>First Year</th>
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<tr>
<td>6</td>
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<td>Landscape Architectural Design and Visualization—LA 101</td>
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<td>3</td>
<td></td>
<td>Introduction to Landscape Architecture—LA 141</td>
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<tr>
<td>3</td>
<td></td>
<td>First-Year Composition—Engl 104</td>
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Admission into the professional program depends upon available resources and is subject to the approval of a faculty committee at the completion of the preprofessional program. Applicants must complete a specified core of courses and are reviewed on the basis of a portfolio of original work, scholastic performance, and a written essay.
The College of Education offers coaching and health endorsements to students who want to add additional teaching areas to their primary licensure program.

The Departments of Educational Leadership and Policy Studies and Curriculum and Instruction offer work for the degrees master of science, master of education, and doctor of philosophy with a major in education. They also offer minor work to students majoring in other fields of study. In the Department of Educational Leadership and Policy Studies, students may complete the Ph.D. with a major in education and a specialization in educational leadership. At the master’s level, students may specialize in counselor education; educational administration; higher education; organizational learning and human resource development; and research and evaluation. Details are found in the graduate section of this catalog.

**Minors**
- Athletic Coaching
- Dance
- Educational Computing
- Industrial Technology

**Graduate Curricula**
Graduate study in the College of Education is conducted through the Graduate College. Details are found in the Graduate College section of this bulletin. www.grad-college.iastate.edu.

**Honors Program**
The College of Education Honors Program provides an opportunity for students with a 3.35 grade point average or higher to complete their course of study in the University Honors Program. For more details, contact the academic advisor, the College Honors Committee, or see Index, Honors Program.

**International Studies (secondary major only)**
The International Studies Program is an interdisciplinary program which may be taken only as a second major. Students pursuing a second major in international studies must complete the International Studies Program as described in this catalog (see Index, International Studies).

**The General Education Requirement**
Students in the College of Education are required to complete a program in general education which is integrated with their professional training and extends through the undergraduate curriculum.

The general education program emphasizes intellectual growth and personal development as contrasted with specific vocational preparation. It is recognized that many contributions to general education may be made by courses which have other primary objectives.

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**Departments of the College**

- **Curriculum and Instruction**
- **Educational Leadership and Policy Studies**
- **Health and Human Performance**
- **Industrial Education and Technology**

**Mission**
The mission of the College of Education is to optimize human potential and performance within a pluralistic and global society. To achieve this mission requires the study, practice, and integration of learning, teaching, discovery, and engagement with practitioners in the field. In these ways, the College of Education prepares exemplary professionals for leadership roles in education, health promotion institutions, business and industry and other human development agencies. The College seeks to ensure excellence in its services and programs and to develop selective areas for national and international prominence.

Building on our land-grant heritage, the College of Education is a leading teaching, learning, and research college focused on optimizing human potential and performance, serving the people of Iowa, and contributing to the national and international scholarly community.

The College of Education is a diverse college guiding students as they prepare to work with people in different organizations. Degree programs include teacher education, preparation for professions in health and physical activity, manufacturing and safety in industry, and professional programs at the graduate level. The College of Education, in conjunction with other colleges, offers licensure programs for early childhood education, elementary, secondary, and community college teaching; school principals and superintendents, as well as school media specialists, special education and school counseling.

In addition, certification programs also exist for students in the Department of Health and Human Performance and the Industrial Technology program.

A person who is to work effectively with people needs broad personal and professional knowledge and understanding. The College of Education strives to provide each student with a sound general education as well as preparation in an area of specialization.

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**Recommended High School Preparation**
Recommended preparation for students entering most departments of the College of Education should include 4 years of English (including speech) with emphasis in composition and communication skills; 3 years each of mathematics and natural sciences, and 3 years of social science and/or humanities. In addition, students interested in Elementary Education or Early Childhood Education are advised to complete three or more years of high school study in one foreign language.

**Advising System**
Each student in the College of Education works closely with an academic advisor who is associated with the curriculum in which the student is majoring. Advisors assist students in developing academic programs and in adjusting to university life. They also provide information and guidance about career choices. Advisors attempt to adjust each student’s schedule of course work in accordance with the student's interests and capabilities.

The college offers an orientation program during the summer for students planning to enter in the fall. Incoming students are encouraged to attend the orientation session so that academic assessments can be made and appropriate classes may be scheduled for the following term.

**Curricula and Special Programs in the College of Education**

- **Early Childhood Education**—(Administered jointly by the Department of Curriculum and Instruction in the College of Education and the Department of Human Development and Family Studies in the College of Family and Consumer Sciences.)
- **Elementary Education**
- **Industrial Technology**—Options: Manufacturing, Occupational Safety.
- **Secondary Education**
- **Education**

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- **Elementary Education**
- **Industrial Technology**—Options: Manufacturing, Occupational Safety.
- **Secondary Education**
- **Education**
The program aims to stimulate a desire for learning and intellectual endeavor, develop understanding and appreciation for the physical and cultural world, encourage independent thinking and analysis, increase competence in all aspects of communication, and create an understanding of individuals as social, psychological, and physical beings.

The student is expected to complete studies in five groups in general education. Areas represented below are not departmental titles. In some cases, courses relating to a given area may be found in several different departments. Credits listed are minimum requirements.

**Cr.**

9 I. Biological sciences, physical sciences, and mathematics
9 II. Social sciences
6 III. Humanities
9 IV. Communication skills
1 V. Health, Dance, Exercise and Sport Science
34 Additional credits in above areas
42

This total will include Engl 104 and 105, Lib 160, and credits used to satisfy University requirements in the areas of U.S. Diversity and International Perspectives.

**Teacher Education and Licensure**

All students who are recommended by Iowa State University for teacher licensure must meet the requirements of the teacher education program and be recommended by the College of Education.

Each student will be enrolled in the department in which he or she plans to major and must meet the graduation requirements of that department and the college in which it is located.

For details concerning the professional teacher education requirements and the areas of specialization requirements, see Teacher Education, Courses and Programs. Information disclosure for students and employees is available at www.iastate.edu/~disclosure/.

**Curriculum in Early Childhood Education**

The curriculum in early childhood education is planned for students preparing to teach young children and work with their families. This program leads to careers in working with young children who are typically developing and those with special needs from birth through age eight. Graduates in this curriculum may teach in early childhood (preschool and primary) classrooms or home based programs, with emphasis on inclusive services; graduates may be employed by either public or private agencies including schools. This curriculum has been approved by the Iowa Department of Education and meets requirements for the early childhood education unified teacher license, which permits individuals to teach general and special education for children from birth through age eight. The program is jointly administered by the Department of Curriculum and Instruction within the College of Education and the Department of Human Development and Family Studies within the College of Family and Consumer Sciences.

For details concerning the professional teacher education requirements and admission to the undergraduate teacher education program, see Teacher Education, Courses and Programs.

**English Proficiency**

In order to meet graduation requirements, all students must earn a C (2.0) or better in Engl 104 and Engl 105.

**U.S. Diversity and International Perspectives**

In order to meet graduation requirements, all students must complete 3 credits of course work in U.S. Diversity and 3 credits in International Perspectives. See department advising office for approved lists of courses.

**Foreign Language Requirement**

Early childhood education majors must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language). The requirement may be met by completion of three or more years of high school study in one foreign language.

Students who have completed three or more years of French, German, or Spanish in high school may not receive graded credit for 101-102 in those languages; test-out credit (T credit) may be obtained by passing an appropriate examination or by completing an advanced sequence (200-level or higher) in that language. If these students choose to take 101-102 on a remedial basis, they will be graded S-F.

Total credits required: 129.5

**Cr.**

41.5 General education

9.5 Communications and Library

Engl 104 (3), 105 (3), Lib 160 (0.5), select 3 credits from communications options list. (3)

12 Natural sciences and Mathematical Disciplines

Biological sciences (3), Math 195 (3), physical sciences (3), FS HN 167

9 Social sciences

American history or American government (3), options (6)

9 Humanities

Select 9 credits from department approved list

2 Health, safety

H 5 105 (2)

12 Human development and family studies

HD FS 102 (3), 220 (3), 221 (3); select 3 credits from HD FS 349, 395, 445, 449, 460

76 Professional education

15 Professional education core

C I 201 (3), 204 (3), 333 (3), 406 (3); Sp Ed 250 (3)

**Curriculum in Elementary Education**

The curriculum in elementary education is planned for students preparing to teach in grades kindergarten through six. For additional information, see Index, Elementary Education.

Teaching endorsements in areas closely related to elementary education, including a special education endorsement in multicategorical resource teaching, are available for elementary education majors. See Teacher Education, Courses and Programs, for information about specific endorsements.

Additional teaching endorsements, available at the graduate level to individuals who hold a valid Iowa teaching license, include the following: K-6 foreign language, reading, special education (behavior disorders, learning disabilities, multicategorical resource, and multicategorical self-contained).

**English Proficiency**

In order to meet graduation requirements, all students must have a C (2.0) or better for each of Engl 104 and Engl 105.

**U.S. Diversity and International Perspectives**

In order to meet graduation requirements, all students must complete 3 credits of course work in U.S. Diversity and 3 credits in International Perspectives. See department for approved lists of courses.

**Foreign Language Requirement**

Elementary education majors must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language). The requirement may be met by completion of three or more years of high school study in one foreign language. Students who have completed three or more years of French, German, or Spanish in high school may not receive graded credit for 101-102 in those languages; test-out credit (T credit) may be obtained by passing an appropriate examination or by completing an advanced sequence (200-level or higher) in that language. If these students choose to take 101-102 on a remedial basis, they will be graded S-F.
Total credits required: 128.5.

**Cr.**

46.5 General Education*

9.5 Communication skills

Engl 104 (3), 105 (3), Lib 160 (0.5); Select from ComSt 102 (3), 218 (3), 317 (3), Sp Cm 212 (3), 312 (3), 315 (3), 322 (3), 327 (3)

9 Social sciences

Psych 230 (3), American history/ American government (3), options (3)

9 Humanities

Select 9 credits from department approved list

Health, dance, exercise sport science, safety options (1)

9 Mathematics

Math 195 (3), 196 (3); Select from 140 (3), 142 (3), 160 (3), 165 (4), 180 (3), 297 (3).

9 Biological/Physical Sciences

Biological sciences (3) select from Anthr 202 (3), Biol 109 (3), 123 (3), 201 (3); Bot 102 (2), 202 (2), Zool 155 (3), 156 (2), 258 (3)

Physical sciences (3) select from Astro 120 (3), 150 (3); Chem 160 (3), 163 (4), 164 (4); Geol 100 (3), 100L (1), 101 (3); L A S 111 (4);

Mteor 206 (3); Phys 101 (3), 106 (4)

18 Area of specialization

(Requires 24 credits. A minimum of 15 credits may not be used to meet other requirements.)

67 Professional education

24 Required courses

C I 201 (3), 204 (3), 250 (3), 245 (2), 268 (1), 332 (3), 406 (3); HD FS 226 (3), 240 (2) or Engl 394 (3)

21 Required methods

C I 377 (4), 468A (1), 378 (4), 468B (1), 448 (3), 468C (1), 449 (3), 468D (1), 443 (3)

6 Related Methods

Select from H S 275 (3); ArtEd 211 (3); Music 265 (3); Ex Sp 284 (3)

16 Student teaching

C I 416A (8) or 416D (8), 416B (8) or 416E (8), Sp Ed 416 (special education students only)

1 R

Orientation (required)

First year—115; sophomore—215; transfer—315

*Refer to departmental curriculum sheet, available from adviser, for specific course requirements.

**Curriculum in Health and Human Performance**

The curriculum in Health and Human Performance is designed for students preparing to enter professional areas related to the health, exercise or sport science fields. Students majoring in Health and Human Performance may select one of six options: Athletic Training, Community and Public Health, Exercise Science, Health/Health Management, Physical Education Licensure, or Sport Management.

Minors in dance, and athletic coaching are available; the requirements appear under *Health and Human Performance, Courses and Programs.*

A major in Performing Arts with a dance emphasis is available; the requirements appear under *Curriculum in Performing Arts in Theatre.*

**English Proficiency**

In order to meet graduation requirements, all students must earn an average of C (2.0) or better in Engl 104 and 105, with neither grade being lower than a C-. Students not meeting this condition must earn a C or better in an advanced writing course (select from Engl 220, 302, 309, or 314).

**U.S. Diversity and International Perspectives**

In order to meet graduation requirements, all students must complete 3 credits of course work in U.S. Diversity and 3 credits in International Perspectives. See university approved list.*

Total credits required: 124 (46 credits in courses numbered 300 or above)

**Cr.**

42 (min) General Education

9 (min) Physical and Life Sciences

Basic Human Physiology and Anatomy—Select from

5 Zool 155 and 156 (lab) OR
8 Zool 255, 255L, 256, and Zool 256L
3 Introduction to Human Nutrition—FS HN 167

6 (min) Mathematics and Computer Sciences

3-4 Computer Science choice

9 (min) Social Sciences

6 (min) Humanities

12.5 Communication Skills

6 Freshman Composition—Engl 104, 105
3 Fundamentals of Public Speaking—Sp Cm 212

0.5 Library instruction—Lib 160

3 Business Communication—Engl 302, 314, or Sp Cm 312

17 Core requirements

Basic Core

(it is strongly suggested that these 3 courses be taken concurrently)

3 Personal and Consumer Health—H S 110
3 Fields and Disciplines in HHP—Ex Sp 256
2 Concepts of Physical Fitness—Ex Sp 258

Advanced Core

(H S 110, Ex Sp 255, Ex Sp 258 are prerequisites for all these courses; students must have completed three of these courses with at least one from each sub-discipline; some courses have unique prerequisites which can be taken as part of General Education coursework)

**Biological Basis of Physical Activity and Health Promotion**

3 Biomechanics—Ex Sp 355 (prereq Phys 106 or 111)
3 Physiology of Exercise—Ex Sp 358 (prereq Zool 255, 255L, 256, 256L)
3 Human Diseases—H S 250 (prereq H S 110)

**Behavioral Basis of Physical Activity and Health Promotion**

3 Sociology of Sport and Physical Activity—Ex Sp 360 (prereq Soc 134 and one of Stat 101, 104, 227 or Ex Sp 470)
3 Sport Psychology—Ex Sp 365 (prereq Psych 101 or Psych 230) OR Exercise Psychology—Ex Sp 366 (prereq Psych 101 or Psych 230)
3 Motor Control and Learning Across the Lifespan—Ex Sp 372 (prereqs Psych 101 or Psych 230; and Zool 255)
3 Consumer and Public Health—H S 310 (prereq H S 110)

**Option 1. Physical Education Licensure**

This option is designed for students seeking a license to teach physical education K-12. Students interested in preparing to coach must earn additional credits in: Ex Sp 220 and 315. Note: when making general education course selections, teacher licensure students must choose C I 201, Psych 230, a natural science and a U.S. history or political science course.

**Professional education requirements**

3 Foundations of American Education—C I 204
R Senior Seminar—C I 415
3 Multicultural Gender Fair Education—C I 406
8 Supervised Student Teaching in Physical Education in the Secondary School—Ex Sp 417
8 Supervised Student Teaching in Physical Education in the Elementary School—Ex Sp 418

**Physical education professional theory**

2 Leadership Techniques for Fitness Programs—Ex Sp 259
3 Elementary and Pre-school Movement Education—Ex Sp 275
0.5-1 Directed Field Experience in Elementary School Physical Education—Ex Sp 280
0.5-1 Directed Field Experience in Physical Education—Ex Sp 281
3 Teaching Physical Education—Ex Sp 375
3 Adapted Physical Education—Ex Sp 395
3 Evaluation in Physical Education—Ex Sp 470
3 Physical Education Curriculum Design and Program Organization—Ex Sp 475

**Physical education professional activity and related courses**

2 First Aid and Emergency Care—H S 105
1 Aquatics—Ex Sp 230
1 Tumbling and Gymnastics Skills—Ex Sp 231
Electives to equal 124 total credits
The following five courses must also be taken; three can fulfill the ADVANCED CORE requirement: Ex Sp 355, 358, 360, 365 or 366, and 372.

Option 2. Health/Fitness Management
This option prepares students for careers in the physical fitness/health field. It is designed for those who wish to prepare for professional roles as exercise specialists or program directors in corporate fitness programs, health clubs, cardiac rehabilitation programs, or other public and private agencies providing physical fitness activities.

2 Basic Athletic Training—Ex Sp 220
2 Leadership Techniques for Fitness Programs—Ex Sp 259
3 Management of Health-Fitness Programs and Facilities - Ex Sp 345
3 Worksite Health Promotion—H S 380
R Search Strategies for Field Experiences and Employment—Ex Sp 385
4 Principles of Fitness Assessment and Exercise Prescription—Ex Sp 458
1 Internship in Exercise Leadership—Ex Sp 459
3 Medical Aspects of Exercise—Ex Sp 462
8-16 Internship in Sport and Exercise Science—Ex Sp 485A
3 Principles of Organization and Management—Mgmt 370

Elective to equal 124 credits
The following courses are required: they can be taken as part of the General Education requirements:
2-3 Mathematics - select from Math 140, 141, 142, 150, 165
3-5 Statistics - select from Stat 101, 104, 227
3 Principles of Macroeconomics—Econ 101
4 Phys 106 or 111

The following five courses must also be taken; three can fulfill the ADVANCED CORE requirement: Ex Sp 355, 358, 366, 372 and H S 350.

Option 3. Athletic Training
The CAAHEP accredited athletic training option prepares students for the NATABOC certification examination or for graduate work in athletic training. Admission to the athletic training option is competitive and based on available department resources and will be determined on the basis of grades in foundation courses and other performance factors. Technical standards can be found on the athletic training website. Details are available from the Health and Human Performance Advising Office or the Athletic Training Education Program Director.

3 Basic Athletic Training for Athletic Trainers—Ex Sp 222
1 Athletic Training Clinical Practicum—Ex Sp 221
1 Introduction to Taping, Bracing, and Equipment Fitting - Ex Sp 219
3 Evaluation of Athletic Injuries I—Ex Sp 224
1 Athletic Training Clinical Practicum—Ex Sp 225
3 Evaluation of Athletic Injuries II—Ex Sp 226
1 Athletic Training Clinical Practicum—Ex Sp 227
2 Therapeutic Modalities for Athletic Trainers—Ex Sp 323
1 Athletic Training Clinical Practicum—Ex Sp 324
3 Rehabilitation of Athletic Injuries—Ex Sp 326
1 Athletic Training Practicum—Ex Sp 327
3 Organization and Administration of Athletic Training—Ex Sp 425
3 Medical Concerns for the Athletic Trainer - Ex Sp 450
R Search Strategies for Field Experiences and Employment—Ex Sp 450
3 Legal Aspects of Sport—Ex Sp 445
4 Principles of Fitness Assessment and Exercise Prescription—Ex Sp 458
R Review of Athletic Training Competencies—Ex Sp 489
2 Instructor’s First Aid and CPR—H S 305
4 General Chemistry—Chem 163
1 Laboratory in General Chemistry—Chem 163L
4 Physics 106 or 111
3 Drug Education—H S 215

Elective to equal 124 total credits
The following courses are required; they can be taken as part of the General Education requirements:
4 Phys 106 or 111
3 Human Anatomy and Physiology I—Zool 256
1 Human Anatomy and Physiology I Laboratory—Zool 256L

The following six courses must also be taken; three can fulfill the ADVANCED CORE requirement: Ex Sp 355, 358, 360, 365, 372 and H S 350.

Option 4. Sport Management
The sport management option prepares students for a variety of sport specialist and leadership positions in amateur and professional sport organizations, health and sport clubs, community recreation centers, resorts, voluntary agencies such as YM/YWCAs, industry, and other public and private agencies involving sports instruction, recreational sports activities, and sport/fitness management.

3 Principles of Sport Management—Ex Sp 270
3 Sport Marketing—Ex Sp 350
3 Sport Facility and Event Management—Ex Sp 352
R Search Strategies for Field Experiences and Employment—Ex Sp 385
3 Sport Business and Finance—Ex Sp 435
3 Legal Aspects of Sport—Ex Sp 445
3 Principles of Marketing—Mkt 340
3 Organization and Theory—Mgmt 370
3 Organizational Behavior—Mgmt 371
3 Financial Accounting—Acct 284
3 Principles of Public Relations—Jl MC 220 or Principles of Advertising—Jl MC 230
3 Principles of Macroeconomics—Econ 102
8-16 Internship in Sport and Exercise Science—Ex Sp 485C

Electives to equal 124 total credits
The following must be taken as part of the General Education requirement:
3 Principles of Microeconomics—Econ 101
3-5 Statistics - select from Stat 101, 104, 227
3 Math 104, 140, 141, 142, 150, or 165

From the Advanced Core requirements the students must select:
3 Sociology of Sport and Physical Activity - Ex Sp 360
Option 5. Exercise Science
The Exercise Science option is designed for students interested in an interdisciplinary approach to the study of human movement. By combining exercise science with another area of study to support an individualized program, this option is suitable for students interested in graduate study or who are preparing for advanced study leading to careers in medicine, physical therapy, or other allied health programs.

<table>
<thead>
<tr>
<th>R</th>
<th>Search Strategies for Field Experience and Employment— Ex Sp 385</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>Two 300-400 level Ex Sp courses</td>
</tr>
<tr>
<td>26</td>
<td>Meet the requirements of a specialization area in a related field (area and program must be approved by the Department of Health and Human Performance).</td>
</tr>
</tbody>
</table>

Electives to equal 124 total credits
A statistics course and one of Math 140, 141, 142, or 165 must be selected in the General Education requirements. Phys 111 must be taken as the prerequisite for Ex Sp 355.

The following five courses must also be taken; three can fulfill the ADVANCED CORE requirement: Ex Sp 355, 358, 360, 365 or 366, and 372.

Option 6. Community and Public Health
This option emphasizes health promotion and disease prevention and prepares students for professional involvement in community health agencies which incorporate health services and the educational process. Students will be prepared for employment in state and public health agencies, volunteer health agencies, hospitals (patient education), and industry (health and wellness programs). Graduates are eligible to take the National Certified Health Education Specialist (CHES) exam which recognizes qualified specialists in the diversified field of health education.

<table>
<thead>
<tr>
<th>3</th>
<th>First Aid and Emergency Care— H S 105</th>
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<tbody>
<tr>
<td>3</td>
<td>Drug Education—H S 215</td>
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<tr>
<td>3</td>
<td>Foundations of Health—H S 260</td>
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<tr>
<td>3</td>
<td>Health Promotion in the Community and Workplace— H S 380</td>
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<tr>
<td>R</td>
<td>Search Strategies for Field Experiences and Employment— H S 385</td>
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<td>Administration of School Health— H S 390</td>
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<td>Community Health Program Development—H S 430</td>
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<td>General Microbiology—Micro 201</td>
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<td>Intro Micro Lab—Micro 201L</td>
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<td>Human Sexuality—HD FS 276</td>
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<td>Aging and the Family—HD FS 377</td>
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<td>Principles of Accident Prevention— I Tec 270</td>
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<td>General Chemistry with lab— Chem 163 and 163L</td>
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<td>4</td>
<td>Principles of Biology with lab— Biol 201 and 201L</td>
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<tr>
<td>3</td>
<td>Principles of Marketing—Mkt 340</td>
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<tr>
<td>3</td>
<td>Principles of Public Relations—Jl MC 220 or Publicity Methods—Jl MC 205</td>
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<tr>
<td>3-4</td>
<td>Select from Engl 309, Engl 313, HD FS 395, HD FS 449 or Jl MC 342/342L</td>
</tr>
<tr>
<td>10-16</td>
<td>Directed Field Experience— Ex Sp 485</td>
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</tbody>
</table>

Electives to equal 124 total credits
The following courses must also be taken. They can fulfill either General Education or Core requirements for the HHP major:

- Basic Human Physiology and Anatomy—Zool 155 and 156
- Statistics - Stat 101, 104, 227
- Principles of Microeconomics— Econ 101
- Psych 230 or HD FS 102 (under Social Science choice)
- Community and Public Health— H S 310
- Human Diseases—H S 350
- Exercise Psychology—Ex Sp 366

Curriculum in Industrial Technology
The industrial technology curriculum prepares students for professional positions that emphasize technical management in industry, business, or government. The Bachelor of Science degree program stresses computer applications, technical management, production processes and product quality.

The curriculum has been designed to assist students to develop a comprehensive understanding of the interaction of people, planning, machines, tools, equipment, safety and production processes, in manufacturing settings. Extensive laboratory experiences are incorporated into most courses.

The program seeks to develop problem solving abilities and creativity to assist graduates in meeting technical requirements, human expectations, and regulatory requirements in contemporary manufacturing settings.

Students majoring in industrial technology select one of the two options: manufacturing or occupational safety. A minor in Industrial Technology with an occupational safety focus is available.

- English Proficiency In order to meet graduation requirements, all students must earn an average of C (2.0) or better in all English courses taken, including Engl 104, Engl 105, and one of the following: Engl 309 or Engl 314.

U. S. Diversity and International Perspectives In order to meet graduation requirements, all students must complete 3 credits of course work in U. S. Diversity and 3 credits in International Perspectives. Courses that are acceptable for meeting these requirements are listed on the University website.

Total credits required: 120.5-123.5.
For additional information see Index, Industrial Technology.

Industrial Technology Major

<table>
<thead>
<tr>
<th>Cr.</th>
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<td>International Perspectives</td>
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<td>Biology, physical sciences, and mathematics—Chem 163, 163L, Math 142, 160, Phys 111</td>
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<td>Social sciences—Psych 101, Econ 101</td>
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<td>Humanities—Art, foreign languages, history, literature, music, philosophy, or religion.</td>
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<td>Communication skills—Engl 104, 105, Sp Cm 212, Lib 160</td>
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<td>4</td>
<td>Health, safety, exercise and sport science, dance—I Tec 270, 1 credit in Ex Sp</td>
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<td>Foundation Courses</td>
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<td>Professional Communication—Select from department approved list</td>
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<td>Report and Proposal Writing—Engl 309 or Technical Communication—Engl 314</td>
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<td>Introduction to Industrial Technology—I Tec 110</td>
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<td>Introduction to Design in Industrial Technology—I Tec 120</td>
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<td>3</td>
<td>Introduction to Non-metallic manufacturing Materials and Processes—I Tec 130</td>
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<td>3</td>
<td>Electrical Fundamentals—I Tec 140</td>
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<td>Introduction to Training and Development in Industry and Business—I Tec 202</td>
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<td>Introduction to Metallic Materials and Processes—I Tec 231</td>
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<td>Total Quality Improvement—I Tec 360</td>
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<td>Safety in Manufacturing—I Tec 392</td>
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<td>Seminar in Industrial Technology—I Tec 395</td>
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<td>Supervised Industrial Internship—I Tec 481</td>
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<tr>
<td>4</td>
<td>Principles of Statistics—Stat 101</td>
<td></td>
</tr>
</tbody>
</table>

Students must select one of two options:
- Manufacturing prepares students to plan and coordinate materials, machines, methods, and human resources in a manufacturing environ-
Occupational safety prepares students to develop, coordinate, and evaluate the safety issues relating to people, materials, equipment, and manufacturing environments.

Options

44 Manufacturing Option
(123.5 Cr.)

32 Option Requirements

3 Financial Accounting—Acct 284
3 Computer Applications in Industrial Technology—I Tec 216 or Programming I—Com S 207
4 Advanced Technical Graphics, Interpretation, and CAD—I Tec 224
3 Analog Manufacturing Applications—I Tec 240
3 Automated Manufacturing Processes—I Tec 336
2 Digital Manufacturing Applications—I Tec 340
3 Facility Planning—I Tec 410
3 Computer Automated Manufacturing Systems—I Tec 435
2 Electrical Outputs for Manufacturing—I Tec 440
3 Automation Systems—I Tec 446
3 Management of Organizations—Mgmt 370
9 Technical Electives—A list of departmentally approved technical electives is available from the undergraduate academic advisor.
3 Electives

41 Occupational Safety Option (120.5 Cr.)

26 Option Requirements

3 Financial Accounting—Acct 284 or Management of Organizations—Mgmt 370
2 First Aid and Emergency Care—HS 105
3 Applied Ergonomics and Work Design—I E 271
2 Introduction to Occupational Safety—I Tec 272
3 Fire Protection and Prevention—I Tec 296
3 Legal Aspects of Occupational Safety and Health—I Tec 394
3 Industrial Hygiene: Chemical and Biological Hazards—I Tec 470
3 Industrial Hygiene: Physical Hazards—I Tec 471
2 Safety Analysis and Design—I Tec 475
3 Basic Human Physiology and Anatomy—Zool 155
8 Technical Electives—A list of departmentally approved technical electives is available from the undergraduate academic advisor.
6 Electives
Register as a professional engineer, which is granted by each individual state, is required for many types of positions. The professional curricula in engineering at Iowa State University are designed to prepare a graduate for subsequent registration in all states. Seniors in accredited curricula (accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology) of the College of Engineering are encouraged to take the Fundamentals of Engineering Examination toward professional registration during their final academic year. Seniors in engineering curricula who have obtained at least 6 semester credits in surveying may take the Fundamentals Examination for professional registration as land surveyors.

Four engineering departments offer the opportunity for well-qualified undergraduate juniors and seniors to pursue a graduate degree in their program while finishing the undergraduate requirements. The departments offering concurrent B.S./M.S. degree programs are: Agricultural and Biosystems Engineering, Civil, Construction and Environmental Engineering, Electrical and Computer Engineering, and Materials Science and Engineering. Refer to the Graduate Study section for each department for more information.

Advanced work in engineering is offered in the post-graduate programs. See the Graduate College section of this catalog.

**Accreditation**

Ten curricula in the College of Engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Engineering Accreditation Commission Accreditation Board for Engineering and Technology

111 Market Place, Suite 1060
Baltimore, MD 21202-7700
Phone: 410-347-7700
WWW: http://www.abet.org
Accreditation status is indicated at the beginning of the courses and programs section of each engineering curriculum.

**Organization of Curricula**

All curricula in engineering are designed as four-year programs. They are structured in two phases: a basic program and a professional program. The basic program consists primarily of subjects fundamental and common to all branches of engineering and includes mathematics, physics, mathematics, engineering computations, and English. The professional phase of a curriculum includes intensive study in a particular branch of engineering, as well as a continuation of supporting work in mathematics, basic sciences, humanities, and social sciences.

Students must complete the requirements of the basic program before proceeding to a professional program.

**Preparation for the Engineering Curricula**

High school credits particularly important to students wishing to study engineering include 2 years of algebra, 1 year of geometry, and 1/2 year of trigonometry; 1 year each of chemistry and physics, and 4 years of English. See Index for specific admission requirements. Preparation and test scores. Advanced placement is possible for exceptionally well-prepared students. Students who are not adequately prepared may be encouraged or required to take additional preparatory coursework and should expect to spend more than the customary time to complete the engineering program. Any coursework which is preparatory or remedial in nature cannot be used to satisfy credit requirements for graduation in any of the engineering curricula.

**Basic Program for Professional Engineering Curricula**

The first year program is much the same for all professional curricula in the College of Engineering. Each curriculum requires completion of the basic program as well as the curriculum designated requirements. The basic program is a set of courses common to all engineering curricula, while the curriculum designated requirements are courses required by individual curricula. The student who desires to receive the bachelor's degree in a minimum time will find it desirable to select a curriculum as soon as possible.

Entering undergraduates must demonstrate proficiency in trigonometry based on test scores, or by having transfer credits from a college trigonometry course, or by passing either Math 141 or 142 before enrolling in Math 166, Aer E 160 or C E 160.

The Department of English may require placement in one or more sections of Engl 101 because of unsatisfactory performance on the English placement test administered to students whose first language is not English.
Basic Program

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Mathematics 165, 166</th>
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<tbody>
<tr>
<td>6</td>
<td>English 104, 105</td>
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<tr>
<td>4</td>
<td>Chemistry 167 or 177*</td>
</tr>
<tr>
<td>3</td>
<td>Engineering 160, Aer E 160, CE 160, Cpr E 185, E E 185, or I E 148**</td>
</tr>
<tr>
<td>5</td>
<td>Physics 221</td>
</tr>
<tr>
<td>R</td>
<td>Engineering 101</td>
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<tr>
<td>0.5</td>
<td>Library 160</td>
</tr>
<tr>
<td>26.5</td>
<td>Total credits</td>
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</tbody>
</table>

Curriculum Designated Requirements

Aerospace Engineering—Aer E 160**, Aer E 161 (3 cr.), Aer E 192 (R)
Agricultural Engineering—Chem 167L (1 cr.), A E 110 (1 cr.), Engr 170 (3 cr.)
Chemical Engineering—Chem 177*, 177L (1 cr.), 178 (3 cr.), 178L (1 cr.)
Civil Engineering—Chem 167L (1 cr.) or Chem 177L (1 cr.), C E 160 (1 cr.), C E 160**, C E 170 (2 cr.), C E 111 (3 cr.)
Computer Engineering—Com S 227 (3 cr.), 185** (3 cr.), Cpr E 166 (R cr.)
Construction Engineering—Con E 110 (R cr.), Psych 101 (3 cr.), Engr 170 (3 cr.)
Electrical Engineering—EE 185** (3 cr.), Com S 207 or 227 (3 cr.), E E 166 (R cr.)
Industrial Engineering—I E 101 (R cr.), I E 148** (3 cr.)
Materials Engineering—Chem 177*, 177L (1 cr.), 178 (3 cr.), 178L (1 cr.), Engr 170 (3 cr.), (Physics 221 scheduled in sophomore year.)
Mechanical Engineering—Chem 167L (1 cr.), Engr 170 (3 cr.), M E 102 (R cr.)

The student's adviser may require or recommend courses in addition to those specified above if the preparation and progress of the student are such that additional courses are necessary or desirable.

*Students planning to enroll in C E 141, Ch E, or Mat E will find Chem 177 to be a better preparation for Chem 178. However, Chem 167 is accepted as a substitute for 177 for those students declaring one of these curricula after having completed 167. The Chem 155-165 sequence is an acceptable substitute for Chem 167.

**Recommended choices by program:
Aer E: Aer E 160 (3 cr.)
C E: C E 160 (3 cr.)
Cpr E: Cpr E 185 (3 cr.)
E E: E E 185 (3 cr.)
I E: I E 148 (3 cr.)

Credit hours for graduation will be given for any of Aer E 160, Engr 160, Cpr E 185, E E 185, or C E 160 without increasing a curriculum's minimum number of credits required for graduation.

Students in the general emphasis in C E have two chemistry/physics sequence options. The environmental emphasis requires Option 1.

Option 1—Chem 177, 177L, 178, 178L, and Phys 221.

Option 2—Chem 167, 167L; or Chem 155, 165, 167L; or Chem 177, 177L; and Phys 221 and 222.

Requirement for Entry into Professional Program

Students enrolled in the College of Engineering must satisfy both of the following requirements before enrolling in the professional courses: 200-level and above offered by departments in the Engineering College:

1. Completion of the basic program with a grade point average of 2.00 or better in the basic program courses.
2. A cumulative grade point average of 2.00 or better for all courses taken at Iowa State University. The following are the only exceptions to this rule:
   a. Students who have completed all of their coursework while enrolled in the College of Engineering, but have not met the two basic program requirements, may enroll for not more than one semester in 200-level or above courses offered by departments in the College of Engineering. This exception may be extended to two semesters for students whose curriculum requires Chem 178 and 178L (i.e. Ch E, C E 141, and Mat E).
   b. Students transferring to the College of Engineering from another college or university, or from a program outside this college, who have not met the two basic program requirements may enroll for not more than two semesters in 200-level or above courses offered by departments in the College of Engineering.
   c. Iowa State students not pursuing an engineering degree may generally take engineering courses without restrictions provided they meet the prerequisites and space is available.
   d. Only the first two semesters of 200-level and above engineering courses, taken at ISU while a student is not enrolled in the College of Engineering, can be applied toward an engineering degree.

Engineering Minors

The College of Engineering offers an undergraduate minor in Nondestructive Evaluation. It is open only to engineering students who have met the basic program requirements and are not on temporary enrollment. The NDE minor consists of one common core course, at least two NDE specific technique courses and at least two supporting courses. Both technique and supporting courses must be selected from lists approved by the advisory committee. A student's minor program in Nondestructive Evaluation must include at least nine credits which are beyond the total used to meet curriculum requirements. The minor is supervised by an interdisciplinary faculty committee. Interested students may contact the Department of Aerospace Engineering to obtain more specific guidelines and requirements.

Undergraduate Majors and Minors Outside the College of Engineering

In addition to the engineering degree program, students may earn majors or minors in other colleges of the university. A major or minor program must meet all requirements of the offering department or program and its college and contain credits beyond the requirements for a B.S. degree in engineering. A minimum of 15 additional credits is required for each major area of study and an additional 9 credits for each minor.

Advising System

The purpose of the advising system in the College of Engineering is to work constructively with students in developing their individual academic programs and to maintain close contact with students during their college careers.

The college offers an orientation program during the spring and summer for students planning to enter in the fall and during the fall for students planning to enter in the spring. All entering students are encouraged to attend an orientation session. Tests given during the orientation program help determine the student's level of achievement and enable the adviser to prepare an appropriate program for the student.

Special Programs

All engineering students are strongly encouraged to participate in either the cooperative education or internship programs. Students who are qualified to participate in the engineering honors program are also urged to do so. These programs are integrated into the professional engineering curricula and may require additional work. However, both these professional and academic programs offer opportunities that will enrich the standard academic experience. Engineering students are also encouraged to take advantage of study abroad opportunities available through the College of Engineering's International Programs Office.
Engineering International Programs—The College of Engineering offers, through its curricula, a cooperative education program. Enrollment in the program allows students to gain practical experience in their career field while attending college. In general, students enrolled in the co-op program will require an additional year to complete curriculum requirements.

These programs are arranged so that the student alternates academic work with employment periods. The student has the opportunity to assess career paths within her/his chosen curriculum and the employer evaluates the student’s potential as a future full-time employee. Both domestic and international co-op programs are available. Cooperative education students pay no fees to the university during their work periods and do not receive credit hours for their work experience. Students register for a non-credit cooperative education course (298, 398, or 498) for each work period and are considered full time students while enrolled in these courses. For additional information contact your academic adviser and the Office of Engineering Career Services.

b. Internship Program. Internships are a mechanism by which a student may work full-time for one semester while maintaining her/his status as a full-time student. Internship students pay no fees to the university during their work periods and do not receive credit hours for their work experience. Students may register for the internship course (397) for a fall or spring semester work period or (396) for the summer term are considered to be full time students. For additional information contact your academic adviser and the Office of Engineering Career Services.

c. Honors Program. The College of Engineering participates in the University Honors Program (see Index). In summary, the Honors Program is designed for students with above average ability who wish to individualize their programs of study. For further details consult the chair of the Engineering College Honors Program Committee or your departmental Honors Program adviser.

d. Engineering International Programs. In a world where the sun never sets, engineers must be prepared to understand other cultures and other ways of doing business. Engineers must expand their exportable skills, language and cross-cultural skills.

Engineering International Programs (EIP) has formed worldwide partnerships to create opportunities for students to work and study with leading universities in other countries and multinational corporations. With careful planning, students may earn credit in courses that fulfill their degree requirements. To learn more about work and study with leading universities in other countries and multinational corporations, visit the EIP home page at www.eng.iastate.edu/intlprogs/.

### Curriculum in Aerospace Engineering

Administered by the Department of Aerospace Engineering. Leading to the degree bachelor of science. **Total credits required: 125.5.** See also Basic Program and Cooperative Programs.

#### Professional Program

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<tr>
<th>Sophomore Year</th>
<th>Cr.</th>
<th>Fall</th>
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<tbody>
<tr>
<td>4</td>
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<td>Calculus III—Math 265</td>
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<tr>
<td>5</td>
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<td>Introduction to Classical Physics II—Phys 222</td>
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<td>Statics of Engineering—E M 274</td>
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<tr>
<td>3</td>
<td></td>
<td>Introduction to Aerospace Engineering—Aer E 261*</td>
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<td>Instrumentation Laboratory—Aer E 202*</td>
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<td>R</td>
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<td>Aerospace Seminar—Aer E 291</td>
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<tr>
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<td>Elementary Differential Equations and Laplace Transforms—Math 267</td>
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<td>Mechanics of Materials—E M 324*</td>
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<td>Dynamics—E M 345</td>
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<td>Aerodynamics I—Aer E 243*</td>
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<td>Thermodynamics—M E 330*</td>
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<td>Principles of Material Science and Engineering—Mat E 272</td>
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<td>3</td>
<td></td>
<td>Astrodynamics I—Aer E 351*</td>
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<td>3</td>
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<td>Flight Structures I—Aer E 321*</td>
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<td>3</td>
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<td>Aircraft Flight Dynamics and Stability—Aer E 355*</td>
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<td>Flight Experience—Aer E 301</td>
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<td>Aerospace Seminar—Aer E 391</td>
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<td>Gas Dynamics—Aer E 311*</td>
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<td>Aerodynamics II—Aer E 343*</td>
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<td>Advanced Aerodynamics and Propulsion Laboratory—Aer E 343L*</td>
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<td>Flight Control Systems I—Aer E 331</td>
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<td>Computational Techniques for Aerospace Design—Aer E 361*</td>
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<td>Flight Structures II—Aer E 421*</td>
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<td>Modern Design Methodology with Aerospace Applications—Aer E 461*</td>
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</table>

**English Proficiency**

The department requires a grade of C (2.0) or better in Engl 104 and 105 to be eligible for English Proficiency Certification. Students satisfying this requirement who are not cited for deficiencies in reports, laboratory reports, or other writings required in other courses, are certified during the semester prior to their semester of graduation. Students not satisfying these requirements are referred to the department’s Academic Standards and Program Quality Committee for corrective action.

*The social sciences and humanities (SSH) electives are to be selected from the department-approved list of courses, subject to department guidelines and are not to be taken under the P-NP policy.

†Twelve elective credits scheduled to be taken at the senior year are of three types: (1) Aerospace Program Technical Electives, 3 credits; (2) Technical Electives, 3 credits; and (3) Career Electives, 6 credits. Aerospace Program Technical Electives and the Technical Electives must be chosen from department-approved lists for each type. All electives must be chosen following published department guidelines. These courses are not to be taken under the P-NP policy.

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.
Curriculum in Agricultural Engineering
Administered by the Department of Agricultural and Biosystems Engineering.

With options in agricultural and environmental systems engineering, biosystems engineering, food and process engineering, and power and machinery engineering. Administered jointly by the College of Agriculture and the College of Engineering. Leading to the degree bachelor of science. Total credits required: 128.5. See also Basic Program and Cooperative Programs.

Sophomore Year

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<tr>
<td>3</td>
<td>Computer Application and Systems Modeling—A E 203*</td>
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<tr>
<td>5</td>
<td>Introduction to Classical Physics II—Phys 222*</td>
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<tr>
<td>3</td>
<td>Statics of Engineering—E M 274*</td>
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<td>Option Requirement</td>
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<tr>
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<td>Engineering Applications of Parametric Solid Modeling—A E 271* or Parametric Solid Models, Drawings, and Assemblies Using Pro/ENGINEER—A E 272*.</td>
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<th>Cr.</th>
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<tr>
<td>3</td>
<td>Agricultural Engineering Fundamentals II—A E 216*</td>
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<tr>
<td>3</td>
<td>Mechanics of Materials—E M 324*</td>
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<td>Mechanics of Materials Laboratory—E M 327*</td>
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<tr>
<td>3</td>
<td>Principles of Microeconomics—Econ 101 or Principles of Macroeconomics—Econ 102</td>
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<td>3</td>
<td>Elementary Differential Equations—Math 266*</td>
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<td>Engineering Statistics—Stat 305</td>
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Junior Year

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<td>Thermodynamics—M E 330*</td>
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Senior Year

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English Proficiency
The department requires a grade of C or better in Engl 104 and 105 (or 105H) and a grade of C or better in the course taken to meet the communication requirement.

1Social sciences and humanities (SSH) electives are to be chosen from the department-approved list. The courses chosen must meet departmental requirements.

2After the freshman year, each student selects one of the options and takes courses listed for the selected option. The elective courses must be selected from the department-approved list.

3One course must be taken from Sp Cm 212, Engl 309, Engl 314.

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

Options

Agricultural and Environmental Systems Engineering—A E 340, 363, 404, 421, 472; E M 378; C E 332, 372; 6 credits in biological and natural resource science from department-approved list; and 13 credits from department-approved electives list.

Biosystems Engineering—A E 363, 480; 6 credits from A E 451, 465, 469; 6 credits from Micro 201, 302; Biol 301, BBMB 301, 481, Biol 202; Ch E 356, 357; Chem 331, 331L, 332; and 11 credits from department-approved electives list.

Food and Process Engineering—A E 363, 480, select 6 credits from A E 451, 465, 469; Biol 202; Chem 362, 363L, Ch E 356 or E M 378; Ch E 357; FS HN 311, 420, Micro 201; and 11 credits from department-approved electives list.

Power and Machinery Engineering—A E 340, 342, 363, 413, 447; select one course from A E 404, 421, 472, 480, M E 436; Agron 154; E M 345, 378; Mat E 272; M E 324, 325; 3 credits in biological and natural resource science from department-approved list; 7 or 8 credits from department-approved electives list.

Curriculum in Chemical Engineering
Leading to the degree bachelor of science.
Total credits required: 125.5. See also Basic Program and Cooperative Programs.

Professional Program

Sophomore Year

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<td>Introduction to Classical Physics II—Phys 222</td>
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<td>3</td>
<td>Organic Chemistry—Chem 331</td>
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Junior Year

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<td>Chemical Reaction Engineering—Ch E 382*</td>
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Senior Year

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English Proficiency
The department requires satisfactory completion of Engl 104, 105 (or 105H), and the Communications elective.

1Selected from list of department-approved social sciences and humanities (SSH) courses.

2Selected from department-approved list.

3Selected from department-approved list.

4Selected from department-approved list.

5Selected from department-approved list.

6Selected from department-approved list.

7Selected from department-approved list.

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.
Curriculum in Civil Engineering (General)

Administered by the Department of Civil, Construction and Environmental Engineering, Leading to the degree bachelor of science.

Total credits required: 129.5 general emphasis; 129.5 environmental specialization emphasis. For any area of emphasis, see the department. Also see 2003-2005 Student Guide to Civil Engineering. Also see Basic Program and Cooperative Programs.

For those interested in construction engineering, a curriculum is provided which leads to the degree bachelor of science in construction engineering. For particulars, see Curriculum in Construction Engineering.

General Emphasis

Sophomore Year

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<td>Statics—E M 274*</td>
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<td>2</td>
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<td>Dynamics—E M 345</td>
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Junior Year

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<td>2</td>
<td>Professional Issues in Civil Engineering—C E 303*</td>
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<tr>
<td>3</td>
<td>Principles of Environmental Engineering—C E 326*</td>
</tr>
<tr>
<td>3</td>
<td>Structural Analysis I—C E 332*</td>
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<td>3</td>
<td>Soil Engineering—C E 360*</td>
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<tr>
<td>2</td>
<td>General Microbiology—Micro 201</td>
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<td>Civil Engineering Design and Construction—C E 304</td>
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<tr>
<td>4</td>
<td>Engineering Hydrology and Hydraulics—C E 372*</td>
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<tr>
<td>3</td>
<td>Design of Concretes—C E 382</td>
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<td>3</td>
<td>Engineering Science or Life Science Elective3</td>
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Senior Year

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<tr>
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<th>Fall</th>
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<tbody>
<tr>
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<tr>
<td>4</td>
<td>Highway Design—C E 453</td>
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<td>3</td>
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<td>Civil Engineering Design I—C E 485</td>
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<td>Social sciences or humanities electives3</td>
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Curriculum in Civil Engineering (Environmental emphasis)

Administered by the Department of Civil, Construction and Environmental Engineering, Leading to the degree bachelor of science.

Total credits required: 129.5. Also see 2003-2005 Student Guide to Civil Engineering. Also see Basic Program and Cooperative Programs.

Sophomore Year

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Junior Year

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<td>3</td>
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<tr>
<td>2</td>
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Senior Year

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<td>Environmental Biotechnology—C E 421</td>
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<tr>
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1Selected from a statistics elective list in the 2003-2005 Student Guide to Civil Engineering.

2Selected from a numerical analysis elective list in the 2003-2005 Student Guide to Civil Engineering.

3For transfer students only.

4Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.
Engineering

Selected from an engineering topic elective list in the 2003-2005 Student Guide to Civil Engineering. Students appointed to advanced ROTC may substitute 3 credits of advanced ROTC credits for 3 credits of engineering topics in the general emphasis curriculum.

For transfer students only.

Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

English Proficiency
Students receiving a grade of C or better in Engl 104 and 105 meet the proficiency requirement of the department. Students not meeting this condition must fulfill an advanced composition requirement specified in the 2003-2005 Student Guide to Civil Engineering.

Curriculum in Computer Engineering

Administered by the Department of Electrical and Computer Engineering. Leading to the degree bachelor of science. Total credits required: 125.5. See also Basic Program and Cooperative Programs.

**Sophomore Year**

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**Junior Year**

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**Senior Year**

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<tbody>
<tr>
<td>3</td>
<td>Senior Design Project I and Professionalism—Cpr E 491</td>
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Technical electives
3 Math/Stat elective
3 General education elective
R Portfolio elective—Cpr E 494

**Second Semester**

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<tr>
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<td>Senior Design Project II—Cpr E 492</td>
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<td>Computer Science elective*</td>
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<td>6</td>
<td>Technical electives*</td>
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<tr>
<td>3</td>
<td>General education elective*</td>
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</table>

English Proficiency
The department requires a grade of C or better in Engl 104, 105 (or 105H), and 314 (or 314H).

Transfer Grade Requirements
The Electrical and Computer Engineering Department requires a grade of C or better for any transfer credit course that is applied to the degree program.

General Education Electives: Students must propose and have approved by their faculty adviser a general education program of 15 credits that meets the university diversity and international perspectives requirements and an objective developed by the student. Courses chosen must not be remedial courses in the university, six (6) credits must be chosen at the 300 level or higher, and courses in engineering, Computer Science, physical and mathematical sciences must not be included. Pass-Not Pass credit is not accepted.

Computer Engineering, Computer Science, and general technical electives must be chosen to satisfy departmental requirements concerning content, distribution, and level. All technical electives must be chosen from lists approved by the department. Details are available in the E CPE Undergraduate Student Services Office or on the Web. Pass/not pass credit not accepted. Six credits of Computer Engineering, three credits of Computer Science, and nine credits of general technical electives are required. One credit of 490 may be used to partially meet these requirements.

The student must choose one of the following math/Stats course (pass/not pass credit not accepted): Math 273, 307, 314, 317, 365, 385, 395, 471 or 481, Stat 322, 330. Credit in 490 may not be used to fulfill this elective requirement.

Outcomes Assessment: Students are required to prepare and maintain a portfolio of their technical and non-technical skills. This portfolio is evaluated for student preparation during the student’s curriculum planning process. Results of the evaluation are used to advise students of core strengths and weaknesses. Prerequisite material exams may be given at key points in the curriculum. These exams are to assist student evaluation of progress made during the academic experience as the material covered in several courses are the foundation of more advanced courses. The results of these assessments are used to evaluate the curriculum and to implement improvements.

Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

**Curriculum in Construction Engineering**

Administered by the Department of Civil, Construction and Environmental Engineering. Leading to the degree bachelor of science. Total credits required: 122.5 Building emphasis; 124.5 Heavy emphasis; 124.5 or 122.5 Mechanical/Electrical emphasis. See also Basic Program and Cooperative Programs.

B - Building construction emphasis.
H - Heavy construction emphasis.
M/E - Mechanical/Electrical construction emphasis.

Undesignated courses are for all emphases.

**Sophomore Year**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
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<tr>
<td>3</td>
<td>Financial Accounting—Acct 284 (B,H)</td>
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<td>Calculus III—Math 265</td>
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<tr>
<td>5</td>
<td>Introduction to Classical Physics II—Phys 222</td>
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<tr>
<td>1</td>
<td>Professional Development—Con E 210</td>
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<td>Economics elective (B,H,M)</td>
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<td>Statics of Engineering—E E M 274</td>
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<td>Construction Materials and Methods—Con E 241</td>
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<td>Mechanical/Electrical Materials and Methods—Con E 251</td>
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<td>Elementary Differential Equations—Math 266 (B, H) or 4 Elementary Differential Equations with Laplace—Math 267 (M,E)</td>
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<td>Electrical Circuits—E E 201 (E)</td>
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<td>Financial Accounting—Acct 284 (B,H)</td>
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**Junior Year**

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<td>Construction Contract Documents—Con E 245</td>
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<td>Construction Equipment and Heavy Construction Methods—Con E 322 (B,H)</td>
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<td>Engineering Law—Con E 380 (B,H)</td>
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<td>Mechanics of Fluids—E M 378</td>
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<td>Mechanics of Materials—E M 324</td>
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<td>Social Science &amp; Humanities Elective (H)</td>
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<td>Engineering Thermodynamics—M E 231 (M,E)</td>
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<td>Electric Circuits—E E 203 (E)</td>
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**Senior Year**

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<tr>
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<td>Senior Design Project I and Professionalism—Cpr E 491</td>
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*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.*
**Senior Year**

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<tr>
<td>3</td>
<td>Concrete and Steel Construction—Con E 340 (B,H)</td>
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<td>Mechanical/Electrical Systems for Buildings—Con E 351 (B,M,E)</td>
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<td>Soil Engineering—C E 360 (B,H)</td>
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<td>Mechanics of Materials Lab—E M 327 (B,H)</td>
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<td>Structural Analysis I—C E 332</td>
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<td>3</td>
<td>Elementary Differential Equations—Math 266 (B) or Social Science &amp; Humanities Elective (B)</td>
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<td>Engineering Topics Elective (H)</td>
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<td>Energy Systems &amp; Power Electronics—E E 303 (E)</td>
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<td>Engineering Law—Con E 380 (E,M)</td>
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<td>Business Communication Elective (M,E)</td>
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<td>Electrical Circuits—E E 441 (M)</td>
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<td>16</td>
<td>B, M; 15 H, E</td>
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**Curriculum in Electrical Engineering**

Administered by the Department of Electrical and Computer Engineering. Leading to the degree of bachelor of science. Total credits required: 1275. See also Basic Program and Cooperative Programs.

**Sophomore Year**

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<tr>
<td>4</td>
<td>Electric Circuits—E E 201*</td>
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<td>Elementary Differential Equations and Laplace Transforms—Math 267</td>
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<td>5</td>
<td>Introduction to Classical Physics II—Phys 222</td>
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<td>Electronic Devices and Circuits—E E 203*</td>
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<td>Introduction to Digital Design—Cpr E 210*</td>
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<td>Calculus III—Math 265</td>
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<td>Signals and Systems I—E E 224*</td>
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**Junior Year**

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<tr>
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<td>Energy Systems and Power Electronics—E E 303*</td>
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<td>Electromagnetic Fields and Waves—E E 311*</td>
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<th>Credits</th>
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<tr>
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<td>Semiconductors and Devices—E E 332*</td>
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<td>Probabilistic Methods for Electrical Engineers—E E 322*</td>
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<td>Technical elective 2</td>
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<td>Technical Communication—Engl 314</td>
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<tr>
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</tbody>
</table>

**Curriculum in Electrical Engineering**

Administered by the Department of Electrical and Computer Engineering. Leading to the degree of bachelor of science. Total credits required: 1275. See also Basic Program and Cooperative Programs.

**English Proficiency**

All English courses taken, including those in the Basic Program, require a grade of C or better. A C– grade or less requires additional composition coursework.

1 Chosen from curriculum-approved lists. All electives must be taken for a grade. Pass-Not grades are not acceptable.

2 Social sciences and humanities (SSH) electives chosen from curriculum-approved list. One of these must have a prerequisite of Psych 101 or a previously taken social sciences and humanities elective. Most students must meet university requirements for diversity and international perspective by selecting appropriate courses from this area.

3 All English courses taken, including those in the basic program, require a C or better. C- or less requires additional composition coursework. All electives must be taken for a grade. Pass/not pass credits are not acceptable.

4 Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

*General Education Electives—Students must propose and have approved by their faculty adviser a general education program of 15 credits that meets the university diversity and international perspectives requirements and an objective developed by the student. Courses chosen must not be remedial courses in the university, six (6) credits must be chosen at the 300 level or higher, and courses in engineering, computer science, physical and mathematical sciences must not be included. Pass/not pass credit not accepted.

2 Technical electives are of two types: (1) courses in computer engineering and electrical engineering, and (2) other courses in engineering and science. All technical electives must be chosen from lists approved by the department and available from the department’s Undergraduate Student Services office. Technical electives must be chosen to satisfy departmental requirements concerning content and distribution. Pass/not pass credit not accepted.

3 Math elective—Students select from math elective from the following courses: Math 307, 317, 395, 471, or 481. Pass/not pass credit not accepted.

4 Outcomes Assessment—Students are required to prepare and to maintain a portfolio of their technical and non-technical skills. This portfolio is evaluated for student preparation during the student’s curriculum planning process. Results of the evaluation are used to advise students of core strengths and weaknesses. Prerequisite material exams may be given at key points in the curriculum. These exams are to assist student evaluation of progress made during the academic experience as the material covered in several courses is the foundation of more advanced courses. The results of these assessments are also used to evaluate the curriculum and to implement improvements.

**Transfer Grade Requirements**

The Electrical and Computer Engineering Department requires a grade of C or better for any transfer credit course that is applied to the degree program.
Curriculum in Industrial Engineering
Administered by the Department of Industrial and Manufacturing Systems Engineering.
Leading to the degree bachelor of science.
Total credits required: 121.5. See also Basic Program and Cooperative Programs.

Sophomore Year

Cr.  Fall  
4  Calculus III—Math 265  
3  Introduction to Manufacturing Processes and Specifications—E I 248*  
2  Principles of Materials Science and Engineering—Mat E 272  
5  Introduction to Classical Physics II—Phys 222  
3  SSH elective  

Total credits: 16

Junior Year

Cr.  Fall  
3  Engineering Economic Analysis—E I 305*  
3  Quality Control—I E 361*  
3  Optimization—I E 312*  
4  Introduction to Circuits, Instruments, and Electronics—E E 441  
3  SSH elective  

Total credits: 16

Cr.  Spring  
3  Applied Ergonomics and Work Design—I E 271*  
3  Elementary Differential Equations for Engineers—Stat 231  
3  Fundamentals of Public Speaking—Sp Cm 212  
3  Statics of Engineering—E M 274  

Total credits: 15

Senior Year

Cr.  Fall  
4  Stochastic Modeling, Simulation and Analysis—I E 413*  
3  Thermodynamics—M E 330  
3  Technical Communication—Engl 314  
3  Manufacturing Systems Engineering—I E 448*  
3  Focus elective  

Total credits: 17

Cr.  Spring  
3  Focus or management elective  
3  Focus elective  
3  Management elective  
3  SSH elective  
3  Industrial Engineering Design—I E 441*  

Total credits: 15

English Proficiency

The department requires a C grade (2.0) or better in Engl 104 and 105 with no grade lower than a C-

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

Curriculum in Materials Engineering
Administered by the Department of Materials Science and Engineering.
Leading to the degree bachelor of science.
Total credits required: 124.5. See also Basic Program and Cooperative Programs.

Professional Program

Sophomore Year

Cr.  Fall  
2  Integrated Materials Design—Mat E 213*  
5  Introduction to Materials Science and Engineering—Mat E 211*  
5  Introduction to Classical Physics II—Phys 222  
3  SSH elective  

Total credits: 17

Cr.  Spring  
3  Thermodynamics in Materials Engineering—Mat E 212*  
3  Structural Characterization of Materials—Mat E 214*  
5  Introduction to Classical Physics II—Phys 222  
3  Statics of Engineering—E M 274  
3  SSH elective  

Total credits: 17

Junior Year

Cr.  Fall  
2  Integrated Materials Design—Mat E 313*  
3  Kinetics and Phase Equilibria in Materials—Mat E 315*  
3  Specialization I  
3  Specialization II  
3  Mechanics of Materials—E M 324  
3  SSH elective  

Total credits: 17

Cr.  Spring  
3  Computational Methods in Materials—Mat E 316*  
3  Mechanical Behavior of Materials—Mat E 318*  
3  Specialization I  
3  Specialization II  
3  SSH elective  

Total credits: 15

Senior Year

Cr.  Fall  
2  Integrated Materials Design—Mat E 414*  
3  Specialization I  
3  Specialization II  
3  SSH elective  
3  Technical elective  
3  Free elective  

Total credits: 17

Cr.  Spring  
2  Materials Engineering Design—Mat E 412*  
3  Specialization I  
3  Specialization II  
3  SSH elective  
3  Technical elective  

Total credits: 14

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

See also Basic Program and Cooperative Programs.

The IMSE curriculum provides students with the opportunity to obtain depth in a topic area of their choice. At least two courses, selected from a department-approved list, must be taken from one of the following areas:

Operations Research: which is concerned with the design and analysis of quantitative models and methods having applications in production and service systems such as inventory control, scheduling, transportation, and logistics.

Manufacturing: which is concerned with the design, analysis, operation, and control of manufacturing processes and systems.

Human Factors: which is concerned with the relationships between people and their work tasks, machines, information, and environment.

Enterprise Computing and Information Management: which is concerned with the integration of information within the functional units of an enterprise as well as among multiple enterprises.

Engineering Management: which is concerned with the strategies necessary for solving internal and external problems of a company in areas such as production, quality, project management, sales, and marketing strategies.

General: for students who do not want to specialize in any of the five focus areas above, choosing instead to combine electives from a number of areas.

*These engineering science electives must be chosen from a department-approved list.

†These social sciences and humanities (SSH) electives must be chosen from a department-approved list and must include at least one 6-credit sequence of prerequisite or related courses. At least 6 credits of SSH electives at or above the 200-level electives must be included.

‡These electives are to be chosen from department-approved lists of business-related courses with advance approval.

§These engineering science electives must be chosen from a department-approved list, must include at least one 6-credit sequence of prerequisite or related courses. At least 6 credits of SSH electives at or above the 200-level electives must be included.

**Core professional curriculum. A student must have a minimum grade point average of 2.00 in this group of courses in order to graduate.
English Proficiency
The Department of Materials Science and Engineering requires a grade of C or better in Engl 104 and 105 and certification from the departmental curriculum committee.

Social sciences and humanities (SSH) electives must be departmentally approved.

Technical electives must be department approved.

The free elective may be SSH, Technical, or other graded course not of remedial nature.

If Electronics is chosen as a specialization then the technical elective requirement is reduced by 2 credits since 331 and 432 are 4 credits each.

Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.

A Mat E student may take up to 9 credit hours from SSH and free electives on a P/NP basis, except that courses used to meet the U.S. Diversity and International Perspectives requirements may not be among them. S/F courses (different from P/NP) will be considered for these requirements on a course-by-course basis.

Areas of specialization from which a student selects two:
- Ceramic Materials: 321, 322, 423, 424
- Electronic Materials: 331, 332, 432, 433
- Metallic Materials: 341, 342, 443, 444
- Polymeric Materials: 351, Ch E 443, 453, 454

Curriculum in Mechanical Engineering
Leading to the degree bachelor of science.

Total credits required: 128.5. See also Basic Program and Cooperative Programs.

Sophomore Year

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<tbody>
<tr>
<td>4</td>
<td>Calculus III—Math 265</td>
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<td>Introduction to Classical Physics II—Phys 222</td>
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<tr>
<td>3</td>
<td>Engineering Statistics—Stat 305</td>
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<tr>
<td>3</td>
<td>Statics of Engineering—E M 274*</td>
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<td>Elementary Differential Equations and Laplace Transforms—Math 267</td>
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<td>Dynamics—E M 345*</td>
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<td>Engineering Thermodynamics I—M E 231*</td>
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Junior Year

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<td>Engineering Thermodynamics II—M E 332*</td>
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<td>Introduction to Circuits and Instruments—E E 442*</td>
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<td>Introduction to AC Circuits and Motors—E E 448*</td>
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Senior Year

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<tr>
<td>6</td>
<td>Technical electives²</td>
</tr>
<tr>
<td>6</td>
<td>General education electives¹</td>
</tr>
</tbody>
</table>

15

English Proficiency
The department requires a minimum of C– in both Engl 104 and 105 with at least a 2.00 average for the two courses.

¹ General Education electives must be chosen from department-approved lists and must include Econ 101 or 102, at least six credits in the humanities and at least six credits in the social sciences. Students must select courses that also satisfy the diversity and international perspective requirements of the university. No more than three 100 level courses are allowed.

² All technical electives must be chosen from a department-approved list. Students must take a minimum of six credits of electives identified on the approved list as mechanical engineering technical electives. Suggested areas of specialization are the following: Energy conversion and utilization—M E 433, 443, 444, 446, 447, 448, 449; E E 456, 457; I E 305.


Materials and Manufacturing—M E 520, 521, 522; E M 514, 569; Mat E 318, 443, 444.

Thermal and environmental engineering—M E 441, 442, 444, 445, 446, 447, 448, 449, 475, 530, 532, 536, 538, 539, 540, 542, 545, 546, 547, and applicable courses in other departments.

Propulsion—M E 445, 447, 448, 449, 542, 548; Aer E 312, 412.

Nuclear Power—M E 431, 585.

³The design elective must be chosen from M E 415, 442, 446, or 449.

*Core professional curriculum. A student must have a minimum grade-point average of 2.00 in this group of courses in order to graduate.
College of Family and Consumer Sciences

Carol B. Meeks, Dean
Beverly J. Crabtree, Emeritus Dean
Ruth E. Deacon, Emeritus Dean
JaneAnn Stout, Associate Dean
Suzanne Hendrich, Associate Dean
Mary Winter, Associate Dean

Departments of the College
Apparel, Educational Studies, and Hospitality Management
Food Science and Human Nutrition
Human Development and Family Studies

The College of Family and Consumer Sciences (CFCS) is committed to advancing the well-being of families, consumers, and related business organizations through the creation, application, and dissemination of knowledge.

These objectives are accomplished by fostering a supportive community committed to optimizing student learning, promoting high quality scholarship that addresses important issues for individuals, families, communities, and related business organizations, and engaging key constituents and partners in addressing needs of families, communities, societies, and related business organizations around the world.

The fields of study encompassed by the College are represented within the departments described above. The College faculty and staff work to create and communicate knowledge not only in a given field, but to combine that knowledge into an integrated whole. Each part of that whole is needed to achieve the goal of enhancing quality of life for all people.

Students in CFCS learn how to contribute to the well-being of society through a variety of careers. At the baccalaureate level, students are prepared to become family and consumer sciences educators, early childhood educators, childcare providers, housing specialists, personal financial managers, apparel designers, merchandisers and entrepreneurs; also restaurant, hotel and institution managers; food scientists, dietitians and nutritionists.

They also are prepared to pursue postbaccalaureate education at other institutions in such areas as social work, law, medicine or other health care professions. In addition, the College offers masters and doctorate programs in each department.

Graduates are prepared for careers as researchers, educators, marriage and family therapists, or upper level managers and administrators in professional fields.

Faculty and staff members of the College of Family and Consumer Sciences aspire to create personal well-being. There is a strong commitment to a love of learning and to nurturing students through rigorous and dynamic curricula. Extensive extracurricular opportunities, both local and international, for the personal and professional development of students are provided. These commitments are the foundation for becoming the best FCS College in the nation.

College of Family and Consumer Sciences
Undergraduate Core Curriculum
Graduates of the College of Family and Consumer Sciences will demonstrate professional and personal competencies in concepts fundamental to the College’s mission. These core concepts serve as a unifying focus for students in the College.

The following two core concepts are interdisciplinary in nature; competencies will be assessed by designated outcomes in courses within each major in the College.

Critical Thinking: Demonstrate the ability to evaluate information based on science and moral reasoning. Apply critical thinking skills in making value-based decisions, forming public policy, and showing civic responsibility as consumers and providers of goods and services necessary to meet the basic life needs of the individual, family, and community.

Interpersonal Communication: Demonstrate the ability to communicate appropriately and effectively as Family and Consumer Sciences professionals and members of the global community while respecting diversity and enhancing the dignity of others.

The above two interdisciplinary concepts are integral to the following three discipline-based concepts. Competencies in these three concepts will be demonstrated by satisfactory completion of approved course work in the College of Family and Consumer Sciences.

Two of the three concept requirements must be fulfilled using courses outside the student’s major department.

Family: Demonstrate knowledge about the family in society and its development, diverse nature, and role in nurturing children, youth, and adults as they grow and change.

Human Nutrition: Demonstrate abilities to make optimal decisions for human health through nutrition and to evaluate nutrition information based on science and moral reasoning.

Consumer Sciences: Demonstrate knowledge about issues facing individuals, families, and communities related to choices by consumers and/or providers regarding at least one of the following human needs: clothing, education, family economics, hospitality services, and housing.

Accreditation
All degree programs in the College of Family and Consumer Sciences are accredited by the American Association of Family and Consumer Sciences (AAFCS). Accreditation includes commitment to self-regulation, ongoing self-study, peer and external evaluation, and regular review by the Council for Accreditation for the AAFCS. These accreditation activities ensure that graduates of the College of Family and Consumer Sciences have had educational experiences of high quality and relevance as judged against nationally accepted standards.

Throughout the United States, only a small number of colleges and universities offering bachelors degrees in Family and Consumer Sciences meet the high standards of the AAFCS accreditation.

In addition to the College accreditation, the following program-specific accreditation/registrations have been attained by Departments within the College:

Department of Apparel, Educational Studies, and Hospitality Management: Family and Consumer Sciences Education Teacher Licensure Program is licensed by the Iowa Department of Education and the Iowa Board of Educational Examiners.

Hotel, Restaurant, and Institution Management is accredited by the Accreditation Commission for Programs in Hospitality Administration, the accrediting agency of the International Council on Hotel, Restaurant, and Institutional Education.

Production focus of the Apparel Merchandising, Design, and Production major is endorsed by the American Apparel and Footwear Association.

Department of Food Science and Human Nutrition:
Food Science and Technology is approved by the Institute of Food Technologists. The Dietetics Internship has initial accreditation and the Didactic Program in Dietetics is currently granted approval status by the Commission on Accreditation/Approval for Dietetics Education of The American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995, 312/899-4876.
Department of Human Development and Family Studies:
The Child Development Laboratory School is accredited by the National Academy for Early Childhood Programs and licensed by the Iowa Department of Human Services; Early Childhood, Birth-Grade 3 is approved by the Iowa Department of Education; Early Childhood Education-Unified is approved by the Iowa Department of Education; Marital and Family Therapy (Ph.D. only) is approved by the Commission on Accreditation for Marriage and Family Therapy Education.

Curricula in Family and Consumer Sciences
The College of Family and Consumer Sciences is fully accredited by the American Association of Family and Consumer Sciences Council for Accreditation. The curricula are planned to meet a variety of academic interests, abilities, and goals of the student. Each curriculum requires depth in a discipline. Breadth is acquired through general education, the College core, and careful use of electives.

Apparel Merchandising, Design, and Production—Options: Merchandising; Design; Production
Child, Adult, and Family Services—Options: Child Programs; Youth Programs; Adult Programs; Family Programs; Policy and Advocacy

Dietetics
Early Childhood Education
Family and Consumer Sciences Education and Studies—Options: Teacher Licensure; Educational Services; General Studies
Family Resource Management and Consumer Sciences—Options: Family Resource Management and Consumer Sciences; Family Financial Counseling
Food Science—Options: Food Science and Technology; Consumer Food Science; Food Science and Industry
Hotel, Restaurant, and Institution Management
Housing and the Near Environment
Nutritional Science

Special Interest Programs
International and Cross Cultural Programs
Study abroad opportunities are available and encouraged through the College of Family and Consumer Sciences to broaden international and cross-cultural perspectives. Scholarships and other forms of financial assistance are available which provide partial support for students studying abroad. The College has established programs with Glasgow Caledonian University, Glasgow, Scotland; University of Otago, Dunedin, New Zealand; and the International College of Hospitality Administration, Brig, Switzerland. Students also study at the London College of Fashion, London, England; Paris American Academy, Paris, France; and participate in group study abroad programs to Europe, Africa, Costa Rica, Peru, and Mexico. Other opportunities may be developed through consultation with the associate dean of undergraduate programs and the student’s adviser; for example, students have acquired internships and studied in such countries as Kenya, Spain, Puerto Rico, Ireland, Guatemala, Switzerland, England, Australia, Germany, and France. Faculty members bring diversity and global perspectives to instruction and research through their work in India, South Korea, Central and South America, Pakistan, Africa, and Europe.

Honors Program
High achieving students, with a grade point average of above 3.35, are invited to apply to the Honors Program. Honors students are encouraged to develop a creative program of study expanding their interests while meeting individual educational objectives. Students in the Honors Program also participate in University Honors Seminars and complete an honors project. For further information, contact the College Honors Committee or academic adviser. Also see Index, Honors Program.

Dietetics Internship (DI)
This postbaccalaureate program, administered by the Department of Food Science and Human Nutrition, has initial accreditation from the American Dietetic Association (ADA). The purpose of the program is to enable those who meet the academic requirements of the ADA to obtain at least 900 hours of practice supervised by registered dietitians in medical nutrition therapy, community nutrition, and foodservice management to meet ADA performance requirements for entry level dietitians. Students who satisfactorily complete the DI will be eligible to take the national registration examination administered by the Commission on Dietetic Registration.

Minors
Minors are available to all Iowa State students including family and consumer sciences majors. Minors consist of at least 15 credits and are available in the following areas:
Apparel Merchandising, Design, and Production
Child, Adult, and Family Services
Educational Services in Family and Consumer Sciences
Family Resource Management and Consumer Sciences
Food Safety (interdepartmental minor)
Gerontology (interdisciplinary minor)
Hotel, Restaurant, and Institution Management
Housing and the Near Environment
Nutritional Science

See Index for minor requirements for specific departments and programs.

Information for Prospective Students

Open Option Status
The College of Family and Consumer Sciences offers an open option for entering students who have not selected a specific area of study. Family and Consumer Sciences Orientation (FCEdS 110) helps students explore the opportunities available. Program planning information can be obtained from general college advisers.

Secondary School Preparation
Preparation required for admission is: 4 years English/language arts; 3 years mathematics; 3 years science; 2 years social studies.

Advising System
Each student in the College of Family and Consumer Sciences works closely with an academic adviser. Freshmen are advised by general college advisers. After the freshman year, each student is assigned an adviser in the department of the chosen curriculum. Freshmen students in Food Science and Human Nutrition are advised by a departmental adviser. The adviser assists the student in making adjustments to the university and provides information and guidance on course work, opportunities for professional and personal development and career choices.

Planned Transfer Programs
By careful planning with the College of Family and Consumer Sciences Academic Programs Office, students may begin their education at another college, then transfer their courses to a curriculum within the College of Family and Consumer Sciences with maximum efficiency in meeting the degree requirements. The College has developed program-to-program transfer plans with community colleges in Iowa and surrounding states. In addition, personalized plans may be developed for students attending other colleges. For more information, call 1-800-522-0683 or contact the associate dean for undergraduate programs, College of Family and Consumer Sciences, 124 Mackay, Iowa State University.

Families Extension
Students may prepare for a career in the Cooperative Extension Service by enrolling in any curriculum in the College of Family and Consumer Sciences that provides them with a broad subject matter base for conducting educational programs for families. Advice on choice of courses should be sought from the Family and Consumer Sciences Education and Studies program, the associate dean and director of Iowa State University Extension to Families programs, the director of Iowa State University Extension to Youth and 4-H programs, or the Extension Human Resources office.
Preparation for Graduate Study
Students considering graduate studies should gain background knowledge in basic subjects related to their area of interest. Undergraduate mathematics, statistics, and research methods courses are useful as preparation for advanced study in graduate school. Upon completion of graduate programs, students are qualified for leadership positions in public and private institutions and for teaching, research, and extension positions in colleges and universities.

Professional Career and Employment Opportunities in Family and Consumer Sciences
Employment of Family and Consumer Sciences graduates remains at a high level. The flexibility of College of Family and Consumer Sciences programs allows for a wide range of career opportunities in diverse areas such as government, industry, education, health and human services, business, extension, and community agencies, locally, nationally, and internationally. A few examples of the positions in these various fields are: dietitian; housing specialist; vocational family and consumer sciences teacher; infant, preschool, or special education teacher; hotel, club, or restaurant manager; financial counselor; apparel merchandiser, designer, or production specialist; food or textile researcher; food scientist; nutrition scientist; sales representative; early childhood educator; consumer product specialist; and supervisor for a human service agency.

Students may prepare for professional programs such as medicine, law, or health administration while pursuing a B.S. degree. The strength of the College programs lies in the capacity to enhance the graduate’s ability to develop and deliver products, programs, or services to families and consumers, as well as to strengthen the communication and leadership skills needed in representing the interests of families and consumers.

General Education
Each department within the College requires students to select and/or elect courses to fulfill a specific number of credits in prescribed areas.

Minimum Group Requirements in the College of Family and Consumer Sciences

Independet Study
Students may pursue independent work by enrolling in 490 courses in individual departments. No more than nine semester credits of independent study may be applied to a degree from the College of Family and Consumer Sciences.

Curriculum in Apparel Merchandising, Design, and Production
Administered by the Textiles and Clothing Program. Leading to the degree bachelor of science. Total credits required: 123 including a minimum of 18 credits in AMDP at Iowa State University for the degree.

The major in apparel merchandising, design, and production provides a broad based program of study with flexibility in creating program options. Courses are required in the following groups: general education, family and consumer sciences core, and textiles and clothing core. To complete the program, a student combines structured clusters of courses to form primary and secondary program options.

A minor in apparel merchandising, design, and production is available; the requirements appear under Textiles and Clothing, Courses and Programs.

Cr. Degree Requirements
12.5 Communications and library
6.5 Engl 104, 105; Lib 160
3 Select from ComSt 102, 214; HD FS 370, and Sp Cm 212
3 Select from Engl 302, 309, 314
17-21 Natural sciences and mathematical disciplines
3 FSHN 167
3-5 Select from biology, chemistry, geology, physics, zoology
3-4 Mathematics (Math 150 recommended for Merchandising and Production Options)
4 Com S 103
4-5 Stat 101 or 227
9 Social sciences
6 Econ 101; HD FS 102
3 Select from the approved FCS list
9 Humanities
6 Select from the FCS-approved list (all T C courses excluded except 257 and 342). Foreign language recommended.
3 One history or art history course. See approved list. For design primary option, course must be art history.

Professional courses
.5 Orientation - FCEdS 110
33-34 Textiles and clothing core
22 T C 131, 165, 204, 231, 245, 375, 410
3 Human studies
Select from T C 342, 354, 355, 467
3-4 Product development
Select from T C 225, 305, 321, 331, 404
3 International T C 362 or 472
2 T C 380, 381, or 470
(outside home state)

Primary options
Select one cluster from primary options
18-20 Merchandising
10 T C 375L, 376; Acct 284; Mkt 340
8-10 Select three courses from T C 377, 470, 472, 474; HRI 287; ADVRT 320; Mkt 410, 446, 448; Mgmt 370, 371

Secondary options
Select a second cluster from the following primary option areas or from the secondary option areas.

Business/Entrepreneurship
Select from T C 472 or 474

Consumer behavior/marketing
Select from T C 467; Mkt 340*

Creative Design
Select from T C 326

History/Theatre Costume
Select three courses from T C 257, 354, 355, 362, 470, 479; Art History; Thre 106, 110, 255

Human Relations/Communications
Select three courses from T C 467, 470, 499; ComS 214, 218, 310, 314, 317; HD FS 370; Mgmt 370, 371; Psych 450, Soc 380, Sp Cm 212

Technical Design
Select two courses from T C 121, 225, 305, 321, 325, 404, 470, 499

Quality Assurance
Select from T C 404, 470, 499; I E 271, 361; I Tec 360; Stat 495

International Trade
Select from T C 362 or 472

Choose credits from one foreign language or 6 credits from T C 381, Anthr 323, 325, 326, 417, 418, 436; FCEdS 421; IntSt 120, 220, 235; Mgmt 414; Mkt 448; TSC 341

* If Merchandising primary option, must select another course from approved list.
** If Production/Apparel Engineering primary option, must select another course from approved list.

Electives
Select courses to broaden or complement the options (see adviser).

123 Total credits

2003-2005
## Curriculum in Child, Adult, and Family Services

Administered by the Department of Human Development and Family Studies. Leading to the degree bachelor of science. Total credits required: 128.

The child, adult, and family services curriculum, with options in child programs, youth programs, adult programs, family programs, and policy and advocacy, prepares students for professional work with children, adults, and families in a variety of public and private human service agencies and organizations. Examples include schools, child care programs, youth programs, adult programs, services to the elderly, community action, policy/advocacy work, and crisis intervention.

A minor in child, adult, and family services is available; the requirements appear under Human Development and Family Studies, Courses and Programs.

The following requirements are for the child programs, youth programs, adult programs, family programs, and policy and advocacy options:

### Cr. Degree Requirements

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Communications and library</td>
</tr>
<tr>
<td>9.5</td>
<td>Engl 104, 105; Lib 160; Sp Cm 212</td>
</tr>
<tr>
<td>3</td>
<td>Select from Engl 302, 309, 314</td>
</tr>
<tr>
<td>12-14</td>
<td>Natural sciences and mathematical disciplines</td>
</tr>
<tr>
<td>3-4</td>
<td>Stat 101 or Math 105, 140, 142, 150, 165</td>
</tr>
<tr>
<td>3</td>
<td>Select from biology or zoology</td>
</tr>
<tr>
<td>3-4</td>
<td>Corn S 103 or C I 201</td>
</tr>
<tr>
<td>3</td>
<td>Select from natural sciences or statistics</td>
</tr>
<tr>
<td>9</td>
<td>Social sciences*</td>
</tr>
<tr>
<td>9</td>
<td>Select from anthropology, economics, political science, psychology, sociology</td>
</tr>
<tr>
<td>9</td>
<td>Humanities*</td>
</tr>
<tr>
<td>9.5</td>
<td>Select from approved list.</td>
</tr>
<tr>
<td>17</td>
<td>Family and consumer sciences core</td>
</tr>
<tr>
<td>14</td>
<td>Select from HDFS approved list</td>
</tr>
</tbody>
</table>

### Child, Adult, and Family Services core

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>HD FS 218, 349, 367, 370, 395</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 239 or 283</td>
</tr>
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### Child Programs Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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<tbody>
<tr>
<td>24</td>
<td>HD FS 220, 221</td>
</tr>
<tr>
<td>4</td>
<td>HD FS 340 or 343</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 445 or 486</td>
</tr>
<tr>
<td>11</td>
<td>HD FS 240, 345 or 460; C I 250; H S 105</td>
</tr>
</tbody>
</table>

### Youth Programs Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>HD FS 226, 227</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 276</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 486</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 360, C I 250, or Psych 436</td>
</tr>
<tr>
<td>9</td>
<td>Select from HD FS 479; Sp Cm 110, H S 215, 395; Soc 241, 330, 331, 340, 371, 473; Psych 422</td>
</tr>
</tbody>
</table>

### Adult Programs Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>HD FS 276, 377</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 226 or 227</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 360 or Soc 463</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 486</td>
</tr>
<tr>
<td>9</td>
<td>Select from HD FS 341, 373, 448, 479; H S 395; Soc 330, 331; Sp Cm 110, 323; Psych 422</td>
</tr>
</tbody>
</table>

### Family Programs Option

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>HD FS 276, 377, 479, 486</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 360, 463; Psych 436</td>
</tr>
<tr>
<td>3</td>
<td>Select from HD FS 220, 221, 226, 227</td>
</tr>
<tr>
<td>6</td>
<td>Select from HD FS 270, 373; Soc 330, 331, 485; Phil 333; Psych 422; Sp Cm 110, 323</td>
</tr>
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</table>

### Policy and Advocacy Option

<table>
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<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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</thead>
<tbody>
<tr>
<td>24</td>
<td>HD FS 239 or 341</td>
</tr>
<tr>
<td>6</td>
<td>Select from HD FS 220, 221, 226, 227, 377</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 380</td>
</tr>
<tr>
<td>3</td>
<td>HD FS 445 or 486</td>
</tr>
<tr>
<td>3</td>
<td>Pol S 215 or 344</td>
</tr>
<tr>
<td>3</td>
<td>Select from HD FS 360, 463; Psych 436</td>
</tr>
<tr>
<td>3</td>
<td>Select from Sp Cm 312, 321, 323, 324, 325, 327</td>
</tr>
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</table>

### Electives

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-18</td>
<td>Electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total Credits</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, ethics, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

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## Curriculum in Dietetics

Administered by the Department of Food Science and Human Nutrition.

The student is prepared for admission to dietetic internship programs and other professional experience programs approved/accredited by The American Dietetic Association. Courses included have been approved as meeting the academic requirements of The American Dietetic Association. There is a $30 fee for a statement of verification of completion of the approved program.

### Cr. Degree Requirements*

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Communications</td>
</tr>
<tr>
<td>6-7</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td>9</td>
<td>Physical sciences</td>
</tr>
<tr>
<td>19</td>
<td>Biological sciences</td>
</tr>
<tr>
<td>9</td>
<td>Social sciences</td>
</tr>
<tr>
<td>40</td>
<td>Food science and human nutrition</td>
</tr>
<tr>
<td>11</td>
<td>Management</td>
</tr>
<tr>
<td>7-8</td>
<td>Electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, ethics, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.
Curriculum in Early Childhood Education

The curriculum in early childhood education is planned for students preparing to teach young children and work with their families. This program leads to careers in working with young children who are typically developing and those with special needs from birth through age eight. Graduates in this curriculum may teach in early childhood (preschool and primary) classrooms and home-based programs, with emphasis on inclusive services; graduates may be employed by either public or private agencies or schools. This curriculum has been approved by the Iowa Department of Education and meets the requirements for the early childhood education unified teacher license, which permits individuals to teach general and special education for children from birth through age eight. The program is administered jointly by the Department of Human Development and Family Studies within the College of Family and Consumer Sciences, and the Department of Curriculum and Instruction within the College of Education.

For details concerning the professional teacher education requirements and admission to the undergraduate teacher education program, see Index, Teacher Education, Courses and Programs.

Foreign Language Requirement

Early childhood education majors must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language). The requirement may be met by completion of three or more years of high school study in one foreign language. Students who have completed three or more years of French, German, or Spanish in high school may not receive graded credit for 101-102 on a remedial basis, they will be advanced sequence (200-level or higher) in appropriate examination or by completing an undergraduate teacher education program, see (T credit) may be obtained by passing an 102 in those languages; test-out credit may not receive graded credit for 101-102 on a remedial basis, they will be advanced sequence (200-level or higher) in appropriate examination or by completing an undergraduate teacher education program, see

CR. Degree Requirements

9.5 Communications skills
6.5 Engl 104, 105; Lib 160
3 Select from communications options list
12 Natural sciences and mathematics disciplines
6 FS HN 167; Math 196
3 Select from physical sciences
3 Select from biological sciences
9 Social sciences*
3 American history or American government
6 Select from approved list
9 Humanities*
3 Select from approved list
2 Health, Safety
H S 105
12 Human development and family studies*
9 HD FS 102, 220, 221
3 Select from HD FS 349, 395, 445, 449, 460
15-15.5 Professional education core
15 C I 201, 204, 250, 332, 406
R-5 Orientation: FCS or Educ
FCEdS 110 or C I 115 or 315; C I 215 (ECE-E only)
21 Preprimary: Inclusive
HD FS 240, 340, 343, 345, 455, 456
21-24 Primary: Inclusive
C I 245, 268, 367, 433 or 443, 438 or 448 (if prerequisites are met), 439 or 449, 46BF, 46BG, 468; Sp Ed 365, 368, 455
16 Student teaching: preprimary and primary (inclusive)
Sp Ed 416 and HD FS 417B or C I 416A and HD FS 417C
0.3-3 Electives
129.5-130 Total credits

*Courses in these areas may be used to meet the CFCS core requirement.

Curriculum in Family and Consumer Sciences Education and Studies

Administered by the Family and Consumer Sciences Education and Studies Program. Leading to the degree bachelor of science. Total credits required: 123.

This curriculum provides a broad-based program of study focusing on preparation for professional careers related to education or community participation. Courses are required in general education and the family and consumer sciences core. Students select one program option.

There are three choices for this curriculum. Option 1, teacher licensure, Option 2, educational services, and Option 3, general studies. In all options, students are prepared with a broad-based understanding of family and consumer sciences.

Option 1, teacher licensure, is designed for students seeking careers as family and consumer sciences educators in a variety of settings such as middle, junior, and senior high schools. With additional credits students may also be approved to teach in specific occupational areas: child care, fashion merchandising, and foodservice. Further information about licensure programs appears under College of Education.

Option 2, educational services, is designed for students seeking careers in extension, business, community agencies, community colleges, and adult education programs.

Option 3, general studies, is designed to provide students with the opportunity to pursue an individualized program which is planned with their academic advisers. Opportunities to participate in study abroad, international internships, field study, and international supervised student teaching experience build a solid base for work in a global world.

The program offers a minor in educational services in family and consumer sciences; the requirements appear under Family and Consumer Sciences Education and Studies, Courses and Programs.

Cr. Degree Requirements

9.5 Communications and library
6 Engl 104, 105
3 Select from: ComSt 102, 214 218, HD FS 370, Sp Cm 212
0.5 Lib 160
9 Natural sciences and mathematical disciplines
3 Zool 165 or Biol 109
3 Select a course from the mathematical disciplines (Teacher licensure option must select Math course)
3 Select additional course in natural science. (Both teacher licensure option and educational services option must complete Chem 160 or high school chemistry)
9 Social sciences
3 Econ 101
3 Soc 134
3 Select from anthropology, economics, psychology, sociology
9 Humanities
9 Courses from approved list (Teacher licensure must complete 3 cr. of American history or American government)
13.5 Family and Consumer Sciences Education and Studies core

Option 1: Teacher Licensure

73 Additional Professional Courses
25 FCEdS 318, 403, 413, 417A, 417B, 460
6 FSHN 111, 167
12 HD FS 102, 276, 349, 488
9 220, 221 or 226, 239, 283 or 483
3 T C Select one course
15 C I 201, 204, 333, 406, 415, 426
3 Select from: Anthr 417; T C 342, 362; Phil 340
123 Total Credits

Option 2: Educational Services

73 Additional Professional Courses
12 FCEdS 415, 418A, 460
6 FSHN 111, 167
9 HD FS 102, 270, 488
9 HD FS 220, 221, or 226, 239; 283 or 483
3 HD FS 474 or T C 474 or HRI 474
3 T C Select one course
9 Select from FCEdS, FSHN, HRI, HD FS, T C
3 HRI 287, Mgmt 370, or Mkt 340
3 Engl 302, 309, 313, 314, or Sp Cm 312
3 JI MC 205
3 Select from: Anthr 417; T C 342, 362; Phil 340
10 Electives
123 Total Credits
Option 3: General Studies
73 Additional Professional Courses
6-11 FCEdS 415, 418B
9 HD FS 102, 283, 488
3 HD FS 474 or T C 474 or HRI 474
3 FSHN 167
14-19 Select from FCEdS, FSHN, HRI, HD FS, T C
3 Select from: Anthr 417; T C 342, 362; Phil 340
3 Engl 302, 314; Jl MC 205; or Sp Cm 312
14 Natural Sciences, Social Sciences, Humanities, Art and Design
13 Electives
123 Total Credits

Occupational teaching areas available:
Child care: HD FS 220, 221, 340, 343, 445
Fashion merchandising: T C 131, 165, 375, 376, 377, Com S 103
Foodservice: Biol 109, Micro 201 or HRI 233, HRI 333, 380, 380L, 438

Curriculum in Family Resource Management and Consumer Sciences
Administered by the Department of Human Development and Family Studies. Leading to the degree bachelor of science. Total credits required: 128

This curriculum focuses on the behavior of families as they allocate and manage their resources and function as consumers. Upon graduation, the student will be prepared to advise clients in the wise use of personal resources, in effective money management, and in sound financial planning. A minor in family resource management and consumer science is available; the requirements appear under Human Development and Family Studies, Courses and Programs.

Cr. | Degree Requirements
---|---
12.5 | Communications and library
9.5 | Engl 104, 105, Sp Cm 212, Lib 160
3 | Select from Engl 302, 309, 314
13-14 | Natural sciences and mathematical disciplines*
6 | Select from natural or biological sciences or mathematics or statistics
3-4 | Com S 103 or 107
4 | Stat 101
15 | Social sciences*
6 | Econ 101 and 102
9 | Select from anthropology, economics, political science, psychology, sociology
9 | Humanities*
9.5 | Family and consumer sciences core
17 | HD FS core
14 | HD FS 269, 449, 491
3 | Select HD FS other than family resources management curriculum

Option 1. Family Resource Management and Consumer Sciences
Cr. | Degree Requirements
---|---
12 | HD FS 283, 395, 483, 488
3 | HD FS 380 or Acct 215
6 | Select from HD FS 239, 341, 360, 370, 377, 488, 489
12 | Select from accounting, economics, finance, history, journalism, management, marketing, political science, psychology, sociology
18-19 | Electives
128 | Total credits

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Option 2. Family Financial Counseling
Cr. | Degree Requirements
---|---
29 | HD FS 283, 341, 370, 483, 488, 489, 491; Acct 284; Econ 353; HD FS 380 or Acct 215
3 | Select from HD FS 395, 448, Soc 305, Psych 280
19-20 | Electives
128 | Total credits

*Courses in these areas may be used to meet the CFCS core requirement.

Curriculum in Food Science
Administered by the Department of Food Science and Human Nutrition.

Option 1. Food Science and Technology
Cr. | Degree Requirements*
---|---
9.5 | Communications
9.5 | Math 165 and 166, or 181 and 182; Stat 101 or 104
23 | Physical sciences
13 | Biological sciences
9 | Social sciences*
9 | Humanities*
39 | Food science and human nutrition
6-7 | Electives
120.5 | Total credits

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Option 2. Food Science and Industry
Cr. | Degree Requirements*
---|---
18.5 | Communications
13 | Physical sciences
6-7 | Mathematical sciences
9 | Social sciences*
7-8 | Biological sciences
9 | Food science and human nutrition
5-6 | Electives
120.5 | Total credits

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.
Curriculum in Food Science and Technology-B.S./M.S.
Administered by the Department of Food Science and Human Nutrition.

Undergraduate Program:

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Communications and library Engl 104, 105; Lib 160; ComSt 214 or Sp Cm 212</td>
</tr>
<tr>
<td>11-12</td>
<td>Mathematical sciences Math 165 and 166, or 181 and 182; Stat 101 or 104</td>
</tr>
<tr>
<td>23</td>
<td>Physical sciences Chem 177, 177L, 178, 331, 331L, 322; Phys 111, 112</td>
</tr>
<tr>
<td>13-16</td>
<td>Biological sciences BBMB 404 and 405, or 420; Biol 201, 202; Micro 302, 302L</td>
</tr>
<tr>
<td>9</td>
<td>Social sciences*</td>
</tr>
<tr>
<td>9</td>
<td>Humanities*</td>
</tr>
<tr>
<td>39</td>
<td>Food science and human nutrition FS HN 110, 167, 203, 311, 351, 403, 405, 406, 410, 412, 420, 421, 471, 472, 480</td>
</tr>
<tr>
<td>3-7</td>
<td>Electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Graduate Program:

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Graduate-level coursework including research</td>
</tr>
</tbody>
</table>

Curriculum in Hotel, Restaurant, and Institution Management
Administered by the Hotel, Restaurant, and Institution Management Program. Leading to the degree bachelor of science. Total credits required: 127

The curriculum in Hotel, Restaurant, and Institution Management develops students as leaders for the foodservice and lodging professions.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Communications and library Engl 104, 105, 302; Lib 160; Sp Cm 212</td>
</tr>
<tr>
<td>13</td>
<td>Natural sciences and mathematical disciplines Math 104, 140 or 150; Stat 101; and 6 credits of natural sciences</td>
</tr>
<tr>
<td>12</td>
<td>Social sciences Econ 101; Psych 101; Soc 134, HD FS 102</td>
</tr>
<tr>
<td>9</td>
<td>Humanities</td>
</tr>
</tbody>
</table>

* A student who has not had high school chemistry is required to take Chem 160.
** A student who has not had high school biology is required to take Biol 160.

Curriculum in Housing and the Near Environment
Administered by the Department of Human Development and Family Studies. Leading to the degree bachelor of science. Total credits required: 128

The curriculum in housing and the near environment focuses on housing needs, issues, and trends, such as housing alternatives for families and children; housing for the elderly and persons with disabilities; housing finance, residential property management; and public policy. Graduates of this curriculum are prepared for employment in the housing industry, including housing-service organizations; public and private (profit and not-for-profit) agencies; real estate and lending institutions, housing management and administration; housing equipment/furnishings industries; housing counseling and housing advocacy. A 15-credit minor in housing and the near environment is available; the requirements appear under Human Development and Family Studies, Courses and Programs.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>Communications and library Engl 104, 105; Sp Cm 212; Lib 160</td>
</tr>
<tr>
<td>3</td>
<td>Select from Engl 302, 309, 314</td>
</tr>
<tr>
<td>9-11</td>
<td>Natural sciences and mathematical disciplines*</td>
</tr>
<tr>
<td>3</td>
<td>Select from natural sciences</td>
</tr>
<tr>
<td>3-4</td>
<td>Select from mathematics or statistics</td>
</tr>
<tr>
<td>3-4</td>
<td>Select from computer science</td>
</tr>
<tr>
<td>9</td>
<td>Social science*</td>
</tr>
</tbody>
</table>

*Courses in these areas may be used to meet the CFCS core requirement.
### Curriculum in Nutritional Science
Administered by the Department of Food Science and Human Nutrition.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Communications and Library</td>
</tr>
<tr>
<td></td>
<td>Engl 104, 105; Lib 160; ComSt 214 or Sp Cm 212</td>
</tr>
<tr>
<td>7-12</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td></td>
<td>4 credits in calculus (2 semesters preferred); Stat 101 or 104</td>
</tr>
<tr>
<td>24</td>
<td>Physical sciences</td>
</tr>
<tr>
<td></td>
<td>Chem 177, 177L, 178, 331, 331L, 332, 332L; Phys 111, 112</td>
</tr>
<tr>
<td>23</td>
<td>Biological sciences</td>
</tr>
<tr>
<td></td>
<td>Biol 201, 201L, 202, 202L, 301, 302; Micro 302, 302L; Zool 355</td>
</tr>
<tr>
<td>9</td>
<td>Social Sciences*</td>
</tr>
<tr>
<td>9</td>
<td>Humanities*</td>
</tr>
<tr>
<td>29-30</td>
<td>Food science and human nutrition</td>
</tr>
<tr>
<td></td>
<td>FS HN 110, 203, 214 or 311, 261, 360, 362, 463 or 466 or 565, 480; select at least 11 additional credits from: FS HN 361, 403, 412, 419 or 519, 461, 463, 464, 466, 490C, 499, 553, 554, 562, 565, 575</td>
</tr>
<tr>
<td>4-10</td>
<td>Electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

### Curriculum in Nutrition
**B.S./M.S.**
Administered by the Department of Food Science and Human Nutrition.

#### Undergraduate Program:

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>Communications and library</td>
</tr>
<tr>
<td></td>
<td>Engl 104, 105; Lib 160; ComSt 214 or Sp Cm 212</td>
</tr>
<tr>
<td>7-12</td>
<td>Mathematical sciences</td>
</tr>
<tr>
<td></td>
<td>4 credits in calculus (2 semesters preferred); Stat 101 or 104</td>
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<td>24</td>
<td>Physical sciences</td>
</tr>
<tr>
<td></td>
<td>Chem 177, 177L, 178, 331, 331L, 332, 332L; Phys 111, 112</td>
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<tr>
<td>20-22</td>
<td>Biological sciences</td>
</tr>
<tr>
<td></td>
<td>BBMB 404 and 405, or 420; Biol 201, 201L, 202, 202L; Micro 302, 302L; Zool 355</td>
</tr>
<tr>
<td>9</td>
<td>Social sciences*</td>
</tr>
<tr>
<td>9</td>
<td>Humanities*</td>
</tr>
<tr>
<td>29-30</td>
<td>Food science and human nutrition</td>
</tr>
<tr>
<td></td>
<td>FS HN 110, 203, 214 or 311, 261, 360, 362, 463 or 466 or 565, 480; select at least 11 additional credits from: FS HN 361, 403, 412, 419 or 519, 461, 463, 464, 466, 490C, 499, 553, 554, 562, 565, 575</td>
</tr>
<tr>
<td>5-13</td>
<td>Electives</td>
</tr>
<tr>
<td>120.5</td>
<td>Total credits</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

#### Graduate Program:

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<tbody>
<tr>
<td>30</td>
<td>Graduate-level coursework including research</td>
</tr>
</tbody>
</table>

*Additional degree requirements: Students must fulfill international perspectives, U.S. diversity, and CFCS core requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.*
College of Liberal Arts and Sciences

Peter W. Rabideau, Dean
Zora D. Zimmerman, Associate Dean
Steven R. Rodermel, Associate Dean
Michael B. Whiteford, Associate Dean
Ruth W. Swenson, Associate Dean Emerita

Departments of the College
Air Force Aerospace Studies
Anthropology
Biochemistry, Biophysics, and Molecular Biology
Botany
Chemistry
Computer Science
Economics
English
Foreign Languages and Literatures
Geological and Atmospheric Sciences
Greenlee School of Journalism and Communication
History
Mathematics
Military Science
Music
Naval Science
Philosophy and Religious Studies
Physics and Astronomy
Political Science
Psychology
Sociology
Statistics
Zoology and Genetics

In the College of Liberal Arts and Sciences, students select from a wide and rich range of program options. The goal of the college is to prepare the student to enter the world beyond the university with skills in reasoning, analysis, and communication; with an appreciation of history and culture, an understanding of the challenges of the future, and a sensitivity toward people and their environments. To achieve this goal, the college asks students to acquire depth in learning within disciplines of their own choice, by way of single or multiple majors and breadth through elective courses and courses fulfilling general education requirements.

The College of Liberal Arts and Sciences is the academic home, the foundation, for many essential learning disciplines. The college provides students with all the components of a modern liberal education. Students may choose to study in various fields of the physical, biological, and social sciences; in mathematical disciplines; in methods and systems of communication; and in the arts and humanities.

The flexible degree requirements in the curriculum in Liberal Arts and Sciences permit programs of study suited to a variety of interests and goals. Students having academic interests not fully met by a departmental major may pursue a major offered by one of the college's interdepartmental programs or may apply for an undergraduate major in interdisciplinary studies (See Index, Liberal Arts and Sciences, Cross-Disciplinary Studies). The college participates in the University Honors Program; thus, students of exceptional academic promise can develop unique and challenging programs of study.

The college has three curricula: a curriculum in Liberal Arts and Sciences, leading to the bachelor of arts or the bachelor of science degree; a curriculum in music, leading to the bachelor of music degree; and a curriculum in liberal studies, leading to the bachelor of liberal studies degree.

High School Preparation/Admission Requirements
Students entering the college are required to present evidence of the following high school preparation:

4 years of English (Typically this preparation includes courses in British, American, and world literature in which critical reading and writing skills are emphasized and courses in speech and composition, including at least one senior-level writing course.)

3 years of social studies (Typically such preparation includes two semesters of world history, two semesters of American history, and a semester of American government. Electives can be chosen from areas such as economics, sociology, or psychology.)

2 years of a single foreign language (Three years or more of a single foreign language are strongly recommended for students who wish to continue their work in that language. A minimum of three years of a single foreign language is required to fulfill the foreign language graduation requirement in the College of Liberal Arts and Sciences.)

3 years of mathematics (Such preparation shall include two semesters of beginning algebra, two semesters of geometry, and two semesters of intermediate algebra. A fourth year of study involving analytic geometry, trigonometry, linear algebra, and/or calculus is strongly recommended for students who will major in mathematical or scientific disciplines.)

3 years of science (At least two years of such preparation shall be chosen from biology, chemistry, and physics.)

Recommended but not required as a condition of admission to the College of Liberal Arts and Sciences is one semester of computer experience. (Such a course should stress problem-solving with computers and should not substitute for courses in mathematics. In schools where computer use is an integral part of most courses, separate instruction in computers is not necessary.)

Students who transfer from another college or university with at least 24 credits of satisfactory coursework may be exempt from most of these requirements. Students who do not meet the requirements listed here may be admitted with a limited number of deficiencies. Contact the college office for further information about resolving these deficiencies.

Transfer Students
To graduate from the College of Liberal Arts and Sciences, a transfer student must complete the general requirements of the college as well as those of the university. Students planning to transfer to Iowa State University for the purpose of enrolling in the College of Liberal Arts and Sciences are advised to contact the college office for information concerning degree program requirements. Prospective transfer students are urged to learn about the academic programs that are of interest to them well before arriving on campus so that pretransfer courses are appropriate to the planned major and transferrable toward graduation from ISU.

Additional information concerning transfer credit evaluation may be obtained through the Office of Admissions as well as the department in which a student is interested.

A transfer student in the College of Liberal Arts and Sciences may choose to graduate under the catalog in effect at the time of his or her graduation or under one of the two immediately preceding catalogs, provided that it covers the period of his or her enrollment either at Iowa State or any other accredited school. Full requirements of the chosen catalog must be met except that adjustments will be made in instances where courses are no longer available or where programs have been changed. A transfer student is responsible for reviewing his/her transfer credit evaluation with the academic adviser during the first semester of enrollment.

University Requirements
The university requirements for the bachelor's degree, including statements of academic standards, the university residence requirement, the English proficiency requirement, U.S. diversity and international perspectives requirement, and the library requirement, appear in the Colleges and Curricula portion at the beginning of this bulletin.

Curriculum in Liberal Arts and Sciences
To obtain a bachelor's degree from the College of Liberal Arts and Sciences, curriculum in liberal arts and sciences, an undergraduate student must earn a minimum of 124.5 semester credits including a minimum of 32 semester credits earned in residence at Iowa State University. In addition, the student must meet general education, English proficiency, library proficiency, foreign language, and
advanced credit requirements, as well as the requirements of a major. Courses taken on a pass/not pass basis may be counted toward the required total of 124.5 credits, and may be used to meet the advanced credit requirement, if appropriate, but may not be used to satisfy any other graduation requirement. No more than 9 credits of 490 (Independent Study) courses in a single discipline may be counted toward graduation.

**General Education Requirements**

Students must earn the minimum credits listed in each of the four general education groups in courses outside the department of the first major listed on the degree program. Interdisciplinary courses may be used to satisfy requirements in any group for which they have been approved, but a student may not apply the same course to more than one group.

**Credit by Examination Program**

Individual departments may use CLEP Subject Tests for testout of specific courses. Students in the College of Liberal Arts and Sciences may use CLEP General Test credits as free electives but not toward any of the general education group requirements.

**General Education Groups**

I. Arts and humanities (minimum 12 credits). The student should develop an understanding of human cultural heritage and history, and an appreciation of reasoning and the aesthetic value of human creativity.*

II. Verbal communication (minimum 2 credits). The student should develop skill in and an understanding of the principles involved in effective communication among people.*

III. Natural sciences and mathematical disciplines (minimum 11 credits including 3 in the mathematical disciplines and 8 in the natural sciences). The student should experience science as a rational search for understanding the structure and behavior of the natural world, and should appreciate mathematics as a valuable tool of the sciences and as an intrinsically important way of thinking.*

IV. Social sciences (minimum 9 credits). The student should develop an appreciation of the principal methods of studying human behavior and an understanding of the structure and functioning of institutions. Courses must be taken in at least two disciplines represented in Group IV.*

*Lists of approved courses are available from advisers or the Office of the Dean, College of Liberal Arts and Sciences.

**Other Requirements**

**English Proficiency**

The faculty of Iowa State University believes that its graduates should acquire competence in written communication during their undergraduate careers. All students must earn an average grade of C– or better in required basic composition courses (e.g., Engl 104 and 105). This should be regarded as a minimally acceptable grade standard. Departments may have stricter criteria as appropriate to their disciplines.

The continued development of communication skills following the freshman year is the responsibility of the student’s major department. The department shall promote this development by adopting measures to certify the writing proficiency of its own majors. Certification is to occur a reasonable time before graduation and shall be based upon satisfactory completion of a designated course in the student’s program in which writing is evaluated or an advanced writing course offered in the English department (e.g., Engl 302, 305, or 314).

**Library Proficiency**

A library minimum proficiency requirement must be met by satisfactory completion of one of the following options:

1. Library 160
2. A test-out examination for credit to be administered by the library staff, who will control the testing procedure and will determine those students who are eligible to take the examination.

**Foreign Language Requirement**

The faculty of the College of Liberal Arts and Sciences believes that undergraduate students should acquire elementary practical experience in a second language, should be introduced to the theoretical study of language structure, and should begin to develop an understanding of a second culture through study of that culture’s language. As a means of achieving this objective, a student must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language).

Students who have completed three or more years of high-school foreign language study are deemed to have completed the LAS Foreign Language requirement. These students may not enroll in or receive credit for 101-102 or 110 in those languages; test-out credit may be obtained by passing an appropriate examination or by completing an advanced sequence (200-level or higher) in that language. 101-102 may not be taken on a remedial basis.

Students who have completed more than one year but less than three years of high-school foreign language study may not enroll in 101 in the same language. These students may satisfy the foreign language requirement by (a) passing the exam for credit at the 102 level, (b) receiving a passing grade in a 102 foreign language course, or (c) receiving a passing grade in a foreign language course at the 200-level or higher. For more information see Department of Foreign Languages and Literatures. (Courses taught in English do not satisfy the foreign language requirement).

Certification in American Sign Language is recognized by the University and satisfies the LAS foreign language requirement.

Students with disabilities who need to satisfy the foreign language requirement may direct questions to the Advising Coordinator in the Foreign Language Department and the Disability Resource Office.

Credits applied toward the foreign language requirement cannot be used to satisfy the general education requirements, but students who have fulfilled the foreign language requirement may apply additional courses in foreign languages toward the appropriate general education groups.

Majors in any foreign language are deemed to have fulfilled the college foreign language requirement. International students for whom English is a second language may satisfy the foreign language requirement by completion of Engl 104 and 105 at ISU with an average grade of C– or better. See Foreign Languages and Literatures for additional information on international students.

**Advanced Credit Requirements**

To obtain a baccalaureate degree from the College of Liberal Arts and Sciences, curriculum in liberal arts and sciences, a student must earn at least 45 credits at the 300 level or above taken at a four-year college. Credits earned in electives taken on a pass/not pass basis or in the major or a minor may be used to meet this requirement.

**Major**

Students must complete the requirements of a major which will include 24 to 48 credits in the major discipline as specified by the major department or program. Tracks within a major must have a common 24 credit core. Some courses outside the major discipline may also be required as supporting work for the major. (See Index for page reference to individual department and program requirements.) The major must contain at least 8 credits in courses taken at Iowa State University that are numbered 300 or above and in which the student’s grade is C or higher. In addition, the average grade of all courses in the major (those courses listed under major on the degree audit) must be 2.0 or higher. Courses from the first major listed on the degree program may not be counted in the general education groups.

Courses in general education may be counted in meeting the requirements of additional majors. When choosing an additional major, students must confirm that the additional major is not prohibited (see list under “Double Majors”).
The major shall be chosen from the following list, which also indicates the degree(s) offered in the respective majors.

Advertising, B.A., B.S.
Anthropology, B.A., B.S.
Applied Physics, B.S.
Biochemistry, B.S.
Biological/Pre-Medical Illustration, B.A.
Biology, B.S.
Biophysics, B.S.
Botany, B.S.
Chemistry, B.A., B.S.
Communication Studies, B.A.
Computer Science, B.S.
Earth Science, B.A., B.S.
Economics, B.A.*, B.S.
English, B.A., B.S.
Environmental Science, B.S.
Environmental Studies (may be taken as a second major with the degree to be determined by the first major)
French, B.A.
Genetics, B.S.
Geology, B.S.
German, B.A.
History, B.A., B.S.
Interdisciplinary Studies, B.A., B.S.
International Studies (may be taken as a second major with the degree to be determined by the first major)
Journalism and Mass Communication, B.A., B.S.
Linguistics, B.A.
Mathematics, B.S.
Meteorology, B.S.
Music, B.A., B.Mus.
Performing Arts, B.A.
Philosophy, B.A.
Physics, B.S.
Political Science, B.A.
Psychology, B.A., B.S.
Religious Studies, B.A.
Russian Studies, B.A.
Sociology, B.A., B.S.
Spanish, B.A.
Speech Communication, B.A., B.S.
Statistics, B.S.
Technical Communication, B.S.
Women's Studies, B.A., B.S.
Zoology, B.S.

*Available only to students who were enrolled as majors before the 1995-1996 year. (See Index, Economics.)

The major in interdisciplinary studies (B.A., B.S.) is available for undergraduate students who have unique interdisciplinary educational goals. Such a major is designed by the faculty and the student and is approved only when the educational goals cannot be met by a reasonable combination of existing majors, minors, and electives. (See Index, Interdisciplinary Studies.)

A curriculum in liberal studies leading to a bachelor of liberal studies degree (B.L.S.) is also available. (See Index, Liberal Studies.)

Double Majors

Students may elect a second major from the departments and program areas listed above, or from a major field offered for the bachelor's degree in another college of the university. Double majors between the following programs are prohibited: Chemistry with Biochemistry and Agricultural Biochemistry, Biology with Animal Ecology, Agricultural Biochemistry, Biochemistry, Botany, Genetics, Microbiology, and Zoology.

The major departments must then approve the degree program, and if those majors involve two colleges, both deans must approve. Such programs must fulfill the general education requirements of the college of the primary major. If one major leads to the B.A. degree and the other to the B.S. degree, the degree awarded will be the one offered by the department of the primary major.

If the primary major may lead to either a B.A. or a B.S., a student may choose to receive either degree. In all cases, the student must satisfy the requirements of each major and of the degree that is chosen for the primary major. Students with a primary major in another college who wish to take a second major in the College of Liberal Arts and Sciences are not required to meet the Liberal Arts and Sciences General Education and Foreign Language requirements. Majors from the Curriculum in Liberal Arts and Sciences may not be added to a Bachelor of Liberal Studies degree or a Bachelor of Music degree.

A student may earn two degrees in this curriculum with two appropriate majors and at least 30 additional credits. Either the B.A. or the B.S. in this curriculum may be earned with the bachelor of music. Any degree offered by this college may be earned together with a degree in any other college of the university. For the requirements for two degrees, see Index, Bachelor's Degree Requirements.

Minor

A minor, which is optional, must consist of at least 15 credits, with at least 6 credits in courses numbered 300 and above taken at ISU with a grade of C or higher. The minor must include at least 9 credits taken at ISU that are not used to meet any other department, college, or university requirement. (See Index, Minors.)

The following minors are offered by the college of Liberal Arts and Sciences:

Advertising
African American Studies
American Indian Studies
Anthropology
Astronomy
Biochemistry
Biological Illustration
Biology
Botany
Chemistry
Chinese Studies
Classical Studies
Criminal Justice Studies
Economics
Emerging Global Disease

English
Environmental Science
Environmental Studies
French
Genetics
Geology
German
History
International Studies
Journalism and Mass Communication
Latin
Linguistics
Mathematics
Meteorology
Military Studies
Music
Performing Arts
Philosophy
Physics
Political Science
Portuguese
Psychology
Religious Studies
Russian Studies
Sociology
Spanish
Speech Communication
Statistics
Technical Communication
Technology and Social Change
Women's Studies
Zoology

Courses applied toward the general education groups may be used to meet the requirements of a minor. (For restrictions, see the Index, Minors.)

If a student declares a minor and completes the requirements specified by the offering department/program, the minor will be recorded on the transcript.

Electives

Students will take additional courses, freely elected, sufficient to accumulate a total of 124.5 credits. These additional courses together with the general education courses may be used to meet the requirements of a minor or of another major, provided that they are taken on a graded basis.

Planning the Program of Study

Careful, comprehensive planning is important for meeting graduation requirements and taking advantage of the resources offered by the university. Each student is encouraged to work with his or her academic adviser in developing a four year plan as soon as possible after declaration of the major. A degree audit listing all completed courses and those remaining to be taken for fulfillment of the degree requirements in the student's chosen major is provided to the student and the adviser each semester. The student should review the audit each semester and consult with the adviser when changes are required. Any changes to the audit must be approved by the academic adviser and by the dean's office. It is essential that the audit be reviewed and updated in a timely fashion in order to avoid delay in the student's graduation.
During the first year, students should meet proficiency requirements in English and in library. They should also make progress toward meeting the general education requirements, a large part of which should be completed by the end of the second year. The third and fourth years should emphasize completion of the major (and minor, if elected) and of general education requirements, and should give the student an opportunity to take electives.

The Open Option
Recognizing the fact that many students entering Iowa State University will not have selected a major, the College of Liberal Arts and Sciences provides the open option in order to give them time to explore possible majors and programs. Open option students who enter as freshmen are expected to declare a major by the beginning of the third semester of enrollment. Entering students who have completed three semesters in another school and students who wish to change majors but are not yet ready to declare the new major may register under the open option for one semester, provided they have completed no more than 75 credits.

Program planning information is available through advisers of open option students, in departmental offices, and in the office of the dean of the College of Liberal Arts and Sciences. Early enrollment in certain course sequences is essential for students who are considering sciences or mathematical disciplines, and selection of a major field by the end of the first year is strongly recommended.

Honors Program
For information on the Honors Program in the College of Liberal Arts and Sciences, see Index, Liberal Arts and Sciences, Cross-Disciplinary Programs, Honors Program.

ROTC Programs
The College of Liberal Arts and Sciences also offers students the opportunity to combine their academic programs with ROTC programs in the Army, Navy, and Air Force.

Teacher Licensure
Students in the College of Liberal Arts and Sciences may be recommended for the Iowa Professional License for full-time teaching of certain subjects in secondary schools. For further information see Index, Teacher Education Program.

Preprofessional Programs
Students in the College of Liberal Arts and Sciences may participate in preprofessional programs in human health-related fields, law, and theology by taking the courses required for admission to professional schools. Students may enter the college with the designation Premed, Prelaw, or Preprofessional Health Programs. Most will earn a bachelor’s degree by choosing a major and meeting the requirements for the major while taking the preprofessional courses.

Others will spend one to three years as students in the college before transferring to a professional school to which they have applied and been accepted. For further information, see Index, Preprofessional Study.

Experiential Learning (Internship/Co-op) Program
The Experiential Learning (Internship/Co-op) Program assists students in gaining career-related experience while going to school. Internships/Co-ops provide students with the opportunity to gain specific skills, apply academic knowledge in practical situations, pretest their career choice, earn a salary, and establish a network of professional contacts. Most internships are full-time and last for a semester or a summer, but a part-time experience is possible. Students wishing to receive academic credit for their internship must make arrangements with a faculty member in their major department. In contrast, co-op students work full-time on an extended basis (work two semesters) or on an alternating basis (work, school, work, etc.) during any semester (fall, spring, summer).

It may take students participating in the Experiential Learning (Internship/Co-op) Program an additional semester or more to complete their academic curriculum requirements. For additional information, contact Business/Liberal Arts and Sciences Career Services.

Curriculum in Music
This curriculum leads to the degree bachelor of music and is an alternative to the curriculum in liberal arts and sciences with a major in music. To obtain a bachelor of music degree, a student must earn a minimum of 124.5 credits including a minimum of 32 credits in residence at Iowa State University and a minimum of 45 advanced credits (credits in courses numbered 300 or above) and must meet all of the requirements specified below.

Courses taken on a pass/not pass basis may be counted toward the required total of 124.5 credits, and may be used to meet the advanced credit requirement, if appropriate, but may not be used to satisfy any other graduation requirement. No more than 9 credits in 490 (Independent Study) courses in a single discipline may be counted toward graduation. See Index, Music. Students interested in pursuing an emphasis in music theater should see Index, Theater and Performing Arts. A minor in music is available; the requirements appear under Music, Courses and Programs.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Degree Requirements</th>
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<tbody>
<tr>
<td>32</td>
<td>General Education Requirements</td>
</tr>
</tbody>
</table>

Students choosing the music education option should consult their advisers regarding general education requirements* |

6 Social sciences
6 Humanities
6 Music 383, 384
3 Phys 198
6 Mathematical, physical, and biological sciences
5 Electives
6.5-14.5 Other Requirements

| 6   | Engl 104, 105† |
| 0.5 | Library 160 |
| 0-8 | Foreign language (one)†† |
| 47  | Music core |
| 22  | Music 120, 221, 222, 231, 232, 331, 332, 337, 338, 361 |
| 12  | Music 119, 219, 319, 419 |
| 3   | One of the following: Music 471, 472, 473, 475, 476 |
| 3   | One of the following: Music 430, 440, 448 |
| 7   | Ensembles |
| 31-47 | Area of concentration |
|      | (select one of the following options) |
| 46-47 | Music education** |
| 46   | Vocal K-12 option |
| 4    | Music 248, 266, 366, 327, 358A, 360, 362A, 367, 405, 466; Music 301 or Theater 354, or Theater 355; C I 204, 406, 415, 426; LAS 417K, 417L |
| 31   | Organ |
| 4    | Music 119B, 219B |
| 8    | Music 319C, 419C |
| 5    | Music 417 |
| 3    | Music history |
| 3    | Music theory |
| 8    | Second foreign language |
| 31   | Piano |
| 12   | Music 119, 219, 319, 419 |
| 4    | Music 321 |
| 8    | Music 417 |
| 3    | Music theory |
| 4    | Electives |
| 31   | String instruments |
| 12   | Music 119, 219, 319, 419 |
| 6    | Music 181, 321 |
| 3    | Music theory |
| 4    | Music 417 |
| 6    | Electives |
| 31   | Composition |
| 8    | Applied music |
| 4    | Music 362A, 362B |
| 13   | Music theory and composition |
| 6    | Electives |
| 31   | Voice |
| 4    | Music 327 and 119B, 119C, or 119K |
| 8    | Music 319A, 419A |
| 6    | Music 324, 325, 360 |
| 3    | Music theory |
| 2    | Music 417 |
| 8    | Second foreign language |
| 31   | Wind or percussion instrument |
| 12   | Music 119, 219, 319, 419 |
| 1-3  | Music 351-352 or 353-354 or 355 |
| 3    | Music 321 |
| 3    | Music theory |
| 4    | Music 417 |
| 6-8  | Electives |
| 124.5-140.5 Total credits |

| 1A   | student must earn an average grade of C- or better in Engl 104 and 105. |
Credits by proficiency or test-out examinations. Students may also earn distance-learning formats; and regular on/off-campus courses, including those with telecourses; Saturday and evening courses; study formats: correspondence courses; students may earn credits earned in various requirements. To complete the degree, the B.L.S. program has no residence off campus.

As described in the Teacher Education section of this bulletin, music education students must meet additional specific course requirements. In many cases these courses can be used to satisfy general education requirements as well.

K-12 options include 16 weeks of student teaching. All students will complete at least 50 hours of field experiences, of which at least 40 hours must occur after admission to teacher education but before student teaching. Music education students should refer to the Teacher Education section of this catalog for further information.

Curriculum in Liberal Studies
The bachelor of liberal studies degree (B.L.S.) was established by the three Iowa Regent universities to meet the needs of Iowans who want to earn a college degree but whose circumstances present obstacles to completing a traditional on-campus degree program. The degree may be earned from Iowa State University, the University of Iowa, or the University of Northern Iowa.

The B.L.S. is a general studies degree in the liberal arts. There is no traditional major. Instead, students take coursework in three areas of distribution. These areas may be focused in a single discipline or diversified over several disciplines. With the assistance of a B.L.S. adviser, students can structure a program that meets their individual educational, vocational or personal goals.

Up to three-fourths of the total degree requirements can be transferred from accredited institutions. Work done in community colleges or other accredited colleges and universities can be applied toward the degree, as can applicable courses taken at any of the three Iowa Regent universities, whether on or off campus.

The B.L.S. program has no residence requirements. To complete the degree, students may offer credits earned in various study formats: correspondence courses; telecourses; Saturday and evening courses; off-campus courses, including those with distance-learning formats; and regular on-campus courses. Students may also earn credits by proficiency or test-out examinations.

Admission
Admission to the B.L.S. program is open to persons who meet either of the following levels of previous educational attainment: Hold the associate in arts (A.A.) or associate in science (A.S.) degree from an accredited two-year college. (Holders of the associate in applied science or associate in applied arts degree are not automatically eligible, although some courses may be found applicable upon review.)

Have at least 62 semester credits of collegiate work acceptable toward graduation at ISU with a total cumulative grade point average of at least 2.00 (a C average).

Requirements for the B.L.S. Degree
The B.L.S. candidate must earn a total of 120 credits in accordance with requirements listed below. Courses taken at Iowa State University on a pass/not pass basis may be counted toward graduation only as electives. No more than 9 credits of 490 (Independent Study) courses in a single discipline may be counted toward graduation.

<table>
<thead>
<tr>
<th>Cr.</th>
<th>General Education Requirements</th>
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<tbody>
<tr>
<td>6</td>
<td>Basic English composition</td>
</tr>
<tr>
<td>8</td>
<td>Foreign language*</td>
</tr>
<tr>
<td>12</td>
<td>Arts and humanities</td>
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<tr>
<td>2</td>
<td>Verbal communication</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics, statistics, or computer science</td>
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<tr>
<td>8</td>
<td>Natural sciences</td>
</tr>
<tr>
<td>9</td>
<td>Social sciences from at least two different disciplines</td>
</tr>
</tbody>
</table>

A list of courses acceptable in the general education groups can be obtained from the college office.

36 Electives
A minimum of 12 credits is required in each of three of the five distribution areas listed below.

Humanities (literature, philosophy, history, religion, art and music appreciation)

Communications and arts (journalism, speech, writing, drama, art, foreign language)

Natural sciences and mathematical disciplines (chemistry, physics, biology, geological and atmospheric sciences, mathematics, statistics, computer science)

Social sciences (sociology, psychology, economics, political science, anthropology, geography)

Professional fields (business, education, family and consumer sciences, social work, agriculture, engineering, nursing)

At least 24 upper-level credits are required in the three distribution areas with a minimum of 6 upper-level credits in each of the areas.

36 Distribution Requirements

*The requirement may be met by completion of three or more years of high school study in one foreign language.

Other Requirements
Included in the total of 120 credits must be the following:

45 upper-level credits from a four-year college
30 credits from ISU earned during the junior/and or senior year.

Three credits of course work in U.S. Diversity and 3 credits in International Perspectives. A grade average of at least 2.00 (a C average) in all coursework applied to the B.L.S. degree, in all upper-level coursework, and in all work completed after admission to the B.L.S. program.

Proficiency in English demonstrated by completion of an approved composition course from a four-year college or by faculty evaluation, as advised.
The professional curriculum is a four-year course of study leading to the doctor of veterinary medicine degree. Undergraduate students are strongly encouraged to complete a bachelor’s degree before applying to the College of Veterinary Medicine. When deciding which major to pursue as an undergraduate, the student should consider the area of veterinary medicine in which they intend to emphasize when they become a veterinarian. For example, those interested in food animal practice may wish to pursue a degree in biological science, animal science, agricultural economics, or business. Future companion animal practitioners may wish to consider a biological science, physical science, business, social science, or humanities degree. These examples are only suggestions. They should be considered as but a few of the many possibilities.

Pre-veterinary Medicine Preparation

Admission Requirements
The College of Veterinary Medicine seeks students with diverse backgrounds and encourages students to enroll in baccalaureate programs in the college of their choice. Undergraduate students are strongly encouraged to complete a bachelor’s degree before applying to the College of Veterinary Medicine. When deciding which major to pursue as an undergraduate, the student should consider the area of veterinary medicine in which they intend to emphasize when they become a veterinarian. For example, those interested in food animal practice may wish to pursue a degree in biological science, animal science, agricultural economics, or business. Future companion animal practitioners may wish to consider a biological science, physical science, business, social science, or humanities degree. These examples are only suggestions. They should be considered as but a few of the many possibilities.

For the most current information regarding applications and admission to the College of Veterinary Medicine, please refer to the College website at http://www.vetmed.iastate.edu/.

Applicants for admission to the College of Veterinary Medicine must have attended an accredited college or university, have completed 40 semester credits prior to the deadline for filing an application for admission, and have completed 60 semester credits prior to the end of the spring term of the year in which the applicant seeks to be admitted to the College of Veterinary Medicine. All science requirements must be fulfilled by the time of filing or scheduled for completion by the end of Fall term of the year in which the applicant applies. The remaining required courses must be completed by the end of the spring term of the year in which the applicant seeks to be admitted. Credits earned must include the following Iowa State semester course offerings or their equivalents:

- English Composition 1 year of composition or writing emphasis courses. May include business or technical writing.
- General Chemistry with Laboratory* 1 year series (2 semesters or 3 quarters) with one semester lab
- Organic Chemistry with Laboratory* 1 year series (2 semesters or 3 quarters) with one semester lab
- Biochemistry* 1 year series (2 semesters or 3 quarters) with labs each term
- Biology with Laboratory* 1 year series (2 semesters or 3 quarters) with labs each term

TOTAL Credits Required 60 cr.

* science requirement
Credits in the previously specified courses will normally be earned on the traditional four-letter grading system with A as the highest grade and D as the lowest passing grade. All required courses must be completed with a grade of “C” or better. It is generally expected that required courses have been completed within the past eight (8) years. AP or CLEP credits must be documented by original scores submitted to the University and MUST meet the University’s minimum requirement in the appropriate subject area. CLEP credits may be accepted only for arts, humanities and social sciences. Credits in the preceding specified courses will not be accepted if earned under the pass-not pass grading system or similar options.

**Application and Admission**

Applicants may apply directly to the College of Veterinary Medicine at Iowa State University using the downloadable application and evaluation forms which are available on or before July 1 on the College of Veterinary Medicine website (www.vetmed.iastate.edu under Students/Prospective Students). The application, three letters of recommendation, transcripts and processing fee must be postmarked by October 1 and scores received by November 1 of the year prior to the year in which the applicant seeks to be admitted.

Paper copies of the professional curriculum application can be requested from the Office of Admissions, 100 Alumni Hall, Iowa State University, Ames, Iowa 50011.

Applicants may also apply using the Veterinary Medical College Application Service (VMCAS). The VMCAS application may be found online at the VMCAS website (www.aavmc.org under Students). Those applying through VMCAS will also need to complete the ISU Supplementary Application also downloadable from the College of Veterinary Medicine website. For further information contact the College of Veterinary Medicine at 515-294-6808.

Any student wishing to use international coursework (including study abroad) to fulfill a required undergraduate course must apply using the direct Iowa State University College of Veterinary Medicine application and must provide a transcript from the foreign institution.

A list of courses in progress at the time of filing and scheduled for completion by the end of spring term should accompany the application and transcripts. Undergraduate college credits must average at least 2.50 on a 4.00 marking system for the application to be accepted. The preceding scholastic requirements are minimum and do not assure admission even though these requirements have been fulfilled.

Admission to the College of Veterinary Medicine is on a competitive and selective basis. Undergraduate GPA (cumulative, required science course, last 45 undergraduate credits), Graduate Record Exam (GRE) general test score (The GRE must be taken prior to October 1 of the year the applicant applies and the scores must be received by November 1), animal and veterinary experience, essays, recommendations and personal development (leadership, citizenship, etc.) are given consideration in the selection of candidates.

The majority of the positions in the entering class are reserved for residents of Iowa. Two states, North Dakota (10) and South Dakota (6), have contracts for up to 16 students in each entering class. A similar contract is in place with the state of New Jersey for up to 4 positions. In addition, a number of positions are available to residents of other states. A few highly qualified international students may also be accepted. Consideration is given equally to all applicants without regard to race, color, national origin, gender, religion, disability, or age, political beliefs, or marital or familial status.

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**Curriculum in Veterinary Medicine**

**Graduation Requirements**

To be awarded the degree doctor of veterinary medicine, candidates must have passed all required courses in the curriculum in veterinary medicine, have earned at least 4 elective credits on a graded basis of A, B, C, D while enrolled in the College of Veterinary Medicine, and have at least a 2.0 grade-point average in the veterinary medicine curriculum.

**Professional Program**

**First Year**

<table>
<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
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<tbody>
<tr>
<td>5</td>
<td>Principles of Morphology I—B M S 330</td>
</tr>
<tr>
<td>6</td>
<td>Biomedical Sciences I—B M S 333</td>
</tr>
<tr>
<td>3</td>
<td>Physiological Chemistry—BBMB 420</td>
</tr>
<tr>
<td>2</td>
<td>Case Study I—B M S 345</td>
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<tr>
<td>R</td>
<td>Veterinarian in Society I—V Med 311</td>
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<tr>
<th>Cr.</th>
<th>Spring</th>
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<tbody>
<tr>
<td>4</td>
<td>Principles of Morphology II—B M S 331</td>
</tr>
<tr>
<td>6</td>
<td>Biomedical Sciences II—B M S 334</td>
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<tr>
<td>3</td>
<td>Neurobiology—B M S 337</td>
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<tr>
<td>2</td>
<td>Veterinary Immunology—V MPM 380</td>
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<tr>
<td>1</td>
<td>Radiology—V C S 391</td>
</tr>
<tr>
<td>2</td>
<td>General Pathology—V Pth 342</td>
</tr>
<tr>
<td>1</td>
<td>Case Study II—B M S 346</td>
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<tr>
<td>R</td>
<td>Veterinarian in Society II—V Med 312</td>
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</tbody>
</table>

**Second Year**

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<thead>
<tr>
<th>Cr.</th>
<th>Fall</th>
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<tbody>
<tr>
<td>4</td>
<td>Veterinary Parasitology—V Pth 376</td>
</tr>
<tr>
<td>3</td>
<td>Systemic Pathology—V Pth 372</td>
</tr>
<tr>
<td>5</td>
<td>Veterinary Microbiology I—V MPM 386</td>
</tr>
<tr>
<td>2</td>
<td>Case Study III—V Pth 377</td>
</tr>
<tr>
<td>1</td>
<td>Integrative Physiology—B M S 355</td>
</tr>
<tr>
<td>1</td>
<td>Veterinarian in Society III—V Med 313</td>
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<thead>
<tr>
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<th>Spring</th>
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<tbody>
<tr>
<td>3</td>
<td>General Pharmacology—B M S 354</td>
</tr>
<tr>
<td>1</td>
<td>Anesthesiology—VCS 398</td>
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<tr>
<td>3</td>
<td>Veterinary Microbiology II—V MPM 387</td>
</tr>
<tr>
<td>3</td>
<td>Public Health—V MPM 388</td>
</tr>
<tr>
<td>6</td>
<td>Principles of Surgery—V C S 397</td>
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<tr>
<td>2</td>
<td>Case Study IV—V MPM 378</td>
</tr>
<tr>
<td>1</td>
<td>Veterinarian in Society IV—V Med 314</td>
</tr>
</tbody>
</table>
Third Year
Cr. Fall
3 Clinical Pathology—V Pth 425
2 Infectious Diseases and Preventive Medicine—V MPM 436
5 Clinical Medicine I—V C S 444
3 Surgery Laboratory—V C S 449
4 Disturbances of Reproduction—V C S 450/VDPAM 450
3 Pharmacology and Therapeutics—B M S 443
R Introduction to Clinics—V C S 440/VDPAM 440
R Seminar—V C S 385
20

Cr. Spring
4 Special Pathology—V Pth 422
3 Infectious Diseases and Preventive Medicine—V MPM 437
5 Clinical Medicine II—V C S 445/VDPAM 445
3 Veterinary Toxicology—VDPAM 426
2 Radiology—V C S 448
1 Ophthalmology—V C S 399
R Seminar—V C S 385
18

Fourth Year
The fourth year of the veterinary medical curriculum is designed to be flexible and to provide for species emphasis. Students must complete 38 credits during their fourth year. They must take a required block and at least one option block. The remainder of the fourth year credits are acquired by selecting additional option blocks, Veterinary Teaching Hospital clinical electives, off-campus clinical electives, or other electives. Additional off-campus clinical elective credits can be earned at approved government agencies, research laboratories, veterinary practices, and other university hospitals.

Required Block
Cr.
3 Anesthesiology—V C S 466
3 Radiology—V C S 460
1 Necropsy—V Pth 456
1 Clinical Microbiology—VDPAM 488
4 ICU/Emergency Medicine—V C S 468
1 Clinical Pathology—V Pth 457
1 Laboratory in Public Health—V MPM 486
R Seminar—V C S 495
14 Total required block credits

Small Animal Option Block
Cr.
2 Soft Tissue Surgery—V C S 455
2 Orthopedic Surgery—V C S 456
2 Ophthalmology—V C S 469
2 Small Animal Medicine I—V C S 453
2 Small Animal Medicine II—V C S 454
2 Community Practice—V C S 463
12 Total Small Animal Option credits

Food Animal Option Block
Cr.
4 Production Animal Medicine—VDPAM 411
2 Diagnostic Laboratory—VDPAM 455
6 Total Food Animal Option credits

Production Animal Medicine Option Block
Cr.
4 Production Animal Medicine—VDPAM 411
2 Diagnostic Laboratory—VDPAM 455
6 Species Emphasis Courses (minimum of 6 credits required)
2-6 Swine Production Medicine Series—VDPAM 478, 479, 480
2-6 Beef Production Medicine Series—VDPAM 481, 482, 483
2-4 Introduction to Dairy Production Medicine—VDPAM 484, 485
2-4 Introduction to Small Ruminant Production Medicine—VDPAM 486
12 Total Production Animal Medicine Option credits

Equine Option Block
Cr.
3 Equine Medicine—V C S 457
3 Equine Surgery—V C S 458
6 Total Equine Option credits
38 Total fourth year required credits

Reinstatement
Any student who voluntarily withdraws from the College of Veterinary Medicine or who is dropped for cause, after having successfully completed one or more semesters forfeits his/her standing and must make written application for reinstatement to this college a minimum of 60 days prior to the opening of the semester for which they seek to re-enter. Any student who voluntarily withdraws from the College of Veterinary Medicine prior to completion of one semester must re-apply for admission to the college in the general applicant pool.
The Graduate College and graduate faculty at Iowa State University are responsible for the quality of graduate education, for administering students' graduate programs, and for promoting research support from various governmental, industrial, and private agencies.

The graduate faculty in various programs handle admission and classification of graduate students, establish requirements for advanced degrees, and have charge of instruction and research at the graduate level. Graduate faculty members also teach graduate courses, serve on program of study (POS) committees, and direct work of master's and doctoral students. All graduate courses offered for major or nonmajor credit are taught by graduate faculty members or graduate lecturers.

Graduate study was offered soon after the university was founded, and the first graduate degree was conferred in 1877. Experimentation and research also started early, first in agriculture and shortly thereafter in home economics, engineering, science, and veterinary medicine. In 1913, the graduate faculty was organized formally and an executive graduate committee was appointed. In 1915, the graduate faculty held its first meeting, and in 1916, it granted the first doctor of philosophy degree.

Graduate education is vital to the quality of university teaching. The creative efforts of graduate faculty members and graduate students result in knowledge necessary to help society solve problems in educational, scientific, technological, and socio-economic areas. The Graduate College encourages educational exchange and contact with undergraduate areas of the university to promote improved teaching on both the undergraduate and graduate levels. A part of this exchange is accomplished by the publication of books and technical articles which are made possible by graduate research.

The degrees master of arts, master of science, and doctor of philosophy are research oriented. In many fields master's degrees are also awarded without a thesis, but a written report of independent study, called a creative work, is required. For those individuals interested in advanced study directed toward meeting vocational or professional objectives, the following degrees are offered: master of accounting, master of agriculture, master of architecture, master of business administration, master of community and regional planning, master of education, master of family and consumer sciences, master of fine arts, master of landscape architecture, master of public administration, and the master of school mathematics.

The Graduate College Handbook lists policies and procedures of the Graduate College. It is available at the Graduate College's Web site: www.grad-college.iastate.edu/.

Admission

Admission to the Graduate College may be granted to a graduate of an institution in the United States that is accredited by a recognized regional association or to a graduate of a recognized institution in another country whose requirements for the bachelor's degree are substantially equivalent to those of Iowa State University. For information concerning graduate study in a particular academic discipline, prospective students should correspond with the chair of the major program in which they wish to study.

The graduate application process at Iowa State is “self-managed,” which means that the student manages his/her own application by collecting the application, fee, academic records, letters of recommendation, and other materials, and sends them in one package to the address listed in the Majors and Programs section of the graduate application brochure. The addresses are also listed on the Graduate College web site at www.grad-college.iastate.edu/academicprogram/programsummariesbya.html.

If an electronic application is submitted, two copies of the application are printed and the supplementary materials are collected and sent to the same address.

The application fee is $20 ($50 for international applicants). An electronic application is available on ISU’s graduate web site at www.grad-college.iastate.edu. This application fee is $25 for U.S. students and $57 for international applicants and must be paid by credit card or electronic check (U.S. banks only). The application fee is required of all applicants except those who have attended Iowa State as undergraduates, or those applying for admission in the nondegree admission status. In addition, an applicant must request that each previous college or university attended provide official transcripts of grades and credits earned, and request that the institution from which the degree was granted provide a statement of the degree received and the applicant's quartile class rank.

Full Admission status may be granted to students who meet either of the following requirements:

1. Graduate in the upper one-half of the graduating class with a bachelor's degree from a Regionally accredited U.S. institution; or
2. Graduate in the upper one-half of the graduating class from a recognized foreign institution where the requirements for the bachelor's degree are similar to those at Iowa State.

Provisional admission status may be granted to students who meet the requirements for full admission (listed above), but have academic or prerequisite deficiencies to remedy. Transfer from provisional admission to full admission status requires the completion of the graduate English requirement, completion of the coursework prescribed to remedy the background deficiencies with a grade average of B or better, and the written recommendation of the major professor and approval by the Dean of the Graduate College.

Restricted admission status may be granted to students who do not rank in the upper one-half of their graduating class and/or lack adequate undergraduate preparation in the proposed field of study. Restricted admission may be granted to graduates of non-English-speaking foreign institutions, even though the student ranks in the upper one-half of the graduating class. Advancement from restricted to full admission status requires completion of 9 semester credits of graduate level course work as a graduate student with a cumulative grade average of B or better and satisfaction of the Graduate College English requirement. A recommendation is submitted in writing by the major professor and must be approved by the Dean of the Graduate College.
Graduate Admission Without a Declared Major
Admission without a declared major is a category for graduates of regionally accredited institutions in the United States who do not intend to seek an advanced degree from Iowa State University. Such students usually include:

1. Those who intend to transfer graduate credit earned at Iowa State University to other institutions.
2. Those who intend to use graduate credits earned for professional certification.
3. Those who enroll for personal satisfaction.
4. Those who enroll occasionally in off-campus graduate courses.

Students who wish to apply to Iowa State University without a declared major need to contact the Office of Admissions, 100 Alumni Hall (1-800-262-3810) for the nondegree application form for students in this category. The application form is also available at the web site at www.iastate.edu/~adm_info/nondegreegrad.html.

Applications and schedules for such students with an undeclared major are processed directly by the Office of Admissions and the Graduate College office; no program approvals are required. (Applications and schedules for students declaring a major require program evaluation and approval.)

A student without a declared major who subsequently seeks full, provisional, or restricted admission must apply to and be accepted by a graduate program and by the Graduate College for degree study. A new application, the application fee (unless the student attended Iowa State University as an undergraduate), and transcripts from all colleges attended are required.

For those students originally admitted to the Graduate College on a nondegree basis, no more than 9 semester hours of graduate credit earned under the nondegree option may be applied if the student later chooses to undertake a graduate degree program. The student’s program of study committee will recommend to the Graduate College which courses (if any) taken on a nondegree basis may be included in the degree program.

Graduate Admission of International Students
An applicant who is a graduate of a recognized foreign institution is subject to the same criteria for admission as a graduate from an institution in the United States and may be recommended for the same admission categories described above except that of the nondegree option. International applicants for nondegree status may be considered for admission at the discretion of the Graduate College dean. Application and admission deadlines for international students can be obtained from the publication Information for International Graduate Applicants.

International students are required to show evidence of financial support and to carry adequate health and accident insurance while in residence.

Graduate Record Examination. The Graduate Record Examination (GRE) is not a university-wide requirement for all applicants. However, many programs require or recommend submission of GRE scores; individual program statements appearing in the publication Graduate Admissions Bulletin should be consulted for this information.

English Requirement for Native Speakers
The English requirement for native speakers is fulfilled by taking a diagnostic English test in their first semester of enrollment at ISU, and following the course of action recommended by their graduate program. The requirement must be satisfied before a student can change from restricted or provisional admission to full admission status. Additionally, the requirement must be met before taking a preliminary oral examination (Ph.D. students) or a final oral examination.

English Requirements for Non-native Speakers
Applicants whose native language is not English and who have not earned a bachelor’s or master’s in a country where the only official language is English are required to submit Test of English as a Foreign Language (TOEFL) scores as part of their application for admission. A minimum score of at least 197 on the computer-based TOEFL test is required for admission to the Graduate College. International students may also submit IELTS (International English Language Testing System) scores in lieu of the TOEFL. The ISU Graduate College minimum is 6.0. Because some programs require a higher scores, applicants should check directly with the program to which they desire admission or see the bulletin Information for International Graduate Applicants for this information.

Graduate students whose native language is not English and who do not have an undergraduate degree from Iowa State University, must also take the English Placement Test at the beginning of their first semester of enrollment. This test is administered by the Department of English in lieu of the Graduate English Examination. Students who do not pass this examination must complete English 101D during their first year of study.

New teaching assistants whose native language is not English are evaluated for their ability to communicate effectively in English before their assistantship assignments are made. Tests of oral proficiency and teaching skills (SPEAK and TEACH) are given before the beginning of each semester. A prospective teaching assistant who does not pass is required to complete coursework in speaking and teaching skills and must be retested.

Graduate Appointments
Graduate assistantships, fellowships, and research grants have been established at Iowa State University to encourage graduate work and to promote research. Such appointments and research opportunities are available through the various departments of instruction and the research centers on campus.

Graduate assistantships, the most common form of graduate student support, are available in three categories: the research assistantship, the teaching assistantship, or the administrative assistantship. A half-time graduate assistantship (20 hours per week) permits the holder to enroll for a maximum of 12 semester credits. Recipients of these assistantships are assessed fees at full Iowa resident rates regardless of the number of credits for which they register. Students who are graduates of a regionally accredited college or university in the United States or of a recognized institution in another country whose requirements for the bachelor’s degree are substantially equivalent to those of Iowa State University, who graduated in the top half of their respective classes and who present the requisite undergraduate or graduate preparation, may apply for these appointments. Students registered on a restricted basis or those placed on academic probation are eligible for assistantship appointment only on a term by term basis. Students admitted without a declared major are not eligible for assistantship appointments. Further information may be obtained by writing to the appropriate graduate program.

The satisfactory completion of one appointment, plus satisfactory academic performance, will ordinarily make a student eligible for reappointment. After a period of three years of full time study for the master’s degree or five years for the doctorate, the student will normally be continued on assistantship support (shorter periods may be stipulated by the student’s program or department).
Postdoctoral Study
Opportunities are provided for postdoctoral study through the extensive research programs of the university. Inquiries should be directed to the appropriate program, institute, or to the dean of the Graduate College.

Graduate Study by Staff Members
Any full-time member of the research, instructional, or extension staff at the rank of instructor, research associate, or assistant scientist may carry up to six course credits per semester and three credits per summer session, subject to the approval of the head of the program or section, and provided it does not interfere with other duties. This privilege may be extended to members of the research, instructional, or extension staffs at the rank of assistant professor with approval of the college dean and the Dean of the Graduate College. Staff members at the rank of professor or associate professor cannot become candidates for graduate degrees from ISU.

Registration
Graduate students are encouraged to register for courses on the ISU web site (www.iastate.edu) via AccessPlus. Students who are unable or who choose not to register through this system may use a walk-through registration procedure. Students who do not register by the published deadline for initiation of a schedule through the AccessPlus systems must use the walk-through procedure. For complete information on registration, see the ISU Schedule of Classes or the Registration Web site at www.iastate.edu/~Registrar/registration/.

Credit Limits
Registration is limited to a maximum of 15 credits per semester. Schedules for graduate assistants on one-half time appointments are limited to a maximum of 12 credits. For full-time staff members, the limit is 6 credits. Different credit limits apply during the summer session; see the Graduate College Handbook at www.grad-college.iastate.edu/deadline/publications.html for more details.

Interim Registration
Registration for special work between semesters and during certain vacation periods cannot exceed one credit for each week that the student is in residence. For more information, consult the Graduate College Handbook.

“In Absentia” Registration
Students completing research or thesis preparation may register in absentia; these credits do not apply toward residence campus requirements.

Off-campus Course Registration
Students who take off-campus courses taught by members of the graduate faculty must register for off-campus credit. Instructions for registering for off-campus credits courses are available from the ISU Extended and Continuing Education Office (102 Scheman, 515-294-6222, www.lifelearner.iastate.edu).

Continuous Registration
Even when Ph.D. graduate students have completed course work and residence requirements, they are required to register and pay tuition and fees, whether or not university facilities and equipment are used or staff is consulted—either in person or in absentia. After the preliminary oral examination is passed (with either full or conditional pass) and if university facilities, equipment, and staff time are used, the Ph.D. candidate must register for the appropriate number of credits in the major department or program and pay the appropriate graduate tuition and fees. After the preliminary oral examination is passed (with either full or conditional pass) and if university facilities, equipment, and staff time are not used, the Ph.D. candidate must register for Gr St 680 (Continuous Registration) and pay the Continuous Registration fee. The Ph.D. candidate must be aware that registration for Gr St 680 is allowed only after the Ph.D. candidate passes the preliminary oral examination; is required only in the fall and spring semesters, and not during the summer term; is not allowed after the completion of the final oral examination; and is not sufficient registration for the term the preliminary or final oral examination is taken; and does not defer student loans. If students take the final examination during the interim between terms (including the first day of classes), registration can be for the term either before or after the examination is held.

Auditing
Audit registration means taking courses without receiving formal credit. Beginning Fall 2001, a new audit policy was instituted at Iowa State University. Its provisions are as follows: Instructors must approve ALL audits; students must register for audits by day 10 of the semester; students are assessed tuition and fees as though they were taking the course for credit; and the course DOES NOT count in determining full-time student status. Audited courses do not appear on the student’s permanent record unless the “Request for Audit(s) to Appear on Transcript” form is completed and signed by the student, course instructor, and major professor. Copies of this form, which are available from the Graduate College or from the Graduate College’s web site at www.grad-college.iastate.edu/deadlines/forms.html, must be filed with the Graduate College, 10 Pearson Hall. After the fifth class day, if a student changes a regular course to an audit, that course will appear on the student’s permanent record as a drop. Audits are not acceptable as registration for loan deferments.

Graduate Courses Taken by Undergraduates
Certain graduate level courses listed in the ISU General Catalog may be used in the program of study even though they were taken for graduate credit by the student as an undergraduate at ISU. The following conditions must be met: the POS committee can request approval from the Dean of the Graduate College that up to nine hours of such credit to be applied toward meeting advanced degree requirements (these courses must be clearly marked on the POS); credits earned in these courses must be in addition to those used to meet requirements for the bachelor’s degree and must have grades of B or better; the student must be classified as an undergraduate and not a special student (credits taken as a special student are not allowed); a letter of certification must be obtained from the Graduation Office (10A Alumni Hall) indicating that the courses were not taken as a special student and were not used toward fulfillment of the undergraduate degree program. This letter must be submitted with the POS form.

Admission of Undergraduates to Concurrent Graduate Degree Programs
Programs in ten departments (Accounting, Agricultural and Biosystems Engineering, Animal Science, Biochemistry and Biophysics, Civil, Construction and Environmental Engineering, Electrical and Computer Engineering, Food Science and Human Nutrition, Materials Science and Engineering, Psychology, and Zoology and Genetics) provide opportunities for well qualified ISU juniors and seniors majoring in those curricula to apply for admission to programs leading to both an M.S. and a B.S. awarded at the end of a fifth year of study. Students interested in a research career may apply for graduate research assistantships during their fourth and fifth years of study. Students should contact the above departments about applying to these programs early in their undergraduate careers. Undergraduate students seeking admission to concurrent graduate degree programs in fields other than the ten above must submit a written proposal for an individualized program, co-signed by their advisers, to the Graduate College for review and approval. The graduate degree will only be awarded at the same time as, or after, the undergraduate degree is conferred. For more information about transferring credits, consult the Graduate College Handbook.

Veterinary Medicine Students in Concurrent Graduate Degree Programs
Students may be concurrently enrolled in the professional curriculum leading to the D.V.M. degree and in a graduate program leading to the M.S. or Ph.D. degree after completion of 128 semester credits. The graduate program may be in the College of Veterinary Medicine or in another college.
Interested students must complete a graduate application, complete a “Concurrent Enrollment Request” form available in the Graduate College office or on the web site at www.grad-college.iastate.edu/deadline/formss.html, submit both forms with appropriate transcripts and letters of recommendation to the Office of Admissions (100 Alumni Hall). (Copies of the forms may be obtained from the Office of Admissions.) State on the application that the application is for a concurrent degree program. Signed approvals on the Graduate Admissions Evaluation form are required from the graduate program, the Dean of the College of Veterinary Medicine, and the Dean of the Graduate College. On admittance, the student receives an admission notification from the Office of Admissions. For more information see the Graduate College Handbook.

**Graduate Students in Concurrent Undergraduate Programs**

Graduate students interested in enrolling in a concurrent undergraduate program should contact the Office of Admissions (100 Alumni Hall) to obtain admission information (even if the student has been previously admitted as an undergraduate). A “Concurrent Enrollment Request” form should be obtained from the Office of Admissions or on the Graduate College Web site at www.grad-college.iastate.edu/deadline/formss.html and circulated for the appropriate approvals. The student must be formally admitted both as a graduate student and as an undergraduate student. Official enrollment and fee payment will be as a graduate student. Credits transferred from the graduate permanent record to the undergraduate permanent record are no longer available for use on a graduate program of study.

**Courses Taken as a Special Student**

A person classified as a “special student” is considered an undergraduate and may not use courses taken under that status in a graduate degree program. A student who has received the baccalaureate degree must register as a graduate student if he/she is to receive graduate credit for courses.

**Grading**

Grades are the permanent official record of a student’s academic performance. Iowa State uses A through F grading for most courses. S, P, and NP grades are given in some courses. The standard four-point scale is used to calculate a grade point average.

**Grade Point Average (GPA)**

All courses (even if they are undergraduate courses) taken as a graduate student will be calculated into the graduate GPA. The GPA is determined by dividing the number of grade points earned by the total number of ISU cumulative hours. The grade given when an incomplete (I) is resolved is figured into the cumulative grade point average, but not into a particular semester’s average. Marks of I, S, P, NP, T, and X are not counted in the grade point average; a mark of F (even if taken S/F) is counted in the grade point average. Creative Component/Research (599 and 699) credits are not used in the calculation of the GPA. In the case of repeated courses, only the grade achieved the last time the course is taken is used in computing the grade point average. (However, grades in courses that are noted as repeatable courses in the catalog, such as certain repeatable seminars, will all be used in calculating the grade point average.)

**Grading Research and Creative Component Credits**

Creative Component/Research credits may be calculated as A, B, C, D, I, S, or F. Plus and minus grades are optional. These credits are not calculated in a student’s GPA.

**Pass (P)/Not Pass (NP) Course Credit**

Pass (P)/Not Pass (NP) courses are those that a student, with the approval of the major professor, may take for personal enrichment, but not for satisfying prerequisites or deficiencies in the undergraduate background. P/NP marks may not be used in a POS, nor do P/NP marks contribute to the student’s GPA. Full credit for P/NP courses is used in calculating tuition assessment and credit load limitations. For more information, see the Graduate College Handbook.

**Satisfactory/Fail (S/F) Grading**

S/F grading is not the same as P/NP grading. S/F grading is by instructor option; all students in a particular course receive S/F grading. P/NP grading generally is a student option. A P mark is equivalent to at least a D- grade whereas an S mark is equivalent to at least a B grade at the graduate level. No special registration procedures are required for S/F grading. An S mark in a course taken S/F is not counted in the grade point average, but an F mark in a course taken S/F is counted in the grade point average and is equivalent to an F in a regularly graded (A-F) course. No more than 20 percent of the total credits (excluding creative component, thesis or dissertation research) in the program of study may be earned on an S/F basis.

S/F grading may be used only for approved courses offered as seminars, symposia, workshops, special topics, and research. Programs must submit requests for S/F grading to the Dean of the Graduate College. The Graduate College Curriculum and Catalog Committee reviews and approves or rejects all S/F courses.

**Grievances about Grades**

A graduate student who feels that a course grade has been unjustly assigned, and whose attempts to resolve the matter with the instructor have failed, may appeal through the grievance procedures described in the Graduate College Handbook.

**Probation**

If a graduate student does not maintain a cumulative 3.0 grade point average on all course work taken, exclusive of research credit, he or she may be placed on academic probation by the Dean of the Graduate College. Grades earned by graduate students in undergraduate courses are included in the calculation of the grade point average.

**Academic Probation**

Academic probation judgments are made on the basis of grades in course work only. While on academic probation a student will not be admitted to candidacy for a degree and if appointed to a graduate assistantship, the student will not receive a Graduate College tuition scholarship. If a student is to qualify for a tuition scholarship, he/she must be removed from probation by the end of the first full month of the term.

To insure that registration does not take place without a review by the program, the Graduate College places a hold on future registrations by a student on probation. Before the student registers for each term, the program must review his or her record and recommend in writing if the Graduate College should permit further registration. Before graduation is approved, the student must complete all courses listed on the program of study with a minimum grade of C and have achieved a 3.0 GPA or greater.

**Master’s Degrees**

General requirements for all master’s degrees are as follows:

**General Requirements**

**Appointment of the Student’s Program of Study (POS) Committee.** Faculty in a major field have the responsibility for establishing specific course requirements and research requirements appropriate to the master’s programs in the major. These requirements may place additional responsibilities on the student, the major professor, or the student’s POS committee beyond those listed in this bulletin or the Graduate College Handbook as deemed appropriate to the goals of the major program.

New graduate students at ISU may be assigned a temporary academic adviser by the major program in the first semester of the student’s residence. This faculty member serves as a co-major professor and jointly accepts responsibility for the direction of a student’s master’s research as a co-major professor. If a member of the graduate faculty serves as a co-major professor and jointly accepts responsibility for the direction of a program of study, for more information on duties and makeup of the committee as well as changes to the committee makeup, see the Graduate College Handbook.

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Program of Study. The student and major professor develop the program of study with the consultation and approval of the POS committee. This agreement between the student and the Graduate College should be submitted as early as possible for approval. It is recommended that the committee be formed and the POS form submitted as early as the second semester of graduate study. In no case can the committee be formed later than the term before the final oral examination.

Residence. There is no on-campus residence requirement for the master’s degree.

Credits. Unless otherwise noted, all credits of acceptable graduate work must be completed in all master’s programs. At least 22 graduate credits must be earned from Iowa State University unless noted in the descriptions under “Specific Master’s Degrees” in this catalog.

Transfer Credits. At the discretion of the POS committee, and with the approval of the program and the Graduate College, graduate credits earned as a graduate student at another institution or through a distance education program offered by another institution may be transferred if the grade was B or better. Such courses must have been acceptable toward an advanced degree at that institution and must have been taught by individuals having graduate faculty status at the institution. If a student wishes to transfer credits from graduate courses taken at or through another university as an undergraduate student, it is the student’s responsibility to provide verification by letter from that institution that these graduate courses were not taken to satisfy undergraduate requirements for a degree.

A transcript must accompany the POS in order to transfer credits. The POS committee may ask for other materials, such as a course outline or accreditation of the institution, to evaluate the course. Transfer courses not completed when the POS is submitted must be completed before the term in which the student graduates. A transcript must then be submitted for review and final approval.

Research credits earned at another institution are generally not transferred. In rare circumstances, the transfer of S or P marks may be accepted for research credits only. It is the responsibility of the POS committee to obtain a letter from the responsible faculty member at the other institution stating that research credits recommended for transfer with S or P marks are considered to be worthy of a B grade or better. Audits may be listed on the program of study, but do not carry credit.

Major. A major is an approved area of study leading to a graduate degree. The exact number of credits in a major is not prescribed.

Minor. Students may request a minor in any program approved to grant a graduate degree and in programs approved to offer only a minor. A student may not minor and major in the same field. Requirements for declared minors are determined by the minor program and the faculty member representing the minor field on the student’s POS committee.

The minor subject area must be tested at the final oral examination and cannot be placed on the transcript after graduation unless it was approved on the program of study, listed on all examination reports, and recorded on the “Application for Graduation” form (diploma slip). A minor cannot be added to a degree that has already been received.

Department/Program Change, Transferring from One Major/Program/Department to Another Students who have been admitted to a graduate program and to the Graduate College may request to transfer at a later date to another department or program. Because graduate students are admitted to particular programs, transfers require the approval of both the receiving program and the Graduate College.

Students seeking transfer to another program or department should first discuss their wishes with the new program DOGE (Director of Graduate Education) to determine requirements and interest by the new program. When a student receives a favorable preliminary response from the new program, he or she should fill out the student portion of the form entitled “Request to Transfer from One/Major/Program/Department to Another” and submit this form to his or her current DOGE. The current DOGE will fill out the Current Program Information adding any comments he or she believes the new program should consider and forward the form to the proposed new program. This form is available from the department, the Graduate College, or the Graduate College web page.

The receiving program will generally give the student the same consideration and employ the same admissions standards that are used for original applications for admission and will expect the same application materials (transcripts, letters of recommendation, test scores, etc). During the process, the new and old programs and the Graduate College are authorized and encouraged to seek and disclose information related to the student’s overall fitness for studies in the receiving program. Programs are authorized to inquire into the student’s prior conduct at the university, both with the prior department and with the Dean of Students.

Upon departmental action (acceptance or denial), the request to transfer form must be sent to the Graduate College for approval. All parties will receive a copy of the completed form from the Graduate College.

Students desiring to transfer from a degree-seeking status to a nondegree-seeking status need to fill out the “Request to Transfer from One Major/Program/Department to Nondegree” form and bring it to the Graduate College.

Students desiring to transfer from nondegree-seeking status to a degree-seeking status must be admitted by a program through the regular graduate admission process.

Curriculum Change from Active Graduate to Active Undergraduate Status Individuals who are in good standing in the Graduate College and who wish to transfer to an undergraduate curriculum must contact the graduate classification officer (10 Pearson Hall). The classification officer will consult with the student and determine the proper course of action.

Curriculum Change from Inactive Graduate to Active Undergraduate Status Individuals who were admitted to the Graduate College more than one year previous and who do not have active graduate status but who wish to change their status from inactive graduate to active undergraduate, must follow the same procedures required of reentering undergraduate students and must begin the process by filing a completed “Undergraduate Reentry” form with the Office of the Registrar. When considering reinstatement, the undergraduate college may consider the student’s overall fitness for continued studies including information about the student’s conduct, employment and education since the student’s last enrollment.

Individuals who do not have active graduate status and who first enrolled less than one year previous should first see the classification officer in the Graduate College.

Time Limits. It is expected that work for the master’s degree shall be completed within five years. In special circumstances the student’s POS committee may recommend that the Dean of the Graduate College extend these degree time limits. Cases in which the student leaves Iowa State during his or her graduate career and later returns are dealt with individually by the student’s POS committee and the Graduate College. The inclusion in the student’s program of study of course work that is beyond the time limits (“over-age” courses) must be justified by the POS committee in a statement accompanying the submission of the program of study.

Application for Graduation. Students planning to graduate must submit an “Application for Graduation” form (diploma slip) to the Graduate Office by the end of the first week of the semester (fall or spring) in which he/she expects to receive the degree, or by the last day of spring semester when wishing to graduate during summer.
Before submitting this form, a student must have submitted and had approved by the Graduate College a “Recommendation for Committee Appointment” form and a “Program of Study” form. Also the student must have been fully admitted to a program and have met the Graduate English requirement. Graduation may be delayed if the “Application for Graduation” form filing deadline is not met. If it becomes apparent that a student cannot graduate during the indicated term, he/she should call the Graduate College (515-294-4531) and cancel the previously submitted “Application for Graduation” form. The student must then file a new form for the next planned term of graduation.

The Thesis. A master’s thesis is a scholarly composition that demonstrates the ability of the author to do independent and creative work. A thesis is required in all fields in which a master’s degree is awarded, except where specific provision is made for a nonthesis degree program. A minimum of three research credits is required on every program of study for a thesis master’s degree.

Responsibility for writing and editing of the thesis rests with the student, under the supervision of the major professor, and not with the Thesis Office. The Graduate College does not permit joint authorship of theses. It is the responsibility of the major professor to supervise the preparation of preliminary and final drafts of the thesis to assure the highest level of quality when the student presents the thesis to the committee for final approval. Copies of the thesis must be submitted to the members of the POS committee at least two weeks before the final oral examination.

The Graduate College Thesis Manual, available free of charge from the Thesis Office (203 Beardshear Hall, 515-294-2666) or online at www.grad-college.iastate.edu/thesis/thesis.html, outlines the details of Graduate College requirements covering the preparation and submission of theses. Students are also encouraged to contact the Graduate College thesis specialist for a preliminary format check. After the final oral examination, two unbound, signed copies of the thesis must be submitted to the Thesis Office no later than the Final Submission deadline for the term of graduation. Some colleges, programs, and departments require the submission of additional copies of the thesis either to the Thesis Office or directly to the program (see the Graduate College Thesis Manual for a list of the units requiring submission of an additional copy to the Thesis Office). A thesis processing fee is charged during the term in which the student intends to graduate.

Creative Component. Every nonthesis student must present substantial evidence of individual accomplishment (e.g., a special report, capstone course, integrated field experience, annotated bibliography, research project, design, or other creative endeavor). A minimum of two credits of such independent work is required on every program of study for a nonthesis master’s degree. Some programs require more credits. (For more information, contact the individual program or consult the Specific Master’s Degrees section in this bulletin.) The element of creative independent study must be explicitly identified on the program of study. The format of the creative component is determined in cooperation with the POS committee. As with a thesis, a creative component should be submitted to the members of the POS committee two weeks before the final oral examination. However, no first submission or final submission of a creative component is turned in to the Thesis Office or Graduate College for review and approval.

Final Oral Examination. All master’s (except M.B.A. students) candidates must pass final oral examinations. The final oral examination must be held by the final examination deadline date for the semester in which the degree is granted. All coursework in the program of study must either be completed or in progress before the final examination can be scheduled. This examination is oral; it may also include a written component if specified by the student’s (POS) committee.

Graduate students must register for the equivalent of two credits, or for the R-credit course GR ST 600 (Examination Only) if no coursework is needed, during the semester in which the final examination is taken. Taking only an R-credit course where the fee is not equivalent to the 2-credit minimum charge is not acceptable for the term of the final oral examination. If the examination is taken during the interim between terms (including the first day of classes), registration can be for either the term before or the term after the examination is held.

The candidate is responsible for initiating the “Request for Final Oral Examination” form, which must be submitted to the Graduate College at least three weeks before the examination. This form can be obtained only from the student’s program or department. The entire POS committee must be convened for the final oral examination. For more information on the final oral examination, see the Graduate College Handbook.

Graduate Student Approval Slip for Graduation. Every candidate for an advanced degree is required to complete a “Graduate Student Approval Slip for Graduation” form. It is sent to the major professor or program to give to the student after the “Request for Final Examination” form is received and approved by the Graduate College. Signatures are required by the major program, the Thesis Office (for those completing a thesis), and the Graduate College. Final clearance of academic requirements will be made when current term grades have been submitted and evaluated by the Graduate College.

All incompletes from previous terms must be completed by the deadline for completion of the Graduate Student Approval Slip. An incomplete or non-report grade that a student receives for the term of graduation will result in removal from that term’s graduation list. The student will need to complete a new Application for Graduation and Graduate Student Approval Slip for the next term of graduation. If a conditional pass was recommended at the final oral examination, the major professor and the committee members, if so specified, must notify the Graduate College in writing no later than the due date for the Graduate Student Approval Slip for the term of graduation that the conditions have been met.

Specific Master’s Degrees

The number of credits in a major for a master’s degree will vary according to the degrees listed below. General credit requirements for all master’s degrees include: a minimum of 30 graduate credits is required for all master’s programs at ISU; at least 22 graduate credits must be earned at ISU unless noted in descriptions; any transfer of graduate credits from another institution must be recommended in the program of study by the POS committee; and graduate credit earned as a graduate student will be approved for transfer only if a B grade or better was earned. A transcript must accompany the POS form.

Master of Arts or Master of Science—Thesis

At least 30 credits of acceptable graduate work must be completed, not less than 22 of which must be earned from ISU. Students are expected to research and write a thesis that demonstrates independent and creative work. A minimum of 3 semester credits is required for thesis research.

Master of Arts or Master of Science—Nonthesis

In certain programs a nonthesis master’s degree program is offered. (For more information on requirements, contact the individual program or department.) This option requires the satisfactory completion of at least 30 graduate credit hours of acceptable work (not including research credit), not less than 22 credits of which must be earned from Iowa State University, and satisfactory completion of a comprehensive final oral examination. In addition, every nonthesis master’s program must present substantial evidence of individual accomplishment (e.g., a special report, capstone course, integrated field experience, annotated bibliography, or other creative endeavor). A minimum of two semester hours of such independent work (referred to as the creative component) is required on every program of study for a nonthesis master’s degree and is applied toward the credit-hour requirement. This element of creative independent study must be explicitly identified on the program of study. Detailed requirements may vary with fields. Reference should be made to the Courses and Programs section in this catalog.
Master of Accounting. The Department of Accounting offers a 32-credit Master of Accounting graduate degree. The program requires 15 credits of graduate accounting courses, at least 9 credits of non-accounting graduate electives, a communications course, an international course from an approved list, and a creative component. The degree is appropriate for any student wanting to pursue a variety of accounting careers. Additionally, the program is designed to help interested candidates meet the 150-hour education requirement for the CPA certification in Iowa.

Master of Agriculture. The major in professional agriculture is an off-campus, nonthesis program leading to the master of agriculture degree. It is available to students wishing to pursue graduate study in agriculture without taking formal coursework on campus. The program is considered to be a terminal master’s degree. Students are required to take a minimum of two courses in each of three disciplines and complete 28 semester credits of formal coursework and four credits of creative component experience, resulting in a total of 32 graduate credits of coursework. Courses are delivered via video-tapes, interactive video, world-wide web, on-and off-campus classes and workshops. Specific courses offered in the program and the location of the off-campus classes may be obtained from the departmental course listings, off-campus course catalog, or by contacting the Professional Agriculture Coordinator, 201 Curtiss Hall.

Master of Architecture. The Department of Architecture offers a two-part program leading to the master of architecture, a professional degree. The M. Arch (100) option is designed for individuals with an undergraduate degree other than architecture. Students explore a full range of architectural subjects through seminars, an intensive sequence of design studios, and thesis. One hundred credits are required, including 40 graduate credits. The M. Arch (60) option is for individuals with a preprofessional undergraduate major in architecture. Applicants are given advanced standing in the M. Arch (100) option based on a review of their academic record. Following the completion of the requisite professional courses the student is expected to develop an individualized course of study leading to the thesis. Sixty credits are required, including 30 graduate credits.

Master of Business Administration. The College of Business offers a 48 graduate credit-hour program leading to a nonthesis master of business administration degree. Students may select courses in the traditional business disciplines or choose areas of specialization in accounting, agribusiness, finance, human resource management, information systems, marketing, and sports management. Since no final oral examination is required, M.B.A. students must be registered for the equivalent of 2 credits the term of graduation or Gr St 601 (required registration) if no course work is required.

Master of Community and Regional Planning. The master of community and regional planning degree requires a minimum of 48 graduate semester credit hours. This degree is available as a thesis or nonthesis option.

Master of Education. For the master of education degree, a range of 30 to 40 graduate credits are required. The student demonstrates an ability to perform independent study through the completion of a creative component or a field-based activity.

Master of Engineering. The academic standards and the general level of attainment are the same for the master of engineering and master of science degrees. Master of engineering programs are offered to meet the needs for professionally oriented programs on campus and for off-campus professionally oriented programs at locations with adequate library and laboratory facilities. An appropriate number of credit hours in design, laboratory work, computation, or independent study is required as evidence of individual accomplishment. Of the minimum 30 graduate credits requirement, 22 credit hours must be earned at ISU.

Master of Family and Consumer Sciences. The College of Family and Consumer Sciences offers two nonthesis options leading to the degree master of family and consumer sciences. Both options are designed to enhance the skills of those holding the bachelor’s degree so that they may meet the requirements of their present jobs or progress in their careers. The comprehensive option can be followed on- or off-campus and requires 36 graduate credits covering a variety of family and consumer sciences subject matter. The specialization option requires 36 credits and is offered on-campus from the following departments and programs: Hotel, Restaurant, and Institution Management; Human Development and Family Studies; and Textiles and Clothing. Both options require a written and oral integrative final exam.

Master of Fine Arts. For this degree a minimum of 60 graduate credits is required, 61 for the MFA in Integrated Visual Arts, including the completion of a thesis-exhibition or a thesis.

Master of Landscape Architecture. The master of landscape architecture degree requires a minimum of 36 graduate credits and the satisfactory completion of a thesis or a creative component.

Master of Public Administration. This is a professional degree program designed to provide training necessary for an administrator in a public or quasi-public bureaucracy. The MPA degree requires 37 credit hours, which includes (a) 12 credit hours in Core Competency, (b) 12 credit hours in one of the Concentration areas, (c) 3-7 credit hours in Research Method, (d) Electives up to 7 credit hours, (e) 3 credit hours of Internship, and (f) 3 credit hours of Creative Component (a Capstone Project).

Master of School Mathematics. This degree is designed primarily for inservice secondary mathematics teachers. Its prescribed program of study requires 36 graduate credits, two of which come from the writing of an approved creative component, 15 from courses offered for graduate credit, and 13 from courses offered for nonmajor graduate credit. At least 22 credit hours must be earned at ISU.

Master’s Double Degree Programs
A double degree requires fulfillment of the requirements for two graduate majors for which two differently named master’s degrees and two diplomas are granted at the same time. For double degrees the final project (thesis or creative component) must integrate subject areas from both departments. One final oral examination must be held covering the combined thesis or creative component. Students planning to pursue double degrees must complete a double degree request form and submit it to the Dean of Graduate College for approval. Just one “Recommendation for Committee Appointment” form and one “Program of Study (POS)” form need to be submitted for the two degrees. However, two “Application for Graduation” forms, one for each degree, will need to be submitted. All forms should show clearly that the student is enrolled in a double-degree program.

Like other master’s programs, three graduate faculty members can constitute a POS committee; however, POS committees for double degrees must include co-major professors from each of the majors. Although specific degree programs may require more, the program of study must include at least 44 hours of non-overlapping credit (22 for each major) in the two degrees.

Six such combinations are currently available: (1) Master of Architecture/Master of Business Administration; (2) Master of Architecture/ Master of Community and Regional Planning; (3) Master of Community and Regional Planning/Master of Business Administration; (4) Master of Landscape Architecture/Master of Community and Regional Planning; (5) Master of Public Administration/Master of Community and Regional Planning; and (6) Master of Science in Statistics/Master of Business Administration. If a student outside one of the named areas is interested in an individually-developed double degree program, a written proposal for a double degree to serve those interests and needs must be submitted to the Dean of the Graduate College for review. Please see the Graduate College Handbook for more information.

Drake University Law School/Iowa State University Combined Degree
To provide training in the complementary fields of law, political science, and economics with a minimum amount of academic duplication, special arrangements for combined degree programs have been approved with the Drake University Law School. ISU and Drake offer a combined J.D.-M.A. in political science and J.D.-Ph.D. in economics. Drake Law School students are permitted to transfer the equivalent of nine semester credits of
specified law courses to ISU for nonmajor graduate credit. Because of the difference in grading systems, the Law School grades are transferred as passes, provided the student has achieved a grade of C or better in those courses at Drake for the political science program or a grade of B or better for the economics program.

Applicants for either of the combined programs must meet the regular entrance requirements of, and be admitted to, both the Drake Law School and the ISU Graduate College.

**Doctor of Philosophy**

**General Requirements**

The degree doctor of philosophy is strongly research oriented. The primary requirements for the degree are: (1) high attainment and proficiency of the candidate in his or her chosen field, (2) development of a dissertation which is a significant contribution to knowledge and which shows independent and creative thought and work, and (3) successful passing of detailed examinations over the field of the candidate's major work, with a satisfactory showing of preparation in related courses. General requirements for Ph.D. candidates are as follows:

**Appointment of the Student's Program of Study (POS) Committee.** The POS committee for a doctoral program consists of at least five members of the graduate faculty. It must include at least three members, including the major professor, from within the student’s major or program. The committee must include members from different majors or different departments so as to ensure diversity of perspectives. A term member of the graduate faculty may participate in the direction of a student’s dissertation research as a co-major professor if a member of the graduate faculty serves as a co-major professor and jointly accepts responsibility for direction of the dissertation.

**Changes to POS committee.** Recommendations for changes in the POS committee must have the approval of the student, major professor, DOGE, and all committee members involved in the change (committee members who are on Faculty Professional Development Assignments, retired, or resigned do not have to sign) before seeking approval of the Graduate College. A form to seek approval is available in program offices or on the web at www.grad-college.iastate.edu/deadline/formss.html. These changes must be approved by the Dean of the Graduate College before the preliminary or final oral examination is held. For more information on changes to the committee and to the Program of Study, see the Graduate College Handbook.

**Program of Study.** The student and the major professor develop the program of study with the consultation and approval of the POS committee. Early selection of a major professor, appointment of a POS committee, and development of a program of study are very important. It is recommended that the committee be formed as early as the second semester of graduate study. In no case can the committee be formed later than the term before the preliminary oral examination.

**Credits.** A minimum of 72 graduate credits must be earned for a Ph.D. degree. At least 36 graduate credits, including all dissertation research credits, must be earned at Iowa State University. At least 24 of these credits must be earned during two consecutive semesters or during a continuous period including two semesters and a summer session while in residence at the university. (This requirement does not apply to doctoral students who are employed more than half time at ISU). There is no specific university requirement regarding the number of credits to be taken inside or outside the major/program.

**Transfer Credits.** At the discretion of the POS committee, and with the approval of the program and the Graduate College, graduate credits earned as a graduate student at another institution or through a distance education program offered by another institution may be transferred if the grade was B or better. Such courses must have been acceptable toward an advanced degree at that institution and must have been taught by individuals having graduate faculty status at that institution. If a student wishes to transfer credits from graduate courses taken at or through another university as an undergraduate student, it is that student's responsibility to verify by letter from that institution that those graduate courses were not taken to satisfy undergraduate requirements for a degree.

A transcript must accompany the POS in order to transfer credits. The POS committee may ask for other materials, such as a course outline or accreditation of the institution, to evaluate the course. Transfer courses not completed when the POS is submitted must be completed before the term in which the student graduates. A transcript must then be submitted for review and final approval. Research credits earned at another institution are generally not transferred. In rare circumstances, the transfer of S or P marks may be accepted for research credits only. It is the responsibility of the POS committee to obtain a letter from the responsible faculty member at the other institution stating that research credits recommended for transfer with S or P marks are considered to be worthy of a B grade or better.

**Residence.** At least 24 semester credits must be earned during two consecutive semesters or during a continuous period including two semesters and a summer session. This requirement does not apply to doctoral students who are employed at least half-time by Iowa State University and government laboratories located in Ames. Of the 72 graduate credits required for a Ph.D. at least 36 credits, including all dissertation research credits, must be earned under the supervision of the student’s POS committee.
The following conditions should be met before the “Request for Preliminary Examination” form is submitted to the Graduate College: admitted to full admission status in a Ph.D. granting program, approved “Recommendation for Committee Appointment” form, approved POS form, English requirement met, not on probation, time limit not exceeded, qualifying examination (if required by program) passed, and registration for at least the equivalent of 2 credits, or for the R-credit course GR ST 600 (Examination Only) if no course work is needed, during the term in which the preliminary oral examination is taken. (Taking only an R-credit course where the fee is not equivalent to the 2-credit minimum charge is not acceptable for the term of the preliminary oral examination.)

A preliminary oral examination will not be scheduled for a student on provisional or restricted admission or on academic probation. Upon successful completion of the preliminary oral examination, the student is admitted to candidacy for the Ph.D. degree. If the graduate student fails all or part of the preliminary oral examination, he/she may be allowed to retake it. Six months must elapse between the first attempt and the next. The entire POS committee must be convened for the preliminary oral examination. The preliminary oral examination must be passed at least six months prior to the final oral examination. An exception to the rule is allowed if a request, signed by the entire POS committee, is approved by the Dean of the Graduate College.

Application for Graduation. Application for graduation should be made by the end of the first week of the semester (fall or spring) in which the student expects to receive the degree, or by the last day of the spring semester if graduation is planned during summer session. To apply for graduation, the student is required to submit to the Graduate College a signed “Application for Graduation” form, available in the program office or on the web at www.grad-college.iastate.edu/forms/forms.html. Before submitting this form, a student must have submitted and had approved by the Graduate College a “Recommendation for Committee Appointment” form and a “Program of Study” form. Also the student must have been fully admitted to a program and have met the Graduate English requirement. Graduation may be delayed if the “Application for Graduation” form filing deadline is not met. If it becomes apparent that a student cannot graduate during the indicated term, he/she should call the Graduate College (515-294-4531) and cancel the previously submitted “Application for Graduation” form. The student must then file a new form for the next planned term of graduation.

Dissertation. A doctoral dissertation must demonstrate conclusively the ability of the author to conceive, design, conduct, and interpret independent, original, and creative research. It must attempt to describe significant original contributions to the advancement of knowledge and must demonstrate the ability to organize, analyze, and interpret data. In most instances, a dissertation includes a statement of purpose, a review of pertinent literature, a presentation of methodology and results obtained, and a critical interpretation of conclusions in relation to the findings of others. When appropriate, it involves a defense of objectives, design, and analytical procedures. Dissertation research should be worthy of publication and should appear in appropriate professional journals or in book form.

Responsibility for writing and editing of the dissertation rests with the student, under the supervision of the major professor, and not with the Thesis Office. The Graduate College does not permit joint authorship of dissertations. It is the responsibility of the major professor to supervise the preparation of preliminary and final drafts of the dissertation, so as to assure the highest level of quality when the student presents the dissertation to the committee for final approval. Copies of the dissertation must be submitted to the POS committee at least two weeks before the final oral examination.

The Graduate College Thesis Manual, available free of charge from the Thesis Office (203 Beardshear Hall, 515-294-2666) or online at www.grad-college.iastate.edu/thesis/thesis.html, outlines the details of Graduate College requirements covering the preparation and submission of dissertations.

After the final oral examination, two unbound, signed copies of the dissertation must be submitted to the Thesis Office no later than the Final Submission deadline for the term of graduation. Some colleges, programs, and departments require the submission of additional copies of the dissertation either to the Thesis Office or directly to the program (see the Graduate College Thesis Manual for a list of the units requiring submission of an additional copy to the Thesis Office).

During the term of graduation, a fee for processing the dissertation is billed by the university accounting system.

Final Oral Examination. The Ph.D. final oral examination, conducted after the dissertation is finished, is oral and often limited to a defense of the dissertation. To receive the degree at the end of a given semester, the student must hold the final oral examination before the final oral examination deadline for the semester.
Graduate Majors

More information on each major can be found in the Courses and Programs section of this catalog under the department or program listed in parentheses after the degree information.

Accounting: M.Acc. (see Accounting)

Aerospace Engineering: M.Eng., M.S., Ph.D. (see Aerospace Engineering)

Agricultural Economics: M.S., Ph.D. (see Economics)

Agricultural Education: M.S., Ph.D. (see Agricultural Education and Studies)

Agricultural Engineering: M. Eng., M.S., Ph.D. (see Agricultural Engineering)

Agricultural History and Rural Studies: Ph.D. (see History)

Agricultural Meteorology: M.S., Ph.D. (see Agronomy)

Agronomy: M.S. (see Agronomy)

Analytical Chemistry: M.S., Ph.D. (see Chemistry)

Animal Breeding and Genetics: M.S., Ph.D. (see Animal Science)

Animal Ecology: M.S., Ph.D. (see Natural Resource Ecology and Management)

Animal Nutrition: M.S., Ph.D. (see Animal Science)

Animal Physiology: M.S., Ph.D. (see Animal Science)

Animal Science: M.S., Ph.D. (see Animal Science)

Anthropology: M.A. (see Anthropology)

Applied Mathematics: M.S., Ph.D. (see Mathematics)

Applied Physics: M.S., Ph.D. (see Physics and Astronomy)

Architectural Studies: M.S. (see Architecture)

Architecture: M. Arch., M. Arch./M.B.A., M. Arch./M.C.R.P. (see Architecture)

Art and Design: M.A. (see Art and Design)

Astrophysics: M.S., Ph.D. (see Physics and Astronomy)

Biochemistry: M.S., Ph.D. (see Biochemistry, Biophysics and Molecular Biology)

Bioinformatics and Computational Biology: M.S., Ph.D. (see Bioinformatics and Computational Biology)

Biomedical Engineering: M.S., Ph.D. (see Biomedical Engineering)

Biophysics: M.S., Ph.D. (see Biochemistry, Biophysics and Molecular Biology)

Biorenewable Resources and Technology: M.S., Ph.D. (see Biorenewable Resources and Technology)

Botany: M.S., Ph.D. (see Botany)

Business: M.S. (see Business Administration)


Chemical Engineering: M. Eng., M.S., Ph.D. (see Chemical Engineering)

Chemistry: M.S., Ph.D. (see Chemistry)

Civil Engineering: M.S., Ph.D. (see Civil Engineering)


Computer Engineering: M.S., Ph.D. (see Computer Engineering)

Computer Science: M.S., Ph.D. (see Computer Science)

Condensed Matter Physics: M.S., Ph.D. (see Physics and Astronomy)

Crop Production and Physiology: M.S., Ph.D (see Agronomy)

Earth Science: M.S., Ph. D. (see Geological and Atmospheric Sciences)

Ecology and Evolutionary Biology: M.S., Ph.D. (see Ecology and Evolutionary Biology)

Economics: M.S., Ph.D. (see Economics)

Education: M.Ed., M.Ed. Practitioner, M.S., Ph.D. (see Curriculum and Instruction, Educational Leadership and Policy Studies, and Health and Human Performance)

Electrical Engineering: M.S., Ph.D. (see Electrical and Computer Engineering)


English: M.A. (see English)

Entomology: M.S., Ph.D. (see Entomology)

Exercise and Sport Science: M.S. (see Health and Human Performance)

Family and Consumer Sciences: M.F.C.S. (see College of Family and Consumer Sciences)

Family and Consumer Sciences Education: M.Ed., M.S., Ph.D (see Family and Consumer Sciences Education and Studies)

Fisheries Biology: M.S., Ph. D. (see Natural Resource Ecology and Management)

Food Science and Technology: M.S., Ph.D. (see Food Science and Human Nutrition)

Foodservice and Lodging Management: M.S., Ph.D. (see Hotel, Restaurant, and Institution Management)

Forestry: M.S., Ph.D. (see Natural Resource Ecology and Management)

Genetics: M.S., Ph.D. (see Genetics)

Geology: M.S., Ph.D. (see Geological and Atmospheric Sciences)

Graphic Design: M.F.A. (see Art and Design)

Health and Human Performance: Ph.D. (see Health and Human Performance)

High Energy Physics: M.S., Ph.D. (see Physics and Astronomy)

History: M.A. (see History)

History of Technology and Science: M.A., Ph.D. (see History)

Horticulture: M.S., Ph.D. (see Horticulture)

Human Development and Family Studies: M.S., Ph.D. (see Human Development and Family Studies)

Immunobiology: M.S., Ph.D. (see Immunobiology)

Industrial Education and Technology: M.S., Ph.D. (see Industrial Education and Technology)

Industrial Engineering: M.S., Ph.D. (see Industrial Engineering)

Industrial Relations: M.S. (see Industrial Relations)

Information Assurance: M.S. (see Information Assurance)

Information Systems: M.S. (see Management Information Systems)

Inorganic Chemistry: M.S., Ph.D. (see Chemistry)

Integrated Visual Arts: M.F.A. (see Art and Design)

Interdisciplinary Graduate Studies: M.A., M.S (see Interdisciplinary Graduate Studies)
**Graduate Certificate Programs**

**Advanced Medical Nutrition Therapy Certificate** (see Food Science and Human Nutrition)

**Community College Leadership Certification** (see Educational Leadership and Policy Studies)

**Counselor Education Endorsement** (see Educational Leadership and Policy Studies)

**Dietetics Communication and Counseling Certificate** (see Food Science and Human Nutrition)

**Dietetics Management Certificate** (see Food Science and Human Nutrition)

**Electric Power Systems Engineering Certificate** (see Electrical Engineering)

**Family Financial Planning Certificate** (see Family Financial Planning)

**Information Assurance Certificate** (see Information Assurance)

**Principal Endorsement (Pre-LEAD)** (see Educational Leadership and Policy Studies)

**Superintendent Licensure** (see Educational Leadership and Policy Studies)

**Special Education Endorsement** (see Curriculum and Instruction)

**Public Management Certificate Public Management Major** (see Political Science)
Courses and Programs

Information About Courses

Course Numbers
The courses in each department are numbered from 1 to 699 according to the following groups:

1-99 Courses not carrying credit toward a degree (zero credit)
100-299 Courses primarily for freshman and sophomore students
300-499 Courses primarily for junior and senior students
500-599 Course primarily for graduate students but open to qualified undergraduates
600-699 Courses for graduate students

Credits and Contact Hours
The academic value of each course is stated in semester credits. Each credit is normally earned by attending one (50-minute) hour of lecture or recitation per week for the entire semester or by attending a laboratory or studio period of two or three hours per week. As a guideline, undergraduate students typically will be expected to spend two hours in preparation outside of class for each lecture or recitation hour. Additional outside work may be required for laboratory or studio classes.

Each course states the number of semester credits assigned to the course preceded in parentheses by the number of hours in class (contact hours) excepted of the student. The first of the two contact-hour numbers indicates the number of lecture or recitation class hours per week for the semester. The second is the number of laboratory or studio hours required per week. Laboratory and studio hours may include some time devoted to lectures and recitations. For example, Com S 103 is listed as (3-2) Cr 4. In that case, the course is 4 semester credits, 3 hours of lecture and 2 hours of laboratory each week.

The term Cr means that the student may earn credit in advance of the student and the instructor. The credit to be earned depends on the number of work hours expected of the student. In accordance with the policy that places some of the onus of teacher-student contact and outside work by the student involving at least three hours per week for the semester is required for each credit.

The term R means that the course is required in a certain curriculum or as a cognate to one or more other courses. It is also used for cooperative education courses and for some optional inspection trips, study tours, and professional development courses for which numerical credit is not granted. An R credit course does not carry numerical credit toward a student's degree but it does apply toward the degree. The R credit course is generally listed as an independent study program as a requirement for a specific curriculum/major that must be completed prior to graduation. R credit courses may be graded using the A-F grading scale or the satisfactory/unsatisfactory grading scale. All R credit courses are assigned a numerical value for purposes of enrollment certification. Requests by students to drop an R credit course will be processed as an administrative drop during period 2 and thus will not be counted against the student's drop limit and will not appear on the student's transcript (See Index Making Schedule Changes)

Semester of Offering
Within each course description may be found one or more of the following terms: Fall, Spring, Summer, or Autumn. The course under the course is offered. The abbreviation for alternate if there is sufficient demand course may be offered more frequently than announced. Insufficient demand or unforeseen staffing problems may result in the cancellation of announced offerings. Students are advised to refer to the Schedule of Classes or consult with departments for up-to-date course schedule information.

Course Prerequisites
A prerequisite indicates the specific academic background or general academic maturity considered necessary for the student to be ready to undertake the course. Prerequisites are usually stated in terms of specific courses but equivalent preparation is usually acceptable. An instructor may, however, direct a student whose background does not meet the stated prerequisite of its equivalent to drop the course. Conversely, an instructor may waive the prerequisite for a course for which he or she is responsible. Thus, permission of the instructor is understood to be an alternate to the stated prerequisites in all courses.

Cross-listed Courses
A course may be listed with its complete description in one department and without its description in another department. In both cases, the department with which the course is cross-listed is noted in parentheses. The full description appears with the department responsible for the course but credit for the course may also be obtained through the department in which it is cross-listed.

Co-listed Courses
A course including its complete description may be listed in two or more departments with the department or departments co-listing the course being noted in parentheses in each case. All departments in which the course is listed share responsibility for its offering and credit for it may be obtained through any of the departments in which it is listed.

Designators
For abbreviations for designating departments and programs See Index Designations

Special Course Fees
Courses for which special course fees are assessed are designated in the Schedule of Classes. Special course fees may be assessed for such extraordinary costs as materials fees (which may include consumable materials or equipment replacement) field trip expenses, developmental math fees, and campus fees. In some cases, special course fees amounts vary from term to term. Additional information on campus fees and the developmental math fee may be found in the fees and expenses section (See Index Fees)

Graduate Programs
Graduate Major
A major in the Graduate College is the area of academic professional concentration approved by the Board of Regents in which the student chooses to qualify for the award of a graduate degree.

Graduate Area of Specialization
Areas of specialization are indicated in the graduate statements of some departments. This is a subdivision of a major in which a strong graduate-level program is available. When approved by the Graduate College, such areas of specialization are shown parenthetically after the major on official records including transcripts and theses/dissertations.

Interdepartmental Programs
Interdepartmental programs are available at both graduate and undergraduate levels. An interdepartmental program is an administrative structure usually not functioning as a department. Ordinarily headed by a supervisory committee and offering a degree in
major(s) in that subject area. Interdepartmental programs have been officially approved and may offer courses.

Nonmajor Graduate Credit
All courses included on the Program of Study of a graduate student must be approved by the student program of study committee. Usually courses in the major are selected from 500- and 600-level major courses. Courses outside of the major can be selected from other 500- and 600-level courses and from 300- and 400-level courses which have been approved for nonmajor graduate credit. In the catalog, the approved 300- and 400-level courses are indicated by the words "Nonmajor graduate credit" in the course description.

Accounting
Richard B. Carter Chair of Department
Professors: Hira Smith
Professors (Emeritus): Brown Elvik, Handy
Associate Professors: Boullion Dills, Donal Jeffrey, Kurtzke, Ravenscroft, Swanson
Assistant Professors: Caplan, Clemm, Janwin, Oterado
Assistant Professors (Adjunct): Curtis
Instructors (Adjunct): Blanshan, Duffy, Mazzettii

Undergraduate Study
For undergraduate curriculum in business major in accounting, see College of Business Curricula.

The primary purpose of accounting is to provide relevant information to both internal users (managers) and external users such as investors, creditors, government, and the general public. Accounting is an integral part of the business environment and public organizations. Accountants therefore participate in planning, evaluating, and controlling the activities of the firm. Accounting is needed by external users in order to make investment decisions, to withhold credit, and in the case of governments, to collect revenue and gather statistical information. In order to provide useful information, accountants collect, analyze, synthesize, and report data in an understandable manner.

The instructional objective of the Accounting Program is to provide a well-rounded professional education in accounting. Such an education should provide the student with (1) a mastery of basic accounting concepts and principles; (2) the ability to think critically and creatively about accounting problems; (3) an ability to communicate effectively and work with others as a member of a team; (4) an awareness and sensitivity for dealing with ethical concerns.

The major in accounting is designed to give students a conceptual foundation as well as to provide a wide range of basic skills and analytical tools for use in reporting for both public and private concerns. Students who complete the accounting major are well prepared to accept positions in industry, government, and the public accounting profession. The requirements for the accounting major are met by successful completion of the following courses: Act 330, 384, 396, 397, 495, and 497. Completion of this course is required prior to Act 497. See the graduate study curriculum in accounting for the 150 hour requirement for CPA certification in Iowa.

In addition, it is highly recommended that an accounting major include Business Law II (Act 316). The CPA exam requires a candidate to be conversant in the CPA law and to be familiar with the specific requirements of the profession. The department also offers a minor for College of Business students with a different major. They are required to take 15 credits from a list of approved courses, of which 9 credits need to be stand alone CPA major courses. In addition to the 18 credit hours of accounting required for the accounting major candidates for the CPA exam must complete two additional accounting courses so that for the CPA exam a total of 24 hours beyond principles. Students may use the electives above or to take graduate level courses totaling the additional six hours. In order to be certified or licensed to practice in Iowa, students must complete 150 credit hours. Students should consider early on how they intend to meet these requirements. Options include the Master of Accounting or double majors Business Law II (Act 316) is also highly recommended please note this class does not count towards the aforementioned 24 hours required to sit for the CPA exam. For states outside Iowa be sure to check local rules as each state determines its own licensing requirements.

Graduate Study
The department offers a program for a graduate degree in accounting (M Acc). This is a 32-hour degree. The program requires 15 hours of graduate accounting courses at least 9 hours of noneconometric graduate electives, a communications course and an international course from an approved list and a 2-hour creative component. The M Acc is appropriate for any student wanting to pursue a variety of accounting careers. Additionally, the program is designed to help interested candidates meet the 150-hour education requirement for CPA certification in Iowa.

The department participates in two graduate degree programs, the M S in business and the MBA. The full- and part-time programs The M S degree in business is a 30-credit curriculum containing a thesis. The MBA program is a 48-credit curriculum. A comprehensive curriculum, Twenty-four of the 48-credit hours are core courses and the remaining 24 are graduate electives.

Within the MBA program, students may develop an area of specialization in accounting. This specialization requires that 12 of the 24 credit hours of the graduate electives be from accounting. Included in this 12-hour requirement is 4 hours of core credit required course Act 598. Enrollment in Act 598 is limited to those students with fifteen hours of undergraduate and/or graduate accounting courses or the permission of the instructor.

The specialization in accounting is designed to meet the 150-hour education requirement for CPA certification in Iowa.

Courses open for nonmajor graduate credit: 485, 495, and 497.

Courses Primarily for Undergraduate Students
Act 215 Legal Environment of Business (3 Cr 3 Cr) 3 FS SS. Prereq: Sophomore classification; General history, structure, and principles of law. The legal system: an approach of social control, good business practices and tools for change. The court system. Constitution, courts contracts administrative agencies and agency law.

Act 284 Financial Accounting (3 Cr 3 Cr) 3 FS SS. Introduction to the basic concepts and procedures of financial accounting from a user's perspective. This course examines the accounting cycle, business terminology, basic control procedures, and the preparation and evaluation of financial reports with an emphasis on financial analysis. Credit is given for Act 285.

Act 285 Managerial Accounting (3 Cr 3 FS SS. Prereq: Act 284. Preparation and use of internal managerial reports for decision making and performance evaluation.


Act 383 Intermediate Managerial Accounting (3 Cr 3 FS SS. Prereq: Act 285 or 286. Generation, communication and use of information to assist management with planning and control decision making in manufacturing and service organizations. Includes traditional and contemporary models of cost estimation, assignment, and control Responsibility accounting and nonrecurring decisions.

Developing written and oral communication skills as well as spreadsheet capabilities.


Act 387 Intermediate Accounting II (3-0) 3 FS Prereq: Act 386. Financial reporting and reporting practices for business enterprises. Generally accepted accounting principles (GAAP) relative to financial statements and the disclosure of current issues in financial accounting.

Act 485 Principles of Federal Income Tax (3-0) 3 FS Prereq: Act 285 or 508. An introduction to the fundamentals of income tax related to transactions by individuals, partnerships, and corporations. Includes taxation of capital gains and losses, real estate transactions, and gifts and estates.

Act 486 Governmental and Nonprofit Institutions Accounting (3-0) 3 FS Prereq: Act 386 or 385. Budgeting accounting and financial reporting practices for public and private nonprofit organizations. Includes financial accounting for entities and accounting for accounting for governmental accounting, as well as accounting for colleges and universities, public schools, health care facilities, voluntary health and welfare organizations, and other not for profit enterprises.

Act 490 Independent Study. Credit to 3 to 12 hours. Prerequisite: permission of instructor.

Act 495 Advanced Accounting Problems (Dual listed with Act 595). 3 Cr 3 Cr. Prereq: Act 386. Funds and capital budgeting, capital budgeting, and operations, financial reporting, financial analysis, and financial statement analysis. Introduction to financial accounting for personal use and for personal tax purposes.

Act 497 Introduction to Auditing (3-0) 3 FS Prereq: Act 384 and 385. The conceptual framework of auditing; professional ethics; external auditing concepts. Auditing methodology including risk analysis, internal control, procedures for gathering evidence and the role of statistical sampling in auditing.

Act 598 Graduate Accounting (2-0) 3 Prereq: Act 286, 285 or 286. The conceptual framework of financial accounting. The construction of financial information on the income and retained earnings statement statement of cash flows and balance sheet. The role of internal control, procedures for gathering evidence and the role of statistical sampling in auditing.

Courses Primarily for Undergraduate Students, open to qualified undergraduate students: Accounting: Survey of Accounting I and II. Managerial Accounting (3-0) 3 Cr. Prereq: Act 286, 285 or 286. The conceptual framework of financial accounting. Construction of financial information on the income and retained earnings statement statement of cash flows and balance sheet. The role of internal control, procedures for gathering evidence and the role of statistical sampling in auditing.

Act 581 Accounting for Decision Making (3-0) 3 Cr 3 FS Prereq: Act 285 or 286. The conceptual framework of financial accounting. Construction of financial information on the income and retained earnings statement statement of cash flows and balance sheet. The role of internal control, procedures for gathering evidence and the role of statistical sampling in auditing.

Act 583 Accounting for Strategic Management (3-0) 3 FS Prereq: Act 386 or 385. Focus on generation and analysis of accounting information for strategic purposes. Includes performance measurement decisions, balanced scorecard, alternative costing methods, capital budgeting, emphasis on communication and analysis of information.
Acct 584 Information Technology and Assurance (3-0) Cr 3 prerequisite: 364 or 508 or permission of the instructor. Focus on information technology controls, implementation, and assurance services. Relating to information technologies. Course requires travel to businesses for on-site evaluation and design.

Acct 585 Tax Implications of Business Decisions (3-0) Cr 3 prerequisite: 285. 6 credits in accounting or 508. The impact of federal tax legislation on the formation and operation and liquidation or reorganization of entities. Income tax planning for executives.

Acct 586 Advanced Federal Taxation (3-0) Cr 3 prerequisite: Advanced topics in Federal Taxation. An in-depth study of partnership, corporation investment and estate and gift tax. Tax administration and tax planning are covered. Strongly recommended for those who plan a career in public accounting or taxation.

Acct 590 Special Topics Cr 1 to 3 each term taken. FS prerequisite: Permission of instructor. For students wishing to do individual research in a particular area of accounting.

Acct 592 Financial Statement Analysis (3-0) Cr 3 prerequisite: 294 or 508. The presentation and analysis of financial statement information from the point of view of the primary users of such data: owners and creditors. Topics covered will include the financial reporting system; the primary financial statements; and effects of accounting method choice on reported financial data and firm valuation.

Acct 595 Advanced Accounting Problems (Dual listed with 495). (3-0) Cr 3 prerequisite: 397. Partnerships branch operations, accounting for partnerships, and affiliated companies. Consolidated financial statements, reporting for multinational operations.

Acct 596 International Accounting (3-0) Cr 3 prerequisite: 294 or 508. Accounting and reporting requirements and managerial issues faced by multinational corporations. The international environment of standard setting will be examined. Technical issues such as transfer-pricing, inflation accounting, and taxation will be discussed.

Acct 597 Advanced Auditing and Assurance Services (3-0) Cr 3 prerequisite: 497. A study of advanced auditing and assurance issues. Topics include risk analysis, internal control, fraud detection, analytical procedures, evaluating operational and strategic objectives and reporting and implementing audit findings.

Acct 598 Financial Accounting Theory and Contemporary Issues (3-0) Cr 3 prerequisite: 366 and 363 or 508. Theoretical discussion of the financial accounting and reporting environment. The usefulness of financial accounting information for decision making will be examined. Number of current financial accounting issues and the financial accounting standard setting process will be discussed and examined.

Acct 599 Creative Component Cr 2 prerequisite: Admission to the Master of Accounting Program. This course prepares students to complete their creative component project required in the Master of Accounting degree.

Aerospace Engineering (Administered by the Department of Aerospace Engineering)

Thomas J. Rudolph Chair of Department

Distinguished Professors: R. B. Thompson, Holger Inger Moenning, Person Raghunathan, Rudolph Schmer, Tannell, Tsi, Zachary

Professors (Adjunct) Hsu

Distinguished Professors (Emeritus) Thompson, Young

Professors (Emeritus) Akers Greer, Jensen, McConnell, Munson, Rizzo, Rogge, Rohach, Wilson

Associate Professors Davol Hallard, Hindman, Lu, Mann, Marts, Sarkar, Sherman, Sturges

Associate Professors (Adjunct) Biner Cox, Roberts, Fussler, Fatma, Severs, Trim Tovell, Yzel

Assistant Professors: Bovet, Arifin, Cheung, He, Jacobson, Zakar, Wick, Legler, Wolter

Undergraduate Study

For undergraduate curriculum in aerospace engineering leading to the degree of bachelor of science see College of Engineering Curriculum. This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The aerospace engineer is primarily concerned with the design analysis, testing, and overall operation of vehicles which operate in air, water, and space. The curriculum is designed to provide the student with an education in the fundamental principles of aerodynamics, flight dynamics, propulsion, structural mechanics, and fluid mechanics. These principles are applied to design control systems, environment modeling, and cost-effective design.

Aerospace engineering is an exciting field that offers a wide variety of opportunities for students interested in space exploration, aircraft design, or the development of advanced materials.

Graduate Study

The department offers courses for the degrees of master of engineering, master of science, and doctor of philosophy with majors in aerospace engineering and minor work. The major work program is usually completed in the first year. The student may consult with other departments for all graduate degrees. Only the major program is available in other departments for all graduate degrees. For all graduate degrees, it is possible to establish a co-major program with another graduate degree program in engineering.

The department offers a wide variety of courses in aerospace engineering. These courses are available in areas such as aerodynamics, flight mechanics, structural analysis, control systems, and fluid mechanics.

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Aer E 243L: Aerospace Engineering Laboratory I (0.5) Cr 0.5 F, FS (8 weeks) Prereq E 242. Reporting and analyzing data. Introduction to aerospace design. Students work in teams to design and build an experiment. Each team is responsible for the design of the experiment, data collection, analysis, and written report. Each team is responsible for the design of the experiment, data collection, analysis, and written report. Each team is responsible for the design of the experiment, data collection, analysis, and written report. Each team is responsible for the design of the experiment, data collection, analysis, and written report.

Aer E 245: Scientific Balloon Engineering and Operations (Same as Mee 265) I (0.5) I(0-2) Cr 0.25 each time taken. F. Engineering aspects of scientific balloon flights. Integration of science mission objectives with engineering and ground support. Certification FAA and FCC regulations, communications and command systems. Flight path prediction and control.

Aer E 291: Aerospace Seminar (1-0) Cr 1 F. Professional skills development activities. Designed to encourage involvement in a variety of aerospace engineering activities and related professional activities. Academic program planning, departmental symposium participation.

Aer E 292: Aerospace Seminar (1-0) Cr 1 R. S. Professional skills development activities. Designed to encourage involvement in a variety of aerospace engineering activities and related professional activities. Academic program planning, departmental symposium participation.

Aer E 296: Cooperative Education Cr 1 F, SS Prereq Permission. First professional work period in the cooperative education program. Students must register for this course prior to commencing work.

Aer E 301: Flight Experience Cr 1 F, Prereq Credit or enrollment in 95. Two hours of flight training and necessary ground instruction. Credit will be approved by the Aerospace Engineering Department. Six hours of flight training certified in a pilot log book. The course is designed to be a practical training experience in the use of aircraft. The course is designed to be a practical training experience in the use of aircraft. The course is designed to be a practical training experience in the use of aircraft. The course is designed to be a practical training experience in the use of aircraft.


Aer E 311L: Gas Dynamics Laboratory (3.0) Cr 1 D S, 0 D 5 S 8 (weeks) Prereq 243 243L, enrollment in 311. Introduction to experimental compressible flow and propulsion principles and techniques and the use of laboratory systems for data collection. Report writing.

Aer E 321: Flight Structures Analysis and Laboratory (2.5-5.0) Cr 3 F, Prereq E 242 Credits. Credit or enrollment in 242. Mat 272 3 hours of lecture weekly plus recitation and laboratory alternating weeks. Determination of flight loads. Materials of selection for flight applications. Analysis of flight structures including trusses beams frames and shear panels employing classical and finite element methods. Design and analysis of flight structures.


Aer E 343: Aerospace Engineering II (3.0) Cr 3 S, Prereq Credit or enrollment in 311 and enrollment in 343L. Incompressible subsonic transonic supersonic hypersonic flow over airfoils and wings. Viscous flow theory. Laminar boundary layers. Transition and turbulent flow. Nonnormal graduate credit.

Aer E 343L: Aerospace Engineering Laboratory II (0.2) Cr 1 S. Prereq Enrollment in 343C. Advanced concepts in aerospace engineering and propulsion through laboratory experience. Experiments include model tests. Techniques in supersonic and hypersonic measurements. Report writing.


Aer E 361: Computational/Techniques for Aerospace Design (1.0) Cr 1 F, Prereq 243 Math 267 M 345. Advanced programming, systems environment, and development of computational tools for aerospace analysis and design. Nonnormal graduate credit.

Aer E 391: Aerospace Seminar (1.0) Cr 1 R. S. Professional skills development activities. Designed to encourage involvement in a variety of aerospace engineering activities and related professional activities. Academic program planning, departmental symposium participation.

Aer E 392: Aerospace Seminar (1.0) Cr 1 R. S. Professional skills development activities. Designed to encourage involvement in a variety of aerospace engineering activities and related professional activities. Academic program planning, departmental symposium participation.

Aer E 396: Summer Internship Cr 1 R S, Prereq Permission of department. Summer professional work period. Students must register for this course prior to commencing work.

Aer E 397: Engineering Internship Cr 1 F, SS Prereq Permission of department. Professional work period one semester maximum per academic year. Students must register for this course prior to commencing work.

Aer E 398: Cooperative Education Cr 1 SS Prereq 289 permission of department. Second professional work period in the cooperative education program. Students must register for this course prior to commencing work.

Aer E 411: Aircraft Propulsion I (3.0) Cr 3 F, Prereq 311 Momentum theorem, thrust and propulsion efficiency. Thermodynamics of compressible flow with heat addition. Components and principles of turbomachinery and gas turbines. Rocket engines and ramjet and scramjet propulsion engine design integration. Nonnormal graduate credit.


Aer E 421: Advanced Flight Structures (2.5-5.0) Cr 3 S, Prereq 265 Math 266 or 267 Analysis of indeterminate flight vehicles including the finite element laboratory. Static analysis of complex structural components subject to thermal and aerodynamic loads. Analytical and finite element methods. Statics and dynamics of plate, membrane, and shell structures. Buckling of beams, frames, and plate structures. Introduction to vibration of flight vehicles. Steady state and transient structural response using normal modal analysis. Nonnormal graduate credit.


Aer E 423: Composite Flight Structures (2.5) Cr 3 Prereq E 324 Mat 272 Failure testing and analysis of composite materials used in flight structures. Basic laminate theory of beams and plates and shells. Manufacturing and machining considerations of various types of composites. Testing of composites for material properties and damage. Student projects required. Nonnormal graduate credit.

Aer E 426: Design of Aerospace Structures (1-4) Cr 3. Multidisciplinary, design and analysis of aerospace vehicle structures. Material selection and design. Strength, durability, and damage tolerance. Static analysis and integration of aircraft configuration and design. Integration of control, flight control, and environment. Nonnormal graduate credit.


Aer E 442: V/STOL Aerodynamics and Performance (3.0) Cr 3 Prereq 355 Introduction to the aerodynamics, stability and control characteristics of V/STOL vehicles. Topics include hovercrafts, jet flaps, ducted fans, and thrust vectored engines. Nonnormal graduate credit.


Aer E 461: Modern Design Methodology with Aerospace Applications (1.0) Cr 3 SS Prereq 461 Fundamental principles used in engineering design of aircraft, missiles, and space systems. Preliminary design of aerospace vehicles.

Aer E 567 Digital Feedback Control Systems II (Same as E 576) Math 576 M 576 (3) Cr 3 3 Prereq 432 E 475 or E 411 or Math 414 or Math 419 and Math 267 Sampled data discrete data and the z transform Design of digital control systems using transform methods root locus frequency response and direct digital methods Design using space state methods Controllability observability pole placement state estimators Digital filters in control systems Microcomputer implementation of digital filters Finite word length effects Linear quadratic optimal control in digital control systems Simulation of digital control systems Aer E 577 Modern Control Systems I (Same as E 577) Math 577 M 577 (3) Cr 3 3 Prereq 331 or E 521 or M 414 or Math 415 and Math 307 State variable and input output descriptions of linear continuous time and discrete time systems Solution of linear dynamical equations Controllability and observability of linear dynamical systems Canonical descriptions of linear equations Inertial realizations of rational transfer function matrices Canonical form dynamical equations State feedback State estimators Decoupling by state feedback Design of feedback systems Stability of linear dynamical systems Aer E 578 Modern Control Systems II (Same as E 578) Math 578 M 578 (3) Cr 3 3 Prereq 577 Well posedness of nonlinear control systems Approximate analysis methods Pointwise perturbation methods and describing function method Lyapunov stability theory Absolute stability of feedback systems Input-output stability Large scale systems Aer E 579 Adaptive Control (Same as E 579) Math 579 M 579 (3) Cr 3 3 Prereq 577 Fundamentals of adaptive control terminology parameter identification basic adaptive controller design techniques analysis of stability parameter convergence and robustness Nonlinear adaptive control Applications examples Aer E 590 Special Topics (C 1 1 to 5 A Aerodynamic Gas Dynamics B Propulsion C Aerospace Structures D Flight Dynamics E Spacecraft Systems F Flight Control Systems G Aerelasticity H Viscous Aerodynamics I Design J Hypersonic K Computational Aerodynamics L Optimization M Non Destructive Evaluation N Wind Engineering Aer E 699 Creative Component (C 1 to 5 Courses for Graduate Students Aer E 619 Seminar (1) Cr 1 Aer E 631 Modern Flight Control Systems (3) Cr 3 3 Prereq 578 Applications of modern control theory to flight control Controller design based on optimal control techniques Nonlinear system theory applications Typical aerospace control methods such as intact following load alleviation and flutter suppression Recent advances in aerospace vehicle control Aer E 635 Optimization in Aerospace Engineering (1 3 Cr 3 3 Prereq 531 541 581 Applications of unconstrained and constrained parameter optimization dynamic programming and optimal control theory to problems in aerodynamics aerospace structures flight dynamics and control and aerospace design Special emphasis on numerical methods of optimization Aer E 656 Optimization in Aerospace Engineering II (3) Cr 3 3 Prereq 635 Applications of unconstrained and constrained parameter optimization dynamic programming and optimal control theory to problems in aerodynamics aerospace structures flight dynamics and control and aerospace design Special emphasis on numerical methods of optimization
Aer E 641 Hypersonic Gas Dynamics (3-0) Cr 3 Alt F offered 2004 Prereq 532 High Mach number flows Newtonian theory small disturbance theory constant density solutions thin shock layers blunt body problems hypersonic boundary layers and viscous interactions thermally and calorically imperfect gases vibrational relaxing and chemically reacting flows

Aer E 646 Computational Methods for Internal and Low Speed Flows (Same as M E 646) (3-0) Cr 3 Alt F offered 2004 Prereq 547 Emphasis is on algorithms suitable for low speed and internal flows at speeds up through transonic. Topics include pressure based schemes pseudo-compressibility methods use of preconditioning to develop algorithms suitable for all speed meshes large eddy simulations algorithms for structured grids and finite elements in fluids


Aer E 650 Fluid Mechanics Seminar (Same as M E 650) (1-0) Cr 1 each time taken F Prereq Permission of instructor. Special topics of current research interest to students and staff of departments concerned


Aer E 662 Viscous Flow Asymptotic Theory (3-0) Cr 3 Alt S offered 2004 Prereq 661 541 1st and 2nd order boundary layer theory. Coordinate expansions. Triple expansions. Compressible boundary layers. Two and three dimensional steady and unsteady flow separation. Internal and external flows. Wave packet propagation in unsteady flows

Aer E 690 Advanced Topics Cr 1 to 5

Aero and/or Gas Dynamics
B Propulsion
C Aerospace Structures
D Flight Dynamics
E Spacecraft Systems
F Flight Control Systems
G Aeronautics
H Viscous Aerodynamics
I Design
J Hyperbolic
K Computational Aerodynamics
L Non Destructive Evaluation
M Wind Engineering

Aer E 697 Engineering Internship Cr R Prereq Permission of DOGE (Director of Graduate Education) graduate classification. One semester and one summer maximum per academic year personal work period. Offered on a satisfactory fee grading basis only

Aer E 698 Research

African American Studies

www.rasate.edu/~catalog/catalogcourses/african.htm

(Interdisciplinary Undergraduate Program)

Program Committee D Anderson R Baum J H Blake S Dunlap K Hidkak D Rollins V Sheares G Tartakov T Teshome

Undergraduate Study

African American Studies is a cross disciplinary program in the College of Liberal Arts and Sciences. Students have the opportunity to explore African American contributions to American culture. Analysis of the African American experience—in history. Literature. Art. Religion and society—provides students with skills and perspective in a diverse society.

African American Studies at Iowa State University is an academic program. Most of the courses in the program satisfy general education requirements in the College of Liberal Arts and Sciences. The human relations requirement for teachers and the university's diversity requirement. At present students can minor or even design their own interdisciplinary Studies major with an emphasis in African American Studies.

A minor in African American Studies requires six courses in the program with a minimum of 18 credits including Introduction to African American Studies (Am 201) and Seminar in African American Culture (Am 460). The remaining credits must come from at least two departments: at least two courses taken at the junior level or above. Independent study and internship opportunities are available for credit, but do not count in the minimum requirements for the minor.

Graduate Study

Courses open for nonmajor graduate credit 334 347 348 349 350 450 475

Courses Primarily for Undergraduate Students

Am 201 Introduction to African American Studies (3 cr) 3 F S An interdisciplinary introduction to the study of African American culture. Includes history. The social sciences. Literature. Religion and the arts. As well as conceptual frameworks for investigation and analysis of the African American experience.

Am 252 African American Theatre Production (Same as Thre 252) See Theatre

Am 325 Peoples and Cultures of Africa (Same as Anth 325) See Anthropology

Am 330 Ethnic and Race Relations (Same as Soc 330) See Sociology

Am 333 African American Ethnology (Same as Anth 333) See Anthropology

Am 334 African American Religious Experience (Same as Relg 334) See Religious Studies Nonmajor graduate credit

Am 347 Survey of African American Literature (Same as Engl 347) See English Nonmajor graduate credit

Am 350 African American Women (Same as W 5 350) See Women's Studies Nonmajor graduate credit

Am 355 History of African Americans I (Same as Hist 355) See History

Am 354 History of African Americans II (Same as Hist 354) See History

Am 460 Seminar in African American Culture (3 cr) 3 S Intensive study of a selected topic in African American Studies in one or more disciplines. Selected readings. Various authors. movires era. or genes Primary and secondary source materials. Nonmajor graduate credit

Am 490 Independent Study Cr 1 to 3 each time taken maximum of 3 Prereq 6 credits in African American Studies and permission of instructor and of the chair of the African American Studies Program

Courses Offered by Other Departments

Engl 349 Selected Topics in Multicultural Literatures of the United States. See English. Available only when offered as a course in African American Literature. Nonmajor graduate credit

Relg 475 Seminar Issues in the Study of Religion. See Religious Studies. When content is appropriate may be taken as Relg 475. Nonmajor graduate credit

Agricultural Education and Studies

Robert A Martin. Chair of Department

University Professors Williams

Professors Ackley Carter Crawford Martin W Miller Trede

Professors (Emeritus) Gannon Gauker Hoerner Lawrence Parsons

Associate Professors Bogue Honeyman Jones G Miller

Associate Professors (Emeritus) Brunoe

Assistant Professors Grudens Schuck Morris Polito

Assistant Professors (Adjunct) Brown

Undergraduate Study

For undergraduate curricula in agricultural education and agricultural studies leading to the degree of bachelor of science see College of Agriculture Curricula.

The department offers two curricula for students desiring to enter careers in agriculture and related fields. These curricula are agricultural education and agricultural studies. The agricultural education curriculum prepares persons for careers as agricultural education instructors and educational specialists for industry and governmental agencies. The agricultural education curriculum has two options: classroom and extension certification and communications. The agricultural studies curriculum prepares persons for careers in production agriculture and agricultural industry.

Graduates of both curricula accept positions in agricultural business, industry agencies and production agriculture.

Graduates are able to communicate effectively. They have a broad base of agricultural knowledge. They have the ability to live and work in a global society and have an understanding of today's technical society. They are skilled in making decisions and have the ability to plan, organize, present, and evaluate information.

The department offers a minor in agricultural education which may be earned by completion of a minimum of 15 credits in agricultural education and studies courses with a minimum of two courses at the 400 level. Courses that can be taken for a minor are 211 310 311 315 402 412 or 414 414 450 490 496 and 499.

Visit our departmental website at www.agecs.iastate.edu.

Graduate Study

The department offers a minor for the degrees of master of science and doctor of philosophy with a major in agricultural education specialization in agricultural education. Opportunities for emphasis in international agricultural education and minor work to students majoring in other curricula. Graduate students who have earned a bachelor's degree in an agricultural discipline may plan a course of study that leads to teacher certification. Candidates pursuing the master of science degree may do so by completing either a thesis or nontext program of study.

Graduates have abilities in delivery systems learning theories and principles, formative and summative evaluation, philosophical models, qualitative and quantitative research, organizational leadership and policy development, assessing educational needs, organizing educational programs and developing international agricultural education programs.

The department administers the interdepartmental graduate program in professional agriculture designed for off-campus students pursuing a master of agriculture degree see Off Campus Credit Courses and Programs.
Courses Primarily for Graduate Students

AgEds 410 Orientation (1-0) Cr 0.5 F Orientation to the department
Agricultural Education
B Agriculture Studies
C General Agriculture

AgEds 411 Orientation for Agriculture Education Scholars (1-0) Cr 1 each time taken maximum of 2 credits F Prereq: Enroll as an agricultural excellence scholar The roles of professionals in agriculture academic preparation for assuming the role of a professional in agriculture and meeting the demands of the scholar's curriculum

AgEds 112 Agriculture Biotechnology Colloquium (1-0) Cr 1 S Prereq: Enrollment as an agricultural excellence scholar The scientific basis of biological and social sciences in agriculture

AgEds 211 Early Field Based Experience (1-0) Cr 1 each time taken maximum of 3 credits FS SS Prereq: 110 Five days on site in an agricultural setting observing competencies and issues in problem solving decision making initiative taking teamwork leadership written and oral communications critical thinking and creativity When students register it is their responsibility to make an appointment with the departmental coordinator (very early in the semester) to plan their experience
A High School Agriculture Program
B Extension
C Agricultural Industries and Agencies

AgEds 290 Special Problems in Agricultural Education and Studies Cr 1 each time taken maximum of 6 FS SS

AgEds 412 Internship in Agricultural Education and Studies 2 to 12 weeks Cr 2 to 6 each time taken maximum of 6 FS SS Prereq: 211 junior classification in AGEDS and permission of instructor A supervised learning experience in an approved learning setting with application to educational agricultural and/or environmental practices and principles Nonmajor graduate credit

AgEds 413 Developing Agricultural Education Programs in Non Formal Settings (2-0) Cr 2 S Prereq: 211 and permission of instructor Basic concepts in planning and evaluating procedures for data collection educational programs in non formal settings includes programming for youth and adults in Extension agricultural industry and related agencies Nonmajor graduate credit

AgEds 418 Pre Student Teaching Experience in Agricultural Education Cr 1 FS SS Prereq 211 402 and admission to teacher education program A one week field based experience in an approved secondary agricultural education program Concurrent enrollment in 417 is required Nonmajor graduate credit

AgEds 417 Supervised Teaching in Agricultural Education Programs Cr 12 FS SS Prereq 211 402 and admission to teacher education program Supervised teaching in public schools Nonmajor graduate credit

AgEds 450 Farm Management and Operation (1-6) Cr 3-6 FS SS Prereq Econ 136 Econ 330 junior classification Participation in the management and operation of a diversified farm class is responsible for the farm records and decisions for buying and selling the farm's livestock crops and equipment Special speakers on current topics May be taken for credit 3 times at different times of the year by permission of the instructor Nonmajor graduate credit

AgEds 480 Independent Study in Agricultural Education and Studies Cr 1 to 3 FS SS Prereq Junior or senior classification permission of instructor A maximum of 6 credits of 450 may be used toward graduation F Prereq: 211 required
A Philosophy Curriculum and Methods
B Leadership Evaluation and Administration
C Business Industry and Production Agriculture
D Extension and Interdisciplinary Agriculture
E Instructional Technology
F Environmental Issues
H Honors
I Communications

AgEds 498 Agricultural Travel Course Cr 1 to 3 each time taken FS SS Prereq: Permission of instructor Limited enrollment Extended field trips to study agriculture and education related topics Location and duration of trips will vary Pre trip sessions arranged Trip expenses paid by students Nonmajor graduate credit
A International
B Domestic

AgEds 499 Undergraduate Research Cr arr FS SS Prereq Permission of instructor advisor and departmental executive officer Research experience in agricultural education and studies with application to selected problems

Courses Primarily for Graduate Students, open to qualified undergraduate students

AgEds 501 Field Research in Agricultural Education Cr 1 each time taken FS SS Prereq Permission of instructor Specific problems issues and content areas in agricultural education On and off campus on arranged basis

AgEds 502 Project Planning Agriculture Education Programs (Dual listed with 401) (3-0) Cr 3 S Prereq 310 Responsibility of an agricultural education teacher curriculum development experiential learning opportunities including FFA and SAE and assessment and maintenance of program quality

Agricultural Education and Studies

AgEds 502 Methods of Teaching in Agricultural Sciences Agricribusiness (3-0) Cr 3 S Prereq 401 Topics include principles of teaching and learning individualized and group methods application of learning instructional management special populations and evaluation

AgEds 503 Methods of Teaching in Agricultural Science Agricribusiness (2-0) Cr 2 S Prereq 401 Topics include principles of teaching and learning individualized and group methods application of learning instructional management special populations and evaluation

AgEds 510 Introduction to Research in Agricultural Education (3-0) Cr 3 S Prereq Permission of instructor Determining your research focus developing research problems and objectives reviewing the literature and establishing a theoretical framework for analysis and analysis of ethical issues The primary outcome is the development of a thesis dissertation or creative component proposal

AgEds 511 Instructional and Organizational Issues for Beginning Teachers of Agricultural Programs Cr 1 to 2 each time taken May be taken no more than 2 times F Prereq Permission of instructor Planning and conducting agricultural programs in secondary schools

AgEds 512 Organizing Agricultural Information for Professional and Scientific Meetings (1-2) Cr 1 S Prereq Graduate classification in agriculture Concepts and practices in planning preparing and presenting materials used in professional meetings and scientific papers by which students may prepare material with special emphasis on computerized delivery methods

AgEds 520 Instructional Methods for Teaching in Agricultural Education (3-0) Cr 3 S Prereq: 310 or 417 F offered 2004 Prereq Permission of instructor Preparation of graduate students to become college or university instructors Addresses techniques for teaching and learning as they influence teaching activity psychological aspects of learning developing teaching plans laboratory teaching evaluating student learning evaluating students' examining personal teaching behaviors that influence learning and choosing appropriate teaching methods

AgEds 521 Leadership Development in Agricultural Education (3-0) Cr 3 S Prereq 2004 Prereq Permission of instructor Principles and practices of leadership and group dynamics Designing organizing implementing and evaluating leadership programs for developing exemplary leaders of agricultural teams and groups

AgEds 524 Program Development and Evaluation in Agricultural Extension (3-0) Cr 3-4 S offered 2004 Prereq Permission of instructor Theories and practice of program planning for extension agricultural education and other contexts for extension education Comprehensive overview of planning to address power and interests in program development needs assessment and evaluation

AgEds 530 Distance Teaching and Learning in Agriculture (3-0) Cr 3 S offered 2003 Prereq Permission of instructor Understanding distance learning in agriculture and then educational needs and preferences Technology options to enhance distance teaching Methods of teaching at a distance and administrative issues

AgEds 538 Adult and Post Secondary Education in Agriculture (3-0) Cr 3 S Prereq 2004 Prereq Permission of instructor Theory and practice of adult learning and the delivery of formal and non formal programming for agriculturally related audiences Why and how adults learn differently than children Leading instruction from the point of learners' first Reviews thinking whole brain concepts domains styles and levels of learning

AgEds 550 Role of Agricultural Education and Agricultural Extension in Technology Transfer (3-0) Cr 3 S offered 2003 Prereq Permission of instructor Process by which formal and informal extension and other agricultural education programs influence introduction and acceptance of agricultural technology including strategies for technology transfer
Agricultural Engineering
(Administered by the Department of Agricultural and Biosystems Engineering) 
Rameshwar Kanwar Chair of Department
University Professors: Baker Bern
Professors: Bundy Downing Hurburgh L Johnson Kanwar Melvin, Mira Xin
Professors (Adjunct): Quick
Professors (Collaborators): Colwin Laffan
Distinguished Professors (Emeritus): H Johnson
Professors (Emeritus): Beer Bekkum, Botheck Buhle Hazen Hoerner Hurl Keesey Lovely
Mangold Marley Meyer Pedersen Smith
Associate Professors: Barcelo Gaviante Greener Harmon Hoff Kaimanekelionkellon Schwab Tim
Assistant Professors: Birrell Brumm Freeman Power Schilling Richard Steward
Assistant Professors (Adjunct): Shahen
Assistant Professors (Collaborators): Malone
Assistant Professors (Emeritus): Boyd
Undergraduate Study
For the undergraduate curriculum in agricultural engineering, the student may select a degree program. The choice of a major discipline can be made in consultation with the student's academic advisor. The curriculum includes basic courses in calculus, physics, chemistry, and computer science. Students are required to complete a minimum of 24 credits in agricultural engineering. The curriculum is designed to provide a strong foundation in fundamental agricultural engineering principles, while also offering opportunities for specialization in areas such as crop production, soil and water management, and agricultural machinery and systems engineering. The program also includes a requirement for a senior project, which allows students to apply their knowledge to real-world problems. Graduates may pursue careers in research, development, and education, or they may choose to continue their education through graduate study.

Graduate Study
The graduate program offers two degree options: Master of Science and Doctor of Philosophy. The Master of Science degree is designed to provide advanced knowledge in agricultural engineering, with a focus on a specific area of interest. The Doctor of Philosophy degree is aimed at students who wish to pursue a career in research and teaching. The program includes coursework in advanced agricultural engineering topics, as well as opportunities for independent research. Students are required to complete a thesis or dissertation, which is a significant contribution to the field of agricultural engineering.
Courses Primarily for Undergraduate Students

A E 110 Experencing Agricultural and Biosystems Engineering (2-0) Cr 3 S Prereq Engr 160 Math 166 Computing solution of agricultural engineering problems by use of numerical techniques and mathematical models. Systems analysis and optimization applicable to agricultural and biological systems.

A E 210 Fundamentals of Agricultural and Biosystems Engineering (2-0) Cr 3 S Prereq Engr 110 Eng 110 Credit or enrollment in Math 267 Application of mathematics and engineering sciences to energy and mass balances in agricultural and biological systems. Emphasis is on solving engineering problems in the areas of air and water vapor systems, electrical engineering system evaluation, load of agricultural hydrologic systems, and bioprocessing.

A E 271 Engineering Applications of Parametric Solid Modeling (1-2) Cr 1-8 weeks FS Prereq Engr 170 or AST 215 or equivalent Creating editing organizing and documenting two dimensional and three dimensional geometries.

A E 272 Parametric Solid Models Drawings and Assemblies using PRO/ENGINEER (1-2) Cr 1-8 weeks FS Prereq Engr 170 or AST 215 or equivalent Application of the Pro/ENGINEER software to create 3D solid models of parts and assemblies. Utilizing the solid models to create design documentation standard drawing views dimensions and notes.

A E 298 Cooperative Education Cr 3 FS SS Prereq Permission of department coop coordinator First professional work period in the cooperative education program. Students must register for this course before enrolling.


A E 363 Agr Industrial Applications of Electric Power and Electronics (3-2) Cr 4 F Prereq Phys 222 Single phase and three phase circuit design Electrical safety Electric motors and controls Programmable logic controllers. Digital logic instrumentation and sensors. Nonmajor graduate credit.

A E 396 Summer Internship Cr R SS Prereq Permission of department internship coordinator Summer professional work period.

A E 397 Engineering Internship Cr R FS Prereq Permission of department internship coordinator One semester maximum per academic year professional work period.

A E 398 Cooperative Education Cr R FS SS Prereq 298 permission of department coop coordinator Semester long professional work period in the cooperative education program. Students must register for this course before enrolling.

A E 401 Senior Seminar (1-0) Cr 1 F Prereq Senior classification Preparation and presentation of papers on agricultural engineering subjects. Discussion of.


A E 451 Food Process Engineering (Dual listed with 551) (2-2) Cr 3 Alt. S offered 2004 Prereq Engr 201 E M 257 or M E 436 Application of momentum heat and mass transfer in food processing. Analysis of selected unit operations used in food processing. Exclusion dehydration thermal processing.

A E 465 Physical Properties of Biological Materials (Dual listed with 565) (2-2) Cr 3 Alt. F offered 2004 Prereq A E 116 Properties of agricultural and food materials needed in design application and evaluation of unit operations used in processing biological materials into finished products. Rheological thermal viscoelastic hygroscopic aerodynamic and mechanical properties.

A E 469 Grain Processing and Handling (Dual listed with 569) (2-2) Cr 3 Alt. S offered 2005 Prereq 216 Cereal grain and oilseed properties. Quality measurement processing and end use value. Design of drying systems using computer simulation. Corn wet and dry milling. Soybean oil extraction. Grain handling systems.

A E 472 Design of Environmental Modification Systems for Biological Products (Dual listed with 572) (4-4) Cr 4 S Prereq 216 E M 320 Principles and design of animal and grain environmental control systems. Insulation heat and mass transfer fans ventilation air distribution heating and cooling equipment. Dust control design.


A E 480 Engineering Quantification of Biological Processes (Dual listed with 580) (2-2) Cr 3 S Prereq 216 Math 266 Biol 109 or 201 or 202 M E 330 Prediction of biological systems behavior by computer simulation of mathematical models. Focus on mathematical representation of biological processes including population dynamics growth development diffusion bioenergetics enzyme kinetics. Flow diagrams for representing systems and constructing mathematical model equations. Finite difference techniques for continuous system simulation including examples of plant growth and soil water balances. Students enrolled in A E 580 will be required to answer an additional final exam question to report on two journal articles and to complete a comprehensive case project than students enrolled in A E 480.

A E 490 Independent Study Cr 1-0-4

B Biosystems Engineering

C Computer aided Design

E Environmental Systems

F Food Engineering

H Honors

P Power and Machinery

Q Structures

R Process Engineering
Agricultural Engineering

S Environmental and Natural Resources Systems U Waste Management
A E 498 Cooperative Education C R F SS Preq: 398 permission of department. Third and subsequent professors. 3 Credits 0 4 E 441 A 467. Method 267. Modeling dynamic systems with ordinary differential equations. Introduction to state variables methods of system analysis. Analysis of mechanical electrical and fluid power systems for agricultural equipment. Analytical and numerical solutions of differential equations and solutions. Introduction to classical controls theory Feedback and stability examined in the s domain. Frequency response as an analytical and experimental tool. MATLAB will be used throughout this course for modeling individual and/or group projects required for graduate credit.
A E 504 Instrumentation for Agricultural and Biosystems Engineering (Dual listed with 404) C 3 F Preq: 363 or 46 E 210 or E 441. Interfacing techniques for computer-based data acquisition and control systems. Basic interfacing components including A/D converter and D/A converter. Signal filtering, multiplexing, and process control. Sensors and theory of operation applied to practical monitoring and control problems. Individual and group projects required for graduate credit.
A E 505 GIS and Natural Resources Management (Dual listed with 405) C 2 1 F Preq: Working knowledge of computers and Windows environment. Introduction to fundamental concepts and applications of GIS in natural resources management with specific focus on watersheds. Topics include basic GIS technology, data structures, database management, spatial analysis, and visualization and display of natural resource data. Case studies in watershed and natural resource management using ArcView GIS. In addition to other assignments, graduate students will write an individual or a joint literature review on topics covered in class and develop enterprise applications.
A E 506 Watershed Modeling and GIS (Same as la LL 506) S ice Lakeside Laboratory
A E 541 Crop Harvesting Dynamics (Dual listed with 441) C 2 3 F Preq: Agron 101, 203. C 3 4 F Preq: Agron 203 and Math 268 or equivalent. Physical principles behind the harvesting of various types of crops, grains, and foods. Fuels, biomass, and fiber properties and fertilizers. Technological principles: practice performance analysis and design of engineered systems for harvesting crops with emphasis on cost and environmental impacts. Design of individual and/or group projects required for graduate credit.
A E 589 Technical Paper for Master's Degree (Elective) C 1 5 F 2005. A technical simulation including examples of plant growth and soil water balances. Students enrolled in a E 585 will be required to answer an additional final exam question to report two journal articles and to complete a more comprehensive class project than students enrolled in a E 480.
A E 596 Creative Component (Carnegie) C 1 5 F 2005. A technical simulation including examples of plant growth and soil water balances. Students enrolled in a E 585 will be required to answer an additional final exam question to report two journal articles and to complete a more comprehensive class project than students enrolled in a E 480.
Agricultural Systems Technology

(Administered by the Department of Agricultural and Biosystems Engineering)

Rameshwar Kanwar, Chair of Department

University Professors: Baker Bern

Professors: Bundy Downing, Hurburgh L Johnson, Kanwar Mevem Misra Xin

Professors (Adjunct): Quick

Professors (Collaborators): Colin Laffen

Distinguished Professors (Emeritus): H Johnson

Professors (Emeritus): Beer Bekkum Bockhord, Buchele Hizen Hoemi Hull, Keeney Lovely, Mangold Marrey Meyey Pederse, Sn Smth

Associate Professors: Batchelor Glaville Grener, Haiman Hoff, Lommon Hickson, Schwaeb T M

Assistant Professors: Buell Brumm Freeman, Powles Schilling Richard Steward

Assistant Professors (Adjunct): Zahan

Assistant Professors (Collaborators): Malone

Assistant Professors (Emeritus): Boyd

Undergraduate Study

The Department of Agricultural and Biosystems Engineering offers the bachelor of science degree with a major in agricultural systems technology (see College of Agriculture, Curricula.)

The curriculum prepares men and women for careers requiring integration and application of agricultural and mechanical technology, physical and biological sciences and business to manage human and natural resources, environmental systems and systems for producing processing and marketing food and other biomaterials worldwide. Graduates have the ability to apply science and technology to problems related to agriculture and manage complex agricultural systems for sustainability. They are able to communicate effectively, solve problems, and communicate environmental issues. Graduates have developed team building skills and computer proficiency.

Graduates find careers with agricultural machinery industries, environmental organizations, governmental agencies, farm builders, grain feed seed fertilizer and chemical companies, or in production agriculture.

The Department of Agricultural and Biosystems Engineering offers a minor in agricultural systems technology which may be earned by completing a minimum of 15 credits of agricultural systems technology courses which includes AST 115, AST 210, and at least two credits in 400 level courses. Students may select courses to provide emphasis in areas such as:

1. Machine technology
2. Livestock production systems
3. Soil and water resource management
4. Electrical systems
5. Grain operations
6. Environmental systems technology

For undergraduate curriculum in agricultural systems technology requiring the degree of bachelor of science, see College of Agriculture, Curricula.

Graduate Study

The Department of Agricultural and Biosystems Engineering offers courses for nonmajor graduate credit in agricultural systems technology for students taking graduate credit in agricultural systems technology for students taking major work in other departments and cooperates in the interdepartmental programs in professional agriculture and bioenvironmental, resource and technology. An minor in agricultural systems technology is offered.

Courses open for nonmajor graduate credit: 420 425 435 460 462 474 475 490 493 496

Courses Primarily for Undergraduate Students

AST 110 Experiencing Agricultural Systems Technology (3) Cr 1 F Prereq: AST majors only Laboratory-based team oriented experiences in a spectrum of topics covering the goals and objectives of agricultural systems technology. Report writing internships careers competencies industry visits

AST 115 Solving Technology Problems (2) Cr 2 F Prereq: Math 140 (can be taken concurrently) Solving technology problems and presenting solutions through technical reports. Graphing and curve fitting using MATLAB. Significance of data. Solutions of technology problems using Excel. Presentation of technical information using Word and PowerPoint

AST 120 Introduction to Renewable Resources (3) Cr 120 Env S 120 NREM 120 (3) Cr 3 F Prereq: Overview of soil water plants and animals as renewable natural resources in an ecosystems context. History and organization of resource management. Concepts of integrated resource management

AST 210 Fundamentals of Agricultural Systems Technology (3) Cr 3 F Prereq: Math 110 (can be taken concurrently) Introduction to problem solving related to fundamental agricultural technology systems such as: agricultural power and machinery, environmental and natural resources, structures, and animal environment.

Electrical systems

5 Grain operations

6 Environmental systems technology

For undergraduate curriculum in agricultural systems technology leading to the degree of bachelor of science, see College of Agriculture, Curricula.

Visit our departmental website at web ase.purdue.edu

AST 326 Conservation Surveying and Engineering (3) Cr 1 Fall Prereq Credit or enrollment in 324 Agricultural surveys for field area measurement and mapping. Handbook design of drainage systems and farm water control structures. Layout of conservation structures

AST 330 Agricultural Machinery and Power Management (2) Cr 3 Fall Prereq Math 210 Math 142 Selection of sizes and operational principles of tractors and machinery systems. Cost analysis and computer techniques applied to planning and management of agricultural machine systems. Principles of operation and selection of power sources

AST 333 Precision Farming Systems (2) Cr 3 F Prereq Math 140 or senior classification Geographic information systems and global positioning systems. Sampling strategies for precision farming. Building prescriptions and recommendation systems. Precision farming equipment software uses legal and social issues and economics

AST 335 Tractor Power (3) Cr 4 F Prereq: Math 142 Theory and construction of tractor engines. Mechanical power trains and hydraulic systems. Introduction to traction. Chassis mechanics and hydraulic power


AST 358 Small Power Equipment (2) Cr 2 F Prereq: Principles of operation. Adjustment and maintenance. Repair of small internal combustion engines and associated equipment


AST 362 Preservation of Grain Quality (2) Cr 2 F Prereq Math 140 Principles and management for grain quality preservation. Grain drying and grain storage. Frost control. Air and airflow. Grain handling methods and system planning. Grain quality measurement and end use value analyses


AST 397 Internship in Agricultural Systems Technology (2) Cr 3 F Prereq: Math 140 Sophomore classification in AS and approval of internship coordinator. A supervised work experience in an approved learning setting with application to agricultural systems practices and principles

AST 398 Cooperative Education in Agricultural Systems Technology (2) Cr 3 F Prereq: Math 140 Sophomore classification in AS and approval of cooperative coordinator. All cooperative education students must register for this course prior to commencing each work period

AST 324 Soil Water Conservation Management (2) Cr 2 F Prereq Math 142 Introduction to engineering principles applied to the planning of soil and water conservation systems. Water control structures. Water quality management. Drainage and irrigation systems. Soil and water resource development

AST 324 Agron 154 Technical economic and environmental aspects of the planning and management of farm field drainage and irrigation systems. Application of theory from engineering science and applied science to the solution of real world problems. Designed for major of agriculture program. Nonmajor graduate credit
Agricultural Systems Technology

AST 425 Impacts of Agriculture on Water Quality

AST 435 Agricultural Safety (1-3) Cr 2 F Prereq 151 Fundamentals of safety injury collection analysis and investigation risk assessment fault tree analysis and hazard communications applied to agricultural operations Exploration of noise indoor air quality chemicals machinery fire and confined space hazards identification and injury prevention interventions Nonmajor graduate credit

AST 460 Agricultural Electronics (1-3) Cr 2 Alt S offered 2004 Prereq 362 Electronics to sense monitor and control processes in power and machinery grain operations animal environment and natural resources Semiconductors digital logic circuits speed pulse pressure temperature and moisture sensors electrohydraulics programmable logic controllers Nonmajor graduate credit

AST 462 Post Harvest Grain Technology (2) Cr 0 Off campus offered as demand warrants Prereq 6 credits in agricultural or biological science 3 credits in math Grain drying and high moisture preservation methods in emphasis on corn Psychrometry Fans and airflow Grain handling methods and system planning corn milling soybean processing Designed for major of agriculture program Nonmajor graduate credit

AST 474 Livestock Housing Systems (2) Cr 2 Off campus offered as demand warrants Prereq 6 credits in agricultural or biological science 3 credits in math Properties of most air effects of environment on animal performance principles of environmental control feed handling systems manure management alternatives and planning total systems Designed for major of agriculture program Credit in only one of 373 or 474 may be used for graduation Nonmajor graduate credit

AST 475 Manure Management Systems for Livestock Production (3) Cr 3 Alt S offered 2004 (web-based course) Prereq 6 credits in agricultural or biological sciences Math 140 Livestock manure production properties collection transport storage treatment and utilization Regulations and environmental impacts Systems for nutrient management and odor abatement Practical design criteria and procedures for planning livestock manure handling systems Nonmajor graduate credit

AST 476 Planning Agricultural Structures and Farmstead Systems (2) Cr 3 S Prereq 373 Layout and organization of farmstead systems Planning farm shops machine sheds crop storage structures livestock production buildings and livestock management systems Analysis of building plans and calculating building costs Building materials including timber concrete and steel construction methods and structural analysis Nonmajor graduate credit

AST 490 Independent Study Cr 1 to 3 Prereq Junior or senior classification permission of instructor A maximum of 4 credits of 490 may be used toward the total of 129 credits required for graduation Nonmajor graduate credit A Animal Environment/ Air Quality C Computer Operations E Electrical/Electronics G Grain Operations H Honors I Safety and Human Factors K Bioprocessing L Livestock Production Systems M Mach-ince Systems N Energy S Soil and Water Resources T Structures/Buildings W Wasse Management

AST 493 Workshop in Agricultural Systems Technology Cr 1 Offered as demand warrants


AST 491 Seed Science Internship Experience Senior as Agron 491 Cr 1-2 May be repeated once FSS Prereq Agron 338 advanced approval and participation of employer and instructor A professional work experience and creative project for seed science secondary majors The project requires prior approval and participation of the employer and instructor The student must submit a written report

AST 496 Agricultural Systems Analysis and Planning (1-4) Cr 3 S Prereq 12 credits in AST and senior classification in agriculture Student teams prepare oral and written reports on term projects involving analysis and planning of systems for agriculture Team projects include problem solving solution evaluation cost analysis and use of computer decision aid and computer graphics to prepare plans and reports Nonmajor graduate credit

AST 498 Cooperative Education in Agricultural Systems Technology Cr R F S S Prereq Senior classification in AST and approval of cooperative coordinator All cooperative education students must register for this course prior to commencing each work period

Agronomy

Steven L. Fales, Chair of Department

Distinguished Professors Fehr

Professors Anderson Arntt Barnhart Bladkmer Campbell Canzio Crude Fales Fenton Gutowski Hartzler Horton Kilborn Lamkey Lee Liebman Luyachaf Miller Moore Mullen Owen Peterson Sanders Schabert Tabbara Takle Taylor Whigham

Professors (Collaborators) Hatfield Haynes Kailen Kaspar Palmer Shoemaker

Distinguished Professors (Emertitus) Bremner Frey Hallauer Pesek Russell Shaw

Professors (Emertitus) I Anderson M Anderson Atkins Bensus Carlson C Carlson George Green Hodges Imsande Kenney Larson Pearce Schaller Schaller A Scott Shibles Shreader Skrida Stintzel T Thompson T Thompson Troep Voith Wemml Weideman

Associate Professors Brunner Bassens Dewer Knopp Mallamo Manu T Peterson Salvador Sawyer M Thompson Wang Westgate Wiederhoft

Associate Professors (Collaborators) Cambardela Grant Kovar Laird Logsdon Moorison Olson Polia M Scott

Assistant Professors Al Kasi Bectraft Bhattacharya Delate Gibson Gogga Gu Hoelzinger Hammond Jannink Muerechta Polito Assistant Professors (Adjunct) Heuchel today

Assistant Professors (Collaborators) Gardner Guen Sauer Widdelhner

Instructors Zieglar

Undergraduate Study

For undergraduate curriculum in agronomy see College of Agriculture Curricula

The Department of Agronomy provides a curriculum for students interested in crop science soil science agricultural meteorology and environmental science. Students selecting agronomy as a major will elect an option in general agronomy environmental science or science.

Graduates have the theoretical and practical knowledge needed for efficient and sustainable production of food, feed and fiber. They have a broad understanding of the role and diversity of plants, soils and climates of the world. Graduates are skilled in communications, critical thinking, problem solving, and working effectively with others. They understand the ethical, cultural, and environmental dimensions of issues facing professionals in agriculture and natural resources.

An agronomy major prepares students for employment in agricultural business and industry agriculture service organizations crop production and soil management environmental and natural resource management farm management and governmental agencies. Graduates pursue careers in the seed, fertilizer and agricultural chemical industries as field agronomists, crop and soil management specialists, research technicians, sales and marketing specialists and production managers. State and federal agencies employ agronomists as extension specialists county extension directors, environmental and natural resource specialists, research associates, soil surveyors, soil conservationists, and in regulatory agencies as plant, food and grain inspectors.

Additional areas of work open to agronomists include integrated pest management, crop protection, wildlife, agricultural finance, turfgrass management, and the home lawn care industry.

The department offers a minor in Agronomy. Students are required to complete an approved minor program that includes Agron 114, 154, 212, 354 and 6 additional credits of which a minimum of 3 credits must be at the 300+ level. A minimum of 15 credits for the agronomy major and 9 credits for the agronomy minor must be earned at Iowa State University. Students work with an agronomy advisor to select courses in crops, soils, and meteorology that are appropriate to their career goals. A list of approved courses is available from an agronomy advisor.

Students can also design a strong basic science education in crop science, soil science, agricultural meteorology, or biotechnology to prepare themselves for science based jobs, graduate study or for research careers.

Graduate Study

The department offers the degrees master of science and doctor of philosophy with majors in agricultural meteorology, crop production and physiology with optional specializations in seed science and weed science, plant breeding and soil science with specialization in soil chemistry, soil fertility, soil management, soil microbiology and biochemistry, soil morphology and genesis or soil physics. Minor work is offered for students with majors in other departments. A.M.S. nonthesis option is available for students desiring a general degree program with additional coursework and a written thesis. Nonthesis option is not intended to prepare students for entering a Ph D program.

Students have a broad knowledge base germane to their area of study. They are trained to integrate and apply knowledge from several disciplines. Students develop skills in scientific reasoning, organization and logical presentation of ideas.

A master of science degree in agronomy designed for the continuing education of professional agronomists is offered by the department. The program is taught at a distance using computer-based instructional media. It is a nonthesis degree requiring completion of a written creative component.

The department cooperates in the interdepartmental program in professional agriculture.
majors in ecology and evolutionary biology, genetics, MCB (molecular cellular and developmental biology), plant physiology, sustainable agriculture, and water resources.

Prerequisite to major work in this department is completion of an undergraduate degree program with emphasis on agronomic, biological, and physical sciences. The foreign language requirement if any for the Ph.D. degree is established on an individual basis by the program of study committee appointed to guide the work of the student.

Courses open for non-major graduate credit: 306 334 342 351 351L 354 356 402 402I 404 406 411 434 437 455 459

Courses Primarily for Undergraduate Students

Agron 105 Leadership Experience Cr R F SS Staff. A participatory experience in activities or completion of a course that enhances the development of leadership and group-dynamic skills. See adviser for departmental requirements.

Agron 110 Professional Development in Agronomy Orientation. (1) Cr. F S Agronomy Orientation to college life; the profession of agronomy and the agronomy curriculum.

Agron 114 Principles of Agronomy. (2) Cr. 3 F Agronomy Principles of agronomy, including atmospheric measurements, radiation, stability, precipitation, winds, fronts, forecasting, and severe weather. Applied topics include global warming, ozone depletion, ENSO weather pattern, wildlife, and atmospheric optics. Self-study laboratory assignments utilize interactive computerized exercises, worksheets, and computerized real-time forecasting. Self-study section available to distant education students all semesters.


Agron 212 Grain and Forage Crops. (3) Cr. 4 FS Agronomy Grain production and management practices for common grain and forage crops common to Midwestern U.S. agriculture. Focus on growth, development, and plant characteristics, management practices, crop use, quality, and problem solving.

Agron 230 Crop Structure Function Relationships. (3) Cr. 3 FS Agronomy Crop structure function relationships -- basic crop characteristics, life history, and production of crop communities in relation to their environment.

Agron 260 Soils and Environmental Quality. (3) Cr. 3 FS Agronomy Soils and environmental quality and their influence on soil properties and environmental and sustainable aspects of crop production. Off campus version offered through internet by interactive computer coursework.

Agron 120 Introduction to Renewable Resources. (Same as AS&T 120, EWS 120, NREM 120) (3) Cr. F S Agronomy Introduction to renewable resources. Sustainable land, water, and materials management. History and organization of resource management. Concepts of integrated resource management.

Agron 154 Fundamentals of Soil Science. (2 to 4) Cr. 3 F Agronomy Fundamentals of soil science -- physical, chemical, and biological properties of soil and their classification and distribution. Use of soil survey and computer database information in balancing agronomic and environmental concerns in soil management.

Agron 155 Soils for Horticultural Scientists. (2 to 4) Cr. 3 F Agronomy Soils for horticultural scientists. Introduction to soil science, factors affecting soil fertility, and soil management for horticultural crops.

Agron 156 Soils for Urban Use. (2 to 4) Cr. 3 F Agronomy Soils for urban use. Introduction to soil science, factors affecting soil fertility, and soil management for urban and residential landscapes.

Agron 206 Introduction to Meteorology. (Same as Mteor 206) (3) Cr. F S Agronomy Meteorology. Basic concepts in meteorology, including atmospheric measurements, radiation, stability, precipitation, winds, fronts, forecasting, and severe weather. Applied topics include global warming, ozone depletion, ENSO weather pattern, wildlife, and atmospheric optics. Self-study laboratory assignments utilize interactive computerized exercises, worksheets, and computerized real-time forecasting. Self-study section available to distant education students all semesters.


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Agron 154 Fundamentals of Soil Science. (2 to 4) Cr. 3 F Agronomy Fundamentals of soil science -- physical, chemical, and biological properties of soil and their classification and distribution. Use of soil survey and computer database information in balancing agronomic and environmental concerns in soil management.

Agron 155 Soils for Horticultural Scientists. (2 to 4) Cr. 3 F Agronomy Soils for horticultural scientists. Introduction to soil science, factors affecting soil fertility, and soil management for horticultural crops.

Agron 156 Soils for Urban Use. (2 to 4) Cr. 3 F Agronomy Soils for urban use. Introduction to soil science, factors affecting soil fertility, and soil management for urban and residential landscapes.

Agron 206 Introduction to Meteorology. (Same as Mteor 206) (3) Cr. F S Agronomy Meteorology. Basic concepts in meteorology, including atmospheric measurements, radiation, stability, precipitation, winds, fronts, forecasting, and severe weather. Applied topics include global warming, ozone depletion, ENSO weather pattern, wildlife, and atmospheric optics. Self-study laboratory assignments utilize interactive computerized exercises, worksheets, and computerized real-time forecasting. Self-study section available to distant education students all semesters.
biological and physical factors control hydrology. Soil formation and nutrient transport. Laboratory emphasizes field investigation of watershed scale processes. Nonmajor graduate credit.

Agron 402I Watershed Hydrology and Surgical Processes (Same as IL 402I). Sea Lakeside Laboratory. Nonmajor graduate credit.

Agron 404 Global Change. (Same as EnSc 404) Env S 404 Mteor 404 (3) Cr 3 S Prereq Four courses in physical or biological sciences or engineering. Table. Recent changes in global biogeochemical cycles and climate models of future changes in climate systems. Impacts of global change on agriculture, water resources and human health. Ethical issues of global environmental change. Nonmajor graduate credit.

Agron 406 Climate of the Continents. (Same as Mteor 406) (2) Cr 2 F. Prereq Agron/Mteor 206. Ann: The major climate controls and how they affect the world and the Climate classification. Combining controls and classification to explain the pattern of climates of the different continents and the world. Semester project and in-class presentation required. Nonmajor graduate credit.


Agron 410 Professional Development in Agronomy. Senior Forum. [1-3] Cr 1 FS. Prereq Senior classification. Staff. Development of an appropriate content for professionalism. Topics include professional certification ethics and maintaining an active network of information sources and professional contacts, and lifelong learning. Student interpretation, presentations and discussions.

Agron 421 Introduction to Plant Breeding. (3-0) Cr 3 F Prereq 320 or Bot 301. Campbell Breeding methods used in the genetic improvement of self-pollinated cross-pollinated and sexually reproducing agronomic crops. Applications of molecular techniques and biotechnological advancements as breeding tools in the development of improved cultivars and transgenic plants. Nonmajor graduate credit.

Agron 434 Forage Utilization. (2-2) Cr 2 F Prereq 334. Bamhurt. Systems of forage utilization including grazing hay and silage. Nutritional chemistry of forage plants and the genetic environmental and post harvest factors that influence their use. Students enrolling for graduate credit will be expected to complete an additional class project. Nonmajor graduate credit.


Agron 450 Issues in Sustainable Agriculture. (Same as EnSc S 450) (2) Cr 2 F. Prereq Agron 302 or Env 302. Technical and organizational aspects of contemporary agricultural issues from an ecocological perspective. Comparative analysis of intended and actual consequences of development of industrial agricultural practices.

Agron 457 Agronomic Applications of Site Specific Management. (2-2) Cr 3 F Prereq 212 354 Stat 101 or 104 or 105. Staff. Introduction and exploration of agronomic applications of site specific management for improved resource management and environmental quality. Emphasis on developing a better understanding of the evolving technologies that are applicable to production agriculture and how these technologies can contribute to an improved environment.

Agron 459 Environmental Soil and Water Chemistry. (Dual listed with 559 same as EnSc 459) Env S 459 Alt 3 Cr 3 Alt F. Offered 2003 Prereq Agron 354 or EnSc 459. Chem 210 or 211 An introduction to the chemical properties of soils. Chemical reactions and transformations occurring in the soil and their impact on the environment. Topics include composition of soils and base cation buffers. Methods in mineral dissolution and precipitation. Speciation ion exchange. Redox reactions adsorption phenomena. Soil pollution and chemical equilibria computer programs.

Agron 460 Agroforestry Systems. (Dual listed with 580 same as For 460) See Forestry.

Agron 473 Soil Genes and Landscape Relationships. (Same as EnSc 473) (2) Cr 4 S Prereq 154 or 402. Sanders. Relationships between soil formation, geomorphology and environment. Soil description, classification, geography, mapping and interpretation for land use. Weekend field trips. Nonmajor graduate credit. Credit for only 473 or 473X may be applied for graduation not both. Nonmajor graduate credit.


Agron 490 Independent Study. Cr 1 to 3 each time taken 4 cr maximum allowed toward the total of 128 credits required for graduation. Prereq Senior classification. FS SS. Prereq Junior or senior classification with at least 8 credits in agronomy. Permission of instructor in specialty area after consultation. Selected studies in crops, soils or agricultural meteorology according to the needs and interests of the student.

Agron 491 Seed Science Internship Experience. (Same as AST 491 Hort 491) Cr 1 to 2. May be repeated once. FS SS. Prereq Internship approval and participation of employer and instructor. Staff. A professional work experience and creative project for seed science secondary majors. The project requires the prior approval and participation of the employer and instructor. The student must submit a written report.

Agron 492 Agronomic Issues. Senior classification. Staff. Objective investigation of current agricultural issues from multiple perspectives. Students will develop positions on or solutions to current agricultural issues by investigating the scientific technical, economic environmental and social ramifications of agriculture and policy.

Agron 493 Workshop in Agronomy. Cr each time taken maximum of 4 Prereq Permission of instructor. Staff. Topics in crops, soils or agricultural meteorology. Nonmajor graduate credit.

Agron 495 Agricultural Travel Course Preparation. (0) Cr R. May be repeated FS SS. Prereq Permission of instructor. Limited enrollment. Students enrolled in this course intend to register for Agron 496 the following term. Topics will include the agricultural industry climate change, economic geography, history, livestock marketing, soils and preparation for travel to locations to be varied.

Agron 496 Agricultural Travel Course. Cr each time taken Prereq Permission of instructor. Limited enrollment. Tour and study of production methods in major crop and livestock regions of the world. Influence of climate, soils, landscape markets and other factors on crop and livestock production. Location and duration of tours will vary. Five expenses paid by students. Check with department for current offerings.

Courses Primarily for Graduate Students, open to qualified undergraduate students

Agron 500 Orientation to Graduate Studies. (2-0) Cr 1 F. Prereq International agronomy graduate students only. Pesek and staff. An introduction to Iowa and U.S. agriculture for international students in agronomic majors. Field trips when possible. Departmental role in the functioning of the university. Teaching and extension in fulfilling the charge given the land-grant university. Offered on a satisfactory-fail grading basis only.

Agron 501 Crop Growth and Development. (2-0) Cr 2 F Prereq 114 Math 140 Chem 165 Biol 110 Muench. Westgate Physiological processes in crop growth development and yield. Photosynthesis respiration water relations mineral nutrition assimilation partitioning seedling vigor light interception and canopy growth root growth reproduction and yield. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 502 Chemistry and Biology of Soils. (2-0) Cr 2 F. Prereq 114 Math 140 Chem 165 and Math 140. Burzis. Soil chemical, physical and biological properties that control processes within the soil. Influence of soil chemical, biological and physical interactions and soil classification. Basic concepts in soil science and their applications. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 503 Climate and Crop Growth. (2-0) Cr 2 F. Prereq 114 Math 140. Taylor. Applied concepts in climate and agricultural meteorology with emphasis on the climate agriculture relationship and the microclimate agriculture interaction. Required course for the Master of Science in Agronomy degree program. Basic meteorological principles are also presented to support these applied concepts. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 504 Global Change. (Dual listed with 404 same as Mteor 504) See Geographical and Atmospheric Sciences. Meteorology.


Agron 507 Mesoscale Meteorology. (Dual listed with 407 same as Mteor 507) (0-0) Cr 3 S Prereq Math 166 and Mteor 454. Gallus. The physical nature and practical consequences of mesoscale atmospheric phenomena. Mesoscale convective systems. Fronts terrain forced circulations Observation.
Agronomy 133

2003-2005

analysis and prediction of mesoscale atmospheric structure. Semester project and in-class presentation required.


Agron 510 Crop Improvement (2-0) Cr 3. S. Prereq 114 Math 140 Chem 163 Biol 109 Campbell. Basic principles in the genetic improvement of crop plants. Methods of cultivar development in self-pollinated and cross-pollinated crop species. Required course for the Master of Science degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 512 Soil Plant Environment (2-0) Cr 2. S. Prereq 502. Recommended 501 Loyd. Soil properties and their impact on soil/plant relationships. Soil structure: aeration, moisture and nutrients will be discussed in the context of soil quality and environmental quality management. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 513 Quantitative Methods for Agronomy (2-0) Cr 2. S. Prereq 114 Math 140. Preregister 104 Haulenbeek. Quantitative methods for analyzing and interpreting agronomic information. Principles of experimental design; hypotheses testing, analysis of variance, regression, correlation and graphical representation of data. Use of spreadsheets for manipulating, analyzing, and presenting data. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.


Agron 521 Principles of Cultivar Development (3-0) Cr 3 F Prereq 421. Stat 401. Brummer Theoretical and practical analyses of alternative breeding methods to improve crop plants. Strategies to incorporate germplasm resources developing populations maximizing genetic gain and use marker-assisted selection. Relationship of breeding methods to commercial seed production.

Agron 522 Field Methods in Plant Breeding (3-0) Cr. 2 S. Prereq 521. Staff. Field experience in planning and conducting plant breeding research for cross-pollinated and self-pollinated crops. Offered on a satisfactory fail only basis.

Agron 526 Field Plot Technique (3-0) Cr 3 S Prereq 421. Moore. Planning experiments for agricultural research analysis of data and concepts in data interpretation.

Agron 527 Plant Genetics (3-0) Cr 3 S Prereq Gen 410. Bhatharcharya. Fundamental genetic and cyto genetic concepts from plant perspective including recombination linkage, genetic analysis of molecular mapping, mapping, and polyloid evolution.


Agron 533 Crop Protection (2-0) Cr 2 F Prereq 501. 503. 502. Heucheln. Integrated management systems for important crop pests. Cultural and biological and chemical management strategies applicable to major crops grown in the Midwest. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.


Agron 543 Crop Physiology (2-0) Cr 2. F Prereq 501. 503. 502. Heuchel. Integrated management systems for important crop pests. Cultural and biological and chemical management strategies applicable to major crops grown in the Midwest. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agron 544 Agricultural Meteorology (2-0) Cr 2 F Prereq 420. Available on and off campus. Prereq 206. Upper division Biological Science. Taylor. Applied concepts in agricultural meteorology. Basic concepts of weather and of climatological relationships influencing production protection yield and associated production risk factors. Credit for only one of 503 or 541 may be applied toward graduation not both. Self study sections are available for resident and to distant education students all semesters.

Agron 542 Advanced Crop Management (2-0) Cr 2. F Prereq 354. Off campus offered as demand warrants. Prereq 250. Staff. Basic concepts in plant-soil-climate relationships with emphasis on recent advances in crop culture and management. Designed for the master of agriculture program.

Agron 544 Soil Management (2-0) Cr 2. F Prereq 354. Off campus offered as demand warrants. Prereq 354. Blackmore. Basic concepts of soil management with emphasis on how various tillage and fertilization practices influence soil growth. Designed for the master of agriculture program.


Agron 550 Advanced Issues in Sustainable Agriculture (2-0) Cr 3 S Prereq 2. F. Prereq 2. Staff. A seminar on agriculture as a human activity, environmental and economic issues for agronomical perspective. Comparative analysis of intended and actual consequences of development of agricultural practices. Individual study and group analysis of environmental literature and scientific reports.

Agron 551 Growth and Development of Perennial Grasses (Same as Hort 561.) Cr 2. Prereq 420. Field. Grasses.

Agron 555 Soil Clay Mineralogy (Same as Geol 555.) Cr 3. Prereq 1 F offered 2003. Prereq 473. Chem 164. Recommended Geol 311. Thompson. Basic principles and applications of clay minerals in soil environments with emphasis on layer silicates and on Fe-Mn and Al oxides.

Agron 555L Soil Clay Mineralogy Laboratory (Same as Geol 555.) Cr 3. Staff. Study and analysis of clay minerals in soils.

Agron 558 Laboratory Methods in Soil Chemistry (2-0) Cr 3 Alt F offered 2003. Prereq 354. Chem 210 or 211. Tabor. Experimental and descriptive inorganic and organic operational theory and prerequisites of soil analysis student's instruments, including spectrophotometry, EPR, and molecular absorption and emission spectroscopy. Mass spectrometry. X-ray diffraction and fluorescence gas and ion chromatography and on selective electrodes.

Agron 559 Environmental Soil and Water Chemistry (Dial listed with 459. 3-0) Cr 3 Alt F offered 2003. Prereq 354. Chem 210 or 211. Tabor. Experimental and descriptive inorganic and organic operational theory and prerequisites of soil analysis student's instruments, including spectrophotometry, EPR, and molecular absorption and emission spectroscopy. Mass spectrometry. X-ray diffraction and fluorescence gas and ion chromatography and on selective electrodes.

Agron 560 Agroforestry Systems (Dial listed with 460. same as For 560. 1. Staff. Introduction to the chemical properties of soils and soil reactions occurring in the soils and their impact on the environment. Topics include composition of soils. Acid base equilibrium buffer systems mineral dissolution and precipitation speciation on exchange redox reactions adsorption phenomena and soil pollution.

Agron 560 Agroforestry Systems (Dial listed with 460. same as For 560. 1. Staff. Introduction to the chemical properties of soils and soil reactions occurring in the soils and their impact on the environment. Topics include composition of soils. Acid base equilibrium buffer systems mineral dissolution and precipitation speciation on exchange redox reactions adsorption phenomena and soil pollution.
Agronomy 561 Population and Quantitative Genetics for Breeding (Same as An S 561) (4-0) Cr 4 F Praes. Stat 401 Jannink Population and quantitative genetics for plant and animal breeding. Topics include forces that change gene frequency covariance between relatives, response to artificial selection, inbreeding depression heterosis cross breeding genotype-by-environment interaction linkage analysis mapping of quantitative trait loci and marker assisted selection.

Agronomy 565 Professional Practice in the Life Sciences (Same as PL P 565.) See Plant Pathology

Agronomy 575 Soil Morphology, Genesis and Classification (3) Cr 3 Alt A offered 2004 Praes. 459 473 Geol 100 M Thompson Synthesis of how landscapes, water organisms, and chemical reactions define the morphology, mineralogy, and spatial distribution of soils.

Agronomy 577 Soil Physics (3-0) Cr 3 S. Praes. 354 Recommended Math 168 Horton The physical soil system components and their physical interactions transport processes involving water, air, and heat.

Agronomy 578 Laboratory Methods in Soil Physics (3-0) Cr 1 S. Praes. 757 concurrent Horton. Methods of measuring soil physical properties such as texture, density, and water content and transport of heat, water and gases.

Agronomy 585 Soil Microbiology and Biochemistry (Same as Micro 585) (2-0) or 3 Cr 2 or 3 Alt A offered 2004 Praes. 485 one course in biochemistry Loyanachan Ecological and environmental considerations of soil microorganisms, organic matter, enzymes, carbon, and other nutrient cycles. Laboratory emphasizes creative component.

Agronomy 590 Special Topics Cr arr. Praes. 15 credits in agronomy. Literature reviews and conferences on selected topics in crops, soils, or agricultural meteorology according to need and interest of students.

Agronomy 591 Agronomic Systems Analysis (3-0) Cr 3 S. Praes. 511 513 531 532 533 534 Wiederhaart. Analysis of cropping systems from a problem solving perspective. Case studies will be used to develop the student's ability to solve agronomic problems. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agronomy 592 Current Issues in Agronomy (3-0) Cr 3 S. Praes. 501 502 512 512 514 Knapp. Study and discussion of topics of current interest to the field of agronomy. While Agronomy 592 deals with agronomics at the farm and landscape level, Agronomy 592 deals with issues on a broader scale including off-farm agricultural impacts. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agronomy 593 Workshop in Agronomy Cr arr. each time taken. Praes. Gradute classification

Agronomy 594 Workshop in Agronomy (0 1) Cr 1 SS Praes. 501 502 503 514 (or current enrollment) Referred. 511 512 513 Heuchel. Hands-on field and laboratory experience including integrated pest management: climateology soils crops and statistics. Required course for the Master of Science in Agronomy degree program. Restricted to graduate students enrolled in degree programs at Iowa State University.

Agronomy 598 Creative Component Cr arr. Praes. Nonthesis M S option only. A written report based on research library readings or topics related to the student's area of specialization and approved by the student's advisory committee.

Courses for Graduate Students

Agronomy 600 Seminar (1-0) Cr 1 each time taken. Reports and discussion of recent literature and research.

Agronomy 605 Advanced Topics in Population Genetics (4-0) Cr 4 Alt A offered 2004 Praes. 516 Bot 511 512 518 544 permission of instructor Wastgate. An in-depth treatment of population biology, genetic linkage and molecular analysis and population structure and dynamics. Emphasis on individual student followed by in-class presentations and discussion.

Agronomy 621 Advanced Plant Breeding (3-0) Cr 3 S. Praes. 521 522 561 Gen 410 Lamkey Estimation and interpretation of genetic effects and variances of plant populations. Analysis of mating design, heterozygosity, and heterosis classification and development of parental materials selection indices and combining ability analysis.


Agronomy 656 Environmental Surface Chemistry (3-0) Cr 3 Alt S. offered 2005 Praes. 585 Chem 521 and 522 Principles of surface and colloidal chemistry applied to minerals and organic matter in soils, sediments, and aquifers. Emphasis on understanding control and mathematical description of interactions at the solid-fluid interface relevant to movement of agrochemicals, heavy metals, and organic pollutant chemicals in the environment.

Agronomy 675 Advanced Soil Genesis and Classification (4-0) Cr 2 Alt S. offered 2005 Praes. 577 Fenton. Processes reactions and theories in soil formation landscape evolution models and principles of soil micromorphology.

Agronomy 697 Seminar in Plant Physiology and Molecular Biology (Same as Bot 697) See Botany.

Agronomy 698 Agronomy Teaching Practicum Cr 1-2 each time taken. F S S. Praes. Grad. classification in agronomy and permission of instructor. Staff Graduate student experience in agronomy teaching program. Offered on a satisfactory-fail grading basis only.

Agronomy 699 Research

Air Force Aerospace Studies

www.rstate.edu/airforce

Michael J. Artese, Chair of Department

Professors Artese

Assistant Professors (Adjunct) Barkley

Instructors (Adjunct) Greenfield

Undergraduate Study

The objectives of the Department of Air Force Aerospace Studies are to provide qualified students the opportunity to earn a commission as an officer in the active duty Air Force and to build better citizens for those not interested in joining the Air Force.

The curriculum is divided into two basic phases: the general military course (GMC) and the professional officer course (POC). The GMC is introductory and consists of four consecutive 1 hour courses normally taken during the freshman and sophomore years. GMC completion is not a prerequisite for entry into the POC although it is recommended by the department.

Prior to entry into the POC most students complete field training at an Air Force base. Students who have completed the GMC participate in a 4-week program which provides a concentrated experience in the Air Force environment. The training program includes junior officer training aircraft and crew orientation career orientation survival training an introduction to basic functions and physical training. A 5 and 7-week training program is offered for Those students entering the POC who did not complete the GMC.

This program includes all that is offered in the 4-week program plus academic and leadership laboratory experiences included in the on-campus GMC courses.

Selection for the professional officer course is on a competitive basis. Selection and processing in this course must meet certain academic, mental, physical, and moral standards. Qualified cadets may be selected as flight cadets and receive flight instruction prior to attending Undergraduate Pilot Training (UPT). Upon enrollment in the POC all cadets are required to
complete a contractual agreement with the Air Force which obligates them to 4 years of active duty as an officer in the United States Air Force. Air Force active duty

0 10 years for pilots and 6 years for navigators. Uniforms and AFROTC texts are supplied to the cadets and those in the POC receive a subsistence allowance between $350 $400 per month.

Students who fail to meet the contract terms may be called to active duty in an enlisted grade or be required to repay monies received from the Air Force. Air Force ROTC scholarships are available and provide payment of full tuition and fees. In addition, Scholarship cadets receive between $250 $400 monthly subsistence allowance and $510 per year book allowance. Upon acceptance of a scholarship the student executes a contract with the Air Force. Scholarships can be awarded for periods of 2, 3, or 4 years with up to 1 additional year for qualified applicants in selected majors. To determine eligibility and initiation application procedures for the scholarship program interested students should contact the department.

Entry into the program is not dependent on departmental major or year in the university. The AFROTC program is open to both male and female students.

The College of Liberal Arts and Sciences offers a minor in military studies. Requirements for the minor include taking a minimum of 15 credit hours of ROTC instruction which may be taken from one or a number of the ROTC courses. At least 5 credit hours must be in courses numbered 300 or above.

Courses Primarily for Undergraduate Students

AFAS 101 Leadership Laboratory I (1-2) Cr. 1 F Air Force customs and courtesies, drill and ceremonies, and military customs and courtesies. The laboratory is required if taking AFAS 141 and considering application in the POC. Leadership Laboratory is open to students who are members of the Reserve Officer Training Corps or are eligible to pursue a commission as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 102 Leadership Laboratory II (1-2) Cr. 1 S Air Force customs and courtesies, drill and ceremonies, and military customs and courtesies. The laboratory is required if taking AFAS 142 and considering application in the POC. Leadership Laboratory is open to students who are members of the Reserve Officer Training Corps or are eligible to pursue a commission as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 141 The United States Air Force Today (1) Cr. 1 F Survey course designed to introduce cadets to the United States Air Force and Air Force Reserve Officer Training Corps. Featured topics include mission and organization of the Air Force, officer and professional service, military customs and courtesies, Air Force officer opportunities, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with leadership experiences.

AFAS 142 The United States Air Force Today (1-0) Cr. 1 S Survey course designed to introduce cadets to the United States Air Force and Air Force Reserve Officer Training Corps. Featured topics include mission and organization of the Air Force, officer and professional service, military customs and courtesies, Air Force officer opportunities, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with leadership experiences.

AFAS 201 Leadership Laboratory II (0-2) Cr. 1 F Air Force customs and courtesies, drill and ceremonies, and military customs and courtesies. The laboratory is required if taking AFAS 241 and applying for the POC. Leadership Laboratory is open to students who are members of the Reserve Officer Training Corps or are eligible to pursue a commission as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 202 Leadership Laboratory II (1-2) Cr. 1 S Air Force customs and courtesies, drill and ceremonies, and military customs and courtesies. The laboratory is required if taking AFAS 242 and applying for the POC. Leadership Laboratory is open to students who are members of the Reserve Officer Training Corps or are eligible to pursue a commission as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 241 The Development of Air Power (1) Cr. 1 F Examines the general aspects of air and space power through a historical perspective. Utilizing this perspective, the course covers a time period from the first balloons and dirigibles to the space-age global positioning systems of the Persian Gulf War. Historical examples are provided to explain the development of Air Force capabilities (competencies) and missions. Students will prepare oral and written presentations discussing the role air power has played in today's U.S. Air and space power.

AFAS 242 The Development of Air Power (1) Cr. 1 S Examines the general aspects of air and space power through a historical perspective. Utilizing this perspective, the course covers a time period from the first balloons and dirigibles to the space-age global positioning systems of the Persian Gulf War. Historical examples are provided to explain the development of Air Force capabilities (competencies) and missions. Students will prepare oral and written presentations discussing the role air power has played in today's U.S. Air and space power.

AFAS 301 Leadership Laboratory III (0-3) Cr. 1 F Advanced leadership experiences involving the planning and controlling of the military activities of the AFROTC cadet corps. The preparation and presentation of briefings and other oral and written communications, and the providing of interviews, guidance and information that will increase the understanding of leadership as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 302 Leadership Laboratory III (0-3) Cr. 1 S Advanced leadership experiences involving the planning and controlling of the military activities of the AFROTC cadet corps. The preparation and presentation of briefings and other oral and written communications, and the providing of interviews, guidance and information that will increase the understanding of leadership as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 341 Air Force Management and Leadership (3-0) Cr. 3 F A study of leadership management fundamentals. Topics include: Air Force personnel and evaluation systems, leadership and the communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied.

AFAS 342 Air Force Management and Leadership (3-0) Cr. 3 S A study of leadership management fundamentals. Topics include: Air Force personnel and evaluation systems, leadership and the communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied.

AFAS 401 Leadership Laboratory IV (0-3) Cr. 1 F Advanced leadership experiences involving the planning and controlling of the military activities of the AFROTC cadet corps. The preparation and presentation of briefings and other oral and written communications, and the providing of interviews, guidance and information that will increase the understanding of leadership as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 402 Leadership Laboratory IV (0-3) Cr. 1 S Advanced leadership experiences involving the planning and controlling of the military activities of the AFROTC cadet corps. The preparation and presentation of briefings and other oral and written communications, and the providing of interviews, guidance and information that will increase the understanding of leadership as determined by the professor of aerospace studies. Offered on a satisfactory/fail grading basis only.

AFAS 441 National Security Forces in Contemporary American Society (3-4) Cr. 3 F, Prereq. 32 or permission of instructor. Examines the national security process, regional studies, advanced leadership ethics, and Air Force doctrine. Special topics of interest focus on the role of Air Force leadership in military strategy, cultural, and in the roles of the military in the United States and around the world. The course is offered in the fall of even years and the spring of odd years.

AFAS 442 National Security Forces in Contemporary American Society (3-4) Cr. 3 F, Prereq. 32 or permission of instructor. Examines the national security process, regional studies, advanced leadership ethics, and Air Force doctrine. Special topics of interest focus on the role of Air Force leadership in military strategy, cultural, and in the roles of the military in the United States and around the world. The course is offered in the fall of even years and the spring of odd years.

American Indian Studies

(Interdepartmental Undergraduate Minor)

Program Director: Sidner Larson

The American Indian Studies Program is a cross-disciplinary program in the College of Liberal Arts and Sciences which offers an opportunity to learn more about the cultural heritage of American Indians, their historical relationship with non-Indians and their participation in contemporary American society.

This program emphasizes perspectives from American Indian Studies anthropology, art history, literature, political science, and sociology.
The courses in the American Indian Studies program provide added background for students whose career interests may include multicultural education, human services, legal services, or public administration. Within the College of Liberal Arts and Sciences, courses in American Indian studies can be used as electives in a minor or in an interdisciplinary studies major (for details see Index: Interdisciplinary Studies). Students majoring in another college who wish to use these courses should consult with their advisors.

A minor in the College of Liberal Arts and Sciences must include at least 15 credits of courses in the field. A minor in American Indian studies must include 210 two courses chosen from among the following: 310, 322, 332, and 346. Two additional courses chosen from the program courses listed below. The American Indian Studies Program Committee will, upon application by the student and review of the program certify that the student has completed a minor in American Indian Studies.

Because course offerings vary from year to year, any student interested in a minor in American Indian Studies should contact the American Indian Studies office for advising. (See Index: LAS Cross Disciplinary Programs.)

Courses open for nonmajor graduate credit: 346

Courses Primarily for Undergraduate Students

Am In 210 Introduction to American Indian Studies (3-0) Cr: 3 CS Introduction to the multidisciplinary aspects of American Indian studies. Topics include literature the arts history anthropology sociology education and contemporary Indian politics. Guest lectures media presentations and discussion of assigned readings.

Am In 240 Introduction to American Indian Literature (Same as Engl 240) See English

Am In 310 Topics in American Indian Studies (3-0) Cr: 3 each time taken. maximum of 6 FS Issues within specific topical areas of American Indian society and culture such as social work with Indian families, tribal government and environmental policy.

Am In 315 Archaeology of North America (Same as Anth 315) See Anthropology

Am In 322 Peoples and Cultures of Native North America (Same as Anth 322) See Anthropology

Am In 323 Peoples and Cultures of Latin America (Same as Anth 323) See Anthropology

Am In 328 American Indian Religions (Same as Relig 328) See Religious Studies

Am In 346 American Indian Literature (Same as Engl 346) See English Nonmajor graduate credit.

Am In 380 North American Indian Art (Same as Art H 380) See Art and Design

Am In 420 Cultural Continuity and Change on the Prairie Plains (Same as Anth 420) See Anthropology

Am In 432 Current Issues in Native North America (Same as Anth 432) See Anthropology

Am In 490 Independent Study Cr var Prereq: 6 credits in American Indian studies permission of instructor. Designed to meet the needs of students who wish to study in areas other than those in which courses are offered. No more than 9 credits in Am In 490 may be counted toward graduation.

Courses Offered by Other Departments

Anth 428 Archaeological Laboratory Methods and Techniques See Anthropology

Anth 429 Archaeological Field School See Anthropology

C1 200C Native American Tutoring See Curriculum Instruction

Hist 370 History of Iowa See History

Hist 465 The American West See History

Pol S 312 Minicourse in American Government and Politics See Political Science. Acceptable only when offered as a course in American Indian tribal government and political theory.

Soc 330 Ethnic and Race Relations See Sociology

Animal Science

www.ans.assist.edu

Susan J. Lamont, Chair of Department

Distinguished Professors Anderson Beit Rothchild Trenkle

University Professors: Keneally Sengbeke

Professors Berger Brant Corday Dekkers Dickson Fernando Harris Hoffman Jurgens Kliner Lamont Mey Metzler Moncar Nissen Pruse Rob He Ruete Ruete Sako Shaly Shonbrenner Strelizer Tuggle

Professors (Collaborators) Acker Clutter Horst Olson Quigley Reinhardt

Distinguished Professors (Emeritus) Freeman Jacobson Sall Willham

University Professors (Emeritus) Parrish

Professors (Emeritus) Bunsellsberg Ewan Foreman Haynes Holden Kiser Owings Relf Self Sper Stovmer Topel Voelker Wickersham Wilson Wunder Young Zimmerman Zollek

Associate Professors Anw Jaebers Cunnick Faust Hanyman Huuat Skar Timms Tivers Young

Associate Professors (Collaborators) Gott Nonnecke

Assistant Professors Bass Koman E Loniger S Loniger Powers-Shilling Reecy Stahl Assistant Professors (Adjunct) Amin Ramsey Assistant Professors (Collaborators) Rasmussen Rothmacher

Undergraduate Study

The Department of Animal Science Undergraduate Program intends for its graduates to be able to detail the symbiotic relationship of animals and humans to solve the complex problems of animal enterprise management and to apply their knowledge and skills in a technically demanding global community. To enable learners to pursue a wide array of career interests the department offers learning experiences ranging from the basic sciences. The department undergraduate degree program has 10 major program goals. They are to provide a comprehensive animal science education in (1) science (2) animal management (3) agribusiness in addition our program strives to create more opportunities for development (4) effective communication skills (5) skills enabling students to gather and integrate information to solve problems (6) self learners (7) leaders and team builders and (8) awareness of domestic and global issues driving changes in the animal industries Our program also works to (9) provide career skills appropriate to job market needs and (10) provide superior counseling for fulfilling individual student objectives.

Learner outcomes for each of these goals for each of our courses and other information defining the program can be found at our website www.istate.edu.

The department offers the degrees bachelor of science in animal science. bachelor of science in dairy science and complementary work toward admission to schools of law medicine and veterinary medicine in either curriculum may be done while satisfying requirements for the degree bachelor of science in animal science or dairy science (see Index). A combined bachelor of science and master of science in animal science is also offered The department offers a minor in Animal Science. The 16-credit minor includes 114L 114L 214L 214L plus courses from a list maintained in the department. Students interested in the minor should contact an Animal Science advisor.

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy. The majors in animal breeding and nutrition meet science animal physiology animal science and molecular cellular and developmental biology. Minor work is offered in these areas to students taking major work in other departments.

A strong undergraduate program is required for those students interested in graduate study. Fundamental training in biology chemistry mathematics and statistics is required to a satisfactory graduate program. Graduate programs in animal science include supporting work in areas such as agronomy anatomy microbiology biochemistry chemistry economics food science and human nutrition genetics physics physiology and statistics. Students may choose graduate programs involving a co-major with one of these areas. Graduate work in meat science is offered as a co-major in animal science and food science and human nutrition.

The department also cooperates in the interdepartmental program in professional agriculture and interdepartmental majors in genetics immunology MCB8 (molecular cellular and developmental biology) and toxicology (see Index).

The foreign language requirement for any is established on an individual basis by the program-of-study committee appointed to guide the work of the student.

Courses open for nonmajor graduate credit: 319 331 333 334 352 353 360 415 419 423 424 425 426 429 434 470 493

Courses Primarily for Undergraduate Students

An S 110 Orientation in Animal Science and ISU 110 Cr R F Orientation to the university and Department of Animal Science. Challenges and opportunities available to the professional animal agriculturalist. Professional goal setting portfolio development and development of interpersonal skills in the context of pursuing a career in animal science.

An S 114 Survey of the Animal Industry (2-0) Cr 2 FS SSS Ways domestic animals serve the basic needs of humans for food shelter relocation fuel and emotional well-being. Terminology, basic structures of the industries surrounding the production care and marketing of domestic animals in the US.

An S 114L Working with Animals (0-3) Cr 1 FS Prereq Credit or concurrent enrollment in 114 A hands-on introductory course in skills for proper care management and animal welfare. Can be taken for a maximum of three times for credit. Offered for a satisfactory/fail grading basis only.

An S 211 Issues Facing Animal Science (6-2) Cr 1 FS Prereq 114 sophomore or junior. Overview of the factors that define contemporary ethical and scientifically based issues facing animal agriculture. Life skill development (including interactive skills communication ability organization information-gathering and leadership skills) emphasized in the context of issues. Offered for a satisfactory/fail grading basis only.

An S 214 Domestic Animal Physiology (3-0) Cr 3 FS Prereq Biol 201 Chem 163 or 177 Introduction to anatomy and physiology of the neural circulatory respiratory immune endocrine reproductive and digestive systems of domestic animals.

An S 214L Domestic Animal Anatomy and Physiology Lab (0-2) Cr 1 FS Prereq Concurrent enrollment in An S 214 Basic anatomy of domestic animals.
An S 216 Equine Science (2-2) Cr. 3 F
Pre req: Course in biology. Introduction to contemporary concepts and basic practices and decisions necessary when managing horses through stages of their lives.

An S 224 Companion Animal Science (2-2) Cr. 3 S
Pre req: Course in biology. Introduction to students to contemporary concepts and basic practices and decisions necessary when caring for the companion animal through stages of its life.

An S 235 Dairy Cattle Performance (1-2) Cr. 2 F
Pre req. 114 Origins and development of breeds, improvement and expansion programs. Comparison of types and performance. Infl uences affecting commercial use and adaptability of types and breeds. Dairy marketing of cattle and milk.

An S 250 Food Animal Science (2-2) Cr. 3 S
Pre req. 114 Course in biology. Introduction to contemporary concepts and basic practices when managing beef, dairy, poultry, sheep and swine through stages of their respective production cycles.

An S 270 Foods of Animal Origin (2-2) Cr. 3 S
Pre req. 201 Biol 163 or 177 Principles of diseases and impacts of the production processing and preservation of wholesome nutritious, and palatable meat, dairy, and egg products. Product evaluation classification, value and utilization.

An S 305 Livestock Evaluation (0-6) Cr. 3 S
Pre req. Junior classification. 250-270 recommended. Fall semester leads to 475A and 475B: Breeding and market animal evaluation of beef, swine, and sheep using contemporary tools. Communication and decision making skills are practiced in the context of making selection decisions.

An S 311 Career Preparation in Animal Science (2-2) Cr. 1 S

An S 353 Animal Breeding Programs Design (0-4) Cr. 2 S
Pre req. 352 Evaluation of alternate breeding programs and genetic improvement techniques in the context of case study. Experiential and cooperative learning techniques employed. Nonmajor graduate credit.

An S 360 Fresh Meats (2-2) Cr. 3 S

An S 399 Animal Science Internship A
Grad. Internship Experience Cr. 2 to 6 may be repeated. FS S Pre req: Permission of the instructor. Practical experience related to animal science.

An S 411 Addressing Issues in Animal Science (0-2) Cr. 1 S
Pre req. Senior classification in an S Life skill development emphasized in the context of exploring one's perspective of the most pressing moral and scientific issues facing animal agriculture. Clarification and communication of personal conclusions in small and large group settings expected.

An S 415 Equine Systems Management (2-2) Cr. 3 S

An S 419 Advanced Animal Nutrition (2-2) Cr. 2 S
Pre req. 319 331 357 419. Metabolism and assimilation of nutrients. Recent advances and developments in basic nutrition. Nonmajor graduate credit.

An S 423 Poultry Systems Management (2-2) Cr. 3 S

An S 424 Companion Animal Systems Management (2-2) Cr. 3 S
Pre req. 224 319 331 357 Decisions facing the administrator of a companion animal enterprise. Financial and business goal identification. Problem clarification and resource allocation to manage the companion animal system. Nonmajor graduate credit.

An S 425 Swine Systems Management (2-2) Cr. 3 S

An S 428 Beef Cattle Systems Management (2-2) Cr. 3 S
Pre req. 270 319 331 357 Decisions facing the administrator of a beef cow-calf or feedlot enterprise. Financial and production goal identification. Problem clarification and resource allocation to manage the beef enterprise. Computer-aided study. Nonmajor graduate credit.

An S 429 Sheep Systems Management (2-2) Cr. 3 S

An S 434 Dairy Systems Management (2-2) Cr. 3 S

An S 440 Computer Applications (2-0) Cr. 2 S
Pre req. 319 331 357 Introduction to electronic spreadsheets, database management, computer communications and other approaches to problems in animal science. Beginning elements of livestock systems analysis.

An S 451 Animal Molecular Biology (Dual listed with S 511) (2-2) Cr. 3 S
Pre req. 352 355 Introduction. Use of molecular biology techniques in domestic animal research and production. Restriction endonuclease mapping, gene mapping, gene cloning, DNA sequencing and amplification and analysis of genetic differences at the molecular level.

An S 470 Processed Meats (2-2) Cr. 3 S
Pre req. 331 372 Physical chemical and biological properties of meat important to processed meat product characteristics. Ingredients technology and equipment used for cured meats. Technical aspects and fresh cooked dry and semi-dry sausages products. Nonmajor graduate credit.

An S 475 Intercollegiate Judging and Competition (A B C E) Cr. 1 to 5. May be repeated.

FS D Cr. 2 S
Pre req. Admission by invitation. Special topics in animal science.
A Meat Animals
B Dairy Cattle
C Meats
D Meat Animal Evaluated Specialized training in evaluating and grading live animals and carcasses
E Horses
An S 489 Issues in Food Safety  (Same as FS HN 489, HDV 489, [1] 1 Credit)  S  offered 2003 PreReq: Consent or enrollment in FS HN 101 or 272 or HDV 233; FS HN 419 or 420; FS HN 403; 4 Capstone seminar for the food safety minor. Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.

An S 491 Independent Study Cr 1 to 3  FS SS  PreReq Permission of the instructor; A minimum of 6 credits of 900 may be used toward the total of 128 credits required for graduation. Open to juniors and seniors in animal science and dairy science showing satisfactory preparation for programs chosen. Individual topics and preparation of report.

An S 492 Animal Science (Dual listed with 593) Cr 1 to 3  FS SS  PreReq: Permission of instructor; FS May be repeated. Offered as demand warrants. PreReq Permission of instructor. Workshop in livestock production includes current concepts in breeding, nutrition, reproduction and management at various levels of livestock production.

An S 495 Agricultural Travel Course Preparation (0.1) Cr 1 to 5  FS May be repeated FS  PreReq Permission of instructor Limit enrollment. Students enrolled in this course will also register for Agron 495 and intend to register in Agron 496 and An S 496 in the following term. Topics will include the agricultural industries climate crops, culture history, livestock marketing and soils and preparation for travel to locations to be visited. Information normally available 9 months before departure.

An S 496 Agricultural Travel Course Cr 1 to 5  FS May be repeated, 1 half credit per week traveled. Offered in each of An S 496 and Agron 496. PreReq Permission of instructor 30 college credits Limit enrollment. Students enrolled in both An S 496 and Agron 496. Tour and study of production methods in major crop and livestock regions of the world. Influence of climate economics, geography soils, landscapes, markets and other factors on livestock and crop production. Locations and duration of tours will vary. Summer tour will usually visit Florida. Fall tour will usually visit a southern location Information usually available 9 months before departure. Tour expenses paid by students.

An S 500 Computer Techniques for Biological Research (2.3) Cr 1 F  Introduction to UNIX and SAS for solving research problems including organization of data files, transfer of files between workstations, developing models and techniques for analysis of designed experiments. Introduction to matrix algebra for solving animal breeding problems using MATLAB and computer simulation.

An S 501 Survey of Animal Dispositions (1) Cr 1 F  Required for Animal Science graduate students Orientation to departmental and graduate school policies and procedures. Discussion of programs of research and outreach in Animal Science. Issues impacting the animal industry. Offered on a satisfactory fail grading basis only.

An S 503 Seminar in Animal Production (1-0) Cr 1  May be repeated. F  PreReq: Permission of instructor. Discussion and evaluation of current topics in animal production and management.

An S 505 Introductory Techniques in Nutrition Experiments (2) Cr 3  3  S  offered 2005 PreReq Stat 401 Planning, execution, interpretation, and communication of nutrition research.

An S 510 Applied Animal Breeding (2) Cr 2  Off campus offered as demand warrants. PreReq 352 Stat 401 Prerequisite: Principles of animal breeding. Application to improvement of domestic animals. Heritability genetic and phenotypic correlations, selection index sire and dam evaluation, and breeding program design. Designed for master of agriculture program.

An S 511 Applied Ruminant Nutrition (2) Cr 2  Off campus offered as demand warrants. PreReq 352 Stat 401. Prerequisite: Principles of animal breeding. Application to ruminant nutrition feeding programs and requirements for lactation growth and reproduction Designed for master of agriculture program.

An S 512 Applied Non Ruminant Nutrition (2) Cr 2  Off campus offered as demand warrants. PreReq 352 Stat 401. Recent developments and application of basic nutritional concepts for swine and poultry production Selected aspects and concepts of computer diet formulation. Designed for master of agriculture program.

An S 515 Integrated Crop and Livestock Production Systems (Same as AE A 515 Agron 515, Susag 515) (3) Cr 3  F  offered 2003 PreReq Susag 509 Managing productivity and minimizing ecological impacts of agricultural systems by understanding nutrient cycles, crop residue, and manure management and subspaces interactions. Consideration of crop and livestock production, inputs, and the environment. Course includes significant off-campus component with teams analyzing Iowa farms.

An S 518 Digestive Physiology and Metabolism of Non Ruminants (3) Cr 3  F  PreReq 419 Digestion and metabolism of nutrients. Nutritional requirements and current research and feeding programs for poultry and swine.

An S 519 Digestive Physiology and Metabolism of Ruminants (2) Cr 3  S  PreReq 419 Digestive physiology and nutrient metabolism in ruminant and non ruminant animals.

An S 533 Physiology and Endocrinology of Animal Reproduction (2) Cr 2  Alt S  offered 2005 PreReq General physiology course. Development and structure of the reproductive system. Physiological and endocrine aspects including puberty, gametogenesis, estrous cycle, pregnancy, parturition, interaction of environment, thyroid and adrenal function and nutrition with these processes.

An S 536 Penntatology (3-0) Cr 3  S  PreReq One course in physiology. Regulation of metabolism and development in the mammalian fetus and neonate will be explored in a comparative manner. Emphasis will be on the dynamic changes in these relationships at birth. Classes will incorporate mammalian student participation and development of critical thinking skills.

An S 540 Livestock Immunogenetics (Same as Micro 540 V PM 540) (2) Cr 2  Alt F  offered 2003 PreReq 540 V PM 520 Basic concepts and contemporary topics in genetic regulation of livestock immune response and disease resistance.

An S 547 Biological Applications of Microscopy (2) Cr 2  Alt S  offered 2005 PreReq 540 V PM 520 Basic principles, microscopes, use of light, and electron microscopy techniques. Photomicrography and photomicrography. Demonstrations and structural analysis with various biosystems.

An S 549 Advanced Vertebrate Physiology I (Same as BMS 549) (3) Lecture Biomedical Sciences.

An S 551 Animal Molecular Biology (Dual listed with 451) (2) Cr 3  F  PreReq 352 BBMB 221 or organic chemistry. Bio 301 Introduction to use of molecular biology techniques in domestic animal research and production. Restriction endonuclease mapping, gene mapping, cloning, DNA sequencing and amplification and analysis of genetic differences at the molecular level.

An S 552 Advanced Vertebrate Physiology II (Same as BMS 552) (4) Cr 4  F  PreReq Bio 305 credit or enrollment in BBMB 420 or 450 Cardiorenal, respiratory and digestive physiology.

An S 552L Advanced Vertebrate Physiology Laboratory (Same as BMS 552 L) (3) Cr 1  F  PreReq Credit or enrollment in BMS 552 Laboratory for cardiovascular renal respiratory and digestive physiology.

An S 553 Biochemical and Physiological Basis of Nutrition: Macronutrients (Same as FS HN 553) (3) Cr 3  S  PreReq, BMBB 420 or BBMB 404 and credit or enrollment in BBMB 405 Integration of the molecular and physiological aspects of macronutrients and insulin metabolism in mammalian systems. Dietary energy carbohydrates, fiber, lipids protein and restriction and protein interactions and metabolic consequences.

An S 554 Biochemical and Physiological Basis of Nutrition: Vitamins and Minerals (Same as FS HN 554) (3) Cr 3  F  PreReq BMBB 420 or BBMB 404 and credit or enrollment in BBMB 405 Integration of the molecular and physiological aspects of vitamin and mineral metabolism in mammalian systems. Interactions among nutrients, metabolic consequences of deficiencies or excesses, relevant polymorphisms and current topics related to micronutrients and non-nutrient components.

An S 556 Current Topics in Genome Analysis (3) Cr 3  F  offered 2005 PreReq Stat 401 Introduction to principles and methodology of molecular genetic techniques useful in analyzing and modifying large genomes. Survey of statistical methods and computer programs for bioinformatics, linkage mapping, correlation, and mapping and mapping quantitative trait loci.

An S 561 Population and Quantitative Genetics for Breeding (Same as Agron 561) (4) Cr 4  F  PreReq Stat 401 Population and quantitative genetics for plant and animal breeding Topics include forces that change gene frequency, covariance between relatives and non-biased prediction. Genes for complex traits, genetic selection, artificial selection, and bioinformatics of linkage and association mapping.

An S 568 Methodologies for Population Quantitative Genetics (4) Cr 2  S  PreReq 561 Stat 402 and computer theory for analysis of animal breeding data Course A (1st half semester) covers linear models selection index methods and basic theory for best linear unbiased prediction. Course B (2nd half semester) best linear unbiased prediction, including genetic groups, environmental adjustment, repeated records multiple traits, and maternal effects models and theory for maximum likelihood estimation of genetic parameters.

An S 569 Professional Practice in the Life Sciences (Same As PI P 565) (3) F  PreReq Professional Practice in the Life Sciences.

An S 570 Advanced Meat Science and Applied Muscle Biology (2-3) Cr 2-3  S  PreReq 470 Ante and postmortem factors affecting composition structure and chemistry of red meat and poultry muscle, and the conversion of muscle to meat and the sensory and nutritional characteristics of meats Oral research reports and a research proposal.

An S 571 Advanced Meat Processing Principles and Technology (2) Cr 2  F  PreReq 470 or 570 Physical and chemical relationships during processing. Effects of modern technology, non-meat additives and preservation techniques on quality and safety of processed meat. Laboratory demonstration of principles and technology.
An S 563 Applied Animal Breeding Strategies (2.0)
An S 565 Animal Breeding Strategies (2.0)
Graduate Study
The department offers the degree master of arts with a major in anthropology. Graduate courses are offered in the areas of biological anthropology, archaeology, cultural anthropology, linguistic anthropology, history and theory, and methodology. Competence in one foreign language and in statistics must be demonstrated. A thesis, generally based on original fieldwork, is required.

Courses open for nonmajor graduate credit: 4271

Courses Primarily for Undergraduate Students

Anth 201 Introduction to Cultural Anthropology (3) Cr 3 FS SS Comparative study of culture as key to understanding human behaviors in different societies. Using a global cross-cultural perspective, patterns of family, life, economic and political activities, religious beliefs, and the ways in which cultures change are examined.

Anth 202 Introduction to Biological Anthropology and Archaeology (3) Cr 3 FS SS Human biological and cultural evolution: survey of the evidence from fossil forms and archaeology. As well as living primates, our closest relatives. Introduction to methods of study in archaeology and biological anthropology.

Anth 230 Globalization and the Human Condition (3) Cr 3 FS SS An introduction to understanding key global issues in the contemporary world. Focuses on social relations, cultural practices, and political and economic linkages among Africa, the Americas, Asia, Europe, and the Pacific.

Anth 257 Introduction to Museums (Same as AS 257) (3) Cr 3 FS SS Prentice Sophomore standing History and theory of museums. Overview of museums in modern society; careers in museums and future needs.

Anth 306 Comparative Studies of World Cultures (3) Cr 3 FS SS Prentice 207. Human evolution as known from fossil evidence comparative primate studies, and genetic variations in living populations. Laboratory tutorial sessions include study and discussion of human osteology, fossil hominids, simple Mendelian traits and bio ethics in applied biological anthropology.

Anth 308 Archaeology (2) Cr 3 FS SS Prentice 202. Methods and techniques for the recovery and interpretation of archaeological evidence; its role in reconstructing human behavior and past environments. Laboratory tutorial sessions include experience in the interpretation of archaeological evidence; the use of classification systems and prehistoric technologies such as ceramics and stone tools. Field trips.

Anth 309 Linguistic Anthropology (Same as Ling 309) (3) Cr 3 FS SS Prentice 207. Language as a human attribute: language versus animal communication. Human communication in cultural context, paralinguage, nonverbal proxemics and kinesics, symbol systems as language and culture. Cross cultural sociolinguistics. Ethnoscience and language policies. Participatory lab focus on analysis of a non-Western language and communication system.

Anth 313 The Family and Kinship in Cross-Cultural Perspective (3) Cr 3 FS SS Prentice 207. Comparative and historical study of the family and kinship systems in cross cultural perspective. Discussion of the structure, change, and function of family and kinship systems in ethnography, including the family's role in Western culture. Theoretical and contemporary family and kinship studies.

Anth 315 Archaeology of North America (Dual listed with 515) same as Am 315 (3) Cr 3 Alt S offered 2005. Prentice 308. Prehistory and early history of North America as reconstructed from archaeological evidence. Political economy, social and political organization, and historical sequences of major culture areas. Linkages of archaeological traditions with selected ethnographically known Native American groups.


Anth 321 World Prehistory (Dual listed with 521) (3) Cr 3 S FS Prentice 202. Comparative and historical an introduction to archaeological sites from around the world including the Near East, Africa, Europe, Mesoamerica and North and South America. Emphasis on the interpretation of material cultural remains in reconstructing past societies.

Anth 322 Peoples and Cultures of Native North America (Dual listed with 522 same as Am 322) (3) Cr 3 FS SS Prentice 202 or Am 210. Origin distribution and traditional way of life of the native peoples of North America. Survey of culture areas ecology and subsistence language kinship life cycle political economic, and religious systems impact of European contact.

Anth 323 Peoples and Cultures of Latin America (Dual listed with 523 same as Am 323) (3) Cr 3 S Prentice 202 or 306 recommended. Origin and distribution of native populations of Old and New World cultures. Theoretical problems of peasant and tribal societies: discussion of economic and religious systems, political processes of change.

Anth 325 Peoples and Cultures of Africa (Dual listed with 525 same as Am 325) (3) Cr 3 Alt F offered 2005. Prentice 201 or 306 recommended. Origins and distribution of peoples of Africa. Geographical and cultural characteristics including trade routes, major civilisations, economy, subsistence language, and social and political organisation and religious systems throughout the continent change processes, the impact of imperialism, and the nature of contemporary African societies.

Anth 326 Peoples and Cultures of East and Southeast Asia (Dual listed with 526) (3) Cr 3 Alt F offered 2004. Prentice 201 or 306 recommended. Origin and development of early civilisations on the eastern rim of the Pacific. Including China, Japan, and mainland and insular Southeast Asia, survey of current issues in ecological, historical, and ideological contexts.


Anth 335 Peoples and Cultures of the Middle East (3) Cr 3 Alt F offered 2004. Prentice 201 or 306 recommended. Anthropological approaches to the study of Middle East cultures. Survey of major culture areas: discussion of economic, political, and social and religious issues and systems. Examination of contemporary social movements.

Anth 337 Andean Archaeology (3) Cr 3 Alt F offered 2004. Prentice 202 or 321 recommended. Survey of prehistoric Andean cultures of Peru, Bolivia, and Ecuador. The archaeology of the Inca and their ancestors. Economic organization, prehistoric economic, religious, and political organization. The rich material culture recovered through archaeological records and the use of ethnohistoric texts and modern ethnography to reconstruct the prehistory of Andean societies.

Anth 340 Magic Witchcraft and Religion (Dual listed with 540) same as Reig 340 (3) Cr 3 Alt S Prentice 201 or 306. Origin and development of indigenous magico-religious systems myth and ritual therapies, prophecy, exorcism, religious and social change including acculturation, syncretism, and revitalization movements.


Anth 414 Southwestern Archaeology (Dual listed with 514) (3) Cr 3 Alt F offered 2004. Prentice 202 or 308 or 315 or 321. Prehistory of the American Southwest as reconstructed from archaeological evidence. Includes an introduction to the intellectual framework of Southwest Archaeology and surveys the Paleoindian and Archaic cultural periods, the adoption of agriculture and the emergence of pueblo societies and regional cultures.

Anth 416 Environmental Archaeology (Dual listed with 516) (3) Cr 3 Alt S offered 2004. Prentice 308. Examination of relationships between the biophysical environment and socio-cultural organization in the archaeological record. Survey of methods used in environmental sciences by archaeologists to understand the human ecosystem.

Anth 418 Global Culture, Consumption and Modernity (Dual listed with 518) (3) Cr 3 Alt F offered 2004. Prentice 201 or 306 recommended. Cross cultural study of the impact of globalization with an emphasis on economic consumption and the movement of goods, ideas, and peoples across cultural and national boundaries.

Anth 420 Cultural Continuity and Change in the Pima Plains (Dual listed with 520) same as Am 420 (3) Cr 3 Alt S recommended. Prentice 315 or 322. Ecological adaptations sociocultural changes and continuities of traditions among Pima and Plains Indian groups through time. Impacts of Euro-American society and technology on Indian of the Great Plains perspectives from ecology, archaeology, ethnology, history, and contemporary literary sources.

Anth 424 Forensic Anthropology (Dual listed with 524) (3) Cr 3 Alt S offered 2004. Prentice Anth 307 and 319 recommended. Comprehensive study of forensic anthropology: a specialized subfield of biological anthropology. Emphasis is placed on personal identification from extremely fragmented burials. Cremated and incomplete skeletal remains. All parameters of forensic study are included as they pertain to anthropology including human variation, taphonomy, paleoanthropology, forensic pathology, epidemiology, genetics, and the nonbiological forensic disciplines. An appreciation for the wide range of medicolegal and biomedical issues will also be gained.

Anth 4271 Archaeology (Same as Am 4271) See Iowa Lakeside Laboratory Nonmajor graduate credit.

Anth 428 Archaeological Lab. Methods and Techniques (Dual listed with 528) (3) Cr 3 Alt S offered 2005. Prentice 306. Laboratory processing and analysis of archaeological materials. Emphasis on technological and cultural processes and archaeological data. Laboratory sessions emphasize the methods and techniques of analysis and recording various categories of material culture.
Anthr 429 Archaeological Field School (Dual listed with 529) Cr 4 or 6 SS 4 or 6 weeks. Prereq. 308 permission of instructor. Summer field school for training in archaeological excavation, research, and data collection and presentation. Preparation for a career in anthropology graduate school and employment opportunities discussed.

Anthr 490 Independent Study Cr 1 to 5 each time taken. Prereq. 9 credits in anthropology. No more than 9 credits of Anthr 490 may be counted toward graduation.

A Archaeology
B Cultural Anthropology
C Biological Anthropology
D Linguistic Anthropology (Same as Ling 490D)
H Honors
I Undergraduate Independent Study (Same as as LL 490)

Courses Primarily for Graduate Students, open to qualified upper-division students.

Anthr 500 Language and Culture (Same as Ling 500) Cr 3-6 Alt S offered 2004. Prereq. 201 or 306 322 or Am In 210 recommended. Conditions and issues of contemporary Native American cultural background and historical background of eighteenth and nineteenth century Indian-White relationships. Examination of legal status, reservation system, treaty violations, Indian missionary education and urbanization, self-determination social impact of resource development and other current concerns.

Anthr 434 Internship Cr 2-6 FS SS Prereq. Junior or senior standing. Supervised practice in government agencies, museums, and business organizations. Not more than 6 credits of internship experience may count toward the major. No credits in Anthr 424 may be used to satisfy Anthropology core courses for majors or for the Anthropology minor. Offered on a satisfactory fail grading basis only.

Anthr 436 Development Anthropology (Dual listed with 536) Cr 3-6 Cr 3 Alt S offered 2004. Prereq. Anthr 201 or 306 Historical and theoretical bases of the practices of development, applied and economic anthropology. Covers a wide range of topics such as the role of aid institutions of development, indigenous knowledge, rural development projects, organization of production, migration, health, and environment.


Anthr 442 Ecological Anthropology (Dual listed with 542) Cr 3-6 Cr 3 Alt S offered 2005. Prereq. Anthr 201 or 306. Recommended. Human interactions with the physical environment. Western and non-Western theories and methods of natural resource use and management. Institutional scientific and linguistic views of nature. Contemporary issues of global significance.

Anthr 444 Sex and Gender in Cross Cultural Perspective (Dual listed with 544) Cr 3-4 with W 544. Cr 3 Alt S offered 2005. Prereq. 201 or 306. Recommended. Cross-cultural examination of the social construction of sexuality. Introduction to the biological fact of sex. Emphasis on non-western societies. Topics presented through examination of ethnographic data will include the range of gender variation status and roles of the institution of marriage and symbols of gender valuation.

Anthr 446 Biological Field School (Dual listed with 546) Cr 4 or 6 SS 4 or 6 weeks. Prereq. Anthr 202 or Biol 109 and permission of instructor. Summer field school for training in behavioral and ecological methods for primatologists. Proposal data collection and analyses and presentation of research topic in primatology.

Anthr 450 Survey of Historical and Theoretical Approaches in Anthropology (3 Cr 3 Alt F offered 2004. Prereq. Senior classification. Anthr majors or consent of instructor. Examination of topical and current research directions in the fields assessed and preparation for graduate study in anthropology.

Anthr 490 Independent Study Cr 1 to 5 each time taken. Prereq. 9 credits in anthropology. No more than 9 credits of Anthr 490 may be counted toward graduation.


Anthr 511 Culture Change and Applied Anthropology (Dual listed with 511) Cr 3-6 Cr 3 Alt F. Prereq. 6 credits in anthropology. 201 or 306. Theoretical and practical considerations of cultural development. Examination of theories of cultural change, contact and acculturation. Dynamics of cultural change in contemporary world cultures. Principles, theories, and ethics of international development projects from a sociocultural perspective.


Anthr 512 The Family and Kinship in Cross Cultural Perspective (Dual listed with 513) Cr 3 Alt S. Prereq. 6 credits in anthropology. 201 recommended. Comparative and historical study of the family and kinship systems in cross-cultural perspective. Discussion of the structure, cycle, and functioning of family and kinship systems in ethnography including the family in Western culture. Theoretical issues in contemporary family and kinship studies.

Anthr 514 Southwestern Archaeology (Dual listed with 514) Cr 3 Alt F offered 2004. Prereq. 202 or 308 or 315 or 321. Prehistory of the American Southwest reconstructed from archaeological evidence. Includes an introduction to the intellectual frameworks of Southwest archaeology and surveys the Paleoindian and Archaic cultural periods. The adoption of agriculture and the emergence of pueblo societies and regional cultures.

Anthr 515 Archaeology of North America (Dual listed with 515) Cr 3 Alt S. Prereq. 308 Prehistory of the American Southwest as reconstructed from archaeological evidence. Includes an introduction to the intellectual frameworks of Southwest archaeology and surveys the Paleoindian and Archaic cultural periods. The adoption of agriculture and the emergence of pueblo societies and regional cultures.

Anthr 516 Environmental Archaeology (Dual listed with 516) Cr 3 Alt S offered 2004. Prereq. 308 Examination of relationships between the biophysical environment and the people of North America as recorded in the archaeological record. Survey of methods used in environmental sciences by archaeologists to understand the human ecosystem.

Anthr 518 Global Culture, Consumption and Modernity (Dual-listed with 418) Cr 3 Alt F offered 2004. Prereq. Anthr 202 or 306 recommended. Cross-cultural study the global consumption with an emphasis on economic consumption and the movement of goods, ideas, and peoples across cultural and national boundaries.

Anthr 519 Skeletal Biology (Dual-listed with 319) Cr 3 Alt F offered 2004. Prereq. Anthr 202 or 307 or college level biology recommended. Concerned with the study of the skeleton, anatomy, morphology, genetics, growth and development and population variation of the human skeleton. Applications to forensic anthropology and paleoanthropology.

Anthr 520 Cultural Continuity and Change in the Prairie Plains (Dual listed with 420) Cr 3 Alt S offered 2004. Prereq. 315 or 322. Ecological adaptations, sociocultural changes, and continuities of traditions among the Plains Indian groups through time. Impacts of Euro-American society and technology on Indians of the Plains. Perspectives from ecology, archaeology, ethnology, history and contemporary literary sources.

Anthr 521 World Prehistory (Dual listed with 321) Cr 3 Alt S. Prereq. 202 recommended. An introduction to archaeological sites from around the world including the Near East, Africa, Europe, Mesoamerica, and North and South America. Emphasis on the interpretation of material cultural remains in reconstructing past societies.

Anthr 522 Peoples and Cultures of Native North America (Dual listed with 322) Cr 3-SS 8 Prereq. 201 or Am In 210. Origin distribution and traditional life of native peoples of North America. Survey of culture areas: ecology and subsistence, language, kinship, life cycle, political economy, and religious systems. Impact of European contact.

Anthr 523 Peoples and Cultures of Latin America (Dual listed with 323) Cr 3 Alt S. Prereq. 6 credits in anthropology. 201 or 306 recommended. Origins and development of native populations of Old and New World cultures: theoretical problems of prehistoric and tribal societies: discussion of economic social political and religious systems: processes of change.

Anthr 524 Forensic Anthropology (Dual listed with 524) Cr 3 Alt S. Prereq. 6 credits in anthropology. 201 or 306 recommended. Recommended. Study of forensic anthropology specialized subfield of biological anthropology. Emphasis placed on personal identifications from extremely fragmentary remains. Burnt autempled and incomplete skeletal remains. All parameters of forensic study are included as they pertain to anthropology including human variation: taphonomy: anthropology: pathology: epidemiology: genetics: and the non-biological forensic disciplines. An appreciation for the wide range of medicolegal and biological issues will also be gained.

Anthr 525 Peoples and Cultures of Africa (Dual listed with 525) Cr 3 Alt S. Prereq. 6 credits in anthropology. 201 or 306 recommended. Origins and distribution of peoples of Africa: geographic characteristics as related to the types including early civilizations: a comparative examination of economic subsistence: language and political organization and religions and societies throughout the continent: the impact of colonization: and the nature of contemporary African societies.

Anthr 526 Peoples and Cultures of East and Southeast Asia (Dual listed with 526) Cr 3 Alt S. Prereq. 6 credits in anthropology. 201 or 306 recommended. Origins and development of...
early civilizations on the western rim of the Pacific including China, Japan, and mainland and insular Southeast Asia. Survey of current issues in ecological historical and cultural contexts.

Anth 528 Archaeological Laboratory Methods and Techniques (Dual listed with 428) Cr. 3 Alt S offered 2005. Prereq 308. Laboratory processing and analysis of archaeological materials experiments in technologies such as stone tools and ceramics, the organization and interpretation of archaeological data. Laboratory sessions emphasize the methods and techniques of analyzing and recording various categories of material culture.

Anth 529 Archaeological Field School (Dual listed with 425) Cr. 4 or 6 SS 4 or 6 weeks. Prereq 308 permission of instructor. Summer field school for training in archaeological excavation and techniques documentation and interpretation of archaeological evidence.

Anth 530 Ethnographic Field Methods Cr. 3 Alt F offered 2004. Prereq 6 credits in anthropology permission of instructor Field training experience in ethnography. Problems emphasizing field studies in the contemporary societies of the world. Focus on techniques of data gathering and analysis.

Anth 532 Current Issues in Native North America (Dual listed with 423) (3-4) Cr. 3 Alt S offered 2004. Prereq 6 credits in anthropology 201 or 306 322 or Amn in 210. Recommended. Conditions and issues of contemporary Native Americans: historical background of eighteenth and nineteenth century Indian-white relationships, examination of legal status, the reservation system, treaty violations, Indian minority education and urbanization, self-determination, social impact of resource development, and other current concerns.

Anth 533 African American Ethnography (Dual listed with 533) (3-4) Cr. 3 Alt F offered 2004. Prereq 6 credits in anthropology 201 or 306 recommended. Ethnographic approaches to the study of African Americans in a cross-cultural and historical perspective race relations in the Americas.

Anth 535 Peoples and Cultures of the Middle East (3) Cr. 3 Alt F offered 2004. Prereq 201 or 306 recommended. Anthropological approaches to the study of Middle East cultures. Survey of major culture areas: discussion of economic, political, and social-religious issues and systems. Examination of contemporary social-commercial developments.

Anth 536 Development Anthropology (Dual listed with 436) (3-4) Cr. 3 Alt S offered 2004. Prereq Anth 201 or 306. Historical and theoretical basis of the practices of development applied and economic anthropology. Covers a wide range of topics such as the role of institutions of development, indigenous knowledge, rural development projects, organization of production, migration and health.

Anth 537 Andean Archaeology (3) Cr. 3 Alt F offered 2004. Prereq 202 or 321 recommended. Survey of prehistoric Andean cultures of Peru, Bolivia, and Ecuador. The archaeology of the Incas and their ancestors. Emphasis on prehistoric economic, political, and religious and political organization. The rich material culture recovered through archaeological research and the use of ethnographic texts and modern ethnographic research to reconstruct the prehistory of Andean societies.


Anth 540 Magic, Witchcraft, and Religion (Dual listed with 340) (3) Cr. 3 Alt S. Prereq 6 credits in anthropology 201 or 306 recommended. Ongoing development of indigenous magico-religious systems and ritual therapeutic aspects symbols and meanings. Religion and sociocultural change including acculturation, revitalization and retransformation movements.

Anth 542 Ecological Anthropology. (Dual listed with 442) (3) Cr. 2 Alt S offered 2005. Prereq Anth 201 or 306 recommended. Human interactions with the physical environment. Western and non-Western theories and methods of natural resource use and management. Institutional scientific and legalistic views of nature. Contemporary issues of global significance.

Anth 544 Sex and Gender in Cross cultural Perspective (Dual listed with 444 same as W S 544) (3) Cr. 3 Alt S. offered 2005. Prereq 201 or 306 recommended. Cross-cultural examination of the social construction of genders out of the biological fact of sex. Emphasis on how sociocultural topics presented through examination of ethnographic data will include the range of gender variation status and roles: the institution of marriage and symbols of gender valuation.

Anth 545 Biological Field School (Dual listed with 445) Cr. 4 or 6 SS 4 or 6 weeks. Prereq Anth 202 or 302 109 and permission of instructor. Summer field school for training in behavioral and ecological methods for primatologists. Proposal data collection and analyses and presentation of research topic in primatology.

Anth 555 Seminar in Archaeology (3) Cr. 3 Alt S offered 2004. Prereq 308 permission of instructor. Examination of the history of anthropological archaeology and current issues and debates concerning methods, theories and the ethics of modern archaeology.

Anth 590 Special Topics Cr 1 to 5 Prereq 10 credits in anthropology senior or graduate classification.

Iowa Lakeside Laboratory (Same as in LL 590)

Courses for Graduate Students

Anth 610 Society and Technology in Sustainable Food Systems (Same as SusAg 610) See Sustainable Agriculture

Anth 699 Research I Iowa Lakeside Laboratory. (Same as in LL 699)

Architecture

Iowa State University

Calvin F Lewis Chair of Department

Professors Block Engelbrecht Lewis Osterberg Persson Shao

Professors (Ementris) Findlay Heenstra Klaastra Kempf McKeown Shank Stone

Associate Professors Bassler Becherer Cardinal Pett Chorro Hornitz Schwenk

Assistant Professors Alpert Arlande Albrecht Maves Noeckel Paason Robinson Squire Standard

Undergraduate Study

The undergraduate program in architecture is a five-year curriculum leading to the bachelor of architecture degree. The program provides opportunities for general education as well as preparation for professional practice and/or graduate study. An optional one semester foreign study program is offered to fourth year students.

The undergraduate curriculum includes one year of preprofessional coursework and four years of professional study. Admission to the professional degree program is based upon the student's performance in the completed preprofessional curriculum. Previous high school record or transfer record (where applicable), portfolio and essay evaluations and available departmental resources.

Objectives of the Bachelor of Architecture program.

The Department is committed to the study of architecture as a cultural discipline in which issues of practice, the multiplicity of social formations in which buildings exist, and the environmental effect are enfolded with the subject matter of building design and construction material of form and use.

Architecture arises from the aspirations that diverse individuals and groups have for their physical environment and from the enterprise of designing and fabricating the landscape we inhabit. It involves individual and multiple buildings in the spaces within them and the exterior landscape.

It is our intent that our students develop the skills with which to critically assess and research architectural questions and to invent architectural designs through which these questions are addressed: that they develop a working method for designing and that they have the communication, graphic, modeling, and computational skills to support design exploration and to represent their design ideas to others: that they gain knowledge of architectural technologies through which buildings are given form of which they are constructed and by which they are environmentally tempered: that they understand architectural history: that they understand the theoretical and discursive cultural underpinnings of the discipline of architecture that they are able to reference architectural precedents and know how to utilize all of these in the development of their ideas and that they have grounding in the ethical and practical aspects of the architectural profession in society.

For students entering the professional program the department strongly recommends purchase or lease of a laptop/notebook computer and appropriate software. See the Undergraduate Academic Advising Handbook in the departmental office or the departmental web pages for hardware and software specifications.

For a more complete undergraduate program description see College of Design Curricula Graduate Study

The graduate program in architecture offers opportunities for both professional and post professional study leading to the master of architecture and master of science degrees. In each of its options the program emphasizes the relationship between professional education and architectural research culminating in a thesis as a demonstration of both professional competence and a deep understanding of the discipline of architecture.

Objectives of the Graduate Architecture Program

Graduate students are asked to pursue architecture as a critical practice. Technical, artistic, theoretical and historical aspects of the discipline are studied in an inventive and interconnected manner with an emphasis on developing a cogent and comprehensive body of architectural knowledge that is rooted in critical thinking and that enables students to learn how to bring their knowledge and critical capacity to bear on the construction of buildings: the evaluation of materials and assemblies: the use of technologies: the analysis of cultural issues: impact of architectural work and sustainability in the design and the eventual pursuit of normative or experimental professional practices.

The M Arch (100) option is designed for individuals with an undergraduate degree other than architecture. Students explore the full range of architectural subjects through seminars and through the sequence of design studios and thesis. One hundred credits are required including 40 graduate credits.

The M Arch (60) option is for individuals with a preprofessional undergraduate major in architecture. Applicants are given advanced standing in the M Arch (100) option based on a review of their academic record. Following the completion of the requisite professional courses the student is expected to develop an individualized course of study leading to the thesis. Sixty credits are required including 30 graduate credits.

For students entering the professional program the department highly recommends purchase or lease of a laptop/notebook computer and appropriate software. See the Undergraduate Academic Advising Handbook in the departmental office or the departmental web pages for hardware and software specifications.
A laptop notebook computer and appropriate software
See the Coordinator or the departmental web pages for
hardware and software specifications.

The M Arch option is a post professional course of
study leading to the master of architecture and is
designed for individuals a professional degree in
architecture. The post professional option affords
the opportunity for advanced study in architectural theory
and design leading to the thesis. Thirty graduate
credits are required.

The graduate program also offers a course of study
leading to the master of science in architectural
studies. The course of study is designed for
students without architectural backgrounds and
students with previous degrees in architecture
wishing to conduct specialized graduate level research
in architecture. Students work closely with faculty
who are engaged in research and scholarship. Thirty graduate credits are required.

Double degree programs are currently offered with the Department of Community and Regional Planning (M Arch / M C R P) and the College of Business (M Arch / M B A).

Financial support in the form of teaching and research
assistantships is available.

Contact the department office for specific curricula.

Courses open for nonmajor graduate credit: 420 422 423 424 425 427 434 437 467 471

Courses Primarily for Undergraduate Students

Arch 102 Pre Architecture Design (1) Cr 4 FS
A studio course focused on three-dimensional design and
training with emphasis on creative
conceptualization. Exploration of materials and
analytical thinking. Includes study of architectural
precedents and exercises to develop ability to
communicate about form and space.

Arch 132 Two Dimensional Studio (0-6) Cr 2 FS
Prereq: Enrolment in the preprofessional program
Introduction to free hand drawing concepts and
practices. Course will engage in the exploration of
the sketch as a means of inquiry, conceptualization and
representation of form and space. Exercises focus on
acquiring proficiency in the perceptual and experiential
aspects of drawing. Various media, subjects and
environmental contexts.

Arch 182 An Introduction to Architecture (3-0) Cr 3
Prereq: Open to non-majors. Through the study of
buildings and theories this course is
designed to introduce the discipline of architecture
presenting architectural buildings and how architectural
works as culturally grounded events and artifacts.

Arch 201 Architectural Design I (1-15) Cr 6 F
Prereq: Completion of the preprofessional program
and admission into the professional program.
Introduction to architectural design. An exploration of
fundamental architectural ideas form, space,
meaning, through studio projects that focus on
human inhabitation of the material environment
introduction to design processes, research invention
problem solving, visualization and communication
Opportunities to develop design media skills.
Special emphasis on materials and methods of building
construction.

Arch 202 Architectural Design II (1.5-16) Cr 6 S
Prereq: 201 A continuation of 201. Studio projects
require more advanced exploration of the
relations between ideas and materiality and of the
complex cultural interactions within which we
design. Further development of design process skills
with a special emphasis on the relations between
design media and design processes.

Arch 221 History of Western Architecture I (Same
as Dens S 221) (0-3) Cr 3 F
Introductory survey with emphasis on the cultural, visual natural and
constructed environment through the Renaissance.

Arch 222 History of Western Architecture II (Same
as Dens S 222) (0-3) Cr 3 F
Introductory survey with

emphasis on the cultural visual natural and
constructed environment through Renaissance.

Arch 230 Design Communications I (0-6) Cr 2 F
Prereq: Admission to the professional program.
Investigations of various design media including
computer graphics and freehand drawing and
their applications to design specifically to the course work in
201. Exercises to develop manual skill and
perceptual sensitivity.

Arch 232 Design Communications II (0-6) Cr 2 S
Prereq: 230 Advanced study of various design media
including computer graphics and their applications to
design specifically to the coursework in 202.
Exercises to develop manual skill and perceptual
sensitivity.

Arch 240 Materials and Assemblies (3-1) Cr 4 F
Prereq: Completion of the preprofessional program
and admission into the professional program.
Introduction to common architectural materials, their
properties, integration into light construction systems, and
model building models of natural and man-made shapes.

Arch 242 Architectural Structures I (3-1) Cr 4 S
Prereq: 240. Structural performance and preliminary design of residential scale wood frame members and systems,
principles of equilibrium and material behavior.

Arch 271 Human Behavior and Environmental
Theory (3-0) Cr 3 F
Prereq: Completion of the preprofessional program
and admission to the professional program.
Introduction of theories that describe social structures and order and the
way in which individuals and societies organize themselves and
structure their environment.

Arch 301 Architectural Design III (1.5) Cr 6 F
Prereq: 202. A consideration of design as a
constructed cultural artifact. Projects address
perceptual aspects and strategies of situation
and location, examination of environmental phenomena
and patterns of use and settlement as revealed and
affected by the architectural artifact. Development of a
critical design process is stressed.

Arch 302 Architectural Design IV (1-15) Cr 6 S
Prereq: 301 and minimum 2.0 GPA in previous studio courses.
A continuation of 301 examining housing in the urban situation
different scales of use and occupation within the city as shaped by cultural
and historical trends. Projects examine collective and individual
values related to the condition of adjacency. The emphasis
will be to consider various aspects of scale within a project
and a further development of critical and technical
methods.

Arch 310 Practical Experience Cr R Prereq:
Permission of department chair. Students must register
for this course prior to commencing each period.
Available only to students taking course loads of
even credits or less.

Arch 334 Computer Applications in Architecture
(2-2) Cr 3 FS. 201. 230 and 232. Current
and potential applications of digital computers in
architecture. Projects employing computer graphic
methods. Awareness of programming languages
related to applications.

Arch 335 Advanced Two Dimensional Studio (Same as Art S
335) (0-8) Cr 2 each time taken. Up to a maximum
of 8 credits for 335 and 535 combined. FS. Investigation of
basic sculptural media. Modeling in clay, wood,
carving, stone, carving, casting in plaster and metal,
and other such techniques.

Arch 344 Architectural Structures II (2-1) Cr 3 F
Prereq: 242. Structural performance and preliminary design of building systems and systems. Investigation of steel frame members
and systems. Special emphasis on steel and metal
construction techniques.

Arch 346 Architectural Structures III (2-1) Cr 3 S
Prereq: 344. Structural performance and preliminary
design of low rise reinforced concrete and
strengthened concrete members and systems.
Wind and seismic lateral forces and the principles of
equilibrium and material behavior.

Arch 381 Solar Home Design (Same as Dens S 351)
(3-0) Cr 3 S, Prereq: 202. Architectural design and
technique of residential structures with emphasis on energy conservation
and solar energy utilization.

Arch 387 Environmental Forces in Architecture
(3-0) Cr 3 F Prereq: Completion of the preprofessional
program and admission into the professional program.
Introduction to environmental forces that describe the
function of buildings in terms of thermal comfort and
patterns of occupancy. Prerequisites: methods of analysis of
thermodynamics and field methods that contribute to
design synthesis. A design process is developed using building simulations
of solar, natural, and artificial energy sources.

Arch 387 Design Inquiry (3-0) Cr 3 S, Prereq: 271.
An overview of methods of inquiry in design. Different
ways of thinking about design and design processes in
architecture. Emphasizing program and design activities with
project objectives, planning and implementing an effective process to
meet those objectives.

Arch 401 Architectural Design V (1.5-15) Cr 6 F
Prereq: 302. A rigorous examination of architecture's
relationship to culture and technology. Studio
projects stress the interpretation and integration of
contextual and historical considerations as well as
structural environmental and social considerations of systems in
a comprehensive design proposal.

Arch 402 Architectural Design VI (1-15) Cr 6 S
Prereq: 401 and minimum 2.0 GPA in previous studio courses.
An examination of the relationship between
architecture and the city. Studio projects stress
analysis and interpretation of the diverse forces and
conditions that impact and inform architectural development
in the urban environment. Urban design study.

Arch 403 Architectural Design VII (1-15) Cr 6 F
Prereq: 402. Advanced forum for student initiated
architectural research and design. Experimentation
and innovation are encouraged.

Arch 404 Architectural Design VIII (1-15) Cr 6 S
Prereq: 403. Advanced forum for architectural
research and/or design. Topics Vary.

Arch 420 History of American Architecture (Dual
listed with 520) (3-0) Cr 3 S, Prereq: Junior
classification. A survey of the historical development of
American architecture. Nonmajor graduate credit.

Arch 422 Topics in Medieval Architecture (Dual
listed with 522) (3-0) Cr 3 F, Prereq: Junior
classification. The history and principles of
medieval architecture and urban design considering
relationships to the cultural, visual arts, site and
surroundings. Nonmajor graduate credit.

Arch 423 Topics in Renaissance to Mid Eighteenth
Century Architecture (Dual listed with 523) (3-0) Cr 3 S,
Prereq: Junior classification. The history and principles of
architectural developments of the mid-eighteenth
century architecture and urban design considering
relationships to the cultural, visual arts, site and
surroundings. Nonmajor graduate credit.

Arch 424 Topics in Nineteenth Century Architecture
(Dual listed with 524) (3-0) Cr 3 F, Prereq: Junior
classification. The history and principles of
nineteenth century architecture and urban design
considering relationships to the cultural, visual arts
site and surroundings. Nonmajor graduate credit.

Arch 425 Topics in Twentieth Century Architecture
(Dual listed with 525) (3-0) Cr 3 F, Prereq: Junior
classification. The history and principles of
twentieth century architecture and urban design
considering relationships to the cultural, visual arts
site and surroundings. Nonmajor graduate credit.

Arch 427 History Theory, and Criticism of Chinese
Architecture (Dual listed with 527) (3-0) Cr 3 F.
Architecture

Preparatory work
Survey of the history and
theoretical concept of Chinese built environment with
emphasis on the morphology of built form and its
relation to art, landscape design, and urban structure.
Nonmajor graduate credit.

Arch 431 Analytical Drawing. (1-6) Cr. 3 F, S, Prereq: 232, 302
Exploration of 2 and 3 dimensional
representations. Emphasis on on-site
freehand sketching. Perspective and orthographic drawing.
Rendering of shadows and textures and use of digital media.

Arch 434 Computer-Aided Architectural and
Environmental Design. (1-4) Cr. 3 S, Prereq: 334
Com S 107 or 205
Emphasis on application of the
computer as a design tool.
Topical applications
and computer graphic methods. Development of computer
software for architectural and environmental problem solving.
Nonmajor graduate credit.

Arch 436 Advanced Design Media. (0-9) Cr. 3
Each
time taken to a maximum of 8 credits.
F, S, Prereq: 230, 232
Special topics in design media applications.

Arch 437 Architectural Photography. (3) Cr. 3 F
Prereq: 202
Emphasis on use of the camera and
lighting in photographing drawings and interiors and
exterior building environments.
Nonmajor graduate credit.

Arch 448 Materials and Assemblies. (3-0) Cr. 3 S
Prereq: 345
Introduction of the materials and
integrated systems found in complex construction assemblies.
Emphasis on determination and utilization
of appropriate forms of materials assemblies and
structural systems for large scale construction.

Arch 458 Environmental Control Systems. (3-0) Cr.
3 S, Prereq: 357
Overview of architectural
environmental control systems in response to
occupant comfort patterns of use health and safety
regulations. Emphasis on the analytical rules of thumb
and calculation methods necessary to provide
integrated design synthesis of technical systems
within architectural frameworks. Advanced is developed to aid
understanding the use and design of mechanical
electrical plumbing fire safety transportation and
conveying systems and subsystems.

Arch 467 Preservation, Restoration, and Rehabilitation.
(3-0) Cr. 3 S, Prereq: 357
Overview of architectural
environmental control systems in response to
occupant comfort patterns of use health and safety
regulations. Emphasis on the analytical rules of thumb
and calculation methods necessary to provide
integrated design synthesis of technical systems
within architectural frameworks. Advanced is developed to aid
understanding the use and design of mechanical
electrical plumbing fire safety transportation and
conveying systems and subsystems.

Arch 471 Design for All People. (Same as Dan S 471)
Gerom 471) (3-0) Cr. 3 S, Prereq: Senior classification or
graduate standing. Principles and procedures of
universal design in response to the varying ability level
of users. Assessment and analysis of existing
buildings and sites with respect to standards and
details of accessibility for all people including visually
impaired, mentally impaired and mobility restricted
users. Design is neither a prerequisite nor a required part of the course.
Enrollment open to students
mapped in related disciplines.
Nonmajor graduate credit.

Arch 482 Professional Practice. (Dual listed with
582) (3-0) Cr. 3 F, S, Prereq: 202
Emphasis on the circumstances and opportunities of the professional
practice of architecture as profession process organization business and evolving models of practice.

Arch 485 Contemporary Architectural Issues. (2-0) Cr.
2 F, S, Prereq: Credit or enrollment in Arch 403
Topical lectures, readings and seminar presentations
regarding contemporary architectural issues in support of
Arch 403.

Arch 490 Independent Study FS SS Cr 1 to 9
Prereq: Written approval of instructor and department chair on required form. Independent investigation
A. Design Communications
B. Technical Systems
D. Architectural History
E. Behavioral Studies
F. Practice
H. Honors

Courses Prerequisite for Graduate Students, open to qualified undergraduate students
Arch 501 Architectural Design and Communication.
(1-15) Cr. 6 F, S, Prereq: Admission to the M Arch
program Emphasis on architectural design and digital
technologies. Parallel development of fundamental architectural design and design
processes.

Arch 502 Architectural Design and Communication.
(1-15) Cr. 6 P, S, Prereq: 501 Emphasis on architectural design and digital
technologies. Fundamentals and communications
processes.

Arch 503 Architectural Design and Communication.
(3-0) Cr. 3 S, Prereq: 502 Architectural design
and communication conventions Emphasis on
architectural systems and design presentation
graphics.

Arch 520 History of American Architecture. (Dual listed with 420) (3-0) Cr. 3 S, Prereq: Graduate classification.
A survey of the historical development of American architecture.

Arch 522 Topics in Medieval Architecture. (Dual listed with 422) (3-0) Cr. 3 F, S, Prereq: 221, 222 and
senior classification or graduate standing. The history and principles of medieval architecture and
urban design considering relationships to the culture visual arts site and surroundings.

Arch 523 Topics in Renaissance to Mid-eighteenth Century Architecture. (Dual listed with 423) (3-0) Cr.
3 S, Prereq: 221, 222 and senior classification or graduate standing. The history and principles of
Renaissance to mid-eighteenth century architecture and
urban design considering relationships to the culture visual arts site and surroundings.

Arch 524 Topics in Nineteenth Century Architecture.
(3-0) Cr. 3 F, S, Prereq: 221, 222 and senior classification or graduate standing.
The history and principles of nineteenth century architecture and urban design considering relationships to the culture visual arts site and surroundings.

Arch 525 Topics in Twentieth Century Architecture.
(Dual listed with 425) (3-0) Cr. 3 F, S, Prereq: 221, 222 and
senior classification or graduate standing. The history and principles of twentieth century
architecture and urban design considering relationships to the culture visual arts site and surroundings.

Arch 527 History, Theory, and Criticism of Chinese
Architecture. (Same as Dan S 527) (3-0) Cr. 3 F, S, Prereq: Senior classification or graduate standing.
The history and theoretical concept of Chinese built
environment with emphasis on the morphology of
built form and its relationship to art, landscape design and urban structure.

Arch 528 Topical Studies in History Theory, and
Criticism of Architecture, (Same as Dan S 528) (2-0)
Cr. 2 or 3 each time taken FS, S, Prereq: 221, 222
or senior classification or graduate standing.
A. Pre-Modern
B. Modern
C. American
D. World Architecture
E. Architects
F. Historic Preservation
G. Technical Structural and Programmatic
I. Urbanism
J. Vernacular Architecture
K. Practice

Arch 534 Advanced Computer Aided Architectural
Design. (1-4) Cr. 3 each time taken maximum of 6
credits. F, S, Prereq: 434. Permission of instructor.
Emphasis on concepts algorithmic design processes and
data base development and evaluation and
development of software for complex data management
and applications in architectural design.

Arch 535 Advanced Three-Dimensional Studio.
(0-8) Cr. 2 each time taken up to a maximum of 8
credits for 355 and 356 combined. F, S, Prereq: 355 or
graduate standing. Advanced investigation of sculptural expression with emphasis on individual projects.

Arch 545 Construction Methods. (3) Cr. 3 S, Prereq:
Senior classification or graduate standing.
Advanced studies of construction methods and procedures.

Arch 552 Architectural Luminous Environment.
(3-0) Cr. 3 S, Prereq: Senior classification or graduate standing.
An integrated study of the concepts of lighting natural and artificial lighting, visual stimuli comfort, discomfort perception and active and
passive systems of control. Emphasis on daylighting design.

Arch 554 Architectural Acoustic Environment.
(3-0) Cr. 3 S, Prereq: Senior classification or graduate standing.
An integrated study of the concepts of acoustic stimuli noise control room acoustics and
sound isolation.

Arch 557 Advanced Studies in Building Systems.
(3) Cr. 3 S, Prereq: Graduate standing. Advanced studies of the integration and development of
technology in building systems.

Arch 558 Appropriate Technologies for Architecture.
(3-0) Cr. 3 F, S, Prereq: Graduate standing.
Appropriate uses of technology in building design.

Arch 556 Housing for Specific Groups. (Same as
eron 566, Dan S 566) (3-0) Cr. 3 S, Prereq:
Senior classification or graduate standing. Principles of
garontology as related to planning programming designing and evaluating housing environments for
elderly residents. The continuum of age segregated and
gene integrated housing options for older people
including independent living, congregate living, shared living, continuing care retirement communities
and nursing care environments. Design is neither a prerequisite nor a required part of the course. Open
to students in related disciplines with an interest in
generontology and housing.

Arch 575 Contemporary Urban Design Theory.
(3-0) Cr. 3 S, Prereq: Senior classification or graduate standing.
Develops an understanding of the urban design theory and its application to urban problems.

Arch 577 Social Impact of the Built Environment.
(3-0) Cr. 3 S, Prereq: Graduate standing.
Interdisciplinary review and analysis of social and
scientific research applied to architectural design.

Arch 582 Professional Practice. (Dual listed with
482) (3-0) Cr. 3 F, S, Prereq: Graduate standing.
Emphasis on the circumstances and opportunities of the professional practice of architecture as profession
process organization business and evolving models of practice.

Arch 584 Architectural History and Theory. (3-0)
Cr. 3 F, S, Prereq: Graduate standing. Pre-modern
architectural history and theory. Interpretations of
language form meaning and technique in relationship to the production of architecture.

Arch 586 Architectural History and Theory II. (3-0)
Cr. 3 S, Prereq: Graduate standing. Modern and
contemporary architectural history and theory.
Interpretations of language form meaning and technique in relationship to the production of
contemporary architecture.

Arch 588 Pre Thesis Seminar. (3-0) Cr. 3 S, Prereq:
Graduate standing. Procedures and methods for thesis
production.

Arch 590 Special Topics. (3-0) Cr. 1 to 5.
Prereq: Written approval of instructor and
department chair on approved form. Investigation of architectural issues having a specialized nature.
Courses for Graduate Students
Arch 601 Advanced Architectural Design I (115)
Cr 6 F prereq Admission to the graduate program and formal contractual and cultural implications of building in the landscape

Arch 602 Advanced Architectural Design II (115)
Cr 6 S prereq Arch 601 A rigorous examination of architecture's relationship with culture and technology. Studio projects stress the interpretation and integration of contextual and historical considerations as well as structural, environmental, and communication systems in a comprehensive design proposal

Arch 603 Advanced Architectural Design III (115)
Cr 6 each time taken to a maximum of 12 credits S prereq Professional degree in architecture or advanced standing in the graduate program. The design of urban buildings in their cultural context

Arch 690 Independent Design Study (115) Cr 6 FS SS Prereq Admission to MSAS or M ARCH 30 credit program. Independent architectural design projects commensurate with student interests, requiring approval of Architecture Graduate Advisory Committee

Arch 699 Thesis (118) Cr 3 9 FS SS

Art and Design
Roger E. Baer Interim Chair of Department
Professors Dale Fowles Singer Smith Siegeltz Tattak
Distinguished Professors (Emeritus) Heggan Miller
Professors (Emeritus) Allen Bro Danielson Evans Held Petersen Pickett Sontag
Associate Professors Aukkatt Baer Caldwell Croyle Cunnally Curran Fontaine Gibbs Harinsd Jones Liligren Malvan Mickelson Stout Warme
Associate Professors (Adjunct) deMartino Polihman
Associate Professors (Emeritus) Bruene Lehrer McClain Polster Sage Sreenivasam
Assistant Professors Gould Hageman Harris Iasevich Kage Kart Martin Muensch Paschoke Raverty Richards Sanders Tilden Welton
Assistant Professors (Adjunct) Boehner Ure

Undergraduate Study
The department offers work for the degrees of bachelor of fine arts and bachelor of arts. Programs in general studio art and art history integrated studio arts (visual communications or studio research emphasis) graphic design and interior design are possible within four curricula art and design—BFA art and design—BFA graphic design—BFA interior design. BFA see College of Design: Curricula Each of these curricula affords excellent preparation for a variety of career opportunities or a basis for graduate study in art and design disciplines.

The curriculum in art and design leading to the BFA provides a studio concentration. Students select an emphasis in one of the following areas (1) visual communications (photography papermaking computer aided art and design illustration mixed media). (2) studio research wood design ceramics jewelry and metals fibers papermaking printmaking drawing two and three dimensional mixed media.

The two concentrations emphasize aesthetics visual problem solving and skill development in a variety of media employing contemporary historical and cultural thinking with visual languages.

The curriculum in graphic design leads to the BFA degree. Emphasis is on creative problem solving the design process and the visual organization of communication media. Graphic design graduates effectively integrate abstract thinking skills communication design theory history and methodol-

ogy technology design process and communication design systems including typography symbology and image creation with an understanding of professional practice.

For students entering the Graphic Design Interior Art and Design or ART IS programs involving computer aided design or animation the department highly recommends purchase or lease of a laptop notebook computer and appropriate software. Contact the department or see the College of Design web site for hardware and software specifications.

The curriculum in interior design leads to the BFA degree. Emphasis is on the student's application of the design process to creatively solve problems of the interior environment based on a knowledge of techniques materials resources human factors and interior professional responsibility. Graduates in interior design are competent in visual communication (sketching drafting and computer aided design) design problem solving space planning lighting for interiors finish and furniture selection and detailing interior construction. The curriculum is accredited by the Foundation for Interior Design Education Research (FIDER) as providing professional level education.

Students working toward the BFA art and design pursue studies in a related or supporting area by means of a second major minor and/or approved program of study that meets the individual needs of a student. Art history art education integrated studio arts pre graphic design and pre interior design courses may be taken to fulfill the art and design program of study.

Students planning a career in art education preparing for certification to teach art in grades kindergarten through twelve should matriculate in the art and design curriculum leading to the BFA degree. This sequencing will provide a strong studio foundation.

Many requirements for teacher certification are course options within general education requirements. Students should work closely with a department advisor in planning their program of study to maximize their ability to meet entrance requirements to the education program. For general requirements for teacher certification see College of Education.

Transfer students with studio credits from other colleges and universities must present for department review a portfolio of work done in those courses in order to have the credits apply toward specific studio requirements. Students are advised to present this portfolio of work upon admission and prior to registration for classes.

A fee will be assessed when field trips are indicated in many courses. Fees for materials are required.

The department offers no minor but participates in the undergraduate minor in design studies.

Graduate Study
The department offers work for the degrees of master of arts in art and design and master of fine arts in graphic design interactive design and interior design. Degree specializations leading to the master of arts degree are available in art education and interior design. Graduates have a broad understanding of visual communication problem solving and interdisciplinary study.

Graduate students who have not completed an undergraduate program of study substantially equivalent to that required of undergraduates in the department can expect that additional supporting coursework determined by the graduate faculty will be required.

Graduate students in the art education specialization leading to the MA degree participate in a 30 credit program of study which is linked with the New Art Basics research project. If they do not hold teacher certification students may work toward acquiring this as part of their graduate study. A creative component is required for the students and completed through individually focused discipline specific coursework culminating in a written summary of research results. Graduates with a specialization in art education are competent as reflective teachers experienced in applied qualitative research in the K-12 classroom. Graduates gain a deep understanding of the New Art Basics approach to visual thinking skills and global multi-cultural visual arts education with a learner-centered focus.

The master of arts program in interior design requires a minimum of 36 credits including an art and design seminar a studio concentration a history from six elective courses outside the department and completion of a thesis or thesis exhibition. Graduate in interior design selecting the MA degree focus on research.

The master of fine arts programs in graphic design and interior design require a minimum of 60 credits while the program in integrated visual arts requires a minimum of 61 credits including an art and design seminar a studio concentration history and symbolology courses a teaching practicum elective courses outside the department or area of study and the completion of a thesis-exhibition or thesis.

The MFA thesis exhibition is composed of two parts a substantial exhibition and a written statement that describes the development of the work in the exhibition its objectives and its historical and cultural points of reference. A thesis may be an appropriate alternative but some portion of the work should entail an element of design problem solving in the form of a visual product.

Master of Fine Arts graduates in graphic design are skilled in visual communication design problem solving and are adept in the use of visual language and symbolology. Graduates are proficient in the design of communications and the use of technologies that incorporate human interaction with environments objects electronic and traditional publications.

Interior Design graduate students selecting the MA degree are required to participate in an interdisciplinary program of study that meets the individual needs of the student. Art history art education integrated studio arts pre graphic design and pre interior design courses may be taken to fulfill the art and design program of study.

Integrated Visual Arts MFA graduates have skills that link traditional studio disciplines with emerging technologies. Graduates are prepared as visual artists to enter studio research business higher education or new interdisciplinary fields. The MFA is recognized as the terminal degree.

Credit earned at Iowa State University or other institution for the master of arts degree may be applied toward the master of fine arts degree at the discretion of the program of study committee.

Applicants to the graduate program should have an undergraduate major in an art or design area and demonstrate the ability technically and conceptually and original work through the presentation of a slide portfolio for faculty review. Past academic performance and the quality of studio work are critical in the admission process. A minimum of 9 GPA in the student's undergraduate major is the standard for full admission to the graduate program. Admission is also determined by studio space available within the program area which changes yearly due to graduate students' progress in their programs of study.

Prospective students are advised to contact the graduate coordinator with specific questions about admission procedures and portfolio review. Application and additional program information may be obtained from the Department of Art and Design College of Design Iowa State University Ames Iowa 50011 3122.

Courses open for nonmajor graduate credit: Art 387 388 Art H 380 382 385 386 481 484 488 495 496 Art Id 355 356 464 465 467 Artis 408 420 422 424 430 438 447
Art (Art)

Courses Primarily for Undergraduate Students
Art 108 Visual Foundations I (0.5 Cr 3 FS SS)
Exploring visual order, creative process and interaction of two and three-dimensional design. Introduction to color

Art 109 Visual Foundations II (0.5 Cr 3 FS SS)
Prereq. 108 Continued exploration of visual order, creative process and interaction of two- and three-dimensional design and color

Art 110 Orientation to Art and Design (1 Cr R FS)
Overview of the department and university with special emphasis on curricular programs, program and study skills. Advising, policy and procedures. Student services. Offered on a satisfactory-fail grading basis only

Art 130 Drawing I (1 Cr 3 FS SS)
The introductory course in drawing focusing on the fundamentals of drawing from observation. Subject matter may include working from the still life, architectural settings, landscape and the human figure. Line, shape, perspective and value studies are explored through a variety of drawing media

Art 230 Drawing II (0.5 Cr 3 FS SS)
Prereq. 130 A continuation of Art 130. Drawing II. Further development of perception, drawing skills from a variety of subject matter. Continued practice with drawing materials and techniques with emphasis on tonal and color media

Art 292 Dimensions of Art and Design (Same as DSN 292) (1 Cr 3 FS SS)
The work of the artist and designer through an examination of the design process, artistic style and selected art and design forms. Cross-cultural viewpoints and issues of diversity in relation to the visual arts and design fields. Prerequisite for nonmajors. Offered on a satisfactory-fail grading basis only

Art 494 Art and Design in Europe Seminar 1-0 Cr 3 FS SS Prereq. 494 Permission of instructor and planned enrollment in 495 Cultural and historical aspects of art and design in Western Europe. Vists to design studios, art museums and educational facilities. Related activities depending on specific area of study which may vary. Each time offered. Tour expenses to be paid by the student

Art 495 Art and Design in Europe (Dual-listed with 495 I) (1 Cr 3 FS SS)
Prereq. 494 Permission of instructor. International study abroad program in Western Europe. Visits to design studios, art museums and educational facilities. Related activities depending on specific area of study which may vary each time offered. Tour expenses to be paid by the student

Art 608 Advanced Computer Aided Art and Design (0.5 Cr 3 Prereq. 608 Permission of the instructor. Computer application and use specific to MFA studio concentration

Art 697 Studio Internship Art Cr 1-4 maximum of 9 FS SS. Prereq. Graduate classification and approval of department chair. Supervised off-campus learning experience with a prominent artist or firm

Art 698 Current Issues in Art and Design Art Cr 1 to 3 each time taken maximum of 9 Prereq. Graduate classification. Selected issues in contemporary art and design. Topics and readings vary each time offered

Art 699 Research Art Cr 1-4 A Thesis B Thesis exhibition

Art Education (ArtEd)

Courses Primarily for Undergraduate Students
ArtEd 211 Introduction to Art Education (3-6 Cr 3 FS) Design for arts experiences for the K-12 classroom. Hands on discipline specific and integrated art activities. Emphasis on thinking skills

ArtEd 313 Practicum Art Education Art Cr 1 each time taken maximum of 3 Prereq. Credit or enrollment in 211 Permission of instructor in advance of semester enrollment. Field experience in K-12 or community art education program

ArtEd 450 Independent Study Cr 1 to 3 each time taken Prereq. Written approval of instructor and department chair on required form in advance of semester enrollment. Student must have completed art and/or education coursework appropriate to planned independent study. Offered on a satisfactory-fail basis

Courses Primarily for Graduate Students, open to qualified undergraduate students
ArtEd 513 Introduction to New Art Basics (3-6 Cr 3 FS) or may be taken for CEU credit. SS Prereq. Permission of instructor. Taught in 2 week workshop format and extended instruction and exploration over the World Wide Web. Overview of higher order thinking skills in relation to visual thinking. Application of metaphor, visual thinking, visual logic and human cultural and historical contexts. Design of discipline specific thinking skills strategies. Some sections will be taught entirely on the World Wide Web

ArtEd 514 Multicultural Perspectives (3 Cr 3 FS) Prereq. Graduate classification and permission of instructor. Understanding the nature roles and functions of the visual arts. Designing methodology for effective classroom instruction in human cultural and historical contexts. Observation and teaching experience at classroom based research sites

ArtEd 515 Visual Thinking Skills Education (3-6 Cr 3 FS) Prereq. Admission to the graduate program in art education. Using theory to inform and direct the design of teaching methodology. Effective classroom techniques for promoting visual ideation. Experience in applied teaching experience at classroom based research sites

ArtEd 516 Classroom Research Seminar (3-6 Cr 3 FS Prereq. 515 Classroom based research theory and practice. Review of literature for individual research in visual education. Focused graduate research pilot project in K-12 classroom

ArtEd 517 Teaching Practicum Art Cr 3 to 6 maximum of 6 Prereq. 516 All courses in the art education program advanced registration required. Supervised experience and individually designed applied research in teaching art in elementary school

ArtEd 518 Teaching Practicum Art Cr 3 to 6 maximum of 6 Prereq. 516 All courses in the art education program advanced registration required. Supervised experience and individually designed applied research in teaching art in secondary school

ArtEd 590 Special Topics Cr var Prereq. Bachelor's degree in art and/or design. Graduate classification, satisfactory equivalency or special permission. Topics vary each time offered

ArtEd 598 Creative Component Cr var Prereq. Concurrent enrollment or credit in 517 or 518 Individually focused discipline specific applied classroom research. Written summary of research exhibition of research results

Graphic Design (ArtGr)

Courses Primarily for Undergraduate Students
ArtGr 177 Introduction to Graphic Design (2 Cr 2 S Prereq. Art 108 credit or enrollment in Art 109 130 Dsn 121 Historical-cultural and social issues related to the practice of visual communication

ArtGr 270 Graphic Design Studio I (0-6 Cr 3 FS Prereq. Art 169 130 ArtGr 177 Dsn 121 enrollment in 276 admittance to the graphic design program. Students should consult the graphic design program through department review. Basic design concepts and color principles used for visual communication. Conceptual and analytical thinking skills through projects and discussions. Decision making for effective visual communication
ArtGr 271 Graphic Design Studio II (0-6) Cr 3 S Preq: Art 230 ArtGr 270 enrollment in 276 Principles of typographic composition structure and hierarchy Formal and conceptual principles of symbology

ArtGr 275 Graphic Technology I (0-4) Cr 2 F Preq: enrollment in 270 Basic computer skills for graphic design

ArtGr 276 Graphic Technology II (0-4) Cr 2 S Preq: 275 enrollment in 271 Basic computer skills for graphic design

ArtGr 277 Graphic Design Internship Seminar II 10 Cr 1 F Preq: Credit or enrollment in 270, 275 Procedural and ethical concerns related to the graphic design internship. Personal goals, preparation of résumé and plans for internship. Offered on a satisfactory-fail grading basis only

ArtGr 370 Graphic Design Studio III (0-6) Cr 3 F Preq: 271, 276 enrollment in a 2 credit option credit or enrollment in 387 Creation and design of images and symbols for applications to the development and integration of typography with images and symbols

ArtGr 371 Graphic Design Studio IV (0-6) Cr 3 S Preq: 370 enrollment in a 2 credit option credit or enrollment in 388 Development and preparation of design concepts for application to the printing and electronic publishing process. Creative problem solving skills introduction to systems design

ArtGr 372 Graphic Design Materials and Processes I (0-6) Cr 3 F Preq: Credit or enrollment in 371 Lecture about the processes and materials involved in graphic design arts reproduction. Course covers: press paper selection and specification ink systems, type systems, fonts, output technology, printing technology, process and binding operations

ArtGr 378 Critical Issues in Graphic Design (2-0) Cr 2 F Preq: Credit or enrollment in 370 Lecture discussion and writing about the critical issues facing the communications field today and in the future

ArtGr 387 Graphic Design History/Theory Criticism I (Dual listed with 587) (3-0) Cr 3 F Preq: Art H 280, 281 Dan S 121 Late nineteen century to the 1960s to provide understanding of the development and character of graphic design. Influential forces, artists, designers, Nonmajor graduate credit

ArtGr 388 Graphic Design History/Theory Criticism II (Dual listed with 588) (3-0) Cr 3 S Preq: 387 Theory and history of contemporary graphic design including designers from the 1960s present Analysis of the role of technology and graphic technology are leading to present design forms. Nonmajor graduate credit

ArtGr 470 Graphic Design Studio V (0-6) Cr 3 F Preq: 371 enrollment in a 2 credit option Advanced design systems as applied to corporate identity and environmental graphic design. Symbolism as an integrated component of communication systems

ArtGr 471 Graphic Design Studio VI (0-6) Cr 3 S Preq: 470 enrollment in a 2 credit option Exploration of theoretical and conceptual concerns of visual communication

ArtGr 472 Photographic Art Direction (Dual-listed with 572) (4-4) Cr 2 Preq: 271, 276 enrollment in 370 or 371, or 470 or 471 Photography as a graphic design component. Compositional and conceptual elements in photographic images. Must have a camera with adjustable shutter speeds and lens openings

ArtGr 473 TIME Based Multi Media (Dual listed with 573) (0-4) Cr 2 F Preq: 370 The design of visual and written communication for electronic media

ArtGr 474 Exhibition Design (Dual listed with 574) (0-4) Cr 2 Preq: 271, 276 enrollment in 370 or 371, or 470 or 471 Visual communication applied to exhibition design focusing on educational or interactive museum exhibitions, trade show booth design, and modular unit design for traveling exhibitions. Transition of graphic information to a three-dimensional space
Art H 181 History of Design (Same as Dns S 181) 3 Cr 0 3 3 F Study of issues and artifacts their relation to the traditional and changing role of the creators and to western european and american culture.

Art H 280 History of Art I (Same as Dns S 280) 3 Cr 3 3 3 F Development of the visual arts of western civilization including painting sculpture architecture and crafts from prehistoric through Gothic.

Art H 281 History of Art II (Same as Dns S 281) 3 Cr 3 3 3 F Development of the visual arts of western civilization including painting sculpture architecture and crafts from the Renaissance to the 19th century.

Art H 380 North American Indian Art (Dual listed with 580 same as Am In 380 Dns S 380) 3 Cr 3 3 3 Visual arts forms of North American Indian people from prehistoric through contemporary Survey of major cultures and individual artist emphasis on the cultural context of their artistic production Nonmajor graduate credit.

Art H 382 Art and Architecture of Asia (Dual listed with 582 same as Dns S 382) 3 Cr 3 3 3 F 3 3 3 offered 2004 Selective history of visual imagery from a variety of major Asian traditions chiefly India China Japan Sri Lanka Cambodia and Indonesia Nonmajor graduate credit.

Art H 383 Greek and Roman Art (Dual listed with 583 same as Dns S 383) 3 Cr 3 3 3 3 F offered 2004 Greek art from Neolithic and Hellenistic periods Roman art from the historical founding to the end of the empire in the West.

Art H 385 Renaissance Art (Dual listed with 585 same as Dns S 385) 3 Cr 3 3 3 3 F offered 2004 European art including painting sculpture architecture and crafts thirteenth through sixteenth centuries Nonmajor graduate credit.

Art H 394 Women in Art (Dual listed with 594 same as Dns S 394 W 394) 3 Cr 3 3 3 3 F offered 2006 Lives careers and achievements of women artists and the related cultural environment from the Middle Ages to contemporary times in Europe and America Feminist movement beginning in the 1970s and specifically feminist issues in art that are becoming widespread in the art world.

Art H 481 Art and Architecture of India (Dual listed with 581 same as Dns S 481) 3 Cr 3 3 3 3 F offered 2003 South Asian art and architecture from earliest times to the present day Development of style social uses and symbolism that gave imagery its meaning.

Art H 484 Traditional Indian Culture (Dual listed with 584 I 3) 3 Cr 3 3 3 3 F 3 Prereq Permission of instructor Historical survey of traditional cultures of India Study abroad course taught in Kamataka India with travel to various sites.

Art H 487 Nineteenth Century Art (Dual listed with 587 same as Dns S 487) 3 Cr 3 3 3 3 F Prereq Permission of instructor.

Art H 488 Modernism and Modern Art (Dual listed with 588 same as Dns S 488) 3 Cr 3 3 F Painting sculpture crafts architecture photography and cinema from Post Impressionism to Surrealism Nonmajor graduate credit.

Art H 490 Independent Study 1 to 6 each time taken. Prereq Written approval of instructor and department chair on required form in advance of semester. Student must have completed all history coursework appropriate to planned independent study. Offered on a graded basis or a satisfactory-fail basis.

Art H 495 Art and Theory Since 1845 (Dual listed with 595 same as Dns S 495) 3 Cr 3 3 Visual arts and critical theory from 1845 to the present Nonmajor graduate credit.

Art H 496 History of Photography (Dual listed with 596 same as Dns S 496) 3 Cr 3 3 F Survey of the evolution of photography and photojournalism from the 1830s to the present seen from an art historical perspective emphasizing causative factors cultural influences and major masters and schools.

Art H 498 Selected Topics in Art History (Dual listed with 598 same as Dns S 498) 3 Cr 3 3 each time taken maximum of 9 Specialized study in the history or criticism of art and/or design.

Courses for Graduate Students

Courses Primarily for Undergraduate Students

Courses open to qualified undergraduate students

Courses Primarily for Graduate Students

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relation to issues of visual communication and problem solving, envisioning information that visualizations and visualization tools can enable. The Studio assignments are designed to give students experience in designing and implementing visualizations for a variety of applications.

Art 305 Mixed Media (Dual listed with 505) 1 Cr 3 each time taken maximum of 6 FS PreReq 12 credits in design and/or drawing including Art 109 130 Exploration and application of various materials, techniques, and ideas.

Art 308 Modeling, Rendering, and Interactive Virtual Photography 4 Cr 3 FS PreReq 230 Introduction to 3D modeling using computer and available software. Modeling, texturing, lighting, and rendering with respect to still and animated visualizations. Art 309 Sources of Visual Design (0-6) Cr 3 FS PreReq 109 230 Studio exercises to develop awareness of external and internal sources for design.

Art 320 Wood Design II (0-6) Cr 3 each time taken maximum of 6 FS PreReq 220 Design and fabrication of basic functions with various woods. An overview of visual effects solving. Introduction to power tools and hand hand tools.

Art 332 Ceramics II (0-6) Cr 3 FS PreReq 222 Further investigation of concepts and techniques in ceramics. Introductions to glaze, research, and kiln firing.

Art 334 Jewelry/Metalsmithing II (0-6) Cr 3 FS PreReq 224 Design of jewelry and hollow forms using traditional and contemporary techniques. Introduction to lost wax casting.

Art 335 Craft Design Seminar (2) Cr 2 Alt. A offered 2006. PreReq 3 credits in craft design. Contemporary issues in craft design through lectures, presentations, and field trips.

Art 386 Introduction to Illustration (Same as BPM 336) 0 Cr 3 F PreReq 238 Application of painting, drawing, and marking techniques to communication. Development of technical facilities in a variety of illustration media. The past and current state of illustration and the role of typography and its integration with illustration. Digital and print production techniques.

Art 337 Illustration as Communication and Interpretive Expression (Same as BPM 337) (0-6) Cr 3 S PreReq 236 Studio problems in illustration covering editorial advertising, and narrative expression. Problem solving methodologies.

Art 339 Photography II (0-6) Cr 3 each time taken maximum of 6 FS PreReq 229 Continuation and expansion of concepts and techniques in photography. Themes: conceptual and historical aspects emphasized.

Art 340 Drawing III Life Drawing (0-6) Cr 3 each time taken maximum of 9 FS PreReq 230 Drawing from the human figure.

Art 355 Three Dimensional Studio (Same as Art 355) 2 Cr each time taken maximum of 8 FS Sculptural media, modeling in clay, wood, carving stone, carving in plaster and metal. Welding and other constructing techniques.

Art 356 Biological Illustration Principles and Techniques (Same as BPM 356) 0-6 Cr 3 each time taken maximum of 6 FS PreReq 6 credits in art and design and 3 credits in the biological sciences. Studio basis and fundamentals of traditional biological rendering techniques. Emphasis on tools and materials.

Art 357 Application of Biological Illustration Techniques (Same as BPM 1357) (0-3) Cr 3 each time taken maximum of 6 S PreReq 356 Rendering techniques applied to different types of biological subject matter including computer and airbrush applications. Term project required.

Art 358 Painting I (0-6) Cr 3 FS PreReq 238 Painting in acrylic and/or oil media composition and expression.

Art 359 Fiber Forms (0-6) Cr 3 FS PreReq 109 and 130 or equivalent or permission of instructor. Three-dimensional contemporary fiber construction. Visual problem solving and conceptual ideas. Development using processes and techniques such as knotting, wrapping, pleating, netting, felting, and manipulation of fabric using traditional techniques and basketry.

Art 360 Weaving (0-6) Cr 3 PreReq 109 and 130 or equivalent or permission of instructor. Color and pattern development in weaving. Yarns Floor loom and frame loom fabric construction.

Art 365 Fiber and Fabric Design (0-6) Cr 3 F PreReq 109 and 130 or equivalent or permission of professor. Shaped pattern, manipulated and embellished textiles using contemporary and traditional yarns. Fabric, thread, and cloth techniques.

Art 366 Resist and Dyed Fabric Design (0-6) Cr 3 F PreReq 109 and 130 or equivalent or permission of professor. Two- and three-dimensional problems in visual imagery using dye and resist processes.

Art 374 Painted Fabric Design (0-6) Cr 3 FS PreReq 109 and 130 or equivalent or permission of professor. Repeat pattern and overlapping transparent colors for fabric design using screenprinting, and direct application of pigments.

Art 375 Relief Printmaking (Dual listed with 556) (0-6) Cr 3 each time taken maximum of 9 FS PreReq 230 Woodcut and intaglio cut printmaking processes in black and white, multicolor, and reduction color printmaking. Collage and text forms of relief printmaking used separately and in combination with woodcuts.

Art 377 Monotype (Dual listed with 557) (0-6) Cr 3 each time taken maximum of 9 FS PreReq 236 Monotype and monoprint processes black and white and color techniques. Basic knowledge of production procedures and drawing skills experimentation.

Art 378 Lithography (Dual listed with 558) (0-6) Cr 3 each time taken maximum of 9 FS PreReq 236 Lithographic printmaking techniques. Theory and practice. Studio procedures drawing and printing skills applied to metal plate lithography.

Art 379 Intaglio (Dual listed with 559) (0-6) Cr 3 each time taken maximum of 9 S PreReq 230 Intaglio printmaking processes. Basic knowledge and production procedures. Drawing and printing skills.

Art 380 Principles of Computer Aided Animation (0-6) Cr 3 each time taken maximum of 9 FS PreReq 380 or permission of instructor. Animation techniques using the computer and available software. Principles of animation. Student's prior knowledge of modeling, lighting, texture and rendering with computer and available software is assumed. Nonmajor graduate credit.

Art 385 Wood Design I (Dual listed with 520) (0-6) Cr 3 each time taken maximum of 12 FS PreReq 320 Independent design and creation of furniture forms. Research and development of furniture forms using innovative processes. Nonmajor graduate credit.

Art 392 Ceramics II (Dual listed with 522) (0-6) Cr 3 each time taken maximum of 12 FS PreReq 322 Forms and surfaces. Historical research. Personal directions in advanced ceramic processes and concepts. Nonmajor graduate credit.

Art 394 Jewelry/Metalsmithing III (Dual listed with 524) (0-6) Cr 3 each time taken maximum of 12 FS PreReq 324 Design of jewelry and hollow forms using traditional and contemporary techniques and materials. Introduction to forging/kissing. Nonmajor graduate credit.

Art 400 Drawing I (Dual listed with 530) (0-6) Cr 3 each time taken maximum of 9 FS PreReq 350 Figurative and/or non figurative drawing with worked over work in composition and concepts. Nonmajor graduate credit.

Art 408 Figurative and/or non figurative painting with advanced work in both media. Composition and theory. Nonmajor graduate credit.

Art 437 Fiber/Fabric Studio Problems (Dual listed with 547) (0-6) Cr 3 each time taken maximum of 9 S PreReq 6 credits from among 343, 345, 346, 347. Exploration of imagery using woven design techniques. Personal development and exploration of ideas. Nonmajor graduate credit.

Art 490 Independent Study (0-6) Cr 1 to 6 each time taken. PreReq: Write approval of instructor and department chair on required form in advance of semester of enrollment. Student must have completed course work appropriate to planned independent study. Offered on a graded basis or a satisfactory fail basis.

Art 493 Workshop Cr 1 to 3 each time taken. SS PreReq: Permission of instructor. Intensive 2 to 4 week studio exploration Topics vary each time offered and may have prerequisites.

Art 508 Computer Aided Animation and Visualization (0-6) Cr 3 each time taken maximum of 5 S PreReq PreReq 109 or two 6 credits of_pre Req. Graduation classification permission of instructor. Independent design and creation of furniture forms. Research and development of computer and design of advanced and/or innovative processes.

Art 522 Ceramics Studio (Dual listed with 422) (0-6) Cr 3 each time taken maximum of 12 FS PreReq Graduation classification permission of instructor. Ceramics Studio. Independent design and creation of ceramic processes and concepts.

Art 524 Jewelry and Decorative Metalsmithing (Dual listed with 424) (0-6) Cr 3 each time taken maximum of 12 FS PreReq Graduation classification permission of instructor. Jewelry and decorative metalsmithing. Personal directions in ceramic processes and concepts.

Art 530 Drawing I (Dual listed with 430) (0-6) Cr 3 each time taken maximum of 9 FS PreReq Graduation classification permission of instructor. Figurative and/
Art and Design

or non figurative drawing with advanced work in media composition and theory

ArtSci 538 Painting (D) (Dual listed with 433) (0-6) Cr 3 each time taken maximum of 9 F Prereq Graduate classification permission of instructor Figurative and/or non figurative painting with advanced work in media composition and theory

ArtSci 547 Fiber/Fabric Studio Problems (Dual listed with 447) (0-6) Cr 3 each time taken maximum of 9 S Prereq Graduate classification permission of instructor Exploration of imagery using woven and surface design processes Personal development and exploration of ideas

ArtSci 555 Relief Printmaking (Dual listed with 356) (0-6) Cr 3 each time taken maximum of 9 F Prereq Graduate classification permission of instructor Woodcut and intaglio printmaking process in black and white multicolor and reduction color printing Collagraphs and forms of relief printmaking used separately and in combination with woodcuts

ArtSci 557 Monotype (Dual listed with 357) (0-6) Cr 3 each time taken maximum of 9 F Prereq Graduate classification permission of instructor Monoprint and monotype processes black and white and color techniques Basic knowledge production procedures and drawing skills experimentation

ArtSci 558 Lithography (Dual listed with 358) (0-6) Cr 3 each time taken maximum of 9 F Prereq Graduate classification permission of instructor Lithographic printmaking process theory and practice Studio procedures drawing and printing skills applied to metal plate lithography

ArtSci 559 Intaglio (Dual listed with 359) (0-6) Cr 3 each time taken maximum of 9 S Prereq Graduate classification permission of instructor Intaglio printmaking processes Basic knowledge and production procedures drawing and printing skills

ArtSci 590 Special Topics Cr air Prereq Bachelor's degree in art and/or design or evidence of satisfactory equivalency in specialized area Written approval of instructor and department chair on required form in advance of semester of enrollment

A Calligraphy
B Ceramics
C Computer Art and Design
D Drawing
E Fibers
F Illustration
G Metals
I Painting
J Photography
K Printmaking
L Wood
M Mixed Media

ArtSci 593 Workshop Cr 1 to 3 each time taken 5S Prereq Graduate classification permission of instructor Intensive 2 to 4 week studio exploration Topics vary each time offered and may have prerequisites

A Calligraphy
B Ceramics
C Computer Art and Design
D Drawing
E Fibers
F Illustration
G Metals
I Painting
J Photography
K Printmaking
L Wood
M Mixed Media

Courses for Graduate Students

ArtSci 605 Research Methods (3) Cr 3 Prereq Permission of instructor Research strategies related to fine art and technology Application of selected methods to specific issues

ArtSci 607 Intermedia (0-6) Cr 3 Exploration and application of media with visual/interdisciplinary methods and ideas

ArtSci 160 S Interior Design Foundations (3) Cr 3 S Prereq Art 108 or equivalent The profession issues and the role of interior design

ArtSci 160S Interior Design Foundations Studio (0-6) Cr 3 S Prereq Art 108 130 credits or enrollment in Art 109 Art 160 S Prereq Art 108 130 credits or enrollment in Art 109 Art 160 S Prereq Art 108 130 credits or enrollment in Art 109 Creative problem solving methods rapid visualization techniques and computer based methods of managing design text information Small scale projects

ArtSci 258 Sophomore Field Study Cr R Prereq Enrollment in second year studio course Study and tours of areas of interest within the interior design profession such as manufacturers designers showrooms and museums Offered on a satisfactory fail grading basis only

ArtSci 261 Graphic Communication for Interior Design I (0-4) Cr 2 F Prereq Admission to the interior design program through program review and enrollment in 265 Proficiency in the development of technical conventions and design drawing using drafting instruments Emphasis on drawing layout line quality and lettering Site and structure measurement dimensions single and multi view drawings sections and axonometrics

ArtSci 262 Graphic Communication for Interior Design II (0-4) Cr 2 F Prereq Admission to the interior design program through program review and enrollment in 265 Proficiency in the development of technical conventions and design drawing using drafting instruments Emphasis on drawing layout line quality and lettering Site and structure measurement dimensions single and multi view drawings sections and axonometrics

ArtSci 263 Graphic Communication for Interior Design III (4-1) Cr 3 S Prereq 261 265 Enrollment in 267 Computer visualization techniques and applications projects employing computer graphic methods

ArtSci 265 Interior Design Studio I (1-9) Cr 4 F Prereq Art 109 Art H 181 ArtD 160 150 S credit or enrollment in 261 262 350 or Arch 240 admission to the interior design program through department review/Enhanced creative interior design problem solving compositional and color theories and graphic communication as applied to the interior design of small scale environments Manual visualization techniques

ArtSci 267 Interior Design Studio II (1-9) Cr 4 S Prereq 261 262 265 350 or Arch 240 Art H 181 enrollment in 261 265 263 and TC 204 Human factors issues including ergonomics human behavior and the requirements of special groups Residential interior design and medium scale projects Detail drawings and interior techniques

ArtSci 350 Interior Systems I (4-0) Cr 3 S Prereq Admission to the interior design program through department review/Structural principles mechanical systems and standard construction methods as related to interior design

ArtSci 351 Interior Systems II (2-2) Cr 3 S Prereq 265 350 or Arch 240 Manufacturer furniture interior finishes and related selection criteria and written specifications

ArtSci 352 Interior Systems III (2-2) Cr 3 S Prereq 265 and enrollment in 350 Light and color as related to interior spaces Lighting principles and techniques to implement lighting design objectives Teamwork

ArtSci 355 Interior Design History/Theory/Criticism I (3) Cr 3 S Prereq Art H 181 Styletistic evaluation of interior finishes furnishings and decorative arts from a critical historic and multidisciplinary perspective Nonmajor graduate credit

ArtSci 356 Interior Design History/Theory/Criticism II (3) Cr 3 S Prereq Art H 181 Theoretical approaches to the design of interior space from a critical historic and multidisciplinary perspective including nineteenth and twentieth century Nonmajor graduate credit

ArtSci 359 Junior Field Study Cr R F Prereq Enrollment in third year studio course Study and tours of areas of interest within the interior design profession such as manufacturers designers showrooms and museums Offered on a satisfactory fail grading basis only

ArtSci 365 Interior Design Studio III (1-9) Cr 4 F Prereq 263 267 351 TC 204 enrollment in 352 and 356 Formal methods of design programming and problem identification Also includes conceptualization and problem solving related to the development of environments and special populations Large scale projects Alternative manual and computer based visualization methods Teamwork

ArtSci 367 Interior Design Studio IV (1-9) Cr 4 S Prereq 352 365 credit or enrollment in 356 and 369 Emphasis on three-dimensional spatial development in large multiple scale institutional projects Expansion of alternative manual and computer based visualization methods Teamwork

ArtSci 368 International Study Orientation Seminar (1-0) Cr 1 Prereq 365 permission of instructor and planned enrollment in Rome study option Historic and contemporary architecture and interior design customs and traditions of Rome and related travel itinerary locations Required of students participating in the interior design international study option Offered on a satisfactory fail grading basis only

ArtSci 369 Interior Design Internship Seminar (1-0) Cr 5 to be repeated for credit F Prereq Enrollment in third year studio course Preparation for professional practice in the field of interior design The role of ethical concerns relating to the interior design profession Preparation of placement credentials and formulation of personal goals Internship plans and agreements Offered on a satisfactory fail grading basis only

ArtSci 453 Interior Systems IV (2-2) Cr 2 S Prereq 352 and enrollment in 467 Specialized interior assemblies and interface with related building systems Detailing and documentation

ArtSci 459 Senior Field Study Cr R Prereq Enrollment in fourth year studio course Study and tours of areas of interest within the interior design profession such as manufacturers designers showrooms and museums Offered on a satisfactory fail grading basis only

ArtSci 460 Interior Design Internship Cr R S Prereq Satisfaction completion of all 300 level interior design coursework TC 204 and Art 240 Professional interior design off campus experience

ArtSci 461 Interior Design Professional Practices (2-0) Cr 2 S Prereq 460 Organization and general management of the interior design office General agreements business procedures professional ethics

ArtSci 463 Housing for the Aging (Same as HD FS 463) See Human Development and Family Studies

ArtSci 464 Selected Studies in Interior Design (Dual listed with 564) (1-0) Cr 2 or 3 each time taken maximum of 9 Prereq 12 credits in design related courses and permission of instructor Special issues with emphasis on them or translation into design application Topics vary each time offered Nonmajor graduate credit

ArtSci 465 Interior Design Studio V (Dual listed with 565) (1-0) Cr 4 F Prereq 450 Design research and refined problem solving methods including functional analysis programming and detailing Multicultural study abroad option Nonmajor graduate credit

ArtSci 467 Interior Design Studio VI (1-0) Cr 4 S Prereq 450 credit or enrollment in 454 and all required interior systems and history/theory/criticism courses Refinement of technical analytical and theoretical problem solving methods and comprehensive design documentation to the development of individual projects Current issues in interior design Nonmajor graduate credit

ArtSci 490 Independent Study Cr 1 to 6 each time taken Prereq Written approval of instructor and department chair on required form in advance of semester of enrollment Student must have
completed related interior design coursework appropriate to planned independent study Offered on a graded basis or a satisfactory-fail basis H Honors

Artd 493 Workshop Cr 1 to 3 each time taken FS SS Prereq Evidence of satisfactory experience in area of specialization Intensive 2 to 4 week studio exploration Topics vary each time offered

Courses Primarily for Graduate Students, open to qualified undergraduate students Artd 564 Selected Studies in interior Design IDual listed with 464 I 3 or 4 Cr F Prereq Graduate classification Design research and refined problem solving methods including functional analysis programming and detailing Multicultural hospitality and retail Study abroad option

Artd 567 Interior Design Studio (II dual listed with 467 I 3 or 4 Cr F Prerq Graduate classification) Design research and refined problem solving methods including functional analysis programming and detailing Multicultural hospitality and retail Study abroad option

Artd 579 Special Topics Cr 1 or 2 Preq Bachelor's degree in interior design or evidence of satisfactory experience in specialized area Written approval of instructor and department chair on required form in advance of semester of enrollment

Artd 593 Workshop Cr 1 to 3 each time taken FS SS Prereq Graduate classification evidence of satisfactory experience in area of specialization Intensive 2 to 4 week studio exploration Topics vary each time offered

Courses for Graduate Students Artd 660 Research Methods (I) Gr Cr 3 S Preq Permission of instructor Research strategies related to interior design Application of selected methods to specific issues

Artd 665 Advanced Interior Design Studio (I) Gr Cr 3 or 4 each time taken maximum of 15 Preq Graduate classification Interior design problemsolving with emphasis on special issues Project types will include but not be restricted to hospitality health care institutional industrial industrial historic preservation and commercial environments

Artd 800 Advanced Topics (I) Gr or MFA classification permission of instructor

Artd 899 Research Cr var A Thesis B Thesis Exhibition

Astronomy and Astrophysics See Physics

Bacteriology See Microbiology

Biochemistry, Biophysics, and Molecular Biology

Alan M Myers Chair of Department

Distinguished Professors Bert Fromm

University Professors Hammond

Professors Atherly Chins Honzko, Howell Jeringer Kostic Miller Myers Nikolaj Nissen Hamilton Robson Rotby Stremmer Thomas Thornburg

Professors (Adjunct) Beria

Professors (Collaborators) Meyer Tabataba

Distinguished Professors (Emeritus) Bremner Graves Metzer

University Professors (Emeritus) Horowitz Whre

Professors (Emeritus) Appliquey Tipton

Associate Professors Bzlyinski Buss Daspinto Huvelt Shin

Associate Professors (Adjunct) James

Associate Professors (Collaborator) Rao

Assistant Professors Andredt Culver Gargarone Norris Peters

Undergraduate Study

The department offers majors in biochemistry or biophysics in the College of Liberal Arts and Sciences and a major in agricultural biochemistry in the College of Agriculture

Biochemists and biophysicists seek to understand life processes in terms of chemical and physical principles They conduct research in the frontiers of biology such as metabolite networks and cell functions of enzymes and membranes and hormones computational approaches and mechanical and proteomic technology protein engineering plant biotechnology muscle structure and function and the design and evaluation of drugs for the treatment of disease

Biochemistry and molecular biology provide the basis for much of modern biotechnology Graduates have opportunities in industry especially the biotechnology sector in universities veterinary medical and medical schools and government laboratories Students who meet the highest academic standards have the opportunity to complete their studies in graduate school medical school or veterinary medical school

Graduates of biochemistry agricultural biochemistry and biophysics understand the chemical principles of biological systems including molecular biology They have developed laboratory expertise in modern biochemical techniques including the ability to analyze data and prepare scientific reports Most have participated in undergraduate research and have developed the skills necessary for both written and oral presentations at a level that will serve the student both within the university and in postgraduate professional life Graduates have the experience of interacting with persons of different disciplines and cultures Students have the training in mathematics and physics to solve problems of broad scope in biological and environmental sciences and to provide leadership in diverse scientific and technological areas

Agricultural Biochemistry Major in the College of Agriculture

For the undergraduate curriculum leading to the degree of bachelor of science see College of Agriculture Curricula In agricultural biochemistry is recommended to students interested in the areas of agriculture requiring strong preparation in biochemistry and biology or in preparation for the study of veterinary medicine Employment opportunities exist in agricultural industries and animal and plant biotechnology

Biochemistry or Biophysics Majors in the College of Liberal Arts and Sciences

For the undergraduate curriculum leading to the degree of bachelor of science see Liberal Arts and Sciences Curriculum In biochemistry and biophysics are recommended to students whose career interests involve advanced study or employment in biochemistry or biophysics or in related areas of the biological or medical sciences

Undergraduate majors in the College of Liberal Arts and Sciences in biochemistry usually have the following basic courses or their equivalents in their programs BBMB 101 102 404 405 or 501 502 411 453 or 551 Chem 177M 177N 178 210 or 211 211L 211L 321 322 322L 331 342 333L 334L Math 165 166 265 or 266 Phys 221 222 Biol 201 201L or 202L or 301L or 302L 201 301L and 3 of the following 4 additional credits of biological science courses from biology biochemistry microbiology genetics and zoology Undergraduate research BBMB 495 is strongly recommended

Undergraduate majors in biochemistry usually include the following basic courses in their programs BBMB 101 461 or 551 Chem 177M 177N 178 210 or 211 321 322 or Phys 311 322 333 334 Math 165 166 266 Phys 221 222 322 or 321L and 323 or 220 Bio 201 201L or 202L Biol 202 and 9 additional credits in 300 or higher level courses in biochemistry biophysics biological sciences chemistry or physics BBMB 404 405 and Biol 301 are recommended in meeting this requirement for students planning for careers in molecular biology Students wishing a strong preparation for graduate studies are advised to take undergraduate research and further mathematics courses such as 385 and 486

These lists of courses should not be regarded as statements of fixed requirements or as complete outlines of the work necessary for the major They are given for the convenience of students and advisers who wish to estimate the amount of basic study that may be needed

Biochemistry and biophysics majors are advised to meet the College of Liberal Arts and Sciences foreign language requirement with courses in French German or Russian

See also the B S M S program under Graduate Study

The department offers minors in biochemistry in both the College of Agriculture and in the College of Liberal Arts and Sciences which may be earned by credit in BBMB 404 405 311 or 411 and 451 or Chem 321 plus additional supporting 300 level courses in chemistry or biochemistry for a total of 15 credits

English proficiency requirement Majors in agricultural biochemistry must complete Eng 104 and 105 and one course in speech fundamentals with a grade of C or better in each of these courses and complete a communications intensive requirement equivalent to 3 credits from courses within the major Majors in the College of Liberal Arts and Sciences must complete Eng 104 and 105 and one of the following with a grade of C or better (a) Eng 305 309 or 314 (b) a written report in BBMB 411 or 499

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy with majors in biochemistry and biophysics and with interdepartmental majors in genetics immunology MCD and molecular cellular and developmental biology plant physiology and toxicology Minor work is offered to students taking major work in other departments

Prerequisite to graduate work is a sound undergraduate background in biology chemistry mathematics and physics

All graduate students are required by the department to teach as part of their training for an advanced degree

The department offers a B S M S program in biochemistry that allows students to obtain both the B S and M S degrees in five years The program is open to students in the College of Liberal Arts and Sciences and in the College of Agriculture Students interested in this program should contact the department office for details Application for admission to the Graduate College should be made near the end of the junior undergraduate (third year) Students would begin research for the M S thesis during the summer semester after that junior year and are eligible for research assistantships

Courses open for nonmajor graduate credit 404 405 411 420 451 481

Visit our departmental websites at jmilcobb or bhmrihomepage.html

Courses Primarily for Undergraduate Students BBMB 101 Introduction to Biochemical Activities I Gr Cr F Research activities career opportunities in biochemistry and biophysics and an introduction to the structure of biological important compounds for students majoring in biochemistry agricultural biochemistry or biophysics or considering one of these majors
Biochemistry, Biophysics, and Molecular Biology

Alan M Myers Chair of Department
Distinguished Professors Beth Fromm

University Professors Hammond

Professors Athery Chins Horzontki Howell Jerinaug Kostic Miller Myers Nickolai Nisen Hamilton Robyn Roby Stromer Thomas Thornburg

Professors (Adjunct) Bara

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Undergraduate Study
The department offers majors in biochemistry or biophysics in the College of Liberal Arts and Sciences and a major in agricultural biochemistry in the College of Agriculture.

Biochemists and biophysicists seek to understand life processes in terms of chemical and physical principles. They conduct research in the frontiers of biology such as metabolic networking structure and function of enzymes membranes and hormones. Computational approaches embryonic and proteomic technology protein engineering plant biotechnology muscle structure and function and the design and evaluation of drugs for the treatment of disease.

Biochemistry biophysics and molecular biology provide the basis for much of modern biotechnology. Graduates have opportunities in industry especially the biotechnology sector in universities, veterinary medical and medical schools, and government laboratories. Students who meet the necessary high standards have the opportunity to continue their studies in graduate school medical school or veterinary medical school.

Graduates of biochemistry agricultural biochemistry and biophysics understand the chemical principles of biological systems including molecular biology. They have developed laboratory expertise in modern biochemical techniques including the ability to analyze data and prepare scientific reports. Most have participated in undergraduate research and have developed the skills necessary for both written and oral presentations at a level that will serve the student both within the university and in postgraduate professional life.

Graduates have the experience of interacting with people of different disciplines and cultures. Students have the training in mathematics and physics to solve problems of broad scope in biological, biomedical, and environmental sciences and to provide leadership in diverse scientific and technological areas.

Agricultural Biochemistry Major in the College of Agriculture

For the undergraduate curriculum leading to the degree of bachelor of science see College of Agriculture Curricula and in biochemistry chemistry physics and mathematics or in preparation for the study of veterinary medicine Employment opportunities exist in agrochemical industries and animal and plant biotechnology.

Biochemistry or Biophysics Majors in the College of Liberal Arts and Sciences

For the undergraduate curriculum leading to the degree of bachelor of science see Liberal Arts and Sciences Curriculum Biochemistry and biophysics are recommended to students whose career interests involve advanced study in biochemistry or biophysics or in related areas of the biological or medical sciences.

Undergraduate majors in the College of Liberal Arts and Sciences in biochemistry usually have the following basic courses or their equivalents in their programs BBMB 101 102 404 405 (or 501 502) 411 412 or 551 Chem 177M 177N 178 210 (or 211) 211L 321 322 322L 331 332 333L 334L Math 165 166 265 (or 266) Phys 221 222 Bio 201 201L (or 202L or 301L) 302L 302 301 and a minimum of 4 additional credits of biological science courses from biology or one of the following areas of study: microbiology or zoology. Undergraduate research BBMB 499 is strongly recommended.

Undergraduate majors in biophysics usually include the following basic courses in their programs BBMB 101 461 or 551 Chem 177L 178 210 (or 211) 321L 322L (or Phys 311) 322 333L Math 165 166 265 266 Phys 221 222 322L (or 321L) and 232 or Comp 205 Biol 201L (or 272L) Biol 202 and 9 additional credits in 300 or higher level courses in biochemistry biophysics biological sciences chemistry or physics. BBMB 404 405 and Biol 301 are recommended in meeting this requirement for students preparing for careers in molecular biology.

Students wishing a strong preparation for graduate studies are advised to take undergraduate research and further mathematics courses such as 385 and 496.

These lists of courses should not be regarded as statements of fixed requirements or as complete outlines of the work necessary for the major. They are given solely for the convenience of students or advisers who wish to estimate the amount of basic study that may be needed.

Biochemistry and biophysics majors are advised to meet the College of Liberal Arts and Sciences foreign language requirement with courses in French German or Russian.

See also the B S M S program under Graduate Study.

The department offers minors in biochemistry in both the College of Agriculture and the College of Liberal Arts and Sciences. These minors may be earned by credit in BBMB 404 405 311 (or 411) and 451 (or Chem 321) plus additional supporting 300 level courses in chemistry or biochemistry for a total of 15 credits.

English proficiency requirement. Majors in agricultural biochemistry must complete Eng 104 and 105 and one course in speech fundamentals with a grade of C or better in each of these courses and complete a communication intensive requirement equivalent to 3 credits from courses within the major. Majors in the College of Liberal Arts and Sciences must complete Eng 104 and 105 and one of the following with a grade of C or better: (a) Eng 305 309 or 314 (b) a written report in BBMB 411 or 499.

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy with majors in biochemistry and biophysics and with interdepartmental majors in genetics immunology MCDP (molecular cellular and developmental biology) plant physiology and toxicology. Minor work is offered to students taking major work in other departments.

Prerequisite to graduate work is a sound undergraduate background in biology chemistry mathematics and physics.

All graduate students are required by the department to teach as part of their training for an advanced degree.

The department offers a B S M S program in biochemistry that allows students to obtain both the B S and M S degrees in five years. The program is open to students in the College of Liberal Arts and Sciences and in the College of Agriculture. Students interested in this program should contact the department office for details. Application for admission to the Graduate College should be made near the end of the junior undergraduate (third) year. Students would begin research for the M S thesis during the summer semester after their junior year and are eligible for research assistantships.

Courses open for non-majors graduate credit 404 405 411 420 451 481

Visit our departmental website at jimolebo

astana.edu/bbmb/homepage.html

Courses Primarily for Undergraduate Students

BBMB 101 Introduction to Biochemical Activities (1) Cr 1 F Research activities: career opportunities in biochemistry and biophysics and an introduction to the structure of biology important components for students majoring in biochemistry agricultural biochemistry or biophysics or considering one of these majors.
The BCB program emphasizes interdisciplinary training in six related areas of focus: Bioinformatics, Functional and Structural Genomics, Genome Evolution, Macromolecular Structure and Function, Mathematical Biology and Biological Statistics, and Metabolic and Developmental Networks. Additional information about research areas and individual faculty members is available at www.bcb.istate.edu

BCB students are trained to develop an independent and creative approach to science through an integrated curriculum and thesis research projects that include both computational and biological components. First-year students are appointed as research assistants and participate in BCB 697 (Graduate Research Rotation) working with three or more different research groups to gain experience in both wet (biological) and dry (computer) laboratory environments. In the second year, students initiate a thesis research project under the joint mentorship of two BCB faculty mentors: one from the biological sciences and one from the quantitative/computational sciences. The M.S. and Ph.D. degrees are usually completed in two and five years, respectively.

During the first year, all BCB students complete background coursework in calculus, molecular genetics, computer science, and discrete mathematics with specific courses determined by prior training. The total course requirements for Ph.D. students include at least one core course in Computer Molecular Biology (BCB 594 and/or 695) and at least one advanced course in Molecular Biology (e.g., Gen 411), BCB 591, and at least 12 credits of advanced coursework in the areas of Molecular Biology (6 credits) and either Computer Science or Mathematics (Statistics 6 credits in one area). Students make research presentations. BCB 591 attend faculty research seminars (BCB 591) and participate in workshops/symposia (BCB 593). M.S. students take the above background and core courses but do not attend faculty research seminars. Additional coursework may be selected to satisfy individual interests or recommendations of the Program of Study Committee. All graduate students are encouraged to take as part of their training for an advanced degree. (For curriculum details and sample programs of study see www.bcb.istate.edu)

Courses open for nonmajor graduate credit: 464, 495

Courses Primarily for Undergraduate Students

BCB 484 Computational Mathematics for Biologists (Same as Math 484) 3 Cr. 3 F

A survey of graph theory, linear algebra, discrete math and algorithms used in computational biology with examples taken from genomics, pharmacogenetics, and structure problems. This course provides mathematics background for BCB/Gen. 3 Math 594 for nonmajor graduate credit.

BCB 495 Molecular Biology for Computational Biologists (Same as Gen 495) 3 Cr. F

Survey of molecular cell biology and molecular genetics for nonbiologists especially students in bioinformatics/computational biology. Basic cell structure and function, principles of molecular biology, biosynthesis, structure and function of DNA, RNA and protein, regulation of gene expression: selected topics. Provides biological background for BCB 594. Nonmajor graduate credit is not offered at this time.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

BCB 542 Introduction to Molecular Biology Techniques (Same as Zooll 542) 3 Cr. BCB 548 Fundamental Algorithms in Computational Biology (Same as Com S 548, Gen 548) 3 Cr. 3 F, 3 Prereq: Com S 311 and some knowledge of programming. Introduction design and analysis of fundamental algorithms and methods for molecular biology. Topics include pairwise sequence alignment, string algorithms, bioinformatics databases, and retrieval systems. Multiple-sequence alignment, phylogenetic trees, physical mapping, genome rearrangements, DNA-chips, fragment assembly, protein folding, and genetic networks.

BCB 549 Advanced Algorithms in Computational Biology (Same as Com S 549, Gen 549) 3 Cr. 3 F, 3 Prereq: Com S 311 and some knowledge of programming. Discussion and analysis of evolutionary principles and the necessary knowledge in computational biology to solve real-world problems. Topics include character and distance-based methods, phylogenetic tree distances and consensus methods, and approaches to extract the necessary information from sequence databases to build phylogenetic trees.

BCB 551 Computational Techniques for Genome Assembly and Analysis (Same as Com S 551) 3 Cr. 3 F, 3 Prereq: Com S 311 and some knowledge of programming. Introduction to practical sequence assembly and comparison techniques. Topics include global alignment, local alignment, overlapping alignment, binding alignment, linear space alignment, and word hashing. DNA protein alignment, DNA-CDS alignment, comparison of two sets of sequences, construction of contigs and generation of consensus sequences. Focus on development of sequence assembly and comparison programs.

BCB 556 Computational Genomics and Evolution (Same as Com S 556) 3 Cr. 3 F, 3 Prereq: Com S 311 or consent of instructor. Introduction to evolutionary sequence analysis at the genome level. Topics include sequence alignment, phylogenetic inference, molecular clock analysis, ancestral state inference, structure-function relationship, functional divergence, and prediction. Evolutionary development of genome duplication and comparative genomics. Focus will be on data analysis and biological interpretation.

BCB 557 Statistical Methods for Computational Biology (Same as Gen 557) 2-3 Cr. 2-3 F, 3 Cr. 3 F, 3 Prereq: BCB 594. Advanced discussion about statistical modelling of DNA and amino acid sequences, microarray expression profiles and other genome-wide data.

BCB 565 Professional Practice in the Life Sciences (Same as PIP 565) 1 Cr. See Plant Pathology.

BCB 590 Special Topics Cr. var. Prereq: Permission of Instructor

BCB 593 Workshop in Bioinformatics and Computational Biology (1-0 Cr) 1 each time taken. F, 3 Cr. Current topics in bioinformatics and computational biology research. Lectures by off-campus experts. Students read background literature and attend preparatory seminars. All lectures are held in the Computer Science and Mathematics building.

BCB 694 Computational Molecular Biology (Same as Com S 594, Gen 594) 3 Cr. 3 F, 3 Prereq: BCB 495. Elective offered in years. State of the art introduction to bioinformatics with emphasis on concepts and principles, combined with hands on (keyboard) applications. Topics typically include molecular databases, DNA sequences analysis, sequence alignment, SNP detection, and other methods for sequence alignment. Sequence analysis, motif identification, multiple sequence alignment, and construction of phylogenetic trees from sequence data. Gene structure prediction, protein structure prediction.

BCB 696 Genomic Data Processing (Same as Gen 596) 3 Cr. 3 F, 3 Prereq: Some knowledge of programming, Chou. Practical aspects of genomic data processing. Emphasis on projects that carry out major steps in data processing using important bioinformatics tools. Topics include basic bioinformatics, raw sequence cleaning and containment removal, shotgun assembly procedures and EST clustering methods.
homology search and function prediction annotation and submission of GenBank reports and data collection and dissemination through the Internet.

CB 587 Introduction to Computational Structural Biology (Same as 3 S P Rearc Math 265 and some knowledge of programming Mathematical and computational approaches to protein structure prediction and determination Topics include molecular distance geometry potential energy minimization and molecular dynamics simulation.

CB 589 Creative Component Cr var

Course for Graduate Students

CB 890 Student Seminar in Bioinformatics and Computational Biology Cr 1 each time taken S Student research presentation.

CB 891 Faculty Seminar in Bioinformatics and Computational Biology (1 0 0) Cr each time taken F Faculty research series.

CB 897 Graduate Research Rotation Cr var each time taken FS SS Graduate research projects performed under the supervision of selected faculty members in the Bioinformatics and Computational Biology major.

CB 899 Research

Biological Premedical Illustration

www.bpmi.ustate.edu

(Interdepartmental Undergraduate Program)

Program Committee: Warren D. Dolphin Chair Dean Bechter C Arthur Crouse John Dorn Steven M Herrnstadt Harry Honer Don Sakaguchi

Undergraduate Study

The interdepartmental undergraduate BPMI major is designed for students who want to combine their interests and aptitudes in science and art. Based on the theme of communicating science through art the major prepares students for careers in biological illustration or for graduate education in medical illustration elsewhere. Graduates enter fields such as biocommunications environmental display design free lance illustration museum display design and various careers in the publishing industry.

Entrance into the BPMI program is by application to the BPMI Advisory Committee. Eligibility is based on an academic standard of at least 2.0 CGPA on 30 credits of university level work and a consideration of artistic ability as demonstrated through submission of a portfolio of representative drawings or other art work. Freshmen and transfer students usually declare pre BPMI as their major while satisfying the conditions for entrance into the major although other majors can be declared.

To earn the B.A. degree offered by the College of Liberal Arts and Sciences students must complete the general education requirements in that college and take at least 42 credits in design and 32 credits in the biological sciences. Design courses include Art 130 and 230 Art 233 238 and 330 BPMI 326 327 338 337 494 and 497 plus 12 credits chosen from a list of approved upper level courses in art and design.

Biological science courses include Bio 102 201L 201L 202L Bio 306 or 404 or 506 Zo 255 320 and at least 12 credits chosen from a list of approved biological science courses. Students must earn a grade of C- or better in all art and science courses included in the major and must earn an overall GPA of 2.00 in both categories. A brochure of courses is available in 201 Bessey Hall that gives a detailed listing of the requirements.

English Proficiency Requirement Students must earn a minimum of C in both English 104 and 105 or equivalent composition courses and in one advanced writing course numbered Eng 302 through 316.

Students in BPMI must complete a senior project or an internship experience in which they design and produce artwork that is suitable for publication or public display.

A minor in biological illustration is offered. A minimum of 17 credits must be taken including 8 credits in biological science courses and 9 credits in art and design courses. The biological science courses must include Bio 201 201L 202 202L The art and design courses must include ArtVis 336 and 337 and an advanced drawing or painting course. For more information contact the chair of the BPMI Advisory Committee in 201 Bessey Hall or view the website listed above.

Courses Primarily for Undergraduate Students

BPM 1326 Introduction to Illustration (Same as ArtVis 326) See Art and Design.

BPM 1327 Illustration as Communication and Interpretive Expression (Same as ArtVis 327) See Art and Design.

BPM 1336 Biological Illustration Principles and Techniques (Same as ArtVis 336) 10 0 Cr each time taken maximum of 6 S F Rearc 326 Rendering techniques applied to different types of biological subject matter including computer applications. Term project requires.

BPM 1395 Field Illustration Cr 1 to 3 each time taken maximum of 6 S S Rearc Permission of instructor. A combination seminar and field trip course emphasizing nature interpretation field sketching techniques and preparation of a final illustration based on field experience.

BPM 1398 Cooperative Education Cr R SS Rearc Permission of the program cooperative education coordinator junior classification. Required of all cooperative education students. Students must register for these courses prior to commencement of each work period.

BPM 1435 Illustrating Nature I Sketching (Same as La 435L) See Iowa Lakeside Laboratory.

BPM 1436 Illustrating Nature II Photography (Same as La 436L) See Iowa Lakeside Laboratory.

BPM 1490 Independent Study Cr 1 to 3 each time taken maximum of 3 Rearc Written approval of instructor and advisory committee chair is required. Credit for work in advance of semester of enrollment.

BPM 1494 Special Topics in Illustration Cr 1 to 3 each time taken. Intensive exploration of illustration techniques in a studio or field setting.

BPM 1497 Illustration Internship Cr 1 to 6 each time taken maximum of 6 Rearc Junior or senior classification in BPMI written approval of supervising instructor and advisory committee chair is required. Credit for work in advance of semester of enrollment. Offered on a satisfactory fail grading basis only.

Biology

www.biology.ustate.edu

Warren D. Dolphin Program Coordinator

The biological sciences at Iowa State University are organized into 20 departments and programs. These can be grouped into the basic sciences agricultural sciences and veterinary sciences. Well over 200 faculty consider themselves life scientists and most teach courses at the undergraduate and graduate levels. Such a large faculty group provides many opportunities for students to learn from some of the national leaders in biological research and teaching and to participate in exciting meaningful research projects that explore frontiers in the life sciences. Few other universities have such a wealth of faculty expertise available to undergraduate students.

Biology is an interdepartmental undergraduate major. Students majoring in Biology are able to integrate knowledge from several life science disciplines into a coherent, broadly based undergraduate program of study. Students who wish to study specific areas of the basic biological sciences should declare majors in animal ecology biochemistry botany entomology genetics microbiology or zoology. Course requirements for these majors are given elsewhere in this bulletin under the department's name. Although requirements for biology and related majors differ significantly the courses taken during the first two years are similar. In particular freshmen biology and chemistry must require calculus and organic chemistry and all require credits in general education courses. As a result and with proper planning a student is able to transfer from one basic biological science major to another without serious consequences any time during the first two years. For detailed requirements see the catalog entries under the particular majors.

The biology major is well suited for those who plan to teach biology who wish to enter government or industrial employment in health or environmental professions or who prefer educational leadership as an end in itself. A bachelor's degree in biology provides excellent preparation for graduate study in many biological disciplines and for entrance into various professional schools such as human medicine or veterinary medicine. Students with particular interests can combine biology with a minor or a second major in another area such as chemistry environmental studies a foreign language journalism mathematics or other majors offered by the university.

Undergraduate Study

Of the courses taught by the biology program Bio 109 is a general presentation of selected biological topics designed primarily for students not majoring in the basic biological sciences. Bio 123 also designed for the non major is intended to be an introduction to topics in environmental biology.

A unified biology core serves the various majors in the life sciences. This core consists of six integrated courses with labs that explore the basic principles of the biological sciences. The first year (Bio 201 202) provides a broad introduction to the nature of life. The second year (Bio 301 302) provides an integrated foundation in the principles of genetics cell biology and elementary biochemistry. The third year (Bio 312 303) provides an evolutionary and ecological perspective.

A detailed description of the courses required in the biology major is available in 201 Bessey Hall or is available on the WWW at the site listed above. Biology majors take a minimum of 40 credits in the biological sciences including the following courses Bio 102 201L 201L 202L 301 301L 302L 302L 303 and 312 plus 18 additional credits in approved life science courses numbered 300 or above. A partial listing of approved courses by department follows.

Animal Ecology

A Ecl 310 Vertebrate Biology

A Ecl 321 Fish Biology

A Ecl 350 Ecological Methods & Analyses

A Ecl 363 Natural History of Birds

A Ecl 410 Aquatic Ecology

A Ecl 442 Aquaculture

Biochemistry

Biophysics and Molecular Biology

BMB 301 Survey of Biochemistry

BMB 311 Biochem Lab or 411

BMB 404 Biochemistry I

BMB 405 Biochemistry II

BMB 420 Physiological Chemistry

BMB 451 Physical Biochemistry

BMB 461 Biophysics

Biomedical Sciences

BMS 329 Physiology and Anatomy of Domestic Animals

BMS 416 Anatomy of Laboratory Animals

BMS 416 Asian Anatomy
Botany
Bol 304 Plants & People
Bot 306 Plant Taxonomy
Bot 320 Plant Physiology
Bot 321 Plant Physiology Lab
Bot 330 Environmental Systems
Bot 364 Biology of Aquatic Plants and Algae
Bot 404 Plant Anatomy
Bot 408 Principles of Mycology
Bot 484 Plant Ecology [5]

Entomology
Ent 370 Insect Biology
Ent 374 Insects and Our Health
Ent 375 Plant Protection Using Natural Enemies
Ent 376 Fundamentals of Entomology & Past Management

Genetics
Gen 308 Biotechnology in Agriculture
Food & Human Health
Gen 340 Human Genetics
Gen 410 Transmission Genetics
Gen 411 Molecular Genetics
Gen 482 Evolutionary Genetics Microbiology
Micro 302 Biology of Microorganisms
Micro 201L Intro Microbiology Lab (201)
Micro 310 Fundamentals of Microbial Infection & Immunity
Micro 402 Microbial Genetics
Micro 404 Microbial Physiology
Micro 408 Virology
Micro 420 Food Microbiology
Micro 475 Immunology
Micro 477 Bacterial Plant Interactions

Zoology
Zool 304 Animal Behavior
Zool 311 Intro Parasitology
Zool 310 Brain & Behavior
Zool 320 Comparative Chordate Anatomy
Zool 322 Vertebrate Biology
Zool 355 Principles of Physiology
Zool 405 Invertebrate Biology
Zool 428 Cell Biology
Zool 433 Developmental Biology
Zool 454 General and Human Endocrinology
Zool 456 Neurobiology
Zool 459 Environmental Physiology

Iowa Lakeside Lab
La LL 301 Iowa Natural History
La LL 302 Plant Animal Interactions
La LL 312 Ecology
La LL 321 Entomology
La LL 364 Biology of Aquatic Plants
La LL 367 Plant Taxonomy
La LL 371 Intro to Insect Ecology
La LL 403 Evolution
La LL 415 Developmental Biology of Freshwater Invertebrates
La LL 419 Vertebrate Ecology and Evolution
La LL 4221 Prage Ecology
La LL 4901 Undergraduate Independent Study

Many courses from the departments of Agronomy, Animal Science, Horticulture and Plant Pathology may also be applied for Biology credit. The complete list of approved courses may be obtained in 201 Bessey Hall or viewed on the WWW at wwwbiology.iastate.edu

Courses beyond the core must be chosen from at least two departments so that the student's program of study reflects appropriate breadth. Students are encouraged to participate in research projects by taking Biol 490 Independent Study in order to gain research experience prior to graduation. A grade of C- or better is required in all biological science courses applied to the major and the cumulative average in the major must be at least a C.

Supporting course requirements include 16 credits in chemistry to include two semesters of general chemistry with labs and at least one semester of organic chemistry with lab after demonstrating competence in algebra and trigonometry. Two semesters of calculus or two semesters of statistics chosen from a list of approved courses available in 201 Bessey Hall and a two semester sequence in general physics.

Because biology is major in the College of Liberal Arts and Sciences students must fulfill the foreign language and general education requirements listed in this bulletin for that college

English Proficiency Requirement. Students must earn a minimum of 400 on the SAT or the equivalent composition courses and in one advanced writing course numbered Engl 302 through 316.

In addition to courses offered on campus, courses in field and aquatic biology are offered at the Iowa Lakeside Laboratory. Courses in marine biology are available at the Gulf Coast Research Laboratory in Mississippi. Students may also attend summer biological field stations elsewhere and transfer credits back

Biology majors seeking certification to teach biology in secondary schools must meet requirements of the College of Education as well as those of the biology program. In addition they must apply formally for admission to the teacher education program. See the Index of Teacher Education Program Teacher Licensure

The program offers a minor in biology which may be earned by credit in Bol 201L, 202, 202L, 301 and 6 credits in courses numbered 300 or above from the list included here. A minor or a double major in biology with a major in Animal Ecology Agricultural Biotechnology Biotechnology Botany Entomology Genetics Microbiology or Zoology is not permitted. Likewise a minor in another basic biological science with a major in biology is not permitted.

Graduate Study
Biology is only an undergraduate major. Persons interested in graduate study in the biological sciences should apply directly to one of the life science departments. Interdepartmental graduate offerings in ecology and evolutionary biology (EEB) genetics molecular cellular and developmental biology (MCDB) neurobiology plant physiology plant pathology immunology biomedical engineering and water resources are also available (see Index).

A non thesis master's degree in interdisciplinary graduate studies (biological sciences) has been established particularly for teachers who wish to broaden and update their formal training in biology.

Courses open for nonmajor graduate credit 374 4031

Courses Primarily for Undergraduate Students
Biol 102 Opportunities in Biology (10) Cr 5 F Orientation to the scope of the biological sciences and discussion of professional opportunities. Required of first year biology majors. Offered on a satisfactory fail grading basis only.
Biol 109 Introductory Biology (3-0) Cr 3 FS SS Life considered at cellular organism and population levels function and diversity of the living world. Presentation of basic biological principles as well as topics and issues of current human interest. Non-majors only. Students may receive graduation credit for no more than one of the following 109 123 or 201
Biol 123 Environmental Biology (Same as Env S 123) (3-0) Cr 3 FS SS An introduction to the structure and function of natural systems at scales from the individual to the biosphere and the complex interactions between humans and their environment. Discussions of human population growth, biodiversity sustainability resource use and pollution. Non-majors only. Students may receive graduation credit for no more than one of the following 123 or 201
Biol 201 Principles of Biology I (3-0) Cr 3 FS PreReq High school biology and chemistry or credit or enrollment in Chem 103 or 117 introduction to the nature of life including the cellular basis of life the nature of heredity evolution diversity of microbial plant and animal life and principles of ecology intended for life science majors. Students may receive graduation credit for no more than one of the following 109 123 201
Biol 201L Principles of Biology Laboratory (3) Cr 1 FS PreReq credit or enrollment in 201 Laboratory to accompany 201
Biol 202 Principles of Biology II (3) Cr 3 FS PreReq 201 Introduction to the nature of life including the cellular basis of life energy relationships the nature of heredity evolution form and function of microbial plant and animal life.
Biol 202L Principles of Biology Laboratory (3-0) Cr 1 FS PreReq credit or enrollment in 202 Laboratory to accompany 202
Biol 301 Principles of Genetics (Same as Gen 301) (3-0) Cr 3 FS PreReq 201L and 202 L credit or enrollment in organic chemistry Introduction to the principles of transmission and molecular genetics of plants animals and bacteria. Recombination structure and replication of DNA gene expression cloning quantitative and population genetics. Students may receive graduation credit for no more than one of the following 301 and 301L Gen 250 Gen 320 and Agron 320
Biol 301L Principles of Genetics Laboratory (Same as Gen 301L) (3-0) Cr 1 FS PreReq credit or enrollment in 301 Laboratory to accompany 301. Students may receive graduation credit for no more than one of the following 301 and 301L Gen 250 Gen 320 and Agron 320
Biol 302 Principles of Molecular Cell Biology and Biochemistry (3-0) Cr 3 FS PreReq 301 Integration of elementary principles of metabolism bioenergetics cell structure and function to develop a molecular view of how the cell works.
Biol 302L Molecular Cell Biology and Biochemistry Laboratory (3-0) Cr 1 FS PreReq credit or enrollment in 302 Laboratory to accompany 302. Students may receive graduation credit for no more than one of the following 302 and 302L Gen 311 and Agron 320

Biol 303 Biological Evolution (Same as Bot 303 Zool 303 Zool 303) (3-0) Cr 3 FS PreReq 301 The mechanisms of evolution. Topics in microevolution population genetics natural selection genetic variation and adaptation. Macroevolution speciation extinction phylogeny and major evolutionary patterns.
Biol 312 Ecology (Same as A Ed 312) Biol 312 EnSci 312) (3-0) Cr 3 FSS PreReq PreReq 201L and 202L Fundamental concepts and principles of ecology dealing with organisms populations communities and ecosystems. Laboratory and field exercises examine ecological principles and methods as well as illustrate habitats.
Biol 312L Ecology (Same as La LL 312L) See Iowa Lakeside Laboratory
Biol 374 Insects and Our Health (Same as Ent 374) See Entomology Nonmajor graduate credit.
Biol 383 North American Field Trips in Biology (3-0) Cr 1 to 4 each time taken. Prereq. Two courses in the biological sciences and by approval of application Extended field trips usually during break periods to North American locations of interest to biologists. Inquire in 201 Bessey Hall for trip schedule.
A Pre trip Seminar Cr 1 Discussion of relevant biological and cultural topics during semester preceding trip.
B Field trip Cr 1 to 3 Trip to North American location under supervision of faculty member. Reports required.
Biol 384 International Field Trips in Biology (3) Cr 1 to 4 each time taken. Prereq. Two courses in the biological sciences and by approval of application Extended field trips usually during break periods to international locations of interest to biologists. Inquire in 201 Bessey Hall for trip schedule.
A Pre trip Seminar Cr 1 Discussion of relevant biological and cultural topics during semester preceding trip.
B Field trip Cr 1 to 3 Trip to international location under supervision of faculty member. Reports required.
Biol 389 Cooperative Education (3-0) Cr 3 FS SS PreReq major classification and permission of the department cooperative education coordinator.
Biological Sciences

Richard J. Martin Chair of Department
University Professors Draper
Professors Bloedel Evans Ghoshal Hsu
R Martin Randic Riedesel Scenes Sharp Umemura
Ware
Professors (Collaborators) Horst
Distinguished Professors (Emeritus) Christensen
Delmann
University Professors (Emeritus) Adams Reece
Professors (Emeritus) Ahrens Bal Canthers
Engen Hembroug Pineida Swenson VanMeter
Associate Professors Apley Bracha Greer Jeftna
A G Kanthasamy P Martin J Ourednik
W Ourednik Sakovu
Associate Professors (Collaborators) Golf
Associate Professors (Emeritus) Clump
Assistant ProfessorsDay Greenlee Kim
Assistant Professors (Adjunct) Aanatharam
Bennih A Kanthasamy Robertson Rowe
Assistant Professors (Collaborators) Kesi Kwon
Rasmussen
Instructors (Adjunct) Bolser

Professional Program of Study
For professional curriculum in veterinary medicine leading to the degree of doctor of veterinary medicine see Veterinary Medicine Curriculum.

A good foundation in anatomy, physiology, and pharmacology of animals is necessary to understand the mechanisms of animal disease processes and their treatment. Study of mammalian anatomy and physiology prepares students with a background in the structural and functional activities of cells, tissues, organs, and body systems of importance to veterinary medicine.

An understanding of drug action is essential for rational drug therapy. The general pharmacology courses provide students with a background in basic pharmacology to include pharmacodynamics, toxicology, and the clinical application of drugs. Special emphasis is placed on chemical agents and therapeutic practices specific to veterinary medicine.

Graduate Programs
The department offers work for the degrees of master of science and doctor of philosophy with majors in veterinary anatomy, physiology, and pharmacology. The department is divided into the three disciplines of veterinary anatomy, physiology, and pharmacology. Graduate studies are supervised by faculty members recognized in their areas of expertise. Current areas of research include diabetes mellitus, glaucoma, drug metabolism, pain neuroscience, and pharmacology of xenobiotics and chemicals. The department offers a comprehensive program in neuroscience and molecular biology. The department is part of the department of veterinary medicine and pharmacology. Graduate studies are supervised by faculty members recognized in their areas of expertise. Current areas of research include diabetes mellitus, glaucoma, drug metabolism, pain neuroscience, and pharmacology of xenobiotics and chemicals. The department offers a comprehensive program in neuroscience and molecular biology. The department is part of the department of veterinary medicine and pharmacology.
Courses Primarily for Undergraduate Students

B MS 329 Anatomy and Physiology of Domestic Animals (3 Cr) 3 C 3 S Prereq. Biol 202. 200. Survey of body systems of the domestic animals. Provides a medical science orientation particularly useful to students in a pre-veterinary medicine curriculum.

Courses Primarily for Professional Curriculum Students

B MS 330 Principles of Morphology I (Dual listed with 530 Q 3-6 Cr 5 S Prereq. First year classification in veterinary medicine. Comparative anatomy of domestic animals.

B MS 333 Biomedical Sciences I (3 Q) 3 Cr B F Prereq. First year classification in veterinary medicine. Microscopic anatomy and physiology of cells, tissues, cardiovascular system, respiratory system, and urinary system.

B MS 334 Biomedical Sciences II (3 Q) 3 Cr B S Prereq. First year classification in veterinary medicine. Microscopic anatomy and physiology of the digestive system, endocrine system, and reproductive system.

B MS 337 Neurobiology (Dual listed with 537 Q 2-2 Cr 3 S Prereq. First year classification in veterinary medicine. Neurobiology of domestic animals.

B MS 345 Case Study I (4 Q) 2 F Prereq. First year classification in veterinary medicine. Clinical applications of basic sciences taught concurrently in the fall semester of the first year curriculum in veterinary medicine.

B MS 346 Case Study II (2 Q) 2 Cr 1 S Prereq. First year classification in veterinary medicine. Clinical applications of basic sciences taught concurrently in the spring semester of the first year curriculum in veterinary medicine.

B MS 354 General Pharmacology (Dual listed with Q 3-0 Cr 3 S Prereq. 333. 334 General principles of drug disposition, drug actions on the nervous, cardiovascular, renal, gastrointestinal, and endocrine systems. Nonmajor graduate credit.

B MS 355 Integrative Physiology (2 Q) 1 F Prereq. Second year classification in veterinary medicine. To integrate all organ systems into a total physiological response to stress. Small group discussions and computer simulations will be utilized.

B MS 403 Behavior of Domestic Animals (1 Q) 1 C 1 S offered 2004 Prereq. Classification in veterinary medicine. Normal and abnormal behavior of domestic animals.

B MS 415 Anatomy of Laboratory Animals (Dual listed with 515 Q 1-1 Cr 2 S 2 Cr 1 S offered 2005 Prereq. One year of college biology. Gross and microscopic anatomy of laboratory animals.

B MS 416 Avian Anatomy (Dual listed with 516 Q 1-1 Cr 2 S 1 S offered 2004 Prereq. One year college biology. Gross and microscopic anatomy of domestic and exotic birds.

B MS 421 Special and Applied Anatomy of the Horse (1-3 Q) 2 F Prereq. 330 classification in veterinary medicine. See An 316 or 415. Applied anatomy of the horse. Nonmajor graduate credit.

B MS 443 Pharmacology and Therapeutics (Dual listed with 543 Q 3-0 Cr 3 S Prereq. 354 Pharmacology and therapeutic uses of fluids, antimicrobial drugs, and anesthetics and drugs for adverse drug reactions.

B MS 490 Independent Study. Cr 1 to 5 each time taken. Prereq. Permission of instructor.
Botany

www.public.state.edu/botany/

David J. Oliver
Chair of Department

University Professors

Horner

Professors Clark Farrar Oliver Rodwell Spalding van der Valk Wendel Wurtele

Distinguished Professors (Emeritus) Tiffany

Professors (Emeritus) Lormeste Larson Smith Stewart Swenson

Associate Professors Colbert Crompton Junk Moloney Reich Wallace

Assistant Professors Basamath Miller Nelson Wilsey

Assistants Professors (Adjunct) Pintchard

Undergraduate Study

For undergraduate curriculum in liberal arts and sciences major in botany see Liberal Arts and Sciences Curriculum.

The Botany department offers broad opportunity for the study of many basic and applied aspects of plant biology. The botany and biology majors and other undergraduate programs in which the department participates prepare students for a wide range of science-related occupations, including biology teaching, medical and pharmacology conservation and outdoor recreation activities, and research and development. The botany and biology majors offer excellent preparation for graduate study in biological sciences, and in such applied disciplines as agronomy forestry, horticulture and plant pathology. Graduates of the botany major understand the basic principles of plant structure function, ecology, and evolution and are able to communicate effectively about plant biology.

Botany is one of the basic biological sciences. Undergraduates majoring in Botany must therefore obtain a general biological foundation by taking courses in the biology program (see Biology Cross Disciplinary Program). Botany faculty are involved in both the organization and teaching of Biology courses thus Biology and Botany are integrated for the benefit of the student.

In addition to the basic Liberal Arts and Sciences requirements Botany majors must also complete:

1. Bot 201, 201L, 202, 202L, 301, 301L, 302, 302L 303 and 312 (22 credits)

2. 18 credits at the 300 level or above in botany from an approved list including Plant Anatomy (Bot 404) and at least one course from each of the other three major disciplines within Botany.

3. 18 credits at the 300 level or above in botany from an approved list including Plant Anatomy (Bot 404) and at least one course from each of the other three major disciplines within Botany.

4. Two courses in Mathematics (calculus and/or statistics) from an approved list (7 B credits).

5. Two semesters of general chemistry with labs and at least one semester of organic chemistry with lab (13 credits).

6. A grade of C or better in Eng 104 and 105 and a C or better in an approved writing course (or satisfactory performance on a departmental writing exam).

A list of approved courses is available in 353 Bessey Hall.

Additional courses in other areas of the biological sciences are recommended depending upon the student's interests. Qualified students are encouraged to enrich their program through an independent study or research project (Bot 450) under the guidance of a faculty member. Courses at the Iowa Lakeside Laboratory the Gulf Coast Research Laboratory or other field laboratories are also recommended.

In addition to the courses listed above, students in consultation with their advisors choose electives that address their individual interests and needs.

A second major or minor in Biology with a major in Botany is not permitted.

Teacher Licensure Botany majors seeking licensure to teach biology in secondary schools must meet requirements of the College of Liberal Arts and Sciences and the College of Education as well as those of the Botany major. In addition they must apply formally for admission to the Teacher Education Program. See Index Teacher Education Program and Teacher Licensure.

Botany Minor The department offers a minor in Botany, which may be earned by completion of 15 or more credits in Botany courses with at least 6 credits in Botany courses numbered 300 or above and earned at ISU with a grade of C or higher. The minor must include 9 credits that are not used to meet any other department, college or university requirement.

Graduate Study

The department offers work for the degrees of master of science and doctor of philosophy with a major in Botany and minor work for students majoring in other departments. Within the Botany major one of the following areas of specialization may be designated aquatic and wetland ecology, ecology, cytology, ecology, morphological and biological principles and the understanding of plant processes involved in assimilation metabolism and regulation of growth and development. Nonmajor graduate credit.

Bot 321 Plant Physiology A (0) 3 Cr 3 S Prereq Bot 301 or Gen 202 Bot 302 or BIOS 301 Chem 231 or 332 Phys 105 or 111 Application of physical and biological principles to the understanding of plant processes involved in assimilation metabolism and regulation of growth and development. Nonmajor graduate credit.

Bot 330 Environmental Systems (Same as Env S 330 EnSci 330) (2-4) Cr 4 F Prereq Bot 202 or Micro 201 Chem 194 or 195 and 197 Math 150 or 161 Crompton Introduction to the dynamics of metabolic and biocenological processes in environmental systems emphasizing microbial processes Environmental factors controlling major autotrophic and heterotrophic processes of microorganisms and higher organisms. Laboratory emphasizes mass balance analysis and environmental simulation modeling. Nonmajor graduate credit.

Bot 340 Biodiversity (Same as Env S 340) (4-6) Cr 2 S 2nd year week. Prereq One course in life sciences. Clark Survey of major groups of organisms and biogeochemical systems. Definition measurement and description of major functional groups of organisms Sources of information about biodiversity. Not intended for major credit in the biological sciences.

Bot 356 Dendrology (Same as For 356) (3-6) Cr 4 F Prereq Bot 201 Farrer Taxonomy morphology and ecology of North American species of woody plants of importance in timber production and wildlife food and cover.

Bot 367 Plant Taxonomy (Same as La LL 367) See Iowa Lakeside Laboratory.

Bot 403 Environmental Biogeochemistry (Same as EnSci 403 GeoSci 403) (3-4) Cr 3 S Prereq EnSci 330 Raitz Biological chemical and physical phenomena controlling material energy and elemental fluxes in the environment. Human interactions with and effects on environmental systems. Nonmajor graduate credit.

Bot 404 Evolution (Same as La LL 404) See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Bot 405 Plant Anatomy (3-3) Cr 4 F Prereq Bot 202. 308 recommended Characteristics of cell and tissue types in vascular plants. Anatomy of developing and mature stems roots and leaves including secondary (woody) growth. Introduction to the special anatomy of flowers and seeds. Nonmajor graduate credit.
Bot 406 Principles of Mycology (Same as Micro 406) Cr 2 F Prereq 10 credits in biological sciences
Tiffany Morphology, taxonomy and ecology of fungi: their relationship to agriculture and industry.
Nonmajor graduate credit.

Bot 410 Aquatic Ecology (Same as Ec 410 EnSci 410) Cr 3 F Prereq 312 EnSci 330 or 301 Structure and function of aquatic ecosystems with application to fishery and pollution problems.
Emphasis on lacustrine, marine and wetland ecology.
Nonmajor graduate credit.

Bot 410L Aquatic Ecology Laboratory (Same as Ec 410L) Cr 1 F, Prereq Concurrent enrollment in 410L Field trips and laboratory exercises to accompany 410L Hands-on experience with aquatic research. ad:monitoring techniques and concepts. Nonmajor graduate credit.

Bot 411 Identification of Aquatic Organisms (Same as Ec 411) Cr 3 FS Prereq Credit or enrollment in 410L. On line taxonomic and identification exercises to accompany 410 Instruction and practice in the identification of eelgrass, macrophytes, zooplankton and benthos.
Nonmajor graduate credit.

Bot 421 Prereq Ecology (Same as La 421) Cr See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Bot 461 Introd to GIS (Same as La 461) Cr See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Bot 484 Plant Ecology (3-0) Cr 3 S Prereq Bot 312 Moloney Principles of plant population and community ecology. Nonmajor graduate credit.

Bot 484I Plant Ecology (Same as La 484) Cr See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Bot 487 Aquatic and Wetland Microbial Ecology (Dual listed with 487 same as EnSci 487 Micro 487) Cr 3 S Prereq 6 credits in biology and 6 credits in chemistry. Crumpion Introduction to major functional groups of phototrophic and heterotrophic microorganisms and their role in aquatic and wetland ecosystems. Emphasis on energy flow and nutrient dynamics. Nonmajor graduate credit.

Bot 490 Independent Study Cr 1 to 3 each time taken. Prereq 7 credits in botany permission of instructor. No more than 9 credits of 490 may be counted toward a degree in botany.

A Plant Physiology and Molecular Biology
B Morphology
C Mycology
D Systematics and Evolution
E Plant Ecology
F Honors
I Iowa Lakeside Laboratory (Same as La 490) See Iowa Lakeside Laboratory.

J Cytology
K Aquatic and Wetland Ecology

Courses Primarily for Graduate Students, open to qualified undergraduate students.

Bot 501 I Freshwater Algae (Same as La 501) I See Iowa Lakeside Laboratory.

Bot 505 Plant Diversity and Evolution (2-4) Cr 4 Alt S offered 2005 Prereq 10 credits in biological sciences Farrar. Current concepts of plant phylogeny from the origin of land plants through the origin of angiosperms, with emphasis on morphological reproduction and evolutionary trends in bryophytes, pteridophytes, and gymnosperms.

Bot 512 Plant Growth and Development (Same as Gen 512 MCDB 512 P Phy 512) 2 Cr 2 F Prereq 320 or a course in developmental biology. 545 or BBMB 404 405 or Gen 520 Wurtele and Beckert Plant growth and development and its molecular genetic regulation. Hormone biosynthesis, metabolism and action. Signal transduction in plants.

Bot 513 Plant Metabolism (Same as Phy 513) 2 Cr 2 F Prereq 320 Phys 111 Chem 331 one semester of biochemistry recommended. Splitting Photosynthesis respiration and other aspects of plant metabolism.

Bot 529 Plant Cell Biology (Same as MCDB 529) 2 Cr 2 F Prereq 320 Bot 301 302 or BBMB 405 Basal plant organization function and development of plant cells and subcellular structures.

Bot 531 Conservation Biology (Same as La 531) I See Iowa Lakeside Laboratory.

Bot 531I Restoration Ecology (Same as La 531I) I See Iowa Lakeside Laboratory.

Bot 537 Environmental Stress Physiology (Same as Hort 537) See Horticulture.

Bot 542 Introduction to Molecular Biology Techniques (Same as Zool 542) I See Zoology.


Bot 552 Pteridology (1-3) Cr. 2 Alt SS offered 2004 Prereq 10 credits in biological sciences Farrar Morphology taxonomy and ecology of the lower vascular plants with emphasis on ferns.

Bot 562 Evolutionary Genetics (Same as Gen 562) See Genetics.

Bot 563 Molecular Phylogenetics (Same as Zool 563) I See Zoology.


Bot 564I Wetland Ecology (Same as La 564) I See Iowa Lakeside Laboratory.

Bot 566 Molecular Evolution (Same as Gen 566 Zool 566) I Cr 3 F Prereq Permission of instructor. Wendel Seminars/weak discussion course covering the fundamentals of molecular evolution. Emphasis is placed on original scientific literature and current topics including rates and patterns of genetic divergence nucleotide and amino acid diversity molecular clocks gene duplication genome structure organellar genomes polyplody transposable elements and modes and mechanisms of gene and genome evolution.

Bot 568 Advanced Systematics (Same as Ent 568 Zool 568) I Cr 3 Alt S offered 2005 Prereq Bot 303 or equivalent permission of instructor Wallace. Principles underlying the geographic distribution of organisms throughout the world's influences of geology and tectonic movements climate migration dispersal habitat and phylogeny in present distribution patterns based on morphological methods.

Bot 570 Landscape Ecology (Same as Ec 570) Cr 2 Cr 3 Alt S offered 2004 Prereq Permission of instructor. Bot 322 or Ent 501 a course in calculus. The study of ecological and evolutionary processes within a spatial context with emphasis on behavior population and community dynamics.

Bot 575 Field Mycology (2-6) Cr 4 F Prereq 10 credits in botany. Collection and identification of fungi and relation of their occurrence to environmental factors. Field trips.

Bot 579I Field Mycology (I See Iowa Lakeside Laboratory.

Bot 580 Ecology and Systematics of Diatoms (Same as La 580) I See Iowa Lakeside Laboratory.


Bot 584 Ecosystem Ecology (Same as EnSci 584) (3) 3 Alt S offered 2004 Prereq Combined 12 credits in biology and chemistry. Survey of the structure and function of major terrestrial ecosystems. Nutrient cycles energy flows and biotic and abiotic controls over ecosystem structure and composition.

Bot 585 Community Ecology (2) Cr 3 Alt F offered 2004 Prereq 484 Factors controlling species diversity species abundance and the structure and function of communities in space and time. Weekend field trips to various vegetation types.

Bot 587 Aquatic and Wetland Microbial Ecology (Dual listed with 487 same as Micro 587) (3) 3 Cr 3 S Prereq 6 credits in biology and 6 credits in chemistry. Crumpion Introduction to major functional groups of phototrophic and heterotrophic microorganisms and their role in aquatic and wetland ecosystems. Emphasis on energy flow and nutrient dynamics.

Bot 588 Population Ecology (Same as Ecol 588) (2) Cr 3 F Prereq Bot 312 Stat 401 a course in calculus. Concepts and theories of population dynamics with emphasis on models of growth competition and regulation.

Bot 590 Special Topics Cr 1 to 3 each time. Prereq 10 credits in botany permission of instructor. A Plant Physiology and Molecular Biology.

Bot 592 Ecological Genetics B Morphology

Bot 593 Aquatic and Wetland Ecology

Bot 595 Agrostology (2-3) Cr 3 Alt F offered 2004 Prereq 306 Clark Structure identification classification physiology and economic aspects of grasses and related families.

Bot 599 Creative Component Cr arr. Research toward nonthesis master's degree.

Courses for Graduate Students.

Bot 612 Seminar in Plant Development Cr 1 each time taken. Prereq Bot/Gen 512 can be taken concurrently). Berek Wurtzel. In depth discussion and critique of journal articles on current topics of interest to participants.

Bot 641 General Mycology (Same as Micro 641) (2-6) Cr 4 F Prereq PP 407 Tiffany First semester of a full year course. Taxonomy morphology ecology and phylogeny of algae fungi and fungi (focimycetes phycomycetes ascomycetes basidiomycetes and fungi imperfecti).

Bot 642 General Mycology (Same as Micro 642) (2-6) Cr 4 S Prereq 641 Tiffany Continuation of 641 Taxonomy morphology ecology and phylogeny of algae fungi and fungi (focimycetes phycomycetes ascomycetes basidiomycetes and fungi imperfecti).

Bot 651 Reproductive Biology of Flowering Plants (Same as Hort 651) See Horticulture.

Bot 679 Light Microscopy (Same as Micro 679) (2) 9 Fall semester even years. Prereq Permission of instructor Horner. Current theories encompassing light optics and their applications for specimen preservation paraffin and resin sectioning general staining histotechnology cytochemistry immunocytocchemistry autoradiography image digitization processing and presentation and photomicrography. Limit of 10 students.

Bot 680 Scanning Electron Microscopy (Same as Micro 680) (2) 9 Fall semester odd years. Prereq Permission of instructor Horner. Current theories encompassing scanning electron optics and
their applications for high and low vacuum microscop  

copy specimen chemical and cryo-preservation methods and x-ray microanalytical and  

topographic imaging image digitization processing and presentation and photomicrography Limit of 10  
students

Bot 681 Transmission Electron Microscopy (Same as Micro 681) (2-9) Cr 5 Spring semester odd years  
Offer Bot 679 and permission of instructor Honors Current the encompassing electron optics and their  
applications for chemical and physical specimen preservation ultramicroscopy general staining and  
and cytotoxicity immunocytometry autoradiography negative staining and shadowing x-ray  
microanalytical image digitization processing and presentation and photomicrography Limit of 10  
students

Bot 696 Seminar in Plant Physiology and Molecular Biology (Same as Agron 696 BBMB 696 For  
696 Gen 696 Hort 696 MCDB 696 P Phy 686 )  
Cr 1 each time taken FS Presentations and discussions of recent literature and problems under investigation

Bot 698 Seminar 1 cr 1 each time taken Meetings of botany faculty and students to discuss recent  
literature and problems under investigation A Vascular Plants B Non vascular Plants E  
Cytogenetic Studies and Evolution F Molecular Cellular and Developmental Biology (Same as  
MCDB 698) G Custom Cellular and Developmental Biology F Ecology A Aquatic and Wateland Ecology

Bot 699 Research 1 cr 1  
A Plant Physiology and Molecular Biology B Morphology C Mycology D Systematics and Evolution  
F Plant Ecology I Iowa Lakeside Laboratory (Same as la LL 699) I see Iowa Lakeside Laboratory  
J Cytology K Aquatic and Wateland Ecology

Courses offered at the Gulf Coast Research Laboratory (GCRL), Ocean Springs, Mississippi

The Gulf Coast Research Laboratory is affiliated with the University of Southern Mississippi Iowa State  
students may register for the following University of Southern Mississippi/GCRL courses and transfer them to  
their ISU degree programs With permission of the ISU coordinator for the GCRL 201 Bessey is required  
for this arrangement Inquire at 201 Bessey for further information

MAR 305 Marine Botany Cr 3 SS A general study of coastal vegetation with emphasis on local  
examples such as swamps savannas woodlands strands and island vegetation

MAR 490 Independent Study  
MAR 491 Special Topics

Business Administration
Leah S Hira Dean

Undergraduate Study
James C McElroy Professor in charge Undergraduate Programs in Business  

For undergraduate curriculum leading to the degree bachelor of science majors in accounting finance management operations marketing production operations management transportation and logistics and a secondary major in international business see College of Business Curricula  

The department of Business Administration supports the undergraduate programs in the departments of Accounting Finance Logistics Operations and Management Information Systems Management and Marketing by providing specialized coursework in  
orientation to business and cooperative education opportunities

Graduate Study
James C McElroy Professor in Charge Graduate Programs in Business  

The College of Business offers two graduate programs in business administration the master of business administration MBA and the master of science in business M S which are described below

The college also has two specialized master degree programs the master of accounting which is described under the Department of Accounting and the Master of Science Systems (M S S) which is described under management information systems Finally the College of Business is a participating member in two interdisciplinary programs the master of science in industrial relations and the master of science in information assurance

Master of Business Administration (M B A)

The College of Business offers a 48 credit program leading to a nonthesis master of business administration degree with a specialization in accounting agribusiness finance human resource management information systems systems marketing or sports management The coursework is designed to provide the knowledge skills and abilities for managerial success and leadership in organizations The M B A is the professional management education program for those pursuing business

Students working toward the master of business administration are required to complete a series of core courses in the basic functional areas of business (accounting economics finance management marketing operations management organization behavior management information systems international business ethics and social responsibility strategic management and business policy) and advanced elective coursework

Courses for the M B A are provided by the departments of Accounting Economics Finance Logistics Operations and Management Information Systems Marketing Management and Statistics Courses from other departments may also be chosen to meet specific student interests Students interested in the agribusiness specialization may need to take courses in the College of Agriculture Double degree programs are offered with the College of Agriculture (M A/M B A) community and regional planning (M B A/M C R P) and statistics (M B A/M S Statistics)

Students may enroll in one of the full time program the part time Saturday program or part time evening program in Des Moines The part time M B A programs are intended for those individuals who desire an M B A while continuing their full time employment

The M B A program is open to all individuals with a baccalaureate degree Undergraduates from liberal arts science and technical programs are especially encouraged to apply Academic potential and promise for a productive career in business and for managerial success and leadership in organizations are important criteria for admission Applicants must submit Graduate Management Admission Test (GMAT) scores official transcripts of previous academic work personal essays resume and three letters of reference International students whose native language is not English and who did not graduate from a U S college or university are required to submit the Test of English as a Foreign Language (TOEFL) scores

Admissions offers to the M B A program are made only for fall semester entry Although applicants will be considered after the deadline applicants are encouraged to submit their application materials by May 1 (March 1 for international students)

Master of Science (M S) in Business

The College of Business offers graduate work leading to the master of science degree with a major in business All the departments in the college (Accounting Finance Logistics Operations and Management Information Systems Management and Marketing) and the departments of Economics and Statistics cooperate in providing coursework toward this degree The program is designed to serve those students who desire specialized study of an area within business at the master s level It also serves to develop their research capabilities

The M S degree is best suited for students with degrees or academic backgrounds in business as they may complete the program within the 30 credit minimum Students without business backgrounds are required to fulfill pre requisites and common body of knowledge coursework in accounting finance management information systems marketing organizational behavior operations management management information systems international business economics and statistics The program is composed of 7 credits of required courses in economics and statistics plus 3 to 6 credits of electives

Application deadline for the M S program is May 1 for fall admission and November 1 for spring admission Applicants must submit official transcripts of previous educational coursework and degrees the Graduate Management Admission Test (GMAT) scores personal essays resume and three letters of reference International students whose native language is not English and who did not graduate from a U S college or university are required to submit the Test of English as a Foreign Language (TOEFL) scores

Courses Primarily for Undergraduate Students

BUS 101 Orientation 1-0 Cr 0 5 FS SS First 8 weeks A required orientation for all College of Business students Review of college and university requirements transfer credits academic planning university policies and deadlines and registration procedures Includes group advising for course selection and registration Offered on a satisfactory fail grading basis only

BUS 101H Orientation 1-0 Cr 0 5 8 weeks Prereq Membership in the Freshman Honors Program Designed to supplement the Freshman Honors orientation (Hon 121) with college specific information to facilitate the development of Honors programs of study in business and to acquaint students with university policies and procedures Offered on a satisfactory fail grading basis only

BUS 211 Introduction to Careers in Business 1-0 Cr 0 5 FS SS 8 weeks Prereq Sophomore classification Introduction to careers open to business majors Presentations by business professionals in various areas of business Offered on a satisfactory fail grading basis only

BUS 291 Experiential Learning 1-0 Cr 1 3 each taken Prereq Written approval of supervising instructor and department chair on required form prior to the learning experience Supervised travel and/or work experience in a business related discipline Offered on a satisfactory fail grading basis only

A Domestic Internship  
B International Internship  
C Domestic Travel and Study  
D International Travel and Study

BUS 301 Professional Employment Preparation 1-0 Cr 1 Designed to provide students with the skills to develop and implement full time or internship job search Topics include resume writing interviewing skills application letter search skills business etiquette dress for success adapting to the workplace and organizing your job search Highlights include a business etiquette dinner with professional leader and an employer panel Offered on a satisfactory fail grading basis only

BUS 382 Business Analysis Laboratory 1-6 Cr 3 FS SS Prereq Permission of Instructor Engineering and business related projects are completed by interdisciplinary student teams Projects are supplied by the industrial partners of the ISU
Chemical Engineering

www.iastate.edu/ch_e/

Charles E. Glazt Chair of Department
Distinguished Professors Reilly Seagrave
University Professors Hill
Professors Brown Fox Glazt Hebert Jolles Porter
Schneider J. Shanks Ulrichson
Distinguished Professors Emeritus Burr Kent
Distinguished Professors Emeritus Wheelock
Professors Emeritus Abraham Boylan Youngquist
Associate Professors Malapragade Rollins
B Shanks Vigil
Associate Professors (Adjunct) Hanneman
Associate Professors Emeritus Collins
Assistant Professors Gonzalez Narasimhan

Undergraduate Study

For undergraduate curriculum in chemical engineering leading to the degree bachelor of science see College of Engineering Curricula. This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Chemical engineering is a profession which provides a link between scientific knowledge and industrial production. The chemical engineer relies on science, experience, creativity and ingenuity to produce these materials economically. Almost everything of a material nature used by society today has at some point felt the influence of the chemical engineer. From raw materials such as minerals, coal, petroleum and agricultural products, chemical engineers create versatile intermediates and commodity chemicals high performance fuels new materials for construction pharmaceuticals high performance foodstuffs synthetic textiles plastics solid state electronic components and dozens of other engineered materials. The chemical engineer's influence has been important in the development of catalysts fuel cells automobile controls biochemical processes artificial kidneys tissue engineering nuclear energy medical instruments and devices as well as in the development of air and water pollution control systems. Many new and equally exciting challenges await the practicing chemical engineer of the future.

The profession of chemical engineering embraces a wide variety of activities including research, process development, product design, manufacturing, supervisory technical sales, consulting and teaching. The engineer can be behind a desk in a laboratory in a manufacturing plant or engaged in nationwide and worldwide travel.

Successful chemical engineers find chemistry, mathematics and physics to be interesting and exciting. Many chemical engineers also have interests in the biological sciences. The curriculum in chemical engineering includes advanced study of chemistry, mathematics, and physics as well as intensive study in the engineering sciences such as chemical reaction engineering, thermodynamics, mass transfer, fluid mechanics, heat transfer, system analysis, and process synthesis and design.

The curriculum in chemical engineering is designed to produce graduates that have the ability to apply knowledge of mathematics, science, and engineering to the ability to design, conduct and interpret experiments and the ability to design a chemical engineering system component or process. Graduates should also have the ability to function on multi-disciplinary teams, the ability to effectively formulate and solve chemical engineering problems and the ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

The curriculum should also assure that graduates have the ability to communicate effectively, the broad education necessary to understand the impact of chemical engineering solutions in a global and societal context and recognition of the need for and an ability to engage in life-long learning, as well as a knowledge of contemporary issues in engineering science and professional and ethical responsibilities.

The curriculum assures that graduates have a thorough grounding in chemistry along with a working knowledge of advanced chemistry such as organic inorganic physical analytical materials chemistry or biochemistry. In addition, a working knowledge including safety and environmental aspects of material and energy balances is applied to chemical processes thermodynamics of physical and chemical equilibria, heat mass and momentum transfer chemical reaction engineering, continuous and stage wise separation operations, process dynamics and control process and appropriate modern experimental and computing techniques is assured.

A significant number of chemical engineering graduates should have an ability to function as engineers in an international setting and an ability to pursue research and advanced studies in chemical engineering on related fields such as medicine, law and business.

A cooperative education program is available to students in chemical engineering. See Cooperative Programs of College of Engineering.

Graduate Study

The department offers work for the degree master of science master of engineering and doctor of philosophy with major in chemical engineering, and minor work for students taking major work in other departments.

Prerequisites to major graduate work is a bachelor's degree in chemical engineering or other related fields. Students with undergraduate background other than chemical engineering should contact the department for further details.

The master of engineering degree requires a creative component. A thesis is required for the master of science degree.

Courses open for nonmajor graduate credit. All 300 and 400 level courses except 302 391 392 396 397 398 490 498 and 499.

Courses Primarily for Undergraduate Students

Ch E 202 Seminar (1-0) CR S Prereq: Sophomore classification in chemical engineering. Offered on a satisfactory-fail grading basis only.

Ch E 210 Material and Energy Balances (3-0) CR 3 FS Prereq: Ch E 178 Math 166 Introduction to chemical processes. Phase equilibrium, fluids, liquids and solids. Application of material and energy balances to chemical engineering equipment and processes.

Ch E 298 Cooperative Education CR R FS Prereq: Permission of department chair. First professional work period in the cooperative education program. Students must register for the course the semester before commencing work.

Ch E 325 Chemical Engineering Laboratory (3-0) CR 2 FS Prereq: Ch E 357 credit or enrollment in Ch E 381. Experiments covering fundamentals and energy balances and energy and transport phenomena. Chemical processes and computational Computer application. Nonmajor graduate credit.

Ch E 356 Transport Phenomena I (3-0) CR 3 FS Prereq: Ch E 210 Phys 221 credit or enrollment in Math 267: Momentum and mechanical energy balances. Noncompressible and compressible fluid flow. Applications to fluid flow, piping system design, filtration, packed beds and distillation. Nonmajor graduate credit.

Ch E 357 Transport Phenomena II (3-0) CR 3 FS Prereq: Ch E 356 Conduction and diffusion convective heat and mass transfer boiling and condensation radiation.
Chemistry

www.chem.iastate.edu

Gordon J Miller Chair of Department

Distinguished Professors: Angela Barton, Corbett Espenson, Gordon Small, Thel Young

University Professors: Hoffman Larock Verkade

Professors: Armstrong Geoffroy Greenhowe Houk, Kostic Kozak, Kraus Miller, Parich Porter, Radebeau W Trahanovsky

Distinguished Professors: (Emeritus) Fritz Johnston Ruedenberg, Svob

Professors: (Emeritus) Franzen Gerstein Hutton Jacobson Martin, McCarty, Powell Strove Vogt

Associate Professors: Ashley Jenkins Schmidt Rohr Shin, Wei

Associate Professors: (Adjunct) Russell K, Trahanovsky

Assistant Professors: Hong Lin, Rohl, Song, Zhao

Undergraduate Study

For undergraduate curricula in liberal arts and sciences leading to the degrees, bachelor of science and bachelor of arts, see Liberal Arts and Sciences Curriculum.

Graduating in the B.S. degree in chemistry qualifies for many fields as teachers of chemistry as supervisors in industry as technical sales personnel and as research chemists in federal state municipal academic or industrial institutions. Graduates with high scholastic standing often continue with graduate work; they can explore more thoroughly the specialized areas of chemistry in which they are interested.

The B.A. degree is useful for students who intend to pursue studies in parallel areas such as secondary school teaching or graduate work in parallel majors or strong minors. The B.A. degree does not prepare students as well for graduate study or professional employment in chemistry.

Graduates have firm foundations in the fundamentals and application of current chemical theories. They are able to design carry-out record and analyze the results of a chemical experiment. They are able to use modern instrumentation and classical techniques to identify and solve chemical problems as well as explore new areas of research. Graduates are able to communicate the results of their work to chemists as well as non-chemists. They understand the ethical and environmental dimensions of problems and issues facing chemists. They follow the proper procedures and regulations for safe storage, labeling use of chemicals and disposal of chemicals. Graduates are skilled in problem solving, critical thinking and analytical reasoning. These skills can be applied to careers in education and industry or professions such as law medicine, environmental sciences and forensic sciences. The curriculum in chemistry is approved by the American Chemical Society (ACS). Students who complete the program obtain an ACS certified baccalaureate degree.

Chemistry majors who wish to transfer into chemistry at the end of their second year may still complete all degree requirements and graduate within five years.

Undergraduate students seeking the B.S. degree in chemistry usually take courses essential to the degree program according to the following schedule:

First year:
- Chem 177M, 177N, 178M, 211L, Math 165, 166 Eng 104, 105, Lab 160

Second year:
- Chem 331, 332, 333L, 334L, Math 265, Phys 221, 222

Third year:
- Chem 321, 322, 322L, 316L, 316L, 301, Eng 314, Foreign language requirement

Fourth year:
- Chem 402, 40L, 2 advanced chemistry courses (minimum 4 credits). Chem 399 or 499 is strongly recommended however credits earned in 399/499 can only be used to meet one of the advanced course requirements.

Chemistry majors seeking certification to teach chemistry in secondary schools must meet requirements of the College of Education as well as those of the chemistry program. In addition, they must apply formally for admission to the teacher education program.

Undergraduate students seeking the B.A. degree in chemistry have the following courses in their degree programs as minimum requirements: 177L (or 167L), 177N, 178L, 211L, 301, 316L, 321L, 322L, 332L, 331, 331L, 332, 332L, Math 165, 166 and Phys 221, 222 are required as supporting work.

The Department offers a minor in chemistry which may be earned by credit in Chem 177L, 177N (or 167L), 178L, 211L, 321L, 331L, 332L and 333L and 332L. The total minimum credits in chemistry thus will be 20 to 23 depending on which advanced courses are selected.

The Department requires a grade of C- or better in each of English 104, 105 and 314.

Graduate Study

The Department offers work for the degrees of master of science and doctor of philosophy with majors in inorganic, physical and physical chemistry as well as the degree of master of science and doctor of philosophy in chemistry. Co-majors may be taken between areas within chemistry or between one of the areas in chemistry and another department. Courses in other areas of chemistry as well as courses in other departments may be used to satisfy the requirements for coursework outside the major field. A Ph.D. student in chemistry may choose an additional specialty in one of the five areas: Materials Chemistry, Industrial Chemistry, Biomedical Sciences, Chemical Instrumentation and Forensic Chemistry. A minimum of ten credits is required for each additional specialty a course which counts towards an additional specialty may also count toward the outside course requirement. A minor in chemistry is available to students in other departments. The Department participates in the interdepartmental major in toxicology.

The Department of Chemistry requires all graduate students majoring in chemistry to teach as part of their training for an advanced degree.

The prerequisite to major graduate work is the completion of undergraduate work in calculus, physics and chemistry. Substantially equivalent to that required of undergraduate chemistry majors at this institution. Courses open for nonmajor graduate credit: 301, 316L, 321L, 322L, 331L, 332, 401L, 402.

The course numbers for general chemistry courses include 105 and 160 and 178. Index to field of work for 200 level courses and above is given by the second and third digits of course numbers:

(a) Inorganic Chemistry 00-09
(b) Analytical Chemistry 10-19
(c) Physical Chemistry 20-29 and 60-69
(d) Organic Chemistry 30-39
(e) Chemical Education 50-59
(f) Interdisciplinary Chemistry 70-79

(g) Research 99

Courses Primarily for Undergraduate Students

Chem 105 Fundamentals of College Chemistry (3-3) Cr. 3 F Preq: Gen Math course or equivalent. An introduction to the subject matter of chemistry designed to impart the fundamental concepts and principles of chemistry with an emphasis on mathematical skills and logical thinking. For students intending to enroll in general chemistry and who have not taken high school chemistry or who have not had a high school college preparatory chemistry course. Credit for Chem 105 does not count toward graduation but it does count toward the GPA.

Chem 165 Foundations of Chemistry for Engineers (3-3) Cr. 3 F Preq: Math 140 or the high school equivalent. The first semester of a two-semester sequence covering principles of chemistry and properties of matter explained in terms of modern chemical theory with emphasis on topics of general interest to the engineer. Chem 155 may not be counted for credit toward graduation in any other engineering curriculum. Credit for Chem 155 does not count toward graduation. Only one of 163, 165, 167 and 177 may count toward graduation. Only one of 155, 163, 167 and 177 may count toward graduation.

Chem 160 Chemistry in Modern Society (3-3) Cr. 3 S Preq: Gen Math course or equivalent. An introduction to the subject matter of chemistry designed to impart the fundamental concepts and principles of chemistry with an emphasis on the interface between chemistry and other fields of human activity. Credit may not be applied toward graduation for both 160 and another chemistry course.

Chem 163 General Chemistry (4-4) Cr. 4 S Preq: 1 year of high school algebra and geometry and either Chem 105 or 155 or 1 year of high school chemistry and credit or enrollment in 163. The first semester of a two semester sequence. A general survey of chemistry and properties with an emphasis on conceptual problems. Stochiometry atomic structure chemical bonding states of matter energy relations acid base theory and oxidation reduction reactions. The 163, 164 sequence does not meet the prerequisite for 331. Credit for examination (test-out examination) for 163 is available only to students who are not currently enrolled in the course. Credit may not be applied toward graduation for both Chem 160 and another chemistry course. Only one of 163, 165, 167 and 177 may count toward graduation. Only one of 155, 163, 165, 167 and 177 may count toward graduation.

Chem 163L Laboratory in General Chemistry (3-3) Cr. 1 F 4 Preq: Credit or enrollment in Chem 163. Laboratory to accompany 163. Must be taken with 163. Only one of 163L, 167L, and 177L may count toward graduation.

Chem 164 General Chemistry (3-3) Cr. 3 F Preq: 163 and 163L Continuation of 163. A general survey of chemistry and properties with an emphasis on conceptual problems. Stochiometry, atomic structure, chemical bonding, states of matter, energy relations, acid-base theory, and oxidation-reduction reactions. The 163, 164 sequence does not meet the prerequisite for 331. Credit for examination (test-out examination) for 164 is available only to students who are not currently enrolled in the course. Only one of 164 and 178 may count toward graduation.
Chem 164L Laboratory in General Chemistry (0-3) Cr 1 FS Prereq 163L and credit for or enrollment in 164. Laboratory students who do not plan to take additional courses in chemistry. Credit may not be applied toward graduation for both 164 and another chemistry course. Only one of 163 165 167 and 177 may count toward graduation. Only one of 153 163 167 and 177 may count toward graduation.

Chem 167 General Chemistry for Engineering Students (4-0) Cr 4 FS Prereq Math 140 or the high school equivalent and one year of traditional college prep chemistry or Chem 105. Principles of chemistry and properties of matter explained in terms of modern chemical theory which explains topics of general interest to the engineer. This is an accelerated course designed for students with an excellent preparation in math and science and is a terminal course intended for engineering students who do not plan to take additional courses in chemistry. Credit may not be applied toward graduation for both 167 and another chemistry course. Only one of 163 165 167 and 177 may count toward graduation. Only one of 153 163 167 and 177 may count toward graduation. Credit by examination (test-out exams) for 167 is available only to students who are currently enrolled in the course.

Chem 167L Laboratory in General Chemistry for Engineering (0-3) Cr 1 FS Prereq Credit or enrollment for credit in 167 or 165. Laboratory to accompany 167. Only one of 163L 167L and 177L may count toward graduation.

Chem 177 General Chemistry (4-0) Cr 4 FS SS Prereq Math 140 or high school equivalent and 165 155 or 1 year high school chemistry and credit or enrollment in 177L 177M. For chemistry and biochemistry majors. The first semester of a two semester sequence which explores chemistry at a greater depth and with more emphasis on conceptual problems and calculations than 163 164. Recommended for physical and biological science majors, chemical engineering majors, and all others intending to take 500 level classes for chemistry and biochemistry majors. For chemistry and biochemistry majors. Only one of 163L 167L and 177L may count toward graduation.

Chem 177L Laboratory in General Chemistry (0-3) Cr 1 FS SS Prereq Credit or enrollment for credit in 177. Laboratory to accompany 177. Must be taken with 177L 177M. For chemistry and biochemistry majors. Only one of 163L 167L and 177L may count toward graduation.

Chem 178 General Chemistry (3-0) Cr 3 FS Prereq 177 177L. Continuation of 177. Recommended for physical or biological science majors, chemical engineering majors, and all others intending to take 300 level classes for chemistry and biochemistry majors. Electrons, acid-base equilibrium, thermodynamics, nuclear chemistry and descriptive topics (non-metals, transition metals, coordination compounds, organic compounds, polymers, biochemistry). Only one of 164 and 178 may count toward graduation. Credit by examination (test-out exams) for 178L is available only to students who are currently enrolled in the course.

Chem 178L Laboratory in General Chemistry (0-3) Cr 1 FS Prereq 177L and credit for or enrollment in 178. Laboratory to accompany 178. 178L is not a necessary corequisite with 178. Only one of 164L and 178L may count toward graduation.

Chem 211 Quantitative and Environmental Analysis (2-0) Cr 2 FS Prereq 164 and 164L or credit or enrollment in 178 and concurrent enrollment in 211. Theory and practice of elementary volumetric, gravimetric, complexometric, and spectrophotometric methods of analysis. Chemical equilibria, sampling and data evaluation. Emphasis on environmental analytical chemistry. The same methods are widely used in biological and materials sciences as well.

Chem 211L Quantitative and Environmental Analysis Laboratory (0-2) Cr 1 FS Prereq Credit or enrollment in 164 and 164L or credit or enrollment in Chem 210 or 211. Introductory laboratory experience in volumetric, spectrophotometric, electrochemical, and chromatographic methods of chemical analysis.

Chem 231 Organic Chemistry (3-0) Cr 3 FS SS Prereq 163L 167L credit or enrollment in 231L. A survey of modern organic chemistry including nomenclature, structure, and bonding and reactions of hydrocarbons and important classes of natural and synthetic organic compounds. For students desiring only an elementary knowledge of organic chemistry. Students in physical or biological sciences and premedical or preveterinary curricula should take the full year sequence 331 and 332 (with the accompanying laboratories 331L and 332L). Only one of 231 and 331 or DSMW 231 may count toward graduation.

Chem 231L Laboratory in Elementary Organic Chemistry (0-3) Cr 1 FS SS Prereq Credit or enrollment for credit in 231L. Laboratory to accompany 231. 231L may be taken with 231.

Chem 239 Cooperative Education Cr R FS Prereq Prereq Permission of the Department cooperative education coordinator. Sophomore classification required. All cooperative education students must register for this course prior to commencing each work period.

Chem 299 Undergraduate Research (for Freshmen and Sophomores) Cr var Prereq Permission of staff member with whom student proposes to work.

Chem 301 Inorganic Chemistry (2-0) Cr 2 FS Prereq 321 Atomic and molecular structure and bonding; principles of molecular shapes and symmetry; acids and bases; solid state structures and properties; inorganic chemistry of H-B-C-N. Nonmajor graduate credit.


Chem 316L Laboratory in Instrumental Analysis (0-0) Cr 2 FS Prereq 211 211L Math 166 and concurrent enrollment in 316L. Phys 222 recommended. Quantitative and qualitative instrumental analysis. Emphasis on theoretical principles of atomic and molecular absorption and emission spectroscopy, electrochemistry, mass spectrometry, liquid and gas chromatography, electrophoresis. Literature of chemical analysis. Nonmajor graduate credit.

Chem 321 Physical Chemistry I (3-0) Cr 3 FS Prereq 178 Math 166 Phys 222 recommended. Classical thermodynamics 1st and 2nd and 3rd laws with applications to gases and interfacial systems: multicomponent equilibrium of reacting systems, distribution coefficients, and electrochemical cells. Nonmajor graduate credit.

Chem 321L Laboratory in Physical Chemistry for Engineers (1-3) Cr 2 FS Prereq Credit or enrollment for credit in 321. Error analysis. Use of computer.

Chem 322 Physical Chemistry II (3-0) Cr 3 FS Prereq Chem 211 Kinetic theory of gases: transport properties; chemical kinetics; quantum mechanics of atomic and molecular structure of spectroscopy and statistical thermodynamics of solids. Nonmajor graduate credit.

Chem 322L Laboratory in Physical Chemistry (1-6) Cr 3 FS Prereq Credit or enrollment for credit in 322. Error analysis. Use of computer. Thermodynamics of gases: transport properties; chemical kinetics; quantum mechanics of atomic and molecular structure of spectroscopy and statistical thermodynamics of solids. Nonmajor graduate credit.

Chem 331 Organic Chemistry (3-0) Cr 3 FS Prereq 178 enrollment in 331L highly recommended. First half of a two semester sequence. Modern organic chemistry including nomenclature, synthesis and bonding reaction mechanisms. For students majoring in physical and biological sciences, premedical and preveterinary curricula. Credit in this semester of organic chemistry should take 231 and 231L, not 331. Only one of 231 and 331 may count toward graduation. Nonmajor graduate credit.

Chem 331L Laboratory in Organic Chemistry (0-3) Cr 1 FS Prereq Credit or enrollment for credit in 331L. Laboratory to accompany 331.

Chem 332 Organic Chemistry (3-0) Cr 3 FS SS Prereq 321 enrollment in 332L highly recommended. Continuation of 331. Modern organic chemistry including nomenclature, synthesis and bonding reaction mechanisms. Natural products: carbohydrates and proteins. For students majoring in physical and biological sciences, premedical and preveterinary curricula. Credit in this semester of organic chemistry should take 231 and 231L, not 331. Only one of 231 and 331 may count toward graduation. Nonmajor graduate credit.

Chem 332L Laboratory in Organic Chemistry (0-3) Cr 1 FS Prereq Credit or enrollment for credit in 332L. Laboratory to accompany 332.

Chem 333L Laboratory in Organic Chemistry (0-6) Cr 2 FS Prereq Credit or enrollment for credit in 333L. Laboratory to accompany 333. Credit in this semester of organic chemistry should take 231 and 231L, not 331. Only one of 231 and 331 may count toward graduation. Nonmajor graduate credit.

Chem 398 Cooperative Education Cr R FS SS Prereq Permission of the Department cooperative education coordinator. Junior classification required. All cooperative education students must register for this course prior to commencing each work period.

Chem 399 Undergraduate Research Cr var Prereq Permission of instructor with whom student proposes to work and junior or senior classification. No more than six credits of 399 and 499 may count toward graduation.

Chem 401L Inorganic Chemistry Laboratory (0-3) Cr 1 FS Prereq 301L. Characterization of inorganic and organometallic compounds by modern techniques. For students majoring in chemistry or biochemistry. Nonmajor graduate credit.

Chem 402 Inorganic Chemistry (3-0) Cr 3 FS Prereq 301L. 331 recommended. Credit in the d and f metals: Bonding; electronic spectra and reactions; polymers, organometallics: organometallics, solid state and biogeochemistry. Nonmajor graduate credit.

Chem 490 Independent Study Cr var Prereq Completion of 6 credits in chemistry at the 300 level.
methods applied to analytical chemistry. Solvent extraction, volatilization, ion exchange liquid and gas chromatography and electrophoresis.

Chem 530 Advanced Organic Chemistry (2 Cr) Cr 2 S Preq 322 Selected topics in modern organic chemistry including stereochemistry, reaction mechanisms, organic synthesis, and spectroscopy. For students not majoring in organic chemistry.


Chem 532 Organic Synthesis II (2-0) Cr 2 S Preq 531 Synthesis of complex organic compounds including natural products.

Chem 537 Physical Organic Chemistry I (3-0) Cr 3 F Preq 322 Molecule structure stereochemistry and reaction mechanisms. Thermo- and kinetic and kinetic data linear free energy relationships. Isotope effects, orbital symmetry.

Chem 538 Physical Organic Chemistry II (3-0) Cr 3 S Preq 327 Survey of reactive intermediates including cations, anions, carbones, and radicals.

Chem 550 Safety in the Chemical Laboratory (1) Cr 1 S Preq 322 Introduction to laboratory safety and chemical hygiene. Use of engineering controls and personal protective equipment. Chemical storage and waste disposal practices. Handling hazardous chemicals. Radiation safety and laser safety. Offered on a satisfactory-fail grading basis only.

Chem 555 Chemical Pedagogy (1) Cr 1 F Preq 322 Policies of method and practice teaching in undergraduate chemistry. Discussion of laboratory courses for chemistry graduate teaching assistants. Offered on a satisfactory-fail grading basis only.

Chem 560 Advanced Physical Chemistry (2-0) Cr 2 S Preq 322 Principles of physical chemistry as they apply to analytical, inorganic, and organic chemistry including thermodynamics, linear and non-linear chemical reactions, and molecular spectroscopy. For students not majoring in physical chemistry.


Chem 572 Spectrometric Identification of Organic Compounds (2-3) Cr 3 F Preq 322 Principles of infrared, ultraviolet, nuclear magnetic resonance, and mass spectrometry as applied to organic chemistry.

Chem 574 Organometallic Chemistry of the Transition Metals (4-0) Cr 2 Alt S offered 2004 Preq 321, 322 Transition metal complexes of ligands such as cyclopentadienyl, olefins, acetylacetonates, and carbon monoxide. Homogeneous catalysis.


Chem 579 Introduction to Research in Chemistry (1-0) Cr 1 Alt S offered 2004 Preq 306 Introduction to research in chemistry in Iowa State University.

Chem 580 Introduction to Computational Quantum Chemistry (3-0) Cr 3 Alt S offered 2003 Preq 522 Basic principles of quantum mechanics. Schrödinger equation. Hartree Fock molecular orbital theory. Introduction to group theory. Introduction to computational chemistry. Applications include molecular structure, potential energy surfaces, and their relation to chemical reactions. Molecular spectroscopy and photochemistry.


Chem 589 Current Topics in Chemistry (1-0) Cr 1 Alt S offered 2004 Preq 306, 322 Description of current literature and chemical problems of concern to participants.

Chem 590 Nonthesis Research (1-0) Cr 1 Alt S offered 2004 Preq 322 Permission of instructor required.

Courses for Graduate Students

Chem 601 Seminar in Inorganic Chemistry (1-0) Cr 1 Each time taken. Preq: Permission of instructor.

Chem 601 Selected Topics in Inorganic Chemistry (1-0 or 2-0) Cr 1 or 2 F Preq: Permission of
by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Civil engineering consists of the application of the laws, forces and materials of nature to the planning, design, construction, maintenance and operation of public and private facilities, subject to economic, social and environmental constraints. Commonly included are transportation systems, bridges and buildings, water supply, pollution control, irrigation and drainage systems, river and harbor improvements, dams and reservoirs. Civil engineering also includes the planning, design, and responsible execution of surveying operations and the location and delineation of physical and cultural features on the surface of the earth. Research testing, design, management, and related functions are also part of civil engineering.

Work on the campus is supplemented by inspection trips which furnish an opportunity for firsthand study of engineering systems in operation, as well as projects under construction.

Environmental engineering involves the design and operation of facilities to protect our environment: the air we breathe, the land on which we live and work, the water that we drink or use for recreational purposes and our natural resources.

Environmental engineering is a specialty area in civil engineering. It is concerned with the protection of the public and natural health, providing safe and potable water supply, management of solid and hazardous waste, proper treatment and disposal of domestic and industrial wastewater, and the control of water quality, soil contamination, and air pollution. At the undergraduate level, the study of various environmental and water resources engineering topics is part of the course study leading to the Bachelor's degree in civil engineering.

Because of the widespread use of microcomputers throughout civil engineering practice, the department has incorporated microcomputer applications into many of the civil engineering courses.

Program Goal
Consultation with an advisory board of employers of civil engineers, with a broad base of civil engineering educators, and with students and alumni has yielded a continuous process of program planning and program assessment. Curriculum development and instructional development to produce an integrated, high-quality-based curriculum. The curriculum in this bulletin has the academic program goals of developing an effective program that fulfills student educational needs and that equips and empowers qualified students for a successful career in civil and environmental engineering.

Program Objectives
Program objectives and related outcomes intended to proceed toward achievement of the program goal above include the following:

1. Design, coordinate, and execute an integrated undergraduate civil engineering program that produced graduates who:
   - have a fundamental understanding of mathematics, statistics, and physical sciences and where appropriate life sciences
   - have a broad base of knowledge in civil engineering technical areas represented by transportation and surveying, structural, environmental and water resources, geotechnical and materials disciplinary areas
   - have a basic understanding of cost estimating, planning, and scheduling for civil engineering projects
   - use critical thinking to identify, define, and develop alternative solutions and implement a feasible design to solve an open-ended or ill-defined problem while considering constructability, sustainability, and maintainability of the design
   - are effective in oral written and graphical communication of ideas to engineers and non-engineers
   - recognize and understand the importance of timely and effective communication during the design and construction process
   - have an ability to effectively use computers as a tool for communication problem solving, analysis and design
   - have an ability to work effectively within a multidisciplinary team
   - recognize and understand the importance of and necessity for high professional and ethical standards
   - have a basic knowledge of business and management principles and practices
   - have an understanding of social, political and cultural issues
   - have the ability to design and conduct experiments as well as analyze and interpret data
2. Provide opportunities for student interaction with practicing professionals
3. Provide opportunities for students to develop their leadership skills
4. Encourage and motivate students for lifelong learning continued intellectual and professional growth and professional licensure
5. Encourage cooperative education internships or progressive summer engineering employment
6. Develop and maintain an academic advising system and a mentoring system that retains qualified students
7. Develop and maintain a faculty that serves as a model of professional excellence for students

Continued curriculum development will expand and increase the implementation of courses and programs to support the goal and objectives listed here. This goal and these objectives are consistent with and supportive of the College goals and objectives (See College of Engineering section).

Graduate Study
The Department of Civil Construction and Environmental Engineering offers work for the master of science and doctor of philosophy degrees in major in civil engineering with areas of specialization in structural engineering, environmental engineering, construction engineering, and management. Geotechnical engineering, civil engineering materials, transportation engineering, and geomatics. The department also offers non-thesis work for students taking major work in other engineering departments.

Candidates for the degree master of science are required to satisfactorily complete 30 credits of acceptable graduate work, including preparation of a thesis or the completion of a creative component in lieu of a thesis.

The normal prerequisite to major graduate work is the completion of a curriculum substantially equivalent to that required of engineering students at this university. However, because of the diversity of interests within the graduate programs in civil engineering a student may qualify for graduate study even though undergraduate or prior graduate training has been in a discipline other than engineering. Supporting work will be required depending upon the student's background and area of interest. A prospective graduate student is urged to specify the degree program in which he or she is interested on the application for admission.

The department participates in the interdepartmental majors in transportation (M S only) and water resources (see Index).

Courses open for nonmajor graduate credit all 300 and 400 level courses except 303 304 314 350 383 396 397 398 403 420 421 451 485 486 490 and 498

Courses Primarily for Undergraduate Students
C E 101 Technical Lecture (1) D: R F S Discussion of various phases of civil engineering. For transfer
students only Evaluation of transfer credits and discussion of graduation requirements
CE 104 Civil Engineering Projects I (2) Cr 1 FS PreReq: introduction to civil engineering projects and practices
CE 111 Fundamentals of Surveying I (2.3) Cr 3 FS PreReq: 103 160 credit or enrollment in Engir 170 or C E 170 Math 165 or enrollment in C E 104 or C E 105 142 or satisfactory scores on mathematics placement examinations credit or enrollment in Math 165
CE 170 Graphs for Civil Engineering 104-2 Cr 2 PS PreReq: Math 165 credit or enrollment in 104 Fundamental graphs. Introduction to computer added drafting and modeling. Civil engineering applications
CE 203 Civil Engineering Synthesis I (2.4) Cr 2 FS PreReq: 104 160 Engir 105 Chem 107 or 177 Application of mathematics and chemistry concepts for the solution of civil engineering problems. Introduction to critical thinking as related to Bloom's Taxonomy of educational objectives. Technical communication for civil engineers. Introduction to self-directed learning. Concepts and applications of engineering economics
CE 298 Cooperative Education Cr R FS SS PreReq: permission of department chair. First professional work period in the cooperative education program. Students must register for this course before commencement work
CE 332 Structural Analysis I (2.2) Cr 3 FS PreReq E M 324 Loads, shear moment and deflected shape diagrams for beams and frames. Approximate methods. Deformation calculations. Application of flexibility methods to frames and continuous beams. Application of moment distribution and stiffness methods to continuous beams and braced frames. Influence lines for determinate and indeterminate beams using Muller-Breslau principle. Computer applications to analyze beams and frames. Nonmajor graduate credit
CE 333 Structural Steel Design I (2) Cr 3 FS PreReq: 322 E M 227 Design and behavior of the elements of steel structures. Proportioning members and connections using load and resistance factor design. Introduction to allowable stress design. Preliminary design of building frames. Nonmajor graduate credit
CE 334 Reinforced Concrete Design I (2) Cr 2 FS SS PreReq: 322 E M 327 Analysis and design of beams. One-way slabs and columns. Preliminary design of building structures. Connection using load and resistance factor design. Nonmajor graduate credit
CE 360 Introduction to Transportation Planning (3) Cr 3 S PreReq: 3 credits in statistics, junior classification. An introductory course for planning urban and regional transportation systems within government. Applications and impacts of legislation. Four steps in population and transportation trends. Land use societal impacts. Public transportation master plans and traffic impact studies. Organization and coordination of the transportation planning function. Term paper and class participation required. Nonmajor graduate credit
CE 365 Principles of Transportation Engineering (2) Cr 2 FS PreReq: 111 203 Physics 221 a course in statistics from the approved departmental list. Introduction to planning and operations of transportation facilities. Transportation system characteristics. Technological economic and environmental factors. Travel demand modeling and capacity analysis. Nonmajor graduate credit
CE 383 Design of Portland Cement Concrete (1-2) Cr 1 FS PreReq: 360 For Cons only. Physical and chemical properties of portland cement and concrete mix design and testing of p c concrete
CE 396 Summer Internship Cr R SS PreReq: permission of department chair. Completion of a two year term in civil engineering employment in civil engineering or related field. Summer professional work period. Students must register for this course prior to commencement work
CE 397 Engineering Internship Cr R FS PreReq: permission of department chair. One semester maximum per academic year professional work period. Students must register for this course prior to commencement work
CE 398 Cooperative Education Cr R FS SS PreReq: permission of department chair. Second professional work period in the cooperative education program. Students must register for this course before commencement work
CE 403 Program and Outcome Assessment Cr FS PreReq: Verification of undergraduate application for graduation by the end of the first week of class. Permission of instructor for students who are scheduled for summer graduation. Assessment of CE Curriculum and educational objectives
CE 417 Land Surveying (3) Cr 3 S PreReq: 111 Legal principles affecting the determination of land boundaries. Public domain survey systems. Locating, searching and maintaining current conveyance records. Record research, plat and title determination. Study of selected court cases. Nonmajor graduate credit
CE 420 Environmental Engineering Chemistry (Dual listed with 521) (2) Cr 3 3 F PreReq: Chem 177 and 178 Math 166 Principles of chemical and physical phenomena applicable to the treatment of water and wastewater and natural waters including chemical equilibrium, reaction kinetics, basic equilibrium and chemical precipitation. Redox reactions and mass transfer principles. Individual and group projects required. Nonmajor graduate credit
CE 421 Environmental Biotechnology (Dual listed with 521) (2) Cr 3 F PreReq: 326 Fundamentals of biochemical and microbial processes applied to environmental engineering. Application of microbiological and physiological processes for the treatment of water and wastewater including air stripping, coagulation and flocculation, sedimentation, filtration, adsorption of chemical oxidation and disinfection. Fixed film and suspended growth biological processes and sludge management
CE 448 Bridge Design (2) Cr 3 Alt S offered. 2006 PreReq: 333 333 Bridge design in structural steel and reinforced concrete. Application of AASHTO Bridge Design Specifications. Analysis techniques for complex structures. Preliminary designs include investigating alternative structural systems and materials. Final designs include preparation of design calculations and sketches. Nonmajor graduate credit
CE 451 Urban Transportation Planning and Modeling (Dual listed with 551) (2) Cr 3 F PreReq: 350 or 265 Transportation data sources and cost analysis. Transportation system management travel demand and network modeling. Traffic legislation and environmental impact assessment systems. Planning sustainable transportation. Use of popular travel demand software and applications of geographic information systems and global positioning systems


C E 485 Civil Engineering Design I (1-2 Cr) 2 F Preq: 304 Sp Crn 212 The civil engineering design process incorporating the client's desires, identification of the engineering problem, development of a technical proposal, identification of design criteria, codes and standards, development of feasible alternatives, selection of best alternative, oral presentation, and poster.

C E 486 Civil Engineering Design II (1-4 Cr) 3 F S Preq: 320 333 or 324 362 credit or enrollment in 428 or 453 The engineering design computations case histories of design inadequacies, environmental impact, safety and health in the vendor life cost estimation, planning and scheduling, contract documentation, and success of previous coursework using a group project.

C E 490 Independent Study By conference Cr 1 to 6 F S Preq: Permission of instructor. Independent study in any phase of civil engineering. Pre-enrollment contract required. H Credits.

C E 499 Cooperative Education Cr R F S S Preq: 308 department chair and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.

Courses Primarily for Graduate Students

C E 501 Preconstruction Project Engineering and Management (3 Cr) 3 Alt F offered 2003 and Alt S offered 2006. Preq: Con E 221 and 421. Application of engineering and management control techniques to construction project development from conceptualization to notification to proceed. Determinants of construction project success. Conceptual estimating, design and engineering planning for automated construction techniques constructability review procedures, planning for safety and value engineering.


C E 503 Construction Management Functions and Processes (3 Cr) 3 Alt F offered 2004. Preq: Con E 421. Analysis of critical construction management skills. Analysis of organizational systems related to construction management. Case studies. Analysis of theories of motivation, planning, leadership, organizational change, etc. as they relate to field construction operations.


C E 510 Information Technologies for Construction (3 Cr) 3 Alt F offered 2004. Preq: Con E 421 or Eng 160 or C E 160 or equivalent. Information technologies including microcomputer based systems, management information systems, automation technologies, computer aided design and expert systems, and their application in the construction industry. Overview of systems acquisition, communication and networking.


C E 520 Environmental Engineering Chemistry (Dual listed with 420) (2-3 Cr) 3 F Preq: Chem 177 and 178. Math 166. Principles of chemical and physical phenomena applicable to the treatment of water and wastewater, and natural waters including chemical equilibrium, reaction kinetics, acid-base equilibria, chemical precipitation, redox reactions, and mass transfer principles. Individual and group projects required. Additional term paper and oral presentation. Extensive laboratory materials.


C E 523 Physical Chemical Treatment Processes (2-2) 3 Cr 3 S Preq: 520 Principles and design of physical chemical processes including coagulation, flocculation, chemical precipitation. Sedimentation, flotation. Adsorption. Membrane processes. Ion exchange and disinfection. Laboratory exercises and demonstrations. Individual and group projects.


Global warming, ozone depletion, meteorological and geographic aspects. Air pollution control, and safety in the workplace. Diffusion and convection, electrostatic precipitation adsorption, afterburning, improved monomer Modeling transport on sink sources. Abatement of transportation related emissions.


C E 528 Hazardous Waste Management (3-0 Cr) 3 Alt S offered 2005. Preq: 326 Regulatory requirements for the classification, transport, storage and treatment of hazardous wastes. Analysis and design of alternatives for treatment and disposal technologies including physical chemical and biological treatment facilities. Infiltration and secure landfill design. Regulatory requirements and procedures for hazardous waste contaminated site investigations and risk analysis. Analysis and design of remedial action alternatives for site restoration.

C E 532 Structural Analysis II (3-0 Cr) 3 F Preq: 332 Displacements by virtual work. Unit load analysis. Development of indeterminate structural problems by the force and stiffness methods. Direct stiffness method for 2-D frames grids 3-D frames. Additional topics for the stiffness method.

C E 533 Structural Steel Design II (3-0 Cr) 3 Every third semester offered F 2004. Preq: 333 Development of the AISC design equations for tension members, columns, beams, beam-columns, and plate girders by LRFD and ASD methods. Elastic and inelastic buckling of members and member elements. Torsion in W shapes.


C E 535 Prestressed Concrete Structures (3-0 Cr) 3 Every third semester offered F 2004. Preq: 334 Design of prestressed concrete structures. Review of hardware stress calculations prestress losses deflections shear design section proportioning, special topics.

C E 536 Masonry and Timber Design (2-2) 3 Every third semester offered S 2004. Preq 334, 335 Design and behavior of masonry beams, columns, walls, and structural systems. Behavior and design of timber and laminated timber beams, columns connections, and structural systems.


C E 542 Structural Analysis by Finite Elements (3-0 Cr) 3 S Preq: 532 Use of the finite element method for the analysis of complex structural configurations. Plane stress plate and shell finite elements. General purpose finite element programs.
C E 545 Seismic Design (3.0) C 3 S Prereq 333

C E 547 Analysis and Design of Plate and Slab Structures (3.0) C 3 F Prereq 334 E M 514 Math 266 Binding and development of plate components in structures utilizing classical and energy methods. Analysis of shell roofs by membrane and bending theories.

C E 550 Advanced Highway Design (3.0) C 3 S Prereq 453 Evaluation of rural and urban street and highway design theory. Establishment of design criteria for urban and highway systems and to intersections and interchanges, drainage design and urban freeway design aspects. Computer applications.

C E 551 Urban Transportation Planning and Modeling (Dual-listed with 451) (2.0) C 2 Cr 3 C F Prereq 350 or 355 Transportation data sources and cost analysis. Transportation system management, travel demand and network modeling. Transportation and financing intelligent transportation systems. Planning, sustainable transportation concepts. Use of popular travel demand software and applications of geographic information systems and global positioning systems. Term project required for graduate credit.


C E 554 Advanced Technology in Transportation (3.0) C 3 F Prereq 355 Graduate standing in transportation or civil engineering or consent of instructor. Advanced traffic control systems including signal systems and design and field tests. Regional traffic management and communications centers. Traffic surveillance monitoring and incident management. Advanced traffic information systems.

C E 555 Advanced Highway Design (3.0) C 3 Alt S offered 2005 Prereq 355 Transportation data sources and cost analysis. Transportation system management, travel demand and network modeling. Transportation and financing intelligent transportation systems. Planning, sustainable transportation concepts. Use of popular travel demand software and applications of geographic information systems and global positioning systems. Term project required for graduate credit.


C E 557 Transportation Systems Analysis (3-0) C 3 Alt F offered 2003 Prereq 355. 3 credits in statistics or probability. Travel studies and analysis of data. Traffic projections. Public transportation systems and analyses. Statewide and regional and local transportation system planning. Corridor travel planning. Optimization of systems.

C E 558 Transportation Systems Development and Management Laboratory (2-2) C 3 Alt F offered 2004 Prereq 350 or 355. Study of designated problems in traffic engineering and urban transportation planning and urban development. Forecasting and evaluation of social, economic and environmental impact of proposed solutions. Considerations of alternatives. Formulation of recommendations and publication of a report. Presentation of recommendations in the host community.

C E 559 Transportation Infrastructure/Asset Management (3-0) C 3 Alt S offered 2005 Prereq 355 or 453. 382 Engineering management techniques for maintaining and managing infrastructure assets. Systematic approach to management through value engineering, construction economics and life cycle cost analysis. Selection and scheduling of maintenance activities. Application of network-wide resource planning project level analysis.


C E 561 Applied Foundation Engineering (2.0) C 3 Cr 3 F Prereq 450. Lateral earth pressure theories and retaining structures. Field investigations in situ testing. Foundations on expansive soils and analyses and design of shallow and deep foundations. Foundation engineering reports.


A 381 Bituminous concrete—offered fall
B 382 Portland cement—offered spring


C E 574 Environmental Impact Assessment (3.0) C 3 Alt S offered 2004. Prereq 414. 4 courses in natural, biological, or engineering sciences and senior or above classification. Review of federal and state requirements for environmental impact assessment requirements of the National Environmental Policy Act and Council on Environmental Quality methods of evaluating the environmental impacts of the physical and social, economic, cultural, historical human health and psychological environments. Public participation in EIS, review and evaluate project environmental impact statements. An environmental impact assessment of a proposed project will be completed in small teams.

C E 575 Soil and Groundwater Remediation (3.0) C 3 Alt S offered 2005. Prereq 573 or Geol 511. Introduction to technologies used for remediation of contaminated soil and groundwater including pump and treat, carbon absorption, soil venting, air sparging and in situ bio-remediation.

C E 590 Special Topics (1 to 5) each time elected. Prereq 322. FS Pre enrollment contract required.

C E 591 Seminar in Environmental Engineering (1.0) Cr 2 FS Prereq Graduate classification. Contemporary environmental engineering issues. Outside speakers. Review of ongoing research in environmental engineering. Offered on a satisfactory fail grading basis only.

C E 594 Special Topics in Construction Engineering and Management (1.0) C 3 FS Prereq 322. FS Prereq 340. 6 credits and permission or instructor. Emphasis for a particular offering will be selected from the following:

A 330 Planning and Scheduling
B 331 Computer Applications for Planning and Scheduling
C 334 Cost Estimating
D 336 Computer Applications for Cost Estimating
E 340 Project Controls
F 342 Computer Applications for Project Controls
G 344 Integration of Planning and Scheduling and Project Controls
H 346 Trenchless Technologies

C E 595 Research Methods in Construction Engineering and Management (6.0) C 1 Prereq 322 Credit or enrollment in 501, 502, 503 or 505. Assigned readings and reports on research methods to solve construction engineering and management problems such as robotics projects control automation. etc. Identification of research methods and project selection and development of research design and critique of research in construction engineering and management.

C E 599 Creative Component (1 to 3) Prereq 3 Pre enrollment contract required. Advanced topic for creative component report in lieu of thesis.

An undergraduate student must have an academic standing in upper one half of his/her class in order to enroll in any 500 level civil engineering course.

Courses for Graduate Students

C E 622 Advanced Topics in Environmental Engineering (2-0, 2 credits) FS Prereq permission of environmental engineering graduate faculty. Advanced concepts in environmental engineering. Emphasis for a particular offering will be selected from the following:

A 345 Water Pollution Control
B 346 Water Treatment
C 347 Solid and Hazardous Waste
D 348 Water Resources
C E 628 Bioremediation Engineering (3:0 Cr: 3 Alt F; offered 2004-Prereq. 520 and 521 Biodegradation and bioremediation of major contaminants pathways of metabolism for major electron acceptor conditions cometabolism factors influencing biodegradation e.g. sorption bioavailability methods to overcome limitations using various bioremediation technologies and molecular tools
C E 649 Advanced Topics in Structural Engineering (3:0) Cr 3 FS Prereq. Permission of the structural engineering graduate faculty Advanced concepts in structural engineering topics Emphasis for a particular offering will be selected from the following topics: A Behavior of Metal Structures B Design of Concrete Shells D Advanced Matrix Analysis of Structures E Dynamic Design of Structures F Reliability Assessment of Structures C E 650 Advanced Topics Cr 1 to 3 Pre-enrollment contract required C E 689 Research Cr 6 Pre-enrollment contract required

Classical Studies
www.vastate.edu/~flng_info/Classics/homepage.html
(Interdepartmental Undergraduate Program)
Program Committee M Mock Chair G Batcher J Cunnally J Hagen J L. Jenny D Holland D Hunter J McGrew M Mock P O'Neill J Thomas
The Classical Studies program as a cross-disciplinary program in the College of Liberal Arts and Sciences, which offers an integrated curriculum of courses in the languages literatures history and thought of ancient Greece and Rome from prehistoric times to the reign of the Emperor Constantine. Complete and current information about the Program may be found on line at www.vastate.edu/~classics/
Courses in Classical Studies provide background for students whose major fields of study or career interests include Anthropology English Foreign Languages and Literatures History Music Philosophy Women's Studies. Law medicine and related fields. Students who wish to pursue an interdisciplinary major in Classical Studies should consult the Program Chair.
A student who wishes to declare a minor must successfully complete the following requirements: (a) Greek 201 or Latin 201 (b) 273 or 275 (c) 420 or 403 or 404 (d) six additional credits from the list below (prior to or departmental) as approved by the program committee. (History majors may substitute 310 for 420 or 403 or 404)

Primary Courses
CI St 273 Greek and Roman Mythology (3:0) Cr 3 F S Survey of the legends myths of the classical world with emphasis on the principal gods and heroes and their relation to ancient social psychological and religious practices. Some attention may be given to important modern theories
H Honors (4:0 Cr) Cr 4
CI St 275 The Ancient City (3:0) Cr 3 F Examination of ancient urban life including historical context physical space material culture religion literature and art. Examination of civic identity (the poles) Contrast between the concepts of urban and rural. Examples drawn from specific ancient cities; some attention to modern trends in recovering the conditions of ancient urban life and the fundamental concept of the city in European history
H Honors (4:0 Cr) Cr 4
CI St 310 Ancient Philosophy (Same as Phil 310) See Philosophy Nonmajor graduate credit
CI St 350 Petrology and the History of Ideas (Same as Eng 350) See English
CI St 353 World Literature Western Foundations through Renaissance (Same as Eng 353) See English
CI St 367 Christianity in the Roman Empire (Same as Relig 367) See Religious Studies Nonmajor graduate credit
CI St 372 Greek and Roman Drama (3:0) Cr 3 S Prereq. 273 or 275 or one year of Latin or Greek. Cultural significance and development of drama in ancient Athens and Rome selected readings in English from dramatists such as Aeschylus Sophocles Euripides Aristophanes Menander Plautus Terence and Seneca
H Honors (4:0 Cr) Cr 4
CI St 373 Greek and Roman Epic (3:0) Cr 3 F Prereq. 273 or 275 or one year of Latin or Greek Focuses on the cultural significance of epic in Greece and Rome. Particular emphasis may be given to the development of the heroic code and its implications for Greek-Roman culture. Readings in English from authors such as Homer and Vergil
H Honors (4:0 Cr) Cr 4
CI St 374 Women in the Ancient Mediterranean World (Same as Hist 334) See History 334 (3:0) Cr 3 S Prereq. Any one course in CI St W S Latin or Greek Historical research and topical survey of the status of women in the Ancient Mediterranean World study of constructs of the female and the feminine. Readings from ancient and modern sources. Emphasis on the Greek and Hellenistic Europe and Rome; may be repeated once.
CI St 376 Classical Archaeology (3:0) Cr 3 S Prereq. 273 or 275 or one year of Latin or Greek. Archaeological survey of the material culture of the ancient Greek and Roman world and the role of archaeological context in understanding the varied aspects of ancient Greek and Roman culture. Among other topics economy architecture arts and crafts trade and exchange religion and burial customs will be explored. May be repeated for a maximum of 6 credits
A Bronze Age (Minoan and Mycenaean palatial cultures) and Early Iron Age Greece (ca 3000-700 BC)
B Archaic through Hellenistic Greece (ca 700-30 BC)
CI St 394 The Archaeology of Greece An Introduction (1:0) Cr 2 S Introduction to the topography of monuments and the art of Greece from the Bronze Age through the Ottoman period. Attention given to the culture of modern Greece preparatory to study abroad in Greece
CI St 395 Study Abroad The Archaeology of Greece 2:6 S Prereq. 394. Supervised on site instruction in the archaeology monuments and art of Greece from the Bronze Age through the Ottoman period. Attention given to the culture of modern Greece
CI St 402 Ancient Greece (Same as Hist 402) See History Nonmajor graduate credit
CI St 403 Ancient Rome (Same as Hist 403) See History Nonmajor graduate credit
CI St 404 Ancient Rome (Same as Hist 404) See History Nonmajor graduate credit
CI St 410 Persuasion in the Athenian Democracy (Same as Sp CM 410) (3:0) Cr 3 S Pre req. 273 or 275 or one year of Latin or Greek. This course examines the origin structure and development of Athenian democracy as well as the social and political functions of rhetoric in 5th and 4th century B.C. Athens against a background of citizenship in the Athenian democracy
CI St 430 Western Political Thought Plato to Machiavelli (Same as Pol Sci 430) See Political Science Nonmajor graduate credit
CI St 480 Seminar in Classical Studies (3:0) Cr 3 Prereq. 36 credits in Classical Studies or permission of Program Chair Advance study of a selected topic in Classical Studies. Research paper or project selected by the student
CI St 480 Independent Study (1 to 6) Each time taken. Prereq. 7 credits in classical studies at the 200 level or higher. Permission of Program Chair. Designed to meet the needs of students who wish to study specific topics in classical civilization in areas where courses are not offered or to pursue such study beyond the limits of existing courses.
Courses for Graduate Students, major or minor open to qualified undergraduates
CI St 512A Proseminar in Ancient Egyptian History (Same as Hist 512A) See History
CI St 594A Seminar in Ancient Egyptian History (Same as Hist 594A) See History

Primary Courses (Offered by Other Departments)
Art H 383 Greek and Roman Art See Art and Design
Greek 101 Elementary Classical Greek I See Foreign Languages and Literatures
Greek 202 Elementary Classical Greek II See Foreign Languages and Literatures
Greek 201 Intermediate Classical Greek See Foreign Languages and Literatures
Greek 332 Introduction to Classical Greek Literature See Foreign Languages and Literatures
Greek 441 Advanced Readings in Greek Literature See Foreign Languages and Literatures
Greek 442 Advanced Topics in Greek Literature See Foreign Languages and Literatures
Hist 280 Introduction to History of Science I See History
Latin 101 Elementary Latin I See Foreign Languages and Literatures
Latin 102 Elementary Latin II See Foreign Languages and Literatures
Latin 201 Intermediate Latin See Foreign Languages and Literatures
Latin 332 Introduction to Latin Literature See Foreign Languages and Literatures
Latin 441 Advanced Readings in Latin Literature See Foreign Languages and Literatures
Latin 442 Advanced Topics in Latin Literature See Foreign Languages and Literatures

Community and Regional Planning
J Timothy Keller, Chair Department of Geography
Professors Mahony Shinn
Associate Professors Borsh Bradley Huntington Mattson
Assistant Professors Ementus Knox Malone
Assistant Professors Owsu Suen
Instructors Clapp

Undergraduate Study
For undergraduate curriculum in community and regional planning leading to the degree bachelor of science see College of Design. Undergraduate study in community and regional planning is a professional field of study aimed at assessing the ever changing socioeconomic and physical environments of communities and planning for their future. Planners evaluate and seize opportunities to understand and solve problems. Most planners work at the local level but they are concerned with issues that affect the world the preservation and enhancement of the quality of life in a community the protection of the environment the promotion of equitable economic
opportunity and the management of growth and change of all kinds.

Planning has its roots in landscape architecture, architecture, engineering, law, economics, and public administration. Most contemporary planners are trained in the physical and social sciences, so they can understand the society and economy in which plans must be implemented. Planning demands technical competence as well as creativity plus pragmatism, and an ability to envisage alternatives to the physical and social environments in which we live.

Graduates of the Community and Regional Planning Department will be capable of performing in entry level positions in public planning agencies or with planning consulting firms. Graduates are able to integrate planning knowledge and skills in practical applications to current planning issues and to communicate in written and oral form.

Graduates of the Community and Regional Planning Department are expected to have knowledge of the structure and functions of urban settlements, the history of planning, aspects of policy and planning, and familiarity with one area of specialized knowledge.

Graduates should have skills in problem formulation, quantitative analysis, written/oral and graphic communications, collaborative approaches to these, and in synthesizing and applying knowledge to practice. Graduates are expected to assess the impact of values in terms of equity and social justice economic welfare and efficiency, environmental sustainability and cultural heritage in the context of citizen involvement in decision making.

The curriculum is accredited by the Planning Accreditation Board of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning. Thus providing the student with an education which, when combined with experience, supports the individual's eligibility for membership in the American Institute of Certified Planners.

The department cooperates in the undergraduate minors in design studies and environmental studies.

Graduate Study

The department offers work for the master of community and regional planning degree with areas of concentration in land use and transportation, community design and development, and rural and environmental planning. In addition, students can design their area of concentration if it does not fit in any of the three areas with the assistance of their major professor.

Degree requirements include completion of a 2 year 48-credit program including a thesis of 9 credits or a professional planning report of 4 credits. Students with a bachelor's degree in community and regional planning from an accredited school can waive up to 9 credits from the following list of courses: CRP 501, 511, 521, 523, 532, 539 and 592. The ability to waive up to 9 credits is determined by a review of the coursework completed by graduates of accredited programs. The students are expected to complete three months of acceptable work experience in a planning office between the first and second year of study.

Double degree programs are offered with architecture (M.C.R.P/M.Arch I business (M.C.R.P/M.B.A.), public administration (M.C.R.P/M.P.A.) and landscape architecture (M.C.R.P/M.P.L.A.) The department participates in the interdepartmental minor in housing and in the interdepartmental major in transportation.

Courses open for nonmajor graduate credit 365, 376.

Courses Primarily for Undergraduate Students

CRP 253 Survey of Community and Regional Planning (3) Gr 3 F, 3 A history of planning the nature and problem of urban areas and their goals, procedures and results of urban planning.

CRP 270 Forces Shaping Our Metropolitan Environment (Same as DSN 270) (3) Cr 3 S. Must be taken prior to completing 9 credits in CRP. Introduction to the social physical and economic forces as they shape metropolitan areas and their interrelationships. A comprehensive picture of metropolitan development showing important roles other urban disciplines play in the planning process and the interrelationships of the disciplines.

CRP 272 Planning Analysis and Techniques I (2-2) Cr 3 S. Preqr Com 102. Existing and emerging techniques for preparation of community planning studies. Sources of data and data survey techniques including survey instruments, sampling methods, sample size for demographic studies, land use studies for comprehensive and transportation plans. The use of aoral and graphic presentation of analytical results. Laboratory emphasizes practical uses and computer applications for data analysis.

CRP 274 Planning Analysis and Techniques II (2-2) Cr 3 F. Preqr 272. Use of quantitative methods for analysis of population, land use, economic and transportation make-up of a community activities and location intensity and timing of land uses and public services. Student oral and graphic presentation of analytical results. Laboratory emphasizes practical uses and computer applications for data analysis.

CRP 291 World Cities and Globalization (Same as DSN 291) (3) Cr 3 F. Preqr Sophomore classification. World cities and globalization in developing and developed countries. Topics include globalization, world cities and regions, urban environment, urban development, the international division of labor, national corporations, international environmentalism, tourism, popular culture and place based identity.

CRP 293 Environmental Planning (Same as DSN 293) (3) Cr 3 F. Preqr Sophomore classification. Comprehensive overview of the field of environmental relationships and the efforts being made to organize control and coordinate environmental aesthetic and cultural characteristics of land, air and water.

CRP 320 Urban Form (Same as DSN 320) (3) Cr 3 S. Preqr 253 or 270 or permission of instructor. Examines how urban form is shaped, what constitutes good urban form, and what are the trends in emerging urban forms. Describes, explains, and normative theories of urban form, and the relationship between urban form and social and economic political cultural and institutional forms.

CRP 330 Practicum Cr 1 to 3 may be repeated up to a maximum of 3 credits. FS SS Preqr Major in community and regional planning. Practical planning experience under close supervision of a professional planner. Practical planning experience related to housing decisions. Some tasks include planning and preparing studies for relevant agencies. Programs urban and regional planning. Preparation for work in a planning office. Discussion of employer presentations from planning professionals and discussion of differences/similarities between public and private planning offices. Offered on a satisfactory-failing grading basis only.

CRP 331 Professional Practice Seminar (Dual listed with 531) Cr 1 S. Preqr Major in community and regional planning. Preparation for work in a planning office. Discussion of employer presentations from planning professionals and discussion of differences/similarities between public and private planning offices. Offered on a satisfactory-failing grading basis only.

CRP 365 Technology and the City (Same as DSN 365) (3) Cr 3 F. Preqr Completion of one semester in design, planning or history major. Historical development of urban areas and their change over time. Impact of technological change on development. The role of technical and design professionals (including civil engineers, architects, landscape architects, and city planners among others) have played. Nonmajor graduate credit.

CRP 376 Urban Rural and Regional Economics (Same as Econ 376) Cr Economics. Nonmajor graduate credit.

CRP 383 Theory of the Planning Process (3) Cr 3 S. Preqr 253 or 270 or junior status. The nature of planning and its role to food security and planning. Levels of planning in decision making. The impact of the process on planning. Techniques related to knowledge in planning relation of facts and values.

CRP 410 Professional Work Experience Cr R F SS SS Preqr Permission of department chair. Approved professional work experience.

CRP 415 Housing (Dual listed with 515) same as DSN 415) (3) Cr 3 F. Preqr 253 or 270 or junior standing. An in-depth review of the problems and issues related to housing planning and policy dealing primarily with interrelationships and interdependencies among the socio-cultural, economic and physical aspects of housing and community design decisions. Analysis of housing policy making processes in the United States and the development of policy and planning systems in selected countries and developing nations.

CRP 416 Urban Design and Planning Practice (Dual listed with 516) (3) Cr 1 F. Preqr 253 or 270 Principles of urban design and their application to residential and commercial development. Review of processes and criteria for subdivision design and site planning.

CRP 417 Urban Revitalization (Dual listed with 517) same as DSN 417) (3) Cr 3 Alt S. Offered 2004. Preqr 253 or 270. The nature, extent causes, and nature of urban decline. Relationship between neighborhood change and the urban development process. Public policy implications. Planning methods available for further revitalization and preservation efforts.

CRP 425 Growth Management (Dual listed with 525) same as DSN 425) (3) Cr 3 Alt F. Offered 2003. Preqr Junior classification. Reversal of growth management techniques used to manage growth. Related change in and to implement plans Capital investment strategies, public land acquisition and protection development impact analysis, impact mitigation, including impact fees, phased growth systems. Urban/suburban; rural relationships and land preservation.

CRP 427 Social Policy Planning (Dual listed with 527) (3) Cr 3 Alt. Offered 2005. Preqr 253 or 270 or junior classification. An overview of the theory and methods of social policy planning with particular attention given to the spatial relationships of policy form. Analysis of sources of resources and the delivery of public services as an integrated part of comprehensive community planning.

CRP 429 Planning in Developing Countries (Dual listed with 532) same as DSN 429) (3) Cr 3 S. Preqr Junior classification. A variety of planning related issues, including rural urban migration development; national policies and programs; urban decay. Rural development strategies; housing problems in a developing country.

CRP 432 Community Development Planning and Programming (Dual listed with 532) (1) Cr 4 F. SS SS Preqr 272, 274, senior classification. Integration of planning, management and the theory and in dealing with a community planning problem. Analysis of problem and formulation of strategies for implementation. Preparation of a community planning report.
implementation procedures. Laboratory emphasized practical applications and uses of GIS.

C R P 552 Geographic Data Management and Planning Analysis (Dual listed with 452.1) 2 credits 3 Cr 3.

F Prereq: 451 or instructor permission. Extensive coverage of geographic data acquisition and design. GIS database creation and maintenance. Geographic data manipulation and analysis. GIS output generation and geographic data presentation. Laboratory emphasizes practical applications and uses of GIS.

C R P 565 Community Economic Development (Dual listed with 455) 3 credits 3 Cr.


Contemporary community economic development issues.

C R P 566 Economic Development in Small Communities (Cr 1) 1 F Offered off campus through Continuing Education on two consecutive Fridays and Saturdays. Prereq: Permission of instructor. Introduction to economic planning. Topics vary from year to year. Emphasis on thesis and professional report writing. Offered on a satisfactory-fail grading basis only.

C R P 570 Seminar in Planning Research (1-0) Cr 1.

S Prereq: Graduate classification in community and regional planning. Topics vary from year to year. Emphasis on thesis and professional report writing.

C R P 573 Urban Planning/Urban Management (Dual listed with 475) 3 credits 3 Cr 3.


C R P 578 Regional and State Planning (Dual listed with 481) 3 Cr 3.

S offered 2004. Prereq: Graduate classification. Analysis of theories, policies and functions at the metropolitan, regional, and state levels with emphasis on area wide governance strategies and structures for guiding development.

C R P 584 Sustainable Communities (Dual listed with 484) 3 credits 3 Cr.

S Prereq: Graduate classification. The theory and application of sustainability to the physical and social planning of communities. We will examine environmental ethics as a basis for sustainability, the history of the idea itself, and the movement toward indicators as outcome measurements both in the US and internationally. We will review environmental ideas that have been or might be applied in communities here and abroad.

C R P 590 Special Topics (1-3) Cr 3.


G Regional Economic Development

H Environmental Planning

I Transportation Planning

J Policy Analysis

K State Planning

L Planning in Developing Countries

M GIS

C R P 591 Environmental Law (Dual listed with 491) same as Denis 591. 3 credits 3 Cr 3.

S Prereq: Graduate classification. Legal precedents and alternative uses for environmental protection. Rights to and regulations for uses of water air and federal environmental control acts and leading federal court cases.

C R P 592 Planning Law Administration and Implementation (Dual listed with 492) 3 credits 3 Cr.

F Prereq: Graduate classification. The basis for constitutional common and statutory law for the powers of plan effectuation. Problems of balancing public and private interests as revealed in the study of leading court cases. Administration of planning agencies and programs.

C R P 599 Professional Planning Report (1-0) Cr 1.

S Prereq: Graduate classification. Independent student research on planning topic. The course will serve as a capstone experience for the student demonstrating ability to integrate planning knowledge and skills in the practical application of the student's graduate plan. The completed report must be submitted to and approved by the PGS committee as evidence of the mastery of the principles of community and regional planning.

C R P 699 Research (C R 3-9) Cr 3-9.

S Prereq: Graduate classification. Independent student research on planning topic. The course will serve as a capstone experience for the student demonstrating ability to integrate planning knowledge and skills in the practical application of the student's graduate plan. The completed report must be submitted to and approved by the PGS committee as evidence of the mastery of the principles of community and regional planning.

Courses for Graduate Students

Complex Adaptive Systems (Interdepartmental Graduate Minor)


The Complex Adaptive Systems (CAS) minor provides graduate students with an understanding of the interrelationships among the various methodologies associated with Artificial Life, including the study of complex adaptive systems. The course will cover key methodologies from both Artificial Life (biological and computational) and complex adaptive systems. The course will also cover key methodologies from both Artificial Life (biological and computational) and complex adaptive systems. The course will cover key methodologies from both Artificial Life (biological and computational) and complex adaptive systems. The course will cover key methodologies from both Artificial Life (biological and computational) and complex adaptive systems. The course will cover key methodologies from both Artificial Life (biological and computational) and complex adaptive systems.

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Interested students may contact the chairperson of the advisory committee for complete lists of courses and of CAS faculty members.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

CAS 532 Complex Adaptive Systems Seminar (Same as E E 532) 3 credits 3 Cr. F, S. Prereq: Admission to CAS minor. Understanding core techniques in Artificial Life are based on basic readings in complex adaptive systems. Understand techniques of complex adaptive systems and apply them to problems in real world applications. Examples of research topics include: Evolutionary computation: Neural networks, Agent based simulations (Agent based Computational Economics). Large scale simulations are to be emphasized. e.g. power grids: whole ecosystems.

CAS 533 Complex Adaptive Systems Concepts and Techniques (Same as E E 533) 3 credits 3 Cr. Prereq: Admission to CAS minor. Understa


Computer Engineering

(Administered by the Department of Electrical and Computer Engineering)

Subrahmanyam Venkata Chair of Department


Professors (Collaborators): Hassoun Khammass L Udpa S Upda

Distinguished Professors (Emeritus): Brown Fouad Lord Nilsson Pomth

University Professors (Emeritus): Jones

Professors (Emeritus): Anderson Brearley Brockman Comstock Fanslow Halse Hseboe Koppenk Porter Robert Smary Tartt Swift Townsend Triska

Associate Professors: Agaraja Aliu Bartlett Beirventhong Chang Chou Cruz Nerea Davidsen Dawes Dickerson Jacobson Klein Krupelol Kumar Millcalley Russell Tingley

Associate Professors (Adjunct): N Bowler

Associate Professors (Emeritus): Bond Carlson Cundy Mederian Merclat Scott Stephenson

Assistant Professors: Balabasamanam Chad Daniels Dogandzic Elia Gondassradguu Guan Ma Patterson Saloapka Song Thira-paka Wang Zhang

Assistants Professors (Adjunct): Amin Bode Mona

Assistant Professors (Collaborators): Barton Chandramoulis Lee

Undergraduate Study

For undergraduate curriculum in computer engineering leading to the degree bachelor of science see College of Engineering, Curriculum. This curriculum is approved by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The Electrical and Computer Engineering (ECPE) Department at Iowa State University provides undergraduate students with the opportunity to learn electrical and computer engineering fundamentals, to study applications of the most recent advances in science and technology, and to prepare for the practice of engineering. The student faculty interaction necessary to achieve this opportunity occurs within an environment that is supported by the principle that excellence in undergraduate education is enhanced by an integrated commitment to successful research and outreach programs.

The computer engineering curriculum offers specializations in computer architecture and digital
design software systems, information security networking, and VLSI. Students may also take elective courses in electromagnetics, microelectronics, VLSI, power systems, and communications and signal processing.

The mission of the computer engineering program at Iowa State University is to enable the graduating student to make significant and substantive contributions to solving computing problems throughout their professional career. The following objectives are identified as critical to the accomplishment of this mission:

A. Objective I: impart and enhance knowledge in the domain of computer engineering. The graduating student should understand:
1. Engineering and basic science fundamentals including mathematics, probability, statistics, physical sciences, and information technology.
2. The design and manufacturing processes.
3. The fundamentals of business, including entrepreneurship, and cost/revenue streams.

B. Objective II: expand and hone engineering abilities. The graduating student should be able to:
1. Identify and solve engineering problems.
2. Analyze and design electrical and computer and multidisciplinary systems.
3. Design and conduct experiments and analyze results.
4. Use modern engineering hardware and software tools such as computers and instrumentation.

C. Objective III: instill and nurture social awareness abilities and understanding. The graduating student should:
1. Desire to engage in lifelong learning and should expect and embrace change.
2. Be able to function effectively as a member of a multidisciplinary team to communicate effectively and to think critically and creatively both independently and with others.
3. Apply standards of professional conduct in view of the value of science and technology in a global/societal context.

As a complement to the instructional activity, the ECPE Department provides opportunities for each student to have experience with broader activities through the Cooperative Internship Program. Students have the opportunity to gain practical industry experience. See College of Engineering Cooperative Programs. Through the Undergraduate Research Program, students have the opportunity to participate in advanced research activities and through international exchange programs, students learn about engineering practices in other parts of the world. Well qualified juniors and seniors in Computer Engineering who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both B. S. and M. S. degrees. Under concurrent enrollment students are eligible for assistantships and simultaneously take undergraduate and graduate courses. Details are available in the Student Services Office and on the department's web site.

Courses open for nonmajor graduate credit: All 300 and 400 level courses except 310, 370, 396, 397, 398, 465, 469, 491, 492, 493, 494, and 498.

Courses Primarily for Undergraduate Students

Cpr E 166 Professional Programs Orientation (Same as E E 166) (1) 0.5 CR. F, S. Overview of the nature and scope of electrical engineering and computer engineering professional, portfolio, and construction. Departmental rules, student services, operations, degree requirements, program study planning, career options, and student organizations.

Cpr E 185 Introduction to Computer Engineering and Problem Solving (2-2) 3 CR. 3 Prereq. Credit or enrollment in Math 141. Introduction to computer engineering and problem solving. Topics include the use of simple tools and techniques for problem solving, the use of computer languages, and the use of problem-solving tools to solve problems. The course is designed to help students develop skills in problem solving and to provide a foundation for more advanced courses. Students are assessed on their ability to apply the concepts learned in the course to real-world problems. The course is designed to provide a foundation for more advanced courses.

Cpr E 203 Electronic Devices and Circuits (Same as E E 203) (3) 3 CR. 4 F. Prereq. EE 201, Math 267. Physics 222, and credit or enrollment in Math 141. Emphasis on mathematical tools and techniques, amplifier circuits, and applications. DC, large signal, and small signal models for independent and frequency dependent models for diodes, bipolar junction transistors, and field-effect transistors. SPICE simulation applied to basic circuit analysis. Design concepts for MOS and bipolar transistors. Analysis, design, and design process. Characteristics of IC technology families. Laboratory design projects.


Cpr E 211 Introduction to Microcontrollers (3-2) 3 CR. 4 F, S. Prereq. 210 or S 207 or 227. Introduction to computer system instruction sets, assembly languages, software design, and instruction set architectures. Students must register for this course before commencing work.

Cpr E 225 Computer Organization and Design (3-2) 3 CR. 4 F. Prereq. 210. Introduction to computer and microprocessor architecture. Computer architecture, instruction set architecture, computer architecture, and computer architecture. Students must register for this course before commencing work.

Cpr E 288 Cooperative Education Cr R FS SS Prereq. Permission of department. First professional work period in the cooperative education program. Students must register for this course before commencing work.

Cpr E 305 Computer Organization and Design (3-2) 3 CR. 4 F. Prereq. 210. Introduction to computer and microprocessor architecture. Computer architecture, instruction set architecture, computer architecture, and computer architecture. Students must register for this course before commencing work.

Cpr E 310 Theoretical Foundations of Computer Engineering (3-3) 3 CR. 4 F. Prereq. 210. An overview of advanced computer and microprocessor architecture. Computer architecture, instruction set architecture, computer architecture, and computer architecture. Students must register for this course before commencing work.

Cpr E 334 Integrated Circuit Design (Same as E E 334) (1) 3 CR. 4 F. Prereq. EE 203. Overview of integrated circuit technology. Advanced MOSFET models, bipolar transistor models, small signal analysis, IC amplifier configurations, biasing and frequency response, MOS digital design. Introduction to CAD tools. Laboratory design projects. Nonmajor graduate credit.

Cpr E 370 Toying with Technology (Same as Mat E 370) 3 CR. See Materials Engineering.

Cpr E 396 Summer Internship Cr R SS Prereq. Permission of department. Summer professional work period.

Cpr E 397 Engineering Internship Cr R FS Prereq. Permission of department. One semester maximum academic year professional work period.

Cpr E 398 Cooperative Education Cr R FS SS Prereq. 288 permission of department. Second professional work period in the cooperative education program. Students must register for this course before commencing work.

Cpr E 425 High Performance Computing for Scientific and Engineering Applications (Same as Com S 425) 3 CR. See Computer Science. Nonmajor graduate credit.

Cpr E 426 Introduction to Parallel Algorithms and Programming (Dual listed with 526 same as Com S 426 (3) 2 CR. 4 F. Prereq. 308 or Com S 321. Com S 317. Models of parallel computation. Program performance. Software tools. Parallel constructs and communication primitives. Parallel programming using MPI. Parallel algorithms for selected problems including sorting, matrix tree and graph problems, fast Fourier transforms. Nonmajor graduate credit.
Cpr E 564 Distributed and Network Operating Systems (Dua) (same as Com S 564) See Computer Science

Cpr E 565 Scalable Software Engineering (3-0) Cr 3 Prereq 486 Study of methods, techniques, and tools for design, development and evolution of complex software aspect-oriented programming domain-specific software technologies, automation for reliable and scalable software engineering. Program analysis, comprehension and transformation


Cpr E 568 Advanced Microprocessor Architecture (3 0) Cr 3 Prereq 350 Analysis and design of advanced microprocessors. Application of computer architecture techniques and concepts. Areas covered include parallelism, instruction set design, memory hierarchy, processor interconnection, and load/store architectures. An introduction to VLSI design as well as an introduction to microprocessor design.

Cpr E 569 Computer Vision (3 0) Cr 3 Prereq 350 Introduction to the field of computer vision. Topics include image processing, feature detection, object recognition, and scene analysis.

Students must earn a C or better in each course in the department which is a prerequisite to a course listed in the student’s degree program.

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy with a major in Computer Science. The doctor of philosophy may also be earned with computer science as a major with some other discipline. Additionally the department offers minor work to students majoring in other departments.

Established research areas include algorithms, artificial intelligence, computational complexity, computer architecture, computer-aided design, computational biology, computer networks, database systems, formal methods, information assurance, machine learning and neural networks, multimedia operating systems, parallel and distributed computing, programming languages, software engineering. There are also numerous opportunities for interdisciplinary research.

Typically, students beginning graduate work in Computer Science have completed a bachelor’s degree or equivalent in Computer Science. However, some students with undergraduate majors in other areas such as mathematical physical or biological science or engineering become successful graduate students in Computer Science.

For the degree master of science a minimum of 31 semester credits are required. A thesis demonstrating research and ability to organize and express significant ideas in computer science is required.

Com S 531 is required and it is taken during the first semester of a normal Graduate program.

The purpose of the doctoral program is to train students to do original research in Computer Science. Each student is also required to attain knowledge and proficiency commensurate with a leadership role in the field.

The Ph.D. requirements governed by the student’s program of study committee within established guidelines of the department and the graduate college include coursework demonstrated proficiency in three areas of Computer Science, a research skills requirement, a preliminary examination and a doctoral dissertation and final oral examination.

The department recommends that all graduate students majoring in Computer Science teach as part of their training for an advanced degree.

Courses open for nonmajor graduate credit. 309 311 321 330 331 342 352 362 383 401 411 425 426 430 440 454 455 461 471 472 473 476 481 484

Courses Primarily for Undergraduate Students

Com S 101. Orientation (1 Cr) R, Fall semester. Introduction to the procedures and policies of Iowa State University and the Department of Computer Science. Test out honorary societies etc. Issues relevant to student adjustment to college life. Also will be discussed. Offered on a satisfactory-fail grading basis only.

Com S 103. Computer Applications (3 Cr) R Fall semester. Introduction to computer literacy and applications. Applications Windows Internet browser/HTML, word processing spreadsheets database management and presentation software. Historical development of computers and telecommunications, computer ethics, computer crime and history of programming languages. No prior computer experience necessary.

Com S 104. Introduction to Computers (3 Cr) R Fall semester. Use of personal computer and workstation operating systems and software. History of machines, computer architecture and telecommunications. Project-oriented approach to word processing, spreadsheet presentation database management, Internet usage HTML and other software. Beginning programming in Visual Basic. Unix. Topics from computer history, programming languages, algorithm development and societal impact. No prior computer experience necessary.

Com S 173. Computer Programming (3 Cr). C Fall semester. Introduction to computer programming for nonmajors using a language such as the Visual Basic language. Basics of good programming and algorithm development, graphical user interfaces.

Com S 201. Computer Programming in COBOL (3 Cr). R Fall semester. Introduction to computer programming in COBOL. Emphasis on the design, writing, debugging and testing of business applications programs in a transaction-oriented environment.

Com S 203. Careers in Computer Science (1 Cr) Fall semester. Introduction to career fields open to computer science majors. Relationship of coursework to careers. Presentations by computer science professionals. Offered on a satisfactory-fail grading basis only.

Com S 207 Programming I (3 Cr). R Fall semester. Introduction to computer programming using an object-oriented programming language. Emphasis on basics of good programming techniques and style through extensive practice in top-down design, writing, running and debugging small programs. Procedural abstraction. Use of abstract data types. This course is designed for nonmajors. Credit may not be applied toward graduation for both 207 and 227.

Com S 208 Programming II (3 Cr). R Fall semester. Introduction to computer programming using an object-oriented programming language. Emphasis on basic programming principles and style through extensive practice in top-down design, writing, running and debugging small programs. Procedural abstraction. Use of abstract data types. This course is designed for nonmajors. Credit may not be applied toward graduation for both 208 and 227.

Com S 227 Introduction to Object-Oriented Programming (3 Cr). R Fall semester. Introduction to object-oriented design and programming techniques. Symbolic and numerical computation, recursion and iteration, Modularity, procedural and data abstraction, subtyping, Object-oriented techniques, Imperative Programming, Emergent programming, object-oriented design through extensive practice in design, writing, running and debugging small programs. This course is designed for majors. Credit may not be applied toward graduation for both 227 and 228.

Com S 228 Introduction to Data Structures (3 Cr). R Fall semester. Introduction to data structures and algorithms. Object-oriented analysis and design, programming with emphasis on data abstraction, inheritance and subtyping, polymorphism, Abstraction, data type specification and correctness. Collections and associated algorithms including stacks queues trees searching sorting graphs and file processing. Analysis of algorithms. Emphasis on object-oriented design, writing and documenting medium sized programs. This course is designed for majors.

Com S 290 Independent Study I R Fall semester. Permission of instructor. Offered on a satisfactory-fail grading basis only. H: Honors.

Com S 308. Programming Languages (3 Cr). R Fall semester. Introduction to programming languages through analysis of language syntax and semantics. Experience with several programming languages. Application to programming problems. Nonmajor graduate credit.

programming skills not for major credit. Credit may not be applied toward graduation for both 311 and 381. Nonmajor graduate credit

Com S 398 Cooperative Education C R Required of all cooperative students. Prereq. Permission of department chair. Nonmajor graduate credit for this course prior to commencing each work period.

Com S 401 Computer Based Information Systems (3) Cr 3 F Prereq. Engr 105 Sp Cm 212 an additional 9 Com S credits at the 200 level or above and either 362 or 363. Systems concepts and implementations for supporting production-oriented information systems. Cross-listed in computer science.

Com S 418 Introduction to Computational Geometry (Dual listed with 518 3 0) Cr 3 Alt S offered 2005 Prereq. 311 or permission of instructor Engr 105 Sp Cm 212 Introduction to data structures algorithms and analysis techniques for computational problems that involve geometry. Line segment intersection polygon triangulation and visibility problems range queries point location arrangements and duality Voronoi diagrams and Delaunay triangulation convex hulls. Other selected topics Programming assignments. Nonmajor graduate credit.

Com S 421 Logic for Mathematics and Computer Science (Same as Math 421) See Mathematics

Com S 425 High Performance Computing for Scientific and Engineering Applications (Same as Cpr E 425) (3) Cr 3 C S Prereq. 311 330 or Cpr E 330 Engr 105 Sp Cm 212 Introduction to high performance computing using different computing platforms including parallel and distributed computation clusters. Discussion of performance visualization and software development issues Sample applications from science and engineering. Practical issues in high performance computing will be emphasized via a number of programming projects and case studies. Oral and written reports. Nonmajor graduate credit.

Com S 436 Introduction to Parallel Algorithms and Programming (Dual listed with 526 same as Cpr E 426) See Computer Engineering Nonmajor graduate credit

Com S 430 Advanced Programming Tools (3) Cr 3 F Prereq. 311 or 330 or 363 or Engr 105 Sp Cm 212 Topics in advanced programming techniques and tools widely used in industry-driven programming and graphical user interfaces. Standard libraries client/server architectures and techniques for distributed applications. Emphasis on programming projects in a modern integrated development environment. Oral and written reports. Nonmajor graduate credit.

Com S 440 Principles and Practice of Compiling (Dual listed with 540) (3) (C R) 3 S Prereq. 331 342 345 Sp Cm 212 Theory of compiling and implementation issues of programming languages. Programming projects leading to the construction of a compiler. Project difficulty level will be given for 440 and 540. Topics: lexical syntax and semantic analyses syntax-directed translation runtime environment and library support. Written reports. Nonmajor graduate credit.

Com S 454 Distributed and Network Operating Systems (Dual listed with 554 same as Cpr E 454) (3) Cr 3 Alt S offered 2005 Prereq. 311 352 Engr 105 Sp Cm 212 Laboratory course dealing with practical issues of design and implementation of distributed and network operating systems and distributed computing environments (DCE). The client server paradigm interprocess communications layered communication protocols synchronization and concurrency control and distributed file systems. Graduate credit requires additional in-depth study of distributed operating systems. Written reports. Nonmajor graduate credit.

Com S 455 Simulation Algorithms and Implementation (Dual listed with 555) (3) Cr 3 F Prereq. 311 and 330 Stat 330 Engr 104 Sp Cm 212 Introduction to simulation with a focus on computer science applications including performance evaluation of networks and distributed systems. Overview of algorithms and data structures necessary to implement simulation software. Discete and continuous time simulation generation of probability distributions simulation of queuing and inventory systems. Monte Carlo simulation point and interval parameter estimation Graduate credit requires additional in-depth study of computer science and written reports. Nonmajor graduate credit.


Com S 471 Computational Linear Algebra and Fixed Point Iterations (Same as Math 471) See Mathematics. Nonmajor graduate credit.

Com S 472 Principles of Artificial Intelligence (Dual listed with 572) (3) Cr 3 F Prereq. 311 330 or Cpr E 310 Stat 330 Engr 105 Sp Cm 212. Com S 342 or comparable programming experience. Specification design implementation and selected applications of intelligent software agents and multiagent systems. Computational models of intelligent behavior including problem solving knowledge representation reasoning planning decision making learning perception action communication and interaction. Reactive rational adaptive learning and communicative agents and multiagent systems. Artificial intelligence programming. Graduate credit requires a research project and a written report. Oral and written reports. Nonmajor graduate credit.

Com S 474 Elements of Neural Computation (3) Cr 3 S Prereq. 311 or Cpr E 310 or Stat 330 Math 165 Engr 105 Sp Cm 212. Com S 342 or comparable programming experience. Introduction to theory and applications of neural computation and computational neuroscience. Computational models of neurons and networks of neurons for associative memory knowledge representation inference pattern classification function approximation stochastic search decision making and behavior. Neural architectures and algorithms for learning including perceptron support vector machines kernel methods bayesian learning instance-based learning reinforcement learning unsupervised learning and related techniques. Applications in Artificial Intelligence and cognitive and neural modeling. Hands-on experience is emphasized through the use of simulation tools and laboratory projects. Oral and written reports. Nonmajor graduate credit.

Com S 477 Problem Solving Techniques for Applied Computer Science (Dual listed with 577) (3) Cr 3 F Prereq. 229 or 330 or Cpr E 310 Math 166 and 307 or Math 317 or Math 318. Selected topics in applied mathematics and modern heuristics that have found applications in areas such as geometric modeling graphics robotics vision human machine interface speech recognition computer animation and polynomial interpolation. Roots of polynomials resultants solution of linear and nonlinear equations approximation data fitting fast Fourier transform linear programming nonlinear optimization Lagrange multipliers genetic algorithms interval analysis and quadratic programming. ODE and PDE. Numerical methods. Formulas cubic splines and Bezier curves. Programming components Written report for graduate credit.

Com S 481 Numerical Solution of Differential Equations and Interpolation. (Same as Math 481) See Mathematics. Nonmajor graduate credit.

Com S 490 Independent Study (C R) 1-3 S Prereq. 6 credits in computer science permission of instructor. No more than 9 credits of 490 may be counted toward graduation. Offered on a satisfactory-fail grading basis only. H Honors

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Com S 502 Complex Adaptive Systems Seminar (Same as CAS 502 EE 502) (1) Cr 1 F Prereq. Admissons to CAS minor. Understanding core techniques in artificial life are based on basic readings in complex adaptive systems. Understanding techniques of complex system analysis methods including evolutionary computation neural nets Agent based simulations (Agent based models in Social Economics). Large scale simulations are to be emphasized. E.g. power grids whole ecosystems.


Com S 507 Numerical Solution of Ordinary Differential Equations (Same as Math 507) See Mathematics.

Com S 511 Design and Analysis of Algorithms (Same as Cpr E 511) (3) Cr 3 F Prereq. 311 A study of basic algorithm design and analysis techniques. Advanced data structures amortized analysis and randomized algorithms. Applications to sorting graphs and geometry. NP completeness and approximation algorithms.

Com S 512 Formal Methods in Software Engineering (3) Cr 3 S Prereq. 311 A survey of formal methods relevant to the software life-cycle process including requirements specifications design implementation testing and maintenance implications of formal results for software prototyping and automated testing.

Com S 515 Software System Safety (3) Cr 3 F Prereq. 306 or 311 342 An introduction to the analysis design and testing of software for safety critical and high integrity systems. Analysis techniques formal verification fault identification and recovery model checking and certification issues. Emphasizes a case-based and systematic approach to software in role safe systems.

Com S 518 Introduction to Computational Geometry (Dual listed with 418) (3) Cr 3 S Alt S offered 2005 Prereq. 311 or permission of instructor. Introduction to data structures algorithms and analysis techniques for computational problems that involve geometry. Line segment intersection polygon triangulation and visibility problems range queries point location arrangements and duality Voronoi diagrams and Delaunay triangulation convex hulls. Other selected topics Programming assignments. A scholarly report must be submitted for graduate credit.

Com S 525 Numerical Analysis of High Performance Computing (Same as Cpr E 525 Math 525) See Computer Engineering or Mathematics.

Com S 526 Introduction to Parallel Algorithms and Programming (Dual listed with 426 same as Cpr E 526) See Computer Engineering.

Com S 531 Theory of Computation (3) Cr 3 S Prereq. 331 A systematic study of the fundamental models and analytical methods of theoretical computer science. Computability the Church-Turing thesis decidable and undecidable problems and the elements of recursive function theory. Time complexity: logic Boolean circuits and NP-completeness: Finite state and pushdown computation.
Com S 540 Principles and Practice of Compiling (Dual listed with 440) Same as Cpr E 540 (3) Cr 3 
5 Prereq 331 and Eng T 305 or Cpr C 212 Theory of compiling and implementation issues of programming languages Programming Projects leading to the construction of a compiler. Projects with different difficult levels are given for 440 and 540. Topics: lexical syntax and semantic analysis; symbol table management; interpreter and compiler design and hereditary environment and library support. Written reports.

Com S 541 Programming Languages (3) Cr 3 F Prereq 342 or 440 Survey of the goals and problems of language design. Formal and informal studies of a wide array of programming language features including type systems, memory states, and control structures. Topics: functional, imperative, declarative, and object-oriented paradigms.

Com S 548 Fundamental Algorithms in Computational Biology (Same as BCB 548 Gen 548) (3) Cr 3 S Prereq 311 and some knowledge of programming. Introduction to the design and analysis of fundamental algorithms and methods for molecular biology. Topics include pairwise sequence alignment, motif discovery, phylogenetic trees, and gene finding. DNA chips, fragment assembly, and gene expression in real-life applications.

Com S 549 Advanced Algorithms in Computational Biology (Same as BCB 549 Cpr E 549) (3) Cr 3 S Prereq 311 and either 228 or 228A and 509. Design and analysis of algorithms for applications in computational biology, including pairwise and multiple sequence alignment, clustering, and motif finding. Topics include: sequence comparison, phylogenetic trees, and gene finding. DNA chips, fragment assembly, and gene expression in real-life applications.

Com S 550 Evolutionary Problems for Computational Biologists (Same as BCB 550 Gen 550) (3) Cr 3 F Prereq 311 and some knowledge of programming. Discussion and analysis of basic evolutionary principles and the necessary knowledge in computational biology to solve real-world problems. Topics include: sequence alignment, phylogenetic trees, and gene finding. DNA chips, fragment assembly, and gene expression in real-life applications.

Com S 551 Computational Techniques for Genome Assembly and Analysis (Same as BCB 551) (3) Cr 3 F Prereq 311 and some knowledge of programming. Overview of the technologies used in sequence assembly and comparison techniques. Topics include: local alignment, global alignment, and parsimony. Focus on the development of genome assembly and comparison programs.

Com S 552 Principles of Operating Systems (3) Cr 3 S Prereq 311 and 312 A comprehensive study of high level language facilities for process synchronization and communication. Formal analysis of deadlock and recovery and system performance. Protocols issues including memory management, access and control, and encryption and authentication.

Com S 554 Distributed and Network Operating Systems (Dual listed with 454 same as Cpr E 554) (3) 1C 3 Cr 3 Alt: offered 2005 Prereq 311 352 Laboratory course dealing with practical issues of design and implementation of distributed and network operating systems. Section projects are performed independently. The client server paradigm, inter-protocol communication, and concurrency and control distributed file systems. Graduate credit requires additional in-depth study of advanced operating systems. Written reports.

Com S 555 Simulation Algorithms and Implementation (Dual listed with 455) (3) Cr 3 S Prereq 311 and 330. Introduction to discrete event simulation, and focus on computer science applications including performance evaluation of networks and distributed systems. Overview of algorithms and data structures necessary to implement simulation software. Discrete and continuous stochastic processes, random number generation, and simulation of queues and inventory systems. Monte Carlo simulation, and interval estimation. Graduate credit requires additional in-depth study of concepts. Oral and written reports.

Com S 566 Analytic Algorithms for Stochastic Models (3) Cr 3 S Prereq 311 and Math 307 and Stat 330. Introduction to the use of stochastic models to study complex systems, including network communication and distributed systems. Data structures and algorithms for analyzing discrete state models expressed in high level programming languages. State space and reachability graph construction model checking. Markov chain construction and numerical solution: computation of performance measures for product forms, approximation techniques, and advanced techniques.


Com S 562 Implementation of Database Systems (3) Cr 3 F Prereq 461 or 561. Implementation topic and projects. Includes the following: Storage architecture buffer management and cache design. Access methods and database design and update operations. Application programming interfaces (APIs), user interfaces, optimization and processing, and transaction management for relational and object-oriented, semistructured (XML), and special purpose databases. Data models. Client/Server architectures and metadata and middleware for database integration in web databases.

Com S 572 Principles of Artificial Intelligence (Dual listed with 472) (3) Cr 3 S Prereq 311 and Stat 330. Com S 342 or comparable programming experience. Specification design implementation and selection of intelligent software. AI and multi agent systems. Computational models of intelligent behavior, including agent-based and procedural knowledge representation. Planning, decision making, learning, perception, and action. Computer science and communication. Reactive and adaptive learning and communication. Artificial intelligence programming. Graduate credit requires a research project and a written report.


Com S 574 Intelligent Multisystem Agents (3) Cr 3 S Prereq 330, 533, or Cpr C 372 or Com S 472 or Com S 474. Specification design implementation, and application of multi agent systems. Intelligent agent architectures agent infrastructure languages, and tools for design and implementation of distributed multi agent systems. Multi agent organizations communication and interaction, cooperation and competition, negotiation and coalition, and learning. Agent based distributed software engineering. Applications in distributed intelligent information networks for information retrieval, inference, and discovery from heterogeneous autonomous distributed dynamic information sources.

Com S 576 Motion Strategy Algorithms and Applications (Dual listed with 476) (3) Cr 3 S Prereq 415 or Math 319. Motion planning and autonomous systems. Computer representation and simulation of complex systems. Motion planning and autonomy. Selecting topics in applied mathematics and modern heuristics that have found applications in areas such as computer vision, graphics, robotics, vision, machine learning, and artificial intelligence. Computer simulation and automation of ODEs, curves, and primitives in the programming components.

Com S 583 Reconfigurable Computing Systems (Same as Cpr E 583) 1 3 S 360 Concurrent Computer Engineering.

Com S 585 Advanced Computer Architecture (Same as Cpr E 585) 1 3 S 360 Concurrent Computer Engineering.


Com S 590 Special Topics (Cr 3) Prereq 449. Perussion of instructor. Offered on a satisfactory fail grading basis only.

Com S 591 Graduate Orientation Seminar (1-0) Cr 1 F Prereq 352 or Cpr C 489. Topics include an introduction to ISU computing facilities. M.S. and Ph.D. degree requirements, career options, ethics, literature searching, technical presentations, technical writing, ethics in writing and discussion of research.
interests and projects by members of the graduate faculty. Offered on a satisfactory-fail grading basis only.

Com S 594. Computational Molecular Biology. (Same as BCB 594). Gen 594. Math 594. 3 Cr. 3 S. Prereq: BCB 492 (BCB 492 or equivalent courses and programming experience in C, C++, or Perl). State-of-the-art introduction to bioinformatics with emphasis on concepts and principles combined with hands-on laboratory applications. Topics typically include molecular databases, sequence-based sequence analysis, amino acid substitution scoring matrices, query search programs, dynamic programming, and other methods for pairwise sequence alignment, motif identification and sequence alignment construction of phylogenetic trees from sequence data, gene structure prediction, protein structure prediction.

Com S 596. Genomic Data Processing. (Same as BCB 596. Gen 596). 3 Cr. 3 F. Prereq: Some knowledge of programming. Chou. Practical aspects of genomic data processing. Emphasis on projects that carry out major steps in data processing using important bioinformatic tools. Topics include basic computing, raw sequence cleaning and contamination removal, shotgun assembly procedures, and EST clustering, methods for genome sequence alignments and practice sequence homology search and function prediction annotation and submission of GenBank reports and data collection and dissemination through the Internet.

Courses for Graduate Students

Com S 610. Seminar. 1-3 Cr. Offered on a satisfactory-fail grading basis only.


Com S 631. Computational Complexity. (3 Cr. 3 Alt F). Offered 2004. Prereq: Math 531. Advanced study in the quantitative theory of computation. Time and space complexity classes. The structure of P, NP, and PSPACE and other complexity classes with respect to resource bounded reducibilities and complete problems. Complexity relative to auxiliary information, including nondeterministic and randomized algorithms, advice machines, Boolean circuits, Kolmogorov complexity, and randomness.


Com S 673. Advanced Topics in Artificial Intelligence and Cognitive Modeling. (3 Cr. 3 Alt S). Offered 2005. Prereq: Math 532 or Com S 572 or Com S 573 or Com S 472 or Com S 473. Advanced study of selected topics in artificial intelligence, agent architectures, and machine learning. Topics include decision trees, neural networks, and reinforcement learning. Emphasis on applications.

Com S 699. Research. 1-3 Cr. Offered on a satisfactory-fail grading basis only. Approval of instructor.

Construction Engineering

Administered by the Department of Civil and Environmental Engineering.

Charles A. Jahren. Professor in Charge.

Professor (Emeritus): Jeglina.

Associate Professor (Emeritus): G. Jahren. Jaselski.

Associate Professor (Emeritus): Chas,

Assistant Professor: Walters.

Assistant Professor (Adjunct): Siruok.

Instructor (Adjunct): Cackler.

Lecturers: Cormie.

Undergraduate Study

For undergraduate study in construction engineering leading to the degree of bachelor of science in construction engineering, the curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Construction engineering is a curriculum administered by the Department of Civil and Construction Engineering. For details of the curriculum in construction engineering for the degree of bachelor of science see the College of Engineering Currículum General objectives which are common to all departments in engineering study are stated in the College of Engineering Objectives of Curricula in Engineering. The curriculum in construction engineering is designed with the objective to prepare students for life-long careers in the constantly changing management environment of the construction industry. Students who successfully complete the curriculum will be prepared for entry into the field or for further study at the graduate level in construction engineering or related fields of study such as law, business, and other engineering disciplines.

Construction engineers need to possess strong fundamental knowledge of engineering design and management principles, including knowledge of business procedures, economics, and human behavior.

Graduates of this curriculum may expect to engage in design of temporary structures, coordination of project design systems, design cost estimating, planning and scheduling, construction and project management, and materials procurement. Equipment selection and cost control. The emergence of design/build construction, the role of the construction engineer is expanding into the field of managerial engineering. Opportunities for future study exist in the fields of construction project management and project delivery. The curriculum offers opportunities for study emphasized with building, heavy mechanical, or electrical components.

The process of construction involves the organization management, and coordination of labor resource requirements, temporary and permanent materials and equipment, and the management of building and construction science and technology. Special attention is given to the management of temporary structures, coordination of project design systems, design cost estimating, planning and scheduling, construction and project management, and materials procurement. Equipment selection and cost control. The curriculum is designed to prepare students for life-long careers in the constantly changing environment of the construction industry. Students who successfully complete the curriculum will be prepared for entry into the field or for further study at the graduate level in construction engineering or related fields of study such as law, business, and other engineering disciplines.
Courses Primarily for Undergraduate Students
Con E 110 Introduction to Construction Engineer ing (3-0-5) Cr. 5. S 2 week. The nature and scope of the construction industry. Overview of construction engineering and education for the constructor. Saturday field trip.
Con E 241 Construction Materials and Methods (2-3) Cr. 3 S Preq. 221 Introduction to materials and methods of building construction and to construction drawings. Structural framing. Fixtures and plumbing. Blueprint reading and quantity takeoff techniques.
Con E 251 Mechanical/Electrical Materials and Methods (3-0) Cr. 1 S Preq. Credit or enrollment in 241. Introduction to the mechanical and electrical construction systems and materials. HVAC, water, and waste water. Transportation. Fire protection. Blueprint reading and quantity takeoff. Speciality contractor organization and management.
Con E 298 Cooperative Education (Ct R S Preq. 298 Permission of department). First professional work period in the cooperative education program. Students must register for this course before commencing work.
Con E 322 Construction Equipment and Heavy Construction Methods (2-3) Cr. 3 S Preq. 241 Selection of construction equipment. Application of engineering fundamentals and economics to performance characteristics and production of equipment. Heavy construction methods and economic applications. Nonmajor graduate credit.
Con E 340 Concrete and Steel Construction (3-2) Cr. 3 S Preq. Credit or enrollment in 322. E M 324 Planning and field engineering for concrete and steel construction. Design and applications of concrete formwork to construction. Erection of structural steel. Nonmajor graduate credit.
Con E 351 Mechanical and Electrical Systems (3-0) Cr. 3 S Preq. 251 Phys. 222 Comprehensive coverage of mechanical systems. Electrical systems. Plumbing. Fire protection. Security. Vertical transportation. Lighting. Fire protection. Acoustics and communications. The course includes analysis techniques and design principles for each system. A comprehensive design project is required for a major building project. Nonmajor graduate credit.
Con E 390 Engineering Law (3-0) Cr. 3 S Preq. Preq. Junior classification. Introduction to law and judicial procedure as they relate to the practicing engineer. Contracts, professional liability, professional ethics, licensing, bidding procedures, intellectual property, products liability. Emphasis on development of critical thinking process, abstract problem analysis and evaluation. Nonmajor graduate credit.

Criminal Justice Studies

Con E 396 Summer Internship (Ct R S Preq. Permission of department). Summer professional work period. Students must register for this course before commencing work.
Con E 397 Engineering Internship (Ct R S Preq. Permission of department). Professional work period. One semester maximum per academic year. Students must register for this course before commencing work.
Con E 398 Cooperative Education (Ct R S Preq. 298 Permission of department). Second professional work period in the cooperative education program. Students must register for this course before commencing work.
Con E 490 Independent Study (1-5) Cr. 1 to 5 S Preq. 298. Permission of instructor. Individual study in any phase of construction engineering. Pre-enrollment contract required.
Con E 498 Cooperative Education (Ct R S Preq. 398 permission of department). Third and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.

Criminal Justice Studies (Interdepartmental Undergraduate Program)
Matthew J. DeLisa, Program Coordinator
The criminal justice studies minor is a cross-disciplinary course of study in the College of Liberal Arts and Sciences. It offers an opportunity for students to learn about the components of the criminal and juvenile justice systems to become acquainted with the issues and problems affecting these systems to apply theoretical concepts to real world problems and to plan a career in criminal or juvenile justice.

Students who declare a minor in criminal justice studies are required to complete 15 credit hours of course work. Students must take five of the following six courses. CJ St 240, 241, 320, 322, 340, and 341. Students are also required to complete a minimum of 3 credit hours of internship experience (CJ St 461). Completion of the minor requires 16 total credits.

Courses open for nonmajor graduate credit. CJ St 332

Primary Courses
CJ St 240 Introduction to the U.S. Criminal Justice System (3-0) Cr. 3 S Preq. Provides systematic overview of law enforcement, criminal prosecution, and defense sentencing the judiciary community corrections, and juvenile punishment. The course demonstrates the role of discretion in all of these agencies as well as the sociological influences of age, race, gender, and class on criminal justice system processes.
In our engagement mission, we strive to develop partnerships within and beyond the university that
enhance the quality and effectiveness of education in practice and
serve our discovery and learning missions.

Undergraduate Study
The Department of Curriculum and Instruction provides the professional education coursework that
takes to licensure of pre-service teachers. Students major in early childhood education (birth through third grade) or elementary education (K-6). Students who are interested in teaching at the secondary level (9-12) major in a specific discipline and complete the courses necessary for their teaching license. Early childhood education and elementary education majors must complete a professional course sequence: C 201 204 C 350 C 305 and 402.

The department offers a minor in educational computing that may be earned by completing the following courses: C 201 203 C 207 or C 207 or C 208 or C 208 C 209 C 302 C 403 and 450.

Early Childhood Education
Every student must complete a curriculum in early childhood education leading to the degree of bachelor of science in

Curriculum and Instruction

www.und.edu/academics

Thomas Andre, Chair of the Department
University Professors: Williams

Professors: Abeloff, Andre, Davis, Duffelmeyer, Grewe, Hamed, McCormick, Messenger, Miller, Owen, Phyne, Tanner, Thompson, Willis

Distinguished Professors Emeritus: Moyer, Rasmussen

University Professors Emeritus: Brown

Professors Emeritus: Bambach, Battem, Baum, Biren, Birkhou, Charles, Coulson, Daily, Ditts, Downs, Hennery, Hoerner, Hunter, Rudolph, Schleker, Schneider, Smith, Thomas, Voiker, Williams, Zbranicki

Associate Professors Emeritus: Allen, Bloom, Blount, Caldwell, Carlson, Coagen, Felder, Gentry, Hargreave, Hausl, Kelly, Merkley, Miller, Murnin, Payne, Schilling, Sharp, Storrie, Torrie

Associate Professors (Adjunct): Rosenbusch

Associate Professors Collaborators: Appelgate, Golff

Associate Professors Emeritus: Amos, Ebert, Irwin

Assistant Professors: L. Allen Clough, Leigh, C. Lubenskie, S. Lubenskie, Niedermayer, Olen, Spann, Thome, St. Ann, Stiebel, Storrie, Torrie

Assistant Professors (Adjunct): Andreotti, McShay, Reck, Schmitt, Sommerville, Stubbs

Assistant Professors Emeritus: Chartfield

Instructors (Adjunct): Connor

missions and goals
The mission of the Department of Curriculum and Instruction is to serve the people of Iowa, the nation, and the world through discovery and teaching. We foster the development of the human potential and the growth of human potential. It is through the education and the education of others.

We are committed to learning and teaching education as disciples.

In discovering our mission, we strive to conduct the highest quality research and scholarship that significantly contribute to educational theory and practice and be known locally and internationally.

In our learning mission, we strive to be recognized.

Elementary Education
For the undergraduate curriculum in elementary education leading to the degree of bachelor of science in

Curriculum of Education Curriculum

The curriculum in elementary education is planned for students preparing to teach at the elementary school level. This program leads to careers in teaching with school aged children. Kindergarten through grade 6.

Endorsements in English Language Arts, basic science social studies, mathematics, and multicultural education are available to elementary education students. An endorsement for teaching foreign language in elementary schools is available through the Department of Foreign Languages and Literature.

Students who enroll in elementary education must make application to and be accepted into the teacher education program prior to enrolling in an advanced elementary education course. For admission and licensure requirements see College of Education. Every student must meet the performance outcome standards for teacher certification. Designated performance indicators (DPIs) for these standards will be assessed in each course. Students will receive both formative and summative evaluations of their progress toward meeting these outcomes throughout their program at ISU. A detailed explanation of the standards DPIs and assessment process may be found in the Teacher Education Handbook. Students may be assessed at any course-level home page. The same information is also available from the student advisor and the student advisor.

Secondary Education
For specific requirements for each area of specialization see Teacher Education curricula for the college in which the chosen degree major is sought.

Students seeking recommendations for a license to teach in the secondary schools must be admitted to the teacher education program and pursue a program that includes the following courses: C 201 204 333 406 415 426 special methods and student teaching in the area of specialization.

All students who are recommended by Iowa State University for teacher licensure must meet the requirements of the teacher education program and be recommended by the College of Education. Each student must meet the performance outcome standards for teacher certification. Designated performance indicators (DPIs) will be assessed in each major. Students will receive both formative and summative evaluations of their progress toward meeting these outcomes throughout their program at ISU. A detailed explanation of the standards DPIs and assessment process may be found in the Teacher Education Handbook. The same information is also available from the student advisor and the student advisor.

For more information, students should contact the academic advisors in their major. Each student will be enrolled in the department in which they plan to major and must meet the graduation requirements of that department and the college in which it is located.
Curriculum and Instruction (C 115) Courses Primarily for Undergraduate Students

C 115 First Year Orientation: Cr. F. R. Overview of elementary and secondary childhood education curricular opportunities. Transitions to college and community life and university procedures. Required of all first semester freshmen majoring in elementary or early childhood education and advised in the College of Education. Offered on a satisfactorily-failing grading basis only.

C 201 Introduction to Instructional Technology (2-2-2) Cr. 3. Overview of instructional technology with an emphasis on uses in education. Instructional applications of computers for problem-based learning including tool software, interactive multimedia, Web page development, and use of digital video and sound. Pedagogical considerations in the use of technology. Laboratory work with hardware and software that facilitate teaching and learning.

C 204 Social Foundations of American Education (3-0-3) Cr. 3. FS SS. Goals of schooling including the roles of teachers today, historical development of schools, educational reforms and alternative forms and current philosophical issues. Human relations aspects of teaching and discussions about teaching as a career.

C 206 Learning of Science (1-0-1) Cr. 1. S. Prereq. Concurrent enrollment in MIB 206. Critical analysis of personal and cultural learning of science concepts. Use of computer simulations to ground student learning experiences. Constructivist approach to learning science with emphasis on metacognition and scientific method. Lecture and laboratory hours.

C 215 Sophomore Orientation: Cr. R. FS Review of elementary education requirements. Program planning. Required of all sophomores majoring in elementary education. Offered on a satisfactorily-failing grading basis only.

C 245 Strategies in Teaching (2-2-2) Cr. 2. FS SS Prereq. 204 HD FS 220 or 221 or 226 for concurrent enrollment in one of these courses. Concurrent enrollment in C 268 eligibility for admission to teacher education program. Introduction to elementary education teaching strategies, classroom management, and curriculum organization. Open to students in the elementary education major or the early childhood education curriculum.

C 250 Education of the Exceptional Learner in a Diverse Society (Same as Sp Ed 250) Cr. Special Education.

C 268 Strategies Practicum: (0) Cr. 1. FS SS Prereq. 204 Clinical experience to be taken concurrently with C 245. Accredited on a satisfactorily-failing grading basis only.

C 280 Pre Student Teaching Experience Cr. 0 to 2 each time taken. Maximum of 8 credits. FS SS 280A may be taken alone. May be taken more than once for credit toward graduation. For enrollment in 280B 1. 280A must be either a prerequisite or taken concurrently. Field experience in an educational setting. 2 1/2 hour blocks of time needed for field experience. Offered on a satisfactorily-failing grading basis only.

A. Students AYe 1 or 2
B. Students EZe 1 or 2 credits by permission only
C. Native American Tutoring: Cr. 1
D. Museum Education: Cr. 1
E. Multicultural Youth Experience: Cr. 1 or 2
F. International Student: Cr. 1 or 2 (Permission of instructor required)

I. Multicultural: F. 1 (concurrent with Sp Ed 330)
J. Mathematics: Cr. 1
K. Science: Cr. 1
L. Early Field Experience: Cr. 5
M. Secondary Science: Cr. 2
N. Coach Field Experience: Cr. 1 (Permission of department required)

C 281 The Special Needs Student Experience (2 Cr. 2) each time taken. Maximum of 6 credits. FS SS Seminars and visits to public schools serving special needs. One week practical at the Iowa School for the Deaf and the Iowa Braille and Sight Saving School. Offered on a satisfactorily-failing grading basis only.

C 282 The Urban Student Experience (2 Cr. 2) each time taken. Maximum of 4 credits. FS SS Seminars and visits to urban schools, and to organizations serving urban students. Offered on a satisfactorily-failing grading basis only.

C 290 Independent Study: Cr. 1 to 3. Prereq. 6 credits in education or permission of department head.

C 302 Using Computers in the Classroom (2-2-2) Cr. 3 FS Prereq. 201 or Comp 107 Integrating computer applications into the curriculum. Designing classroom applications for tool software. Selecting and evaluating software for the classroom issues and trends in computer-based instruction.

C 316 Transfer Orientation: Cr. R. FS Review of elementary education requirements, curricular opportunities and university procedures. Program planning. Required of all transfer students majoring in elementary education. Offered on a satisfactorily-failing grading basis only.

C 332 Educational Psychology of Young Learners (3-0-3) Cr. 3 FS SS Prereq. C 201. Psych 220 or HD FS 222 or 226. Open to majors in Early Childhood Education or Elementary Education. Psychological theory relevant to classroom learning cognition motivation classroom management and assessment for children from birth to grade 6. Implications of theory for teaching children and for assessing learning in educational settings with young and grade school aged children.

C 333 Educational Psychology (Same as Psych 333) (3-0-3) Cr. 3 FS SS Prereq. C 201. Psych 220 or HD FS 222 or 226. Open to majors in Early Childhood Education or Elementary Education. Psychological theory relevant to classroom learning cognition motivation classroom management and assessment for children from birth to grade 6. Implications of theory for teaching children and for assessing learning in educational settings with young and grade school aged children.

C 347 Nature of Science (Dual listed with 5471) (3-0) Cr. 3 Prereq. 280M. The intersection of issues in the history philosophy and psychology of science and their application to impact on science teaching and learning science teacher education and science education research.

C 367 Teaching Literacy in the Primary Grades (4-0) Cr. 4. Prereq. 245 HD FS 222 or 226 admission to teacher education program or major in psychology. Open to majors in Early Childhood Education or Elementary Education. Focus on cognitive development, cognitive learning theory, and instructional techniques. Major emphasis on measurement theory and the classroom assessment of learning outcomes.

C 376 Teaching Literacy in the Intermediate Grades (4-0) Cr. 4. Prereq. 245 HD FS 222 or 226 admission to teacher education program. Concurrent enrollment in 448A 448B 448C 448D. Focus on cognitive development, cognitive learning theory, and instructional techniques. Major emphasis on measurement theory and the classroom assessment of learning outcomes.

C 377 The Teaching of Reading and Language Arts in the Primary Grades (K-3) (4-0) Cr. 4. Prereq. 245 HD FS 222 or 226 admission to teacher education program. Concurrent enrollment in 448A 448B 448C 448D. Focus on cognitive development, cognitive learning theory, and instructional techniques. Major emphasis on measurement theory and the classroom assessment of learning outcomes.

C 378 The Teaching of Reading and Language Arts in the Intermediate Grades (4-6) (4-0) Cr. 4. Prereq. 377 concurrent enrollment in 449A 449B 449C 449D. Focus on cognitive development, cognitive learning theory, and instructional techniques. Major emphasis on measurement theory and the classroom assessment of learning outcomes.

C 395 Teaching Reading in Middle and Secondary Schools (3-0) Cr. 3 FS Prereq. 204 Analysis and application of strategies to enhance student literacy development in middle and secondary school settings.
C 1418 Secondary Science Methods I (2-Cr 2 Prereq 280M 347 or concurrent enrollment in 347 concurrent enrollment in 468B Development of a research-based framework for teaching science that includes student goals congruent student actions the character and role of science inquiry teaching behaviors and strategies contemporary learning theories and self-evaluation

C 1419 Secondary Science Methods II (2-Cr 2 Prereq 280M 247 392 concurrent enrollment in 468X Advancing a research based framework for teaching science in a variety of school settings emphasizing the teachers role the development and refinement of a curriculum management strategy technology and student assessment

C 1426 Principles of Secondary Education (Dual listed with 526) (3 Cr) 3 FS SS Prereq 201 senior classification admitted to teacher education program concurrent enrollment in 415 The curriculum how to make accommodations for students with special needs human relations student evaluation support services classroom management organization of schools legal aspects of schools professionalism and career planning A planned field experience is a professional growth activity included in the course Students often enroll in 480 concurrently with this course

C 1427 Project Opportunity Capstone (1-4 Cr) 1 Cr Issues in education as related to beginning teachers assessment classroom management law special education effective teaching reflectivity technology Quality supervision teaching grades based only

C 1433 Teaching Social Studies in the Primary Grades (12 Cr 2 FS Prereq 376 HD FS 221 concurrent enrollment in 438 439 Sp Ed 355 455 Study development and application of current methods for providing appropriate social studies learning experiences for primary grade children instructional strategies curriculum content formal and informal assessment strategies for diverse learners

C 1438 Teaching Mathematics in the Primary Grades (2 Cr 2 FS Prereq 376 HD FS 221 Math 195 concurrent enrollment in 433 439 4480 Sp Ed 385 455 Study development and application of current methods for providing appropriate mathematics learning experiences for primary grade children Formal and informal assessment strategies for diverse learners

C 1439 Teaching Science in the Primary Grades (2 Cr 2 FS Prereq 376 HD FS 221 concurrent enrollment in 433 439 4480 Sp Ed 455 Study development and application of current methods for providing appropriate science learning experiences and processes for primary grade children Formal and informal assessment strategies for diverse learners

C 1443 The Teaching of Social Studies (3 Cr) 3 FS SS Prereq 377 Study development and application of current methods curriculum materials and assessment strategies for providing appropriate social studies learning experiences for primary and intermediate grade children

C 1448 Teaching Children Mathematics (3 Cr) 3 Cr Prereq Math 195 196 concurrent enrollment in 377 468A 468B Study development and application of current methods for providing appropriate mathematical learning experiences for primary and intermediate children Emphasizes critical evaluation of factors related to the teaching and learning of mathematics

C 1449 The Teaching of Science (3 Cr 3 FS Prereq 377 concurrent enrollment in 378 468B 468D Junior classification Procedures for teaching science to children Emphasis on developmental implications teaching processes and methods current programs and assessment of learning in science

C 1450 Ethnicity and Learning (3 Cr) 3 FS Prereq 245 Examination of cultural relevance in education Development and application of strategies and techniques for implementing multicultural goals and multidisciplinary perspectives in the elementary school classroom setting

C 451 Ethnology and Learning Practicum (1-4 Cr 3 Prereq 450 Field experience in a multicultural or ESL (English as a Second Language) classroom setting Students must have on full day or two half days open each week in order to participate

C 456 Integrating Technology into the Reading and Language Arts Curriculum (Dual listed with 556) (3 Cr) 3 SSS Prereq 201 377 Methods and strategies used to integrate technology into the reading and language arts curriculum Use and evaluation of reading and language arts software for elementary classrooms

C 457 Teaching Exceptional Learners in the Regular Classroom (Same as Sp Ed 457) See Special Education NEmajor graduate credit

C 468 Supervised Practicum in Teaching (1-2 Cr 2 FS SS Prereq 245 250 268 admission to teacher education program Observation application of current methods and instruction with children in a supervised elementary classroom while engaged in other elementary methods courses Offered on a satisfactory fail grading basis only

A Primary Grades Reading Language Arts Cr 1
B Intermediate Grades Reading Language Arts Cr 1
C Mathematics Cr 1
D Science Cr 1
E Foreign Language Cr 1
F Primary Grades Literacy Inclusive Cr 1
G Primary Grades Mathematics Inclusive Cr 1
H Primary Grades Science Inclusive Cr 1
J Secondary Science Cr 2
K Secondary Science Cr 2

C 478 Diagnosis and Correction of Reading Problems (3 Cr 3 FS Prereq 378 Diagnosis of students with reading difficulties using formal informal and on going assessment Instructional strategies for mildly moderately and severely disabled readers

C 480 Field Experience for Secondary Teaching Preparation (Same as Eng 480 F Eng 380) 1 Cr 0-5 Extra time taken maximum delayed 2 Observation and participation in a variety of school settings after admission to the teacher preparation program Permission of area coordinator required prior to enrollment (SP grading may be used in some offerings of some sections)

C 486 Methods in Elementary School Foreign Language Instruction (Same as F Eng 486) See Foreign Languages and Literatures NEmajor graduate credit

C 487 Methods in Secondary School Foreign Language Instruction (Same as F Eng 487) See Foreign Languages and Literatures

C 488 Supervised Tutoring in Reading (Dual listed with 588B) (2-3 Cr 3 Prereq 416 or LAS 417 Using formal and informal diagnostic procedures to plan and implement individualized reading instruction Field work

C 490 Independent Study Cr 1-3 Prereq GPA of 2.5 or more for preceding semester
A Music Education (Same as Music 490A) See Music
B Vocational and Educational Guidance
C Curriculum Construction
D Principles of Education
E Methods of Teaching
F Educational Psychology
G Instructional Technology
H Honor
I Foundations of Educational Statistics
J Multicultural Education
K Social Studies
L Literacy Education
M Mathematics Education
N Foreign Language
O Foundations of Education

C 491 Educational Inquiry (1-2 Cr 2 FS Prereq Participation in Project Opportunity Introduction to research terminology qualitative and quantitative
methodology, data collection techniques, and research resources to more closely link research and practice for prospective elementary school teachers, a field-based research component to synthesize coursework, field experiences, and related research.

C 1494 Practice and Theory of Teaching Literature in the Secondary Schools (Same as Eng 494) See English

C 1495 Teaching Speech (Same as Sp Cm 495) See Speech Communication

C 1497 Teaching Secondary School Mathematics (Same as Math 497) (0-0) Cr 3 Prereq: 15 credits in college mathematics admission to teacher education 426 or 528 or consent of instructor Additional topics from number theory, and mathematics history. Critical examination of K-12 curriculum pedagogy and assessment.

C 1503 Theories of Teaching Secondary School Mathematics (0-0) Cr 3 Prereq: 15 credits in college mathematics admission to teacher education 426 or 528 or consent of instructor Additional topics from number theory, and mathematics history. Critical examination of K-12 curriculum pedagogy and assessment.

C 1504 Managing and Evaluating Instructional Technology Programs (0-0) Cr 3 F Prereq: Graduate classification 501 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1505 Introductory to Using Technology in Learning and Teaching (0-0) Cr 3 F Prereq: Graduate classification 501 Teaching and learning using computers. Selection and evaluation of software and hardware for teaching and learning. Research on computer software, telecommunications, and computer-based instruction.

C 1506 Multicultural Gender Fair Education in Curriculum Development and Instruction (0-0) Cr 3 F Prereq: Graduate classification 501 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1507 Methods and Strategies of Instructional Design (0-0) Cr 3 F Prereq: Graduate classification 501 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1508 Algebra in the K-12 Classrooms (3-0) Cr 3 Prereq: 448 or 497 or graduate status. Focus on algebraic concepts and applications in the K-12 classroom. Use of research-based instructional strategies and appropriate technologies to apply fundamental ideas of patterning, coordinate graphing, and relationships among variables into K-12 classrooms. Additional topics from number theory, and mathematics history. Critical examination of K-12 curriculum pedagogy and assessment.

C 1509 Geometry in the K-12 Classrooms (3-0) Cr 3 Prereq: 448 or 497 or graduate status. Euclidean and non-Euclidean geometry explorations with a focus on pedagogical issues in the K-12 classroom. Use of research-based instructional strategies and appropriate technologies to teach geometry in K-12 classrooms. Additional topics from discrete mathematics, history of philosophy of geometry, and fractal geomatics.

C 1510 Advanced Technology in Education (3-0) Cr 3 S Prereq: 505 Exploration of applications of technology in educational settings Development of advanced computer applications in relationship to theories of learning and instruction.

C 1512 Engineering in K-12 Classrooms (1-0) Cr 1 Prereq: 448 or 497 or teaching license concurrent enrollment in E M 322 Explorations of engineering concepts appropriate for K-12 classrooms. Use of research-based teaching strategies for K-12 classrooms.

C 1513 Multicultural and Gender Fair Education in Curriculum Development and Instruction (3-0) Cr 3 S Prereq: 501 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1521 Teaching and Learning Using Computers (1-0) Cr 1 Prereq: Graduate classification 501 Teaching and learning using computers. Selection and evaluation of software and hardware for teaching and learning. Research on computer software, telecommunications, and computer-based instruction.

C 1522 Educational Psychology of Learning Cognition, and Motivation (Same as Psych 533) (3-0) Cr 3 F Prereq 333 or teacher licensure Learning cognition and motivation in educational training settings instructional theory and models individual differences and instructional process.

C 1523 Educational Psychology of Computing Applications (3-0) Cr 3 F Prereq: 510 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1526 Principles of Secondary Education (Dual listed with 426) (3-0) Cr 3 Prereq: 6 credits in education. The curriculum how to make accommodations for students with special needs human relations student evaluation support services classroom management, organization of schools legal aspects of schools, and career planning. A planned field experience is a professional growth activity included in the course.


C 1529 Supervised Tutoring in the Reading and Language Arts Curriculum (Dual listed with 556) (2-0) Cr 3 S Prereq: Teaching license Methods and strategies used to integrate technology into the curriculum. Use and evaluation of reading and language arts software for elementary classrooms.

C 1530 Principles of Computer Applications (3-0) Cr 3 S Prereq: 510 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1531 Conceptual Change Constructivism and Science Teaching (3-0) Cr 3 Prereq: Bachelor's degree Current learning theories within science education and the application to science classrooms. Examination of models which assist the implementation of these theories of learning. National science standards.

C 1542 The Secondary School Curriculum (2-0) Cr 2 F Prereq: Teacher licensure. Curriculum and co-curricular programs of secondary schools. Recent trends in goals content organization and organization for instruction. Local community resources as curriculum content.

C 1543 Teaching Science to Elementary School Students (3-0) Cr 3 Prereq: Teaching license Critical examination of the discipline of science within the elementary school curriculum. Emphasis on content assessment and revision of science programs using current curriculum procedures.

C 1544 Science Literacy (3-0) Cr 3 Prereq: Bachelor's degree. In-depth study of science literacy. Opportunities for experience and develop broadened understanding of science literacy. Focal areas include the nature of science, epistemology and reasoning as part of science literacy within science classrooms. Pedagogical strategies to improve science literacy within classroom settings.

C 1545 The Elementary School Curriculum (2-0) Cr 2 F Prereq: Teacher license. Curriculum and co-curricular programs of elementary schools. Recent trends in goals treatment. Content organization and organization for instruction. Local community resources as curriculum content.


C 1547 Nature of Science (Dual listed with 347) (3-0) Cr 3 Prereq: Bachelor's degree. The intersection of issues in the history of philosophy, sociology and psychology of science and their application to and impact on science teaching and learning. Science teacher education and science education research.

C 1548 Foundations of Reading and Language Arts (3-0) Cr 3 SS Prereq: Teaching license. Analyzing discussing and researching the theory and practice of current literacy issues.

C 1554 Reading and Responding to Children's Literature (3-0) Cr 3 Prereq: Teaching license. Research and discussion of issues surrounding the use of current children's literature in the classroom including censorship diversity and literature selection.

C 1555 Integrating Technology into the Reading and Language Arts Curriculum (Dual listed with 556) (2-0) Cr 3 S Prereq: Teaching license. Integrating technology into the curriculum. Use and evaluation of reading and language arts software for elementary classrooms.

C 1573 Computer Applications in Science Education (3-0) Cr 3 Prereq: 510 Principles and procedures for program review assessment, and analysis of media technology programs in education and corporate settings.

C 1586 Supervised Tutoring in Reading and Language Arts (Dual listed with 556) (3-0) Cr 3 Att F offered odd numbered years Prereq: Secondary teaching experience. Methodology for identifying analysis and correction of forms of discrimination in standardized tests and misconceptions of mathematics. Particular emphasis on teaching interdisciplinary concerns use of technology uses and modifications of resources materials and current trends.

C 1588 Special Topics Credit 1 to 3 Prereq: 9 graduate credits in education.

A Curriculum
B Instructional Technology
C Science Education
D Secondary Education
E Environmental Education
F Multicultural Education
G Mathematics Education
Complements work in other areas of specialization in education.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
HP C 581 Philosophy of Education (3:0) Cr. 3 Prereq Graduate classification The bases of American educational theory and practice. Philosophical analysis of the viewpoints on education of selected individuals and groups.

HP C 584 Classics of Educational Philosophy (3:0) Cr. 3 Prereq Graduate classification Intensive study of influential statements of educational purpose organization, curriculum, and problems in the development of Western education.

HP C 585 Comparative Education Traditions (3:0) Cr. 3 Prereq Graduate classification Analysis of the cultural traditions of education outside the United States. Emphasis is given to an examination of the principles upon which selected educational systems have been built. Special attention is given to non-European traditions.

HP C 586 Comparative Education Global and National Systems (3:0) Cr. 3 Prereq Graduate classification Examination of global patterns, ideologies, and reform movements in education contrasting policies and practices in different cultural and geographic contexts. The role of multilateral aid and credit agencies in influencing the development and provision of schooling. Consideration of principles and methods of comparative analysis of education systems.

HP C 588 History of American Education (3:0) Cr. 3 Prereq Graduate classification Historical analysis of selective educational policies such as equal educational opportunity, governance, discipline, and teacher education. Biographies, school records, and government reports are examined. Antecedents to current issues are stressed.

HP C 590 Special Topics Cr. 1 to 5 Prereq 9 credits in education
A History of Education
B Philosophy of Education
C Comparative Education

HP C 591 Supervised Field Experience Cr. 1 to 6 Prereq 9 graduate credits in special area. Supervised on the job field experience in special areas.

HP C 593 Workshops Cr. 1 to 5 Prereq 9 credits in education

HP C 599 Creative Component Cr. 1 to 3

Courses for Graduate Students
HP C 602 Social and Philosophical Issues in Education (3:0) Cr. 3 each term taken maximum of 6 Prereq Graduate classification A study in depth of selected educational issues, movements, or problems in American education.

HP C 615 Seminar (1 to 3) Cr. 1 to 3
A History of Education
B Philosophy of Education
C Comparative Education

HP C 690 Advanced Special Topics Cr. 1 to 3

HP C 699 Research Cr arr

Courses for Graduate Students
HP C 603 Advanced Instructional Systems Design (3:0) Cr. 3 Prereq 503 Exploration of aspects of the instructional design process including projective practice, iteration, and the development and evaluation of instructional systems.

HP C 610 Technology in Teacher Education (2:0) Cr. 2 or 3 Prereq 505 Research on using technology in teacher education programs. Application, evaluation, and field component involving collaboration with various organizations.

HP C 611 Philosophical Foundations of Instructional Technology (3:0) Cr. 3 Prereq 12 graduate credits in instruction. Exploration of the philosophical underpinnings that serve as foundations for research and practice in instructional technology. Includes works in the positivist and postpositivist interpretation.
Sp Ed 339 Collaborative Partnerships in Special Education (3.0) Cr 1 Pr Ed 384 Concurrent enrollment in 339 Study of collaborative partnerships used in education of students with mild/moderate disabilities including emotional needs of students and issues basic theoretical and practical approaches with educational alternatives implications of state and federal statutes
Sp Ed 355 Classroom Assessment of Diverse Learners in the Primary Grades (2-0) Cr 2 S Pr Ed 344 Concurrent enrollment in 355 C 1433 439 45614681 Examination and application of strategies for determining special education needs planning and evaluating instructional programs and monitoring student progress
Sp Ed 365 Classroom Assessment for Special Education (4-0) Cr 4 S Pr Ed 330 Formal and informal diagnostic instruments Determination of special education needs Planning adaptation and evaluation of instructional programs for students with mild disabilities
Sp Ed 368 Issues in Literacy for Diverse Learners in the Primary Grades (1-0) Cr 1 F Pr Ed 344 Concurrent enrollment in C 1347 4681 Federal and state law Servicing individual models Issues related to providing literacy instruction that meets the needs of diverse learners in inclusive primary settings
Sp Ed 419 Supervised StudentTeaching Cr var FS Pr Ed 344 Full admission to teacher education cohort in elementary education for students in inclusive primary grade classrooms
Sp Ed 418 Supervised StudentTeaching Cr var FS Pr Ed 344 Full admission to teacher education cohort in elementary education for students in inclusive primary grade classrooms
Sp Ed 439 Methods of Multicultural Instruction (3-0) Cr 3 S Pr Ed 344 Concurrent enrollment in 345 456 Instructional strategies techniques in academic areas and materials for individual instruction and classroom management for elementary students with mild disabilities
Sp Ed 455 Instructional Methods for Diverse Learners in the Primary Grades (2-0) Cr 2 S Pr Ed 344 Concurrent enrollment in 355 C 1433 439 45614681 Instructional strategies techniques in academic areas that support the learning of students with diverse learning needs Emphasis on accommodations modifications and alternative teaching strategies to meet individual student needs
Sp Ed 532 Multicultural Strategies for Elementary and Secondary Schools (3-0) Cr 3 S Pr Ed 344 Team teaching Emphasis on teaching methods appropriate for the multicultural classroom
Sp Ed 533 Multicultural Strategies for Secondary Schools (2-0) Cr 3 F Pr Ed 344 Concurrent enrollment in 532 Materials for individualized instruction and behavior management for students with mild disabilities
Sp Ed 541 Training Strategies for Learning Disabilities (2-0) Cr 2 F Pr Ed 344 Concurrent enrollment in 542 Strategies for learning disabilities
Sp Ed 545 Case Work Cr 1 to 5 Pr Ed 344 Concurrent enrollment in 540 Pr Ed 344 Concurrent enrollment in 542 Emphasis on special areas of learning needs for students with mild disabilities
Sp Ed 550 Career Education and Transition for Youth with Learning and Behavior Disabilities (2-0) Cr 2 Pr Ed 344 Concurrent enrollment in 550 Pr Ed 344 Concurrent enrollment in 550 Application of learning strategies and materials in an integrated setting
Sp Ed 560 Classroom Management (3-0) Cr 3 Pr Ed 344 Concurrent enrollment in 560 Pr Ed 344 Concurrent enrollment in 560 Class management strategies Emphasis on practical use of techniques with students in regular and special education classrooms
Sp Ed 564 Consultation Collaboration Methods in Special Education (2-0) Cr 2 Pr Ed 344 Concurrent enrollment in 564 Consultation Collaboration Methods in special education Emphasis on collaborative problem solving techniques for professionals with diverse expertise and responsibilities
Sp Ed 566 Role of the Consultant (1-0) Cr 1 Pr Ed 344 Emphasis on role of the educational consultant in collaborative problem solving for students with mild disabilities
Sp Ed 567 Principles of Corrective Mathematics for Secondary Schools (Same as C 167) See Curriculum and Instruction
Sp Ed 590 Special Topics Cr 1 to 5 Pr Ed 344 15 credits in education permission of department head
Sp Ed 592 Supervised Field Experience (2-0) Cr 1 to 6 Pr Ed 344 15 credits in special area admission to the graduate program in special education admission to the graduate program in special education
Sp Ed 593 Workshop Cr 1 to 5 Pr Ed 344 15 credits in education
Sp Ed 599 Creative Component Cr 1 to 5 Pr Ed 344 15 credits in education

Courses for Graduate Students
Sp Ed 615 Seminar (2-0) Cr 1 Pr Ed 344 15 credits in education Selected topics special education presentation discussion and analysis of published research and student or faculty research projects
Sp Ed 699 Research Cr 1 to 5 Pr Ed 344 15 credits in education

Design Studies (Interdepartmental Undergraduate Program)

Kate Schwennsen Program Coordinator

The Design Studies program brings together courses that deal with the integrated study of the conceptualization production visible form uses and history of artifacts building and environments as well as the common qualities and connections among the design fields Students in any college may elect to take a minor in Design Studies

Minor

The undergraduate minor in Design Studies is constructed to facilitate design awareness among interested students and to provide a vehicle for interdisciplinary study within the College of Design Students seeking a Design Studies minor complete fifteen credits including three credits of history selected from College of Design course offerings and twelve additional credits selected from College of
Sp Ed 339 Collaborative Partnerships in Special Education (3:0) Cr 3 F Prereq Concurrent enrollment in 330 Study of collaborative partnerships used in education of students with mild/moderate disabilities including emotional needs of children and youth and work with families. Examination of relationships between general and special education teachers, parents, and other education professionals and agencies.

Sp Ed 355 Classroom Assessment of Diverse Learners in the Primary Grades (2:0) Cr 2 S Prereq Concurrent enrollment in 355 C 433 438 439 4680 4682 Examination and application of strategies for determining special educational needs planning and evaluating instructional programs and monitoring student progress.


Sp Ed 368 Issues in Literacy for Diverse Learners in the Primary Grades (1:0) Cr 1 F Prereq Concurrent enrollment in C 365 4690. Examines the needs of diverse learners in inclusive settings.

Sp Ed 415 Supervised Student Teaching Var FS Prereq Full admission to teacher education senior classification 355 455 Reservation required. Student teaching experience in inclusive primary grade classrooms.

Sp Ed 418 Supervised Student Teaching Var FS Prereq Full admission to teacher education senior classification student in elementary education section 330 365 436 439 457 C 280 478 Reservation required.

Sp Ed 439 Methods of Multicultural Instruction (3:0) Cr 3 S Prereq C 245 Concurrent enrollment in 365 459. Instructional strategies and techniques. Dilemmas in academic areas and materials for individual instruction and classroom management for elementary students with mild disabilities.

Sp Ed 455 Instructional Methods for Diverse Learners in the Primary Grades (2:0) Cr 2 S Prereq Concurrent enrollment in 355 C 433 438 439 4680 4682 Examination and application of strategies and techniques in academic areas that support the learning of students with diverse learning needs. Focuses on accommodations, modifications, and alternative teaching strategies to meet individual student needs.

Sp Ed 457 Teaching Exceptional Learners in the Regular Classroom (3:0) Cr 3 FS Prereq Concurrent enrollment 365 436. Observation and involvement with students with mild disabilities in a multicultural classroom setting. Offered in the satisfactory fail grading basis only.

Sp Ed 490 Independent Study Cr 1 to 5 Prereq 12 credits in elementary education permission of department head.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Sp Ed 503 Introduction to Behavior Disorders (1:0) Cr 1 Prereq Teaching license taken concurrently with 504 and 505. Characteristics, identification procedures and patterns of service delivery and exemplary education programs and concerns about management of students with behavior disorders.

Sp Ed 504 Introduction to Learning Disabilities (1:0) Cr 1 Prereq Teaching license taken concurrently with 503 and 505. Conceptualizations of characteristics of learning disabilities as well as etologies of learning problems.

Sp Ed 505 Introduction to Multicultural Instruction (1:0) Cr 1 Prereq Teaching license taken concurrently with 503 504. Historical development of education of diverse learners and specific strategies and issues in academic areas and materials for individual instruction and classroom management.

Sp Ed 512 Educational Interventions for Children and Youth with Behavior Disorders (2:0) Cr 2 Prereq Teaching license concurrent enrollment in 513 or 514. Interventions to meet the educational needs of children and youth with behavior disorders in the school setting. Adapting educational materials and plans coordination of school and community.

Sp Ed 513 Educational Interventions for Children and Youth with Behavior Disorders in the Elementary Schools (1:0) Cr 1 Prereq Teaching license concurrent enrollment in 512 Application of the basic principles of educational intervention approaches to elementary school children who are identified as behaviorally disabled.

Sp Ed 514 Educational Interventions for Youth with Behavior Disorders in the Secondary School (1:0) Cr 1 Prereq Teaching license concurrent enrollment in 512 Application of the basic principles of educational intervention approaches to secondary school youth who are identified as behaviorally disabled.

Sp Ed 515 Curriculum Based Assessment of Children and Youth with Learning and Behavioral Disorders (3:0) Cr 3 Prereq Teaching license Individual educational diagnostic procedures and techniques.

Sp Ed 517 Seminar in Educational Interventions and Management of Children and Youth with Disabilities (2:0) Cr 2 Prereq 512 or 531 or 541. Critical review of recent literature in education and psychosocial sciences as applied to education of students with mild to severe disabilities.

Sp Ed 531 Methods for Teaching Multicultural Classrooms (2:0) Cr 2 Prereq 505 concurrent enrollment in 532 or 533. Remedial instructional models and materials for individualized instruction and behavior management for students with mild disabilities.

Sp Ed 532 Multicultural Strategies for Elementary Teaching (1:0) Cr 1 Prereq Concurrent enrollment in 531 Application of teaching/learning strategies appropriate at the elementary level.

Sp Ed 533 Multicultural Strategies for Secondary Teaching (1:0) Cr 1 Prereq Concurrent enrollment in 531. Application of teaching/learning strategies appropriate at the secondary level.

Sp Ed 541 Teaching Strategies for Learning Disabilities (2:0) Cr 2 Alt F offered even numbered years. Prereq 504 concurrent enrollment in 542 or 543 Analysis of instructional techniques and materials, remedying specific learning disabilities.

Sp Ed 542 Learning Disabilities Strategies for Elementary Teaching (3:0) Cr 1 Alt F offered odd numbered years. Prereq Concurrent enrollment in 541. Application of instructional strategies and materials modification for elementary school students.

Sp Ed 543 Learning Disabilities Strategies for Secondary Teaching (1:0) Cr 1 Alt F offered even numbered years. Prereq Concurrent enrollment in 541. Application of instructional strategies and materials modification for secondary school students.

Sp Ed 553 Reading for Adolescents with Mild Disabilities (Same as C 553) (3:0) Cr 3 Prereq Teaching license Instructional strategies for enhancing the comprehension and retention of students with mild disabilities in conjunction with content area reading material.

Sp Ed 555 Career Education and Transition for Youth with Learning and Behavior Disabilities (2:0) Cr 2 Prereq Teaching license Examination of the academic, personal, social, employability and daily living skills needed for a satisfactory adult life. Exploration of curriculum programs and services to meet those needs.

Sp Ed 560 Classroom Management (3:0) Cr 3 Prereq Teaching license Current classroom management techniques. Emphasis on practical use of techniques with students in regular and special education classrooms.


Sp Ed 565 Role of the Consultant (1:0) Cr 1 Prereq 564. Role of the educational consultant in different settings (e.g., department, area education agency, school district, private). Examines roles in relationship to models (mental health, collaborative organization).

Sp Ed 567 Principles of Corrective Mathematics for Secondary Teachers (Same as C 677) See Curriculum and Instruction.

Sp Ed 590 Special Topics Cr 1 to 5 Prereq 15 credits in education permission of department head.

Sp Ed 591 Supervised Field Experience (2:0 to 12) Cr 1 to 6 FS SS Prereq 15 graduate credits in special area admission to the graduate program in special education. Supervised on-the-job field experience in special areas:

A Learning Disabilities: Elementary
B Learning Disabilities: Secondary
C Behavioral Disorders: Mild Elementary
D Behavioral Disorders: Mild Secondary
E Behavioral Disorders: Moderate to Severe Elementary
F Behavioral Disorders: Moderate to Severe Secondary
G Multicultural: Elementary
H Multicultural: Secondary
I Multicultural: SCI Elementary
J Multicultural: SCI Secondary

Sp Ed 593 Workshop Cr 1 to 5 Prereq 15 credits in education.

Sp Ed 599 Creative Component Cr 1 to 5 Prereq 15 credits in education.

Courses for Graduate Students

Sp Ed 615 Seminar (2:0) Cr 1 Prereq 15 credits in education. Selected topics in special education. Presentation, discussion and analysis of published research and student or faculty research projects.

Sp Ed 699 Research Cr arr Prereq 15 credits in education.

Design Studies

(Interdepartmental Undergraduate Program)

Kate Schwennsen, Program Coordinator

The Design Studies program brings together courses that deal with the integrated study of the conceptualization of production visible forms and history of objects, buildings, and environments as well as the common qualities and connections among the design fields. Students in any college may elect to take a minor in Design Studies.

Minor

The undergraduate minor in Design Studies is constructed to facilitate design awareness among interested students and to provide a vehicle for interdisciplinary study within the College of Design.

Students seeking a Design Studies minor complete fifteen credits including three credits of history selected from College of Design course offerings and twelve additional credits selected from College of...
Design course offerings. Courses from Architecture and Design, Community and Regional Planning, Landscape Architecture, and Design Studies may be taken to meet the requirements of the minor. At least six of the fifteen credits must be taken at Iowa State University in courses numbered 300 or above. At least nine of the fifteen credits must not be used to meet any other college or university requirements except the credit requirement for graduation.

Students enrolled in the College of Design may not use courses in their major to satisfy this minor.

Additional information is available in the Student Programs and Services Office, 297 College of Design.

Graduate Study

Courses open for nonmajor graduate credit 385 380 392 383 385 394 467 471 481 487 488 495 496 498

Courses Primary for Undergraduate Students

Dan S 110 Design Exchange Seminar I (0-2) Cr 1 F Prereq: Member of Design Exchange Learning Community. Orientation to the College of Design Introduction to the design disciplines and studio pedagogy.

Dan S 111 Design Exchange Seminar II (0-2) Cr 1 S Prereq: Member of the Design Exchange Learning Community. Development and clarification of career and academic plans.

Dan S 181 History of Design. Same as Art H 181 (3-0) Cr 3 FSS Studies of issues and artifacts relating to the traditional and changing role of the creators and to western culture.

Dan S 221 History of Western Architecture I. Same as Arch 221. See Architecture.

Dan S 222 History of Western Architecture II. Same as Arch 222. See Architecture.

Dan S 270 Forces Shaping Our Metropolitan Environment. Same as C R P 270. See Community and Regional Planning.

Dan S 273 Landscape Architectural History Prehistory to 1800. Same as L A 273. See Landscape Architecture.

Dan S 274 The Social and Behavioral Landscape. Same as L A 274. See Landscape Architecture.

Dan S 280 History of Art I. Same as Art H 280. See Art History.

Dan S 281 History of Art II. Same as Art H 281. See Art History.

Dan S 291 World Cities and Globalization. Same as C R P 291. See Community and Regional Planning.

Dan S 292 Dimensions of Art and Design. Same as Art 292. See Art and Design.

Dan S 293 Environmental Planning. Same as C R P 293. See Community and Regional Planning.

Dan S 301 Study Abroad Preparation Seminar (0-1) Cr 1 each time taken up to a maximum of 4 credits. Prereq: Permission of instructor. Cultural introduction to host country introduction to faculty sponsor and program of study the particulars of traveling and living abroad and financial and logistical preparations. Guest lectures. Required of all students planning to participate in a College of Design study abroad program for 8 or more credits.

Dan S 320 Urban Form. Same as C R P 320. See Community and Regional Planning.

Dan S 351 Solar Home Design. Same as Arch 351. See Architecture.

Dan S 365 Technology and the City. Same as C R P 365. See Community and Regional Planning. Nonmajor graduate credit.

Dan S 371 Landscape Architectural History 1800 to Present. Same as L A 371. See Landscape Architecture.


Dan S 382 Art and Architecture of Asia. Dual listed with 582 same as Art H 382. See Art History. Nonmajor graduate credit.

Dan S 383 Greek and Roman Art. Dual listed with 583 same as Art H 383. See Art History. Nonmajor graduate credit.

Dan S 385 Renaissance Art. Dual listed with 585 same as Art H 385. See Art History. Nonmajor graduate credit.

Dan S 394 Women in Art. Dual listed with 594 same as Art H 394. See Art History. Nonmajor graduate credit.

Dan S 415 Housing. Dual listed with 515 same as C R P 415. See Community and Regional Planning.

Dan S 417 Urban Revitalization. Dual listed with 517 same as C R P 417. See Community and Regional Planning.

Dan S 425 Growth Management. Dual listed with 515 same as C R P 415. See Community and Regional Planning.

Dan S 429 Planning in Developing Countries. Dual listed with 519 same as C R P 429. See Community and Regional Planning.

Dan S 442 Site Analysis and Development Design. Dual listed with 542 same as C R P 442. See Community and Regional Planning.

Dan S 446 Interdisciplinary Design Studio. Dual listed with 546 same as D S 446. 12 to 20 Cr 4 to 6 FSS Prereq. Junior classification in a curriculum in the College of Design and permission of instructor. Advanced interdisciplinary design projects.

Dan S 443 Housing Environments for Elderly and Disabled Persons. Same as HD FS 463. See Human Development and Family Studies.

Dan S 467 Preservation, Restoration, and Rehabilitation. Same as Arch 467. See Architecture. Nonmajor graduate credit.

Dan S 471 Design for All People. Same as Arch 471. See Architecture. Nonmajor graduate credit.

Dan S 478 Topical Studies in Landscape Architecture. Dual listed with 578 same as L A 478. See Landscape Architecture.

Dan S 481 Art and Architecture of India. Dual listed with 581 same as Art H 481. See Art History. Nonmajor graduate credit.

Dan S 484 Sustainable Communities. Dual listed with 584 same as C R P 484. See Community and Regional Planning.

Dan S 487 Nineteenth Century Art. Dual listed with 587 same as Art H 487. See Art History. Nonmajor graduate credit.

Dan S 488 Modernism and Modern Art. 1880-1945. Dual listed with 588 same as Art H 488. See Art History. Nonmajor graduate credit.

Dan S 491 Environmental Law. Dual listed with 591 same as C R P 491. See Community and Regional Planning.

Dan S 495 Art and Theory Since 1945. Dual listed with 595 same as Art H 495. See Art History. Nonmajor graduate credit.

Dan S 496 History of Photography. Dual listed with 596 same as Art H 496. See Art History. Nonmajor graduate credit.

Dan S 498 Selected Topics in Art History. Dual listed with 598 same as Art H 498. See Art History. Nonmajor graduate credit.

Dan S 517 Urban Revitalization. Dual listed with 417 same as C R P 517. See Community and Regional Planning.

Dan S 525 Growth Management. Dual listed with 425 same as C R P 525. See Community and Regional Planning.

Dan S 528 Topical Studies in History Theory and Criticism of Architecture. Same as Arch 528. See Architecture.

Dan S 529 Planning in Developing Countries. Dual listed with 429 same as C R P 529. See Community and Regional Planning.

Dan S 542 Site Analysis and Development Design. Dual listed with 442 same as C R P 442. See Community and Regional Planning.

Dan S 546 Interdisciplinary Design Studio. Dual listed with 446 same as D S 446. 12 to 20 Cr 4 to 6 FSS Prereq. Junior classification in a curriculum in the College of Design and permission of instructor. Advanced interdisciplinary design projects.

Dan S 558 Appropriate Technologies for Architecture. Same as Arch 558. See Architecture.

Dan S 566 Housing for Specific Groups. Same as Arch 566. See Architecture.

Dan S 575 Contemporary Urban Design Theory. Same as Arch 575. See Architecture.

Dan S 577 Social Impact of the Built Environment. Same as Arch 577. See Architecture.

Dan S 578 Topical Studies in Landscape Architecture. Dual listed with 478 same as L A 578. See Landscape Architecture.

Dan S 580 North American Indian Art. Dual listed with 380 same as Art H 580. See Art History.

Dan S 581 Art and Architecture of India. Dual listed with 481 same as Art H 581. See Art History.

Dan S 582 Art and Architecture of Asia. Dual listed with 382 same as Art H 582. See Art History.

Dan S 583 Greek and Roman Art. Dual listed with 383 same as Art H 583. See Art History.

Dan S 584 Sustainable Communities. Dual listed with 484 same as C R P 584. See Community and Regional Planning.

Dan S 585 Renaissance Art. Dual listed with 385 same as Art H 585. See Art History.

Dan S 587 Nineteenth Century Art. Dual listed with 487 same as Art H 587. See Art History.

Dan S 588 Modernism and Modern Art. 1880-1945. Dual listed with 488 same as Art H 588. See Art History.

Dan S 591 Environmental Law. Dual listed with 491 same as C R P 591. See Community and Regional Planning.

Dan S 594 Women in Art. Dual listed with 394 same as Art H 594. See Art History.

Dan S 595 Art and Theory Since 1945. Dual listed with 495 same as Art H 595. See Art History.

Dan S 596 History of Photography. Dual listed with 496 same as Art H 596. See Art History.

Dan S 598 Selected Topics in Art History. Dual listed with 498 same as Art H 598. See Art History.

Ecology and Evolutionary Biology

www.eeb.iastate.edu

(Interdepartmental Graduate Major)

The ecology and evolutionary biology interdisciplinary major is offered through a faculty housed in seven departments of the university. Faculty from the departments of Agronomy, Ecology Evolution, and Organismal Biology, Ecology, Geology, Atmospheric Sciences, Mathematics, Natural Resource Ecology and Management, Plant Pathology, and Statistics cooperate to offer courses and research opportunities leading to the M.S. and Ph.D. degrees with a major in ecology and evolutionary biology.

Applicants should have completed an undergraduate or master of science or arts degree in one of the biological, physical, or mathematical sciences or should have equivalent preparation. Students with degrees in the physical or mathematical sciences should have taken undergraduate courses in both basic ecology and evolution.

Students majoring in ecology and evolutionary biology may prepare themselves for careers focused on basic or applied ecology and evolutionary biology in a variety of settings including academic, government, industry, and private organizations. For example, graduates often work in wetland restoration and management, conservation of biodiversity and ecosystem systems, natural resource and wildlife management, environmental analysis and management, forestry, and agriculture. Graduates have a broad understanding of ecology and evolutionary biology, have had experiences designing and conducting research, writing grant proposals and communicating effectively with scientific colleagues at meetings and by writing publications.

The ecology and evolutionary biology major is designed for students interested in the study of mechanisms controlling the composition, structure, and functional processes of ecosystems and the mechanisms that regulate the pattern and rate of evolutionary change within and among species. Cooperating departments offer courses in physiological population community ecosystem restoration and landscape ecology aquatic and wetland ecology forest ecology agroecology wildlife and resource management. Students study ecosystem and molecular genetics and evolution. In addition, interdisciplinary courses in ecology and evolution are offered, including a special topics course, a seminar, and an extended field trip.

Information on application procedures, research interests of the faculty and specific requirements of the major can be obtained from the chair of the supervisory committee.

Courses for Graduate Students

EEB 505: Ecological Field Trip (0-2) Credit 2 each time taken, Prereg. Graduate classification required. Annual field trip to a region of North America to study the major terrestrial and aquatic ecosystem types of the region. Report required.

EEB 590: Special Topics (1-3) Credit 1 to 3 each time taken, Prereg. Graduate classification and permission of instructor.

EEB 699: Seminar (1-9) Credit 1 each time taken, Prereg. Graduate classification. Reports and discussion of recent research and literature.

EEB 699: Research

Courses Offered by the Organization for Tropical Studies

ISU graduate students can take courses through the widely recognized Organization for Tropical Studies (OTS) at field sites in Central and South America. Students register at ISU and upon successful completion receive credit from Duke University which transfers as either OTS 510 or OTS 515. For further information about OTS courses see www.ots.duke.edu or inquire at 201 Bassay.

OTS 510 Tropical Biology. An Ecological Approach. Cr. 8. This course is designed for students in the early stages of graduate study in biology or a related field with the goal of training graduate students in research methods by providing intensive field experience in diverse tropical ecosystems.

OTS 515 Topics in Tropical Biology. Cr. 1-6. This course is designated for students enrolled in graduate course offerings through OTS (excluding OTS 510). Examples of graduate courses offered by OTS include Tropical Plant Systematics, Tropical Ecology and Conservation, and Tropical Agroecology.

(FOR information regarding undergraduate courses offered by OTS see Index Organization for Tropical Studies)

Economics

www.econ.iastate.edu

J Anne Hallam, Chair of Department

Distinguished Professors Allan Baumel Harl Huffman Johnson

University Professors Lisan Wiesner


Professors (Adjunct) Hansen

Professors (Collaborators) Boal

Distinguished Professors (Emeritus) Fox, Fuller Ladd Luckett

Professors (Emeritus) Adams Adams Amene Foden Gratza Howell Julius Kolmer Meyer Pausen Prescott Scott Skadberg Starfield Stephenson Stockeberg

Associate Professors Falk Gallagher Krieder Lawrence Lance Quarmback Schroeter Voei Wang

Associate Professors (Adjunct) Alexander

Associate Professors (Emeritus) Oakey

Assistant Professors Bhattacharya Bunzel Doyle Hueth Kikenyi Marcioul Singen Weininger Zhao

Assistant Professors (Adjunct) Langmer Luvega Wohlgemuth

Undergraduate Study

The department offers work for the degree bachelor of science with a major in agricultural business, and for the degree bachelor of science with a major in economics. For further discussion of programs in agricultural business see the statement below under College of Agriculture. For programs in economics see the statement below under College of Liberal Arts and Sciences. Visit our website at www.econ.iastate.edu.

Graduates of the Department of Economics have unique skills that distinguish them from other graduates. They have the ability to think and reason clearly and can address complex issues using tools and decision making models of economics, mathematics, statistics, as well as concepts from the biological physical, and social sciences. Graduates develop human relations skills that are essential in the work place and the community. They are able to communicate economic and business concepts to other professionals, collective organizations, and the general public using a variety of means.

Graduates understand the interaction of technology, human activity, and the environment. They are able to apply concepts associated with making optimal choices among economic alternatives. Graduates are prepared for graduate work in law, economics, and business, as well as the world of work having learned tools of critical analysis and skills essential to getting and keeping meaningful employment.

College of Agriculture

For the undergraduate curriculum in agricultural business see College of Agriculture Currucula.

The agricultural business curriculum prepares students for advanced studies and for careers in agricultural business, management, in agricultural extension, and in government service. A major in agricultural economics requires a minor in economics. Students do not need to have an undergraduate major in economics or agricultural economics in order to

College of Liberal Arts and Sciences

Candidates for the bachelor of science degree with a major in economics must fulfill the requirements established by the College of Liberal Arts and Sciences. (For details of undergraduate curriculum see College of Liberal Arts and Sciences.)

The economics curriculum prepares students for advanced studies professional degrees such as law and business administration, and for careers in finance, business, and economic research management. Sales and marketing insurance risks real estate labor relations international development, and government service.

Students majoring in economics are required to take either Math 165 and 166 or Math 160 and 161 within the mathematical and natural sciences group. Students who plan to take postgraduate work in economics or who want a more quantitative program should definitely take Math 165 and 166 (or the above sequence). Additional requirements are Statistics 226 and 326 and Computer Science 103. Eighty credits in economics are required for the bachelor of science degree. These 28 must include Econ 101, 102, 301, 302, 472, and 492 in addition one course is required in economics in the department. Advanced courses are defined as having either 301 or 302 (or both) as a prerequisite. Economics majors must maintain a C average in 101, 102, 301, and 302 with no grade lower than a C.

An optional Business Economics track is available for majors who intend to enter the business world after graduation. Requirements are the same as for the regular track except that students take Econ 431 (Managerial Economics) as their advanced course they may substitute Econ 353 (Money & Banking) or a financial economics course for Econ 302 substitute Eng 302 (Business Communication) for Eng 314 and must take six credits of business courses from an approved list. Students taking the Business Economics track are strongly encouraged to complete the College of Business minor (see the Curriculum in Business section).

Optimal progress for an economics major would be to complete the prerequisites sequence (101 and 102) in the freshman year. Math 150 and 156 (or the Math 165 166 sequence) should also be completed in the freshman year followed by the intermediate sequence Econ 301 and 302 in the sophomore year. Computer Science 103 and Statistics 226 and 326 are recommended in the sophomore year. Required advanced courses and electives should be taken in the junior and senior years. A minor in economics is offered. Courses to be included in the minimum of 15 hours are Econ 101, 102, 301, and 302.

English Proficiency Requirement: The major in economics requires a grade of C or better in each of the following English courses: 104, 105 (or 105H), and 314.

The department participates in the interdisciplinary programs in international studies and women's studies.

Graduate Study

The department offers work toward the degrees master of science and doctor of philosophy with majors in economics and agricultural economics. The department also offers minors to students with majors in other departments.

Students do not need to have an undergraduate major in economics or agricultural economics in order to

Econ 110 Orientation in Economics/Agricultural Business (1.0) Cr. F Orientation course for freshmen and new transfer students in agricultural business and economics.

Econ 235 Introduction to Agricultural Markets (3.0) Cr. 3 FS Prereq: 101 Basic concepts and economic principles related to markets for agricultural inputs and products. Overview of current marketing problems faced by farms and agricultural businesses. A framework for understanding the complex markets food marketing channels. Food quality and food safety and the role of agricultural economists in the distribution of agricultural commodities. The implications of consumer preferences at the farm level. Introduction to hedging futures and other risk management tools.

Econ 292 Career Seminar (1.0) Cr. F Prereq: Introduction to agriculture or agricultural economics. Career opportunities in various industries and government institutions with an emphasis on agricultural economics. Required training and skills needed to perform successfully in different types of careers. Factors required to market and obtain employment in other states or after graduation. Personal resumes reviewing and letter writing. Offered on a satisfactory/unsatisfactory basis only.

Econ 298 Cooperative Education Cr. R FS Prereq: Per 101 Permission of the departmental cooperative education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.


Econ 308 Agent Based Computational Economics (3.0) Cr. 3 S Prereq: 301, 302. Computational study of economics as evolving systems of autonomous interacting agents. Evolution of complex agents and complex adaptive systems theory for modeling the adaptation learning and co-evolution of economic agents in decentralized market economies. Evolution of experimental economics virtual market environments, distributed artificial intelligence and artificial life. Modeling agent-based computational laboratories for the experimental study of market protocols and agent learning processes. Illustrative economic applications (e.g., financial markets, labor markets, agricultural markets, and electronic auction markets). Constructing automated Internet markets. Use of tools and software. Use of nonmajor graduate credit.


Econ 320 Labor Economics (3.0) Cr. 3 S Prereq: 301 Survey of contemporary labor market problems and policy toward labor. Economic analysis of topics such as labor supply and demand, work incentive factors, consumer behavior, family labor programs, education and training, mobility minimum wages.
Econ 353 Money, Banking and Financial Institutions (3) Cr 3 F S SS Prereq 101 102 Theoretical and applied analysis of money banking and financial markets money interest rates and portfolio choice the banking industry in transition the money supply process the Federal Reserve System and the conduct of monetary policy macro implications of monetary policy international finance

Econ 355 International Economics (4) Cr 4 F Prereq 101 102 Explanations of causes of international trade and finance and the effects of future capital flows and employment patterns Analyses of government policies towards trade such as tariffs quotas and free trade agreements Theory of balance of payments and exchange rate determination and the role of government policies Examine international monetary arrangements Credit for either 355 or 455 but not both may be applied to graduation Nonmajor graduate credit

Econ 370 Comparative Capitalism and Economic Transitions (3) Cr 3 F Prereq 101 102 Compares two organization and performance of variants of market capitalism including energizing government interventions and patterns of economic growth and income distribution analysis of planning incentives and enterprise behavior in variants of socialism study of comparative economic transformations of socialist economies including future capabilities and social market economies includes examination of the United States Europe Japan Russia and China

Econ 376 Rural Urban and Regional Economics (Same as C R P 376 I 3) Cr 3 F Prereq 101 Farm location with respect to regional resources transport scale economies externalities and policies Measures of local comparative advantage and specialization Spatial markets Population location considering jobs wages commuting and local amenities Business residential and farm land use and value Migration The product cycle and other theories of rural and urban development Market failures regulation firm recruiting local public goods and finance and development policies Nonmajor graduate credit

Econ 380 Environmental and Resource Economics (Same as Env 380 I 3) Cr 3 F Prereq 101 Natural resource availability use conservation and government policies Environmental quality and pollution control policies

Econ 385 Economic Development (3) Cr 3 S Prereq 101 102 Current problems of developing countries theories of economic development agriculture and economic development measure ment and prediction of economic performance of developing countries policies and reforms required for satisfying basic needs of Third World countries interrelationships between industrialized countries and the developing countries including foreign aid Nonmajor graduate credit

Econ 397 Internship Cr 2 each time taken maximum of 4 F S Prereg Permission of instructor and classification in agricultural business or economics Students complete a research report based on their internship or approved work experience that examines chosen topics in management marketing or finance Offered on a satisfactory/fail grading basis only

Econ 398 Cooperative Education Cr R F S SS Prereg Permission of the department cooperative education coordinator junior classification Required of all cooperative education students Students must register for this course prior to commencing each work period

Econ 401 Topics in Microeconomics (3) Cr 3 F Prereq 301 Stat 226 Advanced treatment of selected topics from one or more of the following areas household production models factor markets game theory and imperfect competition general equilibrium intertemporal choice asset markets income distribution externalities and public goods etc Nonmajor graduate credit

Econ 402 Topics in Macroeconomics (3) Cr 3 S Prereq 301 302 Stat 226 Advanced treatment of selected topics from one or more of the following areas business cycle theory growth theory fiscal and monetary policy coordination issues open economy macroeconomics and financial economics Nonmajor graduate credit

Econ 415 Economics of Imperfect Competition Antitrust and Regulated Industries (Dual listed with 515) I 3 Cr 3 S Prereq 301 Math 151 or 160 or 165 The economic and strategic analyses of monopoly and oligopoly predatory pricing cartels and price fixing entry barriers and entry deterrence vertical integration technological change and bid rigging and other anticompetitive practices The economic foundations of antitrust policy and industry regulation Nonmajor graduate credit

Econ 430 Advanced Farm Business Management (3) Cr 4 F Prereq 330 Effective use of strategic planning decision methods and computer assistance for solving farm problems Applications of economic and management theory to analyze farm business decisions using efficiency measures to assess current resource use and direct the farm business analysis planning and tax process Computers as aids in the decision process Nonmajor graduate credit

Econ 431 Managerial Economics (3) Cr 3 S Prereq 301 Topics including application of microeconomic theory of the firm and markets organizational incentives and efficiency pricing market structure and strategies role of information and decision making in business strategy Credit for either 431 or 432 but not both may be applied to graduation Nonmajor graduate credit

Econ 432 Agribusiness Management (3) Cr 3 F Prereq 330 An advanced topics course in agribusiness management Students study a variety of topics such as the optimal organization of the firm managing in different market structures game theory approaches to strategizing tax management strategies incentive structures in a farm setting instruments of the international variables of information network economics managerial decisions for internet oriented firms the economics of regulation and decision making under uncertainty Credit for either 431 or 432 but not both may be applied to graduation Nonmajor graduate credit

Econ 437 Applied Commodity Marketing and Risk Management (3) Cr 3 S Prereq 235 301 Stat 226 Applied commodity price analysis The purpose and performance of commodity markets Distinguishing features of agricultural commodities Hedging and spread trading and commodity spot forward futures and options markets Valuation theory Nonmajor graduate credit

Econ 451 Agricultural Law (3) Cr 4 F Prereg Senior classification The legal framework impinging upon decision making by farm firms and individuals real and personal property contracts secured transactions negotiable instruments debtor creditor relations bankruptcy organization of farm firms intergenerational property transfers trusts insurance liabilities environmental law federal and state regulatory powers Nonmajor graduate credit

Econ 452 Legal Issues in Agriculture (2) Cr 2 Prereg 101 Describes laws and regulations in agriculture Offered as demand warrants The legal framework impinging on decision making by individuals families and farms in agriculture ownership and transfer of real property commercial law including secured transactions sales and negotiable instruments bankruptcy income tax planning and management estate and business planning for the farm family civil liabilities water law environmental law government regulation of agriculture Nonmajor graduate credit

Econ 455 International Trade and Finance (4) Cr 4 S Prereq 301 Rigorous treatment of theories of international trade and its impact on domestic and world welfare and the distribution of income Theoretical analyses of government policies towards trade such as quotas tariffs and free trade areas Theory of exchange rate balance of payments determination and the role of government policy studies of efficiency of the international marketplace Examination of alternative international monetary arrangements Credit for either 355 or 455 but not both may be applied toward graduation Nonmajor graduate credit

Econ 460 Agricultural Food and Trade Policy (Dual listed with 560) I 3 Cr 3 S Prereq 301 or 501 Descriptions and analyses of food and agricultural policies and programs of the U.S. agriculture Explanation and economic analysis of government policies and programs to develop agriculture conserve agricultural resources address consumer food concerns stabilize farm prices and raise farm incomes The influence of macroeconomic policy world economy and international trade on U.S. agriculture Nonmajor graduate credit

Econ 466 Agricultural Finance (3) Cr 3 S Prereq 301 Stat 226 Fin 301 and Econ 353 recommended Financial analysis of agricultural businesses liquidity capital structure and growth of agricultural firms risk and return capital budgeting methods analysis of land investments leasing and costs of credit financial intermediation and major financial institutions for agriculture credit scoring loan pricing and asset liability management techniques by financial intermediaries public policies and agricultural credit markets Nonmajor graduate credit

Econ 470 Public Choice (Same as Pol S 470) I 3 Cr 3 Alt F offered 2003 Prereg 101 Application of economics to political science in the study of nonprofit decision making Behavior of bureaucrats electorate politics and voting Major factors that create action representative democracies direct democracies logrolling voter paradoxes game theory and terrorism Nonmajor graduate credit

Econ 472 Introductory Econometrics (4) Cr 4 FS Prereq 301 302 or 353 Stat 326 Introduction to the models and methods used to estimate relationships and test hypotheses in economic and social sciences Simple and multiple regression analysis stochastic regressors heteroskedasticity autocorrelation measurement error simultaneous equations Nonmajor graduate credit

Econ 480 Intermediate Environmental and Resource Economics (Dual listed with 580) I 3 Cr 3 Prereg 301 Theories of natural resource utilization and allocation Externalities public goods and environmental quality Planning natural resource use and environmental quality Methodologies for analyzing natural resource and environmental problems Nonmajor graduate credit

Econ 490 Independent Study Cr 1 to 5 each time taken Prereg Junior or senior classification 14 credits in economics Students in the College of Agriculture may use no more than 6 credits of Econ 480 toward the total of 128 credits required for graduation students in the College of Liberal Arts may not use more than 9 credits of Econ 480 toward graduation Offered on a satisfactory/fail grading basis only

H Honors

Econ 492 Graduating Senior Survey (1) Cr R FS Prereg Graduating senior Final preparation for graduation The final stages of job searching interviewing letter writing and resume preparation Outcomes assessment information from graduating seniors including opinion surveys instructor/advisor/ course evaluations exit interviews student accomplishment surveys and comprehensive skills examinations Departmental recognition of graduating seniors Life as an alumnus expectations and obligations Convocation and commencement information Offered on a satisfactory/fail grading basis only

Econ 493 Workshops Cr 1 to 3 each time taken No more than 6 credits may be applied toward graduation Prereg Permission of instructor Offered on a satisfactory/fail grading basis only
Econ 496 Economics Travel Course Cr 1 to 3 each time taken maximum of 6 Prereq: Sophomore status permission of instructor Tour and study of international agricultural and food economics markets institutions Locations and duration of tours will vary Limited enrollment

Econ 498 Cooperative Education Cr R FS SS Prereq: Permission of the department and appropriate education coordinator Senior classification Required of all cooperative education students Students must register for this course prior to commencing each work period

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Econ 500 Quantitative Methods in Economic Analysis I (4) Cr 4. F Prereq: 301 1 year of calculus Stat 401 and permission of the Instructor Graduate S fulfilling major requirements for the economics major This course covers introductory statistical techniques for economists focusing on applications in economic analysis topics covered include descriptive statistics sampling theory estimation and hypothesis testing in the analysis of economic data

Econ 501 Microeconomics (4-0) Cr 4 F Prereq: 301 credit or enrollment in 500 or equivalent background in calculus and statistics. The theory of the consumer firm and imperfect competition Welfare economics and selected topics in general equilibrium and uncertainty. This is a Master’s level course

Econ 502 Macroeconomics (4-0) Cr 4 F Prereq: 302 credit or enrollment in 500 or equivalent background in calculus and statistics. Advanced macroeconomics Topics include aggregate supply and demand models of consumption and investment money supply and demand inflation and disinflation monetary and fiscal policy and stabilization policy. This is a Master’s level course

Econ 515 Economics of Imperfect Competition Antitrust and Regulated Industries (Dual listed with 415 I) (3-0) Cr 3 Prereq: 360 Math 161 or 165 The economics of monopoly and oligopoly. Market structure and pricing cartel and credit pricing entry barriers and entry deterrence. Vertical integration. Technological change. Fidg andberg and antitrust practice. The economic foundations of antitrust policy and industry regulation

Econ 520 Labor Supply and Human Capital Formation (Dual listed with 430 I) (3-0) Cr 3 Prereq: 501 or 601 Labor supply theories. Human capital investment and labor market decisions. Applications of human capital theory to agricultural labor supply. The economics of immigration and education. This is a Master’s level course

Econ 521 Labor Markets (3-0) Cr 3 Prereq: 501 or 601 Analysis of labor demand and market determination of wages and employment. Analysis of distortions in labor markets due to non-competitive forces. Legislation and discrimination. Wage inequity compensation and work incentives. Compressing differentials. Microeconomic analysis of unemployment and job search

Econ 530 Advanced Farm Management (2-0) Cr 2 Prereq: 6 credits in economics Offered off campus as demand warrants Management techniques of planning implementation and control as applied to farm businesses Quantitative tools as applied to agricultural decision making. Accounting methods for control concepts and decision theory as used to manage agricultural enterprises Designed for master of agricultural program only

Econ 532 Business Economics (3) Cr 3 Prereq: 101 and enrollment in MBA or BAP program not for economics majors Applications of microeconomic theory and decision analysis. Demand analysis production and cost analysis. Forecasting. Pricing market structures and strategy. Capital investment analysis decision making under uncertainty government and business

Econ 533 Economic and Business Decision Tools (Same as Bus 533) (3) Cr 3 S Prereq: 532 Team taught by faculty in the Department of Economics and the College of Business this course focuses on applied economic and business tools decision making. The topics include Monte Carlo analysis with applications option pricing and insurance mechanism design portfolio analysis using existing standard spreadsheet software and add-ins. Dynamic programming tools for inventory management and financial decision-making. The use of artificial intelligence and financial performance evaluation using commercially available software

Econ 535 Agricultural Marketing (3) Cr 3 Prereq: 501 or 525 Analysis of agricultural marketing systems focusing on their structure pricing and coordination mechanisms (including futures markets) and performance. Government market intervention and regulation methods

Econ 536 Applied Agricultural Marketing (2) Cr 2 Prereq: 6 credits in economics Off campus. Offered as demand warrants. Market structure and performance in the food and agricultural sector. Vertical coordination systems and pricing systems in agriculture. Market price forecasting. Alternating marketing analysis and production for major agricultural commodities including the use of futures and options markets. Designed for master of agriculture program only


Econ 544 Public Economics I (3-0) Cr 3 Prereq: 501 or 601 Public goods and services. Fiscal policy. Market failure and policy response. Lindahl equilibrium. Voting and social choice. Aggregation and preferences non-manipulation of voting schemes

Econ 545 Public Economics II (3-0) Cr 3 Prereq: 501 or 601 Optimal taxation excess burden partial equilibrium. General equilibrium. Optimal social insurance. The social welfare function. The social insurance effects of taxation on labor supply and savings. The economics of the health sector

Econ 553 Applied Research in Monetary and Macroeconomics (3-0) Cr 3 Prereq: 502 or 571 Application of economic theory to the analysis of contemporary issues in macroeconomics. Monetary economics and financial economics. This is a Master’s level course

Econ 555 Issues in International Economics (3) Cr 3 Prereq: 502 or 501 or 502 Issues of international trade and finance. Emphasis on current policy issues in international economics. This is a Master’s level course

Econ 560 Agricultural Food and Trade Policy (Dual listed with 430 I) (3-0) Cr 3 Prereq: 101 Or 501 Description and analysis of economic problems of U.S. agriculture. Description and analysis of economic problems of government policies and programs to develop agriculture conserve agricultural resources address consumer food concerns stabilize farm prices and raise farm incomes. The influence of macroeconomic policy world economy and international trade on U.S. agriculture

Econ 563 Issues in Government Policy Affecting Agriculture (2-0) Cr 2 Prereq: 101 Off campus. Offered as demand warrants. Government policy and the political process. The role of special interest groups and political influences on agriculture and trade. Description and analysis of government policies and programs designed to address production agriculture problems and consumer food concerns. Evaluation of the interaction of agriculture and world trade as affected by U.S. and foreign government policies. Designed for master of agricultural program only

Econ 571 Intermediate Econometrics (3) Cr 3 S Prereq: 501 Analysis of single and multiple time series regression models dummy explanatory variables. Causal correlation heteroskedasticity distributed lags. Qualitative dependent variables. Simultaneity. Use of econometric models for tests of economic theories and forecasting


Econ 583 Water Resources (Same as W Res 583) (3-0) Cr 3 Prereq: Graduate classification. Not for economics majors. Analysis of water resource management issues from economic legal political and sociological perspectives. Topics include rational water allocation systems. Market failure. Investment. Pollution control strategies. Water management. Administered by Economics in cooperation with Political Science and Sociology

Econ 585 Economic Growth and Development (3) Cr 3 Prereq: 501 and 502 and 601 The economics of economic growth and development. Theories of economic growth and development and their applications. The role of development in the world economy. The economics of economic growth and development and their applications. The role of development in the world economy. The economics of economic growth and development and their applications. The role of development in the world economy.
Econ 601 Microeconomic Analysis I (4 Cr) F
Prelq 301 previous or concurrent enrollment in 600 and permission of Director of Graduate Studies

Econ 602 Macroeconomic Analysis I (4 Cr) F
Prelq 301 previous or concurrent enrollment in 600 and permission of Director of Graduate Studies

Econ 603 Macroeconomic Analysis II (4 Cr) Cr 4: S
Prelq 601 602 and permission of Director of Graduate Studies.

Econ 604 Advanced Macroeconomic Analysis (4-1) Cr 4: F Prelq 601 602 and permission of Director of Graduate Studies.
Topics will be determined by the instructor. Potential topics include: real and monetary aspects of international trade, macroeconomic policy, and monetary and fiscal policy in open economies.

Econ 605 Advanced Topics in Microeconomics (3-0) Cr 3
Each time taken Prelq 603 604 Selected topics in microeconomic theory of current significance to the profession.

Econ 606 Advanced Topics in Macroeconomics (3-0) Cr 3
Each time taken Prelq 603 604 Selected topics in macroeconomic theory of current significance to the profession.

Econ 615 Industrial Organization I (3 Cr) Cr 3
Prelq 603 Theoretical analysis of traditional topics in industrial organization. Review of game theory.

Econ 616 Industrial Organization II (3 Cr) Cr 3

Econ 618 Game Theory (3-0) Cr 3 Prelq 501 and permission of instructor. Theoretical analysis and applications of strategic form games and cooperative games. Nash equilibrium. Bayesian games. Subgame perfect equilibrium. The core. Evolutionary equilibrium. Repeated games with finite automata and common knowledge.

Econ 620 Advanced Topics in Agricultural Economics (3-0) Cr 3 Each time taken Prelq 603 Selected topics in agricultural economics of current significance to the profession.


Econ 642 Agricultural Economics II (3-0) Cr 3 Prelq 603 Advanced treatment of topics in agricultural economics with emphasis on equilibrium analysis. Part I: Application of price theory to agricultural market analysis. Vertical market relations. Product differentiation in food and natural products. Agricultural policy in international trade of agricultural products.


Econ 654 Advanced Topics in Financial Economics (3-0) Cr 3 Each time taken Prelq 653 Selected topics in financial economics of current significance to the profession.


Econ 672 Econometrics II (4-1) Cr 4: S Prelq 671 Identification and estimation of systems of simultaneous equations. Qualitative choice and limited dependent variable models. Introduction to time series methods and applications including alternative variance specifications.

Econ 673 Microeconomics (3-0) Cr 3 Prelq 672 671. Econometric treatment of models arising in microeconometric applications. Microeconomics. Models are primarily concerned with the analysis of cross section data. Topics include systems of demand equations in panel data settings, random utility models of discrete choices, production functions, frontier estimation and discrete/continuous models of participation and consumption.

Econ 674 Macroeconomics (3-0) Cr 3 Prelq 672 670 Time series econometric techniques and their applications to macroeconometric and financial markets. Techniques may include GARCH and ARCH models, unit root and cointegration models, structural VARs and contagion testing.

Econ 675 Advanced Topics in Econometrics (3-0) Cr 3 Each time taken Prelq 672 or Stat 543. Advanced treatment of issues important in econometrics. Topics chosen from asymptotic theory, nonlinear estimation, Bayesian and robust econometrics.
promote educational inquiry that enhances educa-
tional practices at local state national and
international levels.
Teaching All Educational Leadership and Policy
Studies faculty engage in teaching that is conso-
sistent with the principles of adult learning and effective
teaching that help students develop critical thinking and
professionally relevant skills and that provides a
foundation for the application of knowledge to
practice.
Service All Educational Leadership and Policy
Studies faculty using their professional expertise work with
educators educational institutions and other
consortium groups to design and develop programs.
Advising All Educational Leadership and Policy
Studies faculty foster students professional and
personal growth by guiding and inspiring them to
formulate and complete their relevant programs of study and
to conduct high quality research.
Curricular Program The Educational Leadership and
Policy Studies faculty develop and implement futuristic
curricula and programs to ensure that students learn to
think critically and perform their professional roles in
an exemplary fashion.

General Goals
The general goals of the department and hence of each of its program areas and affiliated programs are to

- Conduct high quality graduate education programs both on and off-campus for students seeking graduate degrees in major in education and/or seeking professional licensure as school service personnel
- Establish appropriate conditions and opportunities and resources with which both faculty and graduate
students may engage in scholarly activities
- Assist the educational enterprise of Iowa in development by utilizing, when appropriate the talents and expertise of the faculty and graduate student body in such activities as workshops, conferences and consultation in small groups both on and off-campus.

Graduate Study
Degrees The Department of Educational Leadership and Policy Studies EELS offers work for the
degrees master of science master of education
certificate of advanced studies and doctor of
philosophy in major in education. EELS also offers
minor work to students majoring in other fields of
study. At the master's level students may specialize in
counselor education educational administration higher education organizational learning and human
resource development and research and evaluation.
Interested students should consult the specific program area for master degree information related to
that program.

Students may complete the Ph.D. with a major in
education and a specialization in educational
leadership with emphasis in either educational
administration or higher education.

Specific information about the requirements of the Ph D.
degree is available from the departmental office or on
the website (www.educ.state.edu/phd/educ Phd.htm)

The following information refers only to the Ph.D.
program

Prerequisites Prerequisite to major graduate work in
educational leadership is completion of an under
graduate degree with coursework appropriate to
the planned specialization and evidence that the
student ranks above average in scholastic achievement and
promise of professional competence.

Learning Opportunities Doctoral students in
Educational Leadership and Policy Studies will
complete seminars laboratory experiences field
experiences independent research and a capstone
experience course. In addition to the common
experiences noted above students will each select an
intellectual content area that will prepare them to
work in the setting of their choice.

Counselor Education (Co Ed)

John M. Uttille Program Coordinator

Degrees Counselor Education offers work for the
master of science and master of education degrees
with a specialization in counselor education and with
the option of thesis or creative component. Courses
are designed for cohort groups.

Emphasis The Counselor Education Program focuses on
preparing educational leaders who work as
counselors and leaders in schools communities
and/or businesses. The program prepares students for
one of the following settings elementary schools secondary schools or community

Prerequisites Prerequisite to major graduate work in
educational leadership is completion of an under
graduate degree with coursework appropriate to the
planned specialization and evidence that the student
ranks above average in scholastic achievement and
promise of professional competence.

Learning Opportunities To become counselors who
are educational leaders Counselor Education master's
students learn the art and science of counseling
individuals facilitating groups and enhancing schools
and communities. Opportunities are provided to
engage students in an experiential curriculum
participate in relevant practical experiences in schools
and communities related to their specializations and present portfolios that summarize
their cumulative learning.

Careers Graduates of the Master's Degree Program in
Counselor Education are prepared for leadership
roles as elementary or secondary school counselors and/or counselor consultants to individual clients
school districts home schoolers parochial and private
schools educational agencies businesses and

Outcomes Graduates of the Master's Degree Program in Counselor Education will possess skills and
knowledge for leadership as well as skills as K 12
school counselors and counselor consultants. By the
time of graduation students will demonstrate the
necessary skills and knowledge to

- Identity themselves as educational leaders who
inspire their clients with vision risk-taking and
energy
- Possess the awareness knowledge and skills that function at high level
- Establish and maintain professional relationships
- Adapt to ethical codes of the counseling profession
- Competent in the administration of ASCAs (American School Counselor Assoc.) National
Standards for School Counselors in three core areas personal/social academic and career
development
- Be skilled as talent developers.

Courses for Graduate Students

Co Ed 501 Foundations of Counseling (3-0) Cr 3 F
Prereq 8 credits in undergraduate education
psychology or sociology. Counseling theories that
facilitate change in individual professional roles and functions professional organizations and associations
professional history and trends ethical standards and
legal issues professional preparation standards and
professional credentials.

Co Ed 506 Art of Helping (3-0) Cr 3 F Prereq
Credit or enrollment in 501. Building skills in listening
responding and developing counseling relationships.

Co Ed 510 Counseling Individuals (3-0) Cr 3 S
Prereq 501 and 505 Provides an understanding of
counseling process with focus on counseling theories
applicable to schools ethics career development and
social and cultural issues.

Co Ed 515 Counseling Individuals II (3-0) Cr 3 S
Prereq 501 and 505 Provides an understanding of
counseling process with focus on assessment and
evaluation developmental and learning theory
relevant research and factors considered in
application.

Co Ed 520 Counseling Specialization (3-0) Cr 3 F
Prereq 510 and 515 Provides an indepth opportunity to
explore topics to develop an area of specialization.

Co Ed 530 Facilitating Groups I (3-0) Cr 3 F Prereq
520 Provides an understanding of the group
counseling process with focus on group theories
ethics for group leaders planning implementing
and facilitating groups dynamics and leader interventions
at various group stages accent on career develop-
ment participation in group laboratory activities.

Co Ed 535 Facilitating Groups II (3-0) Cr 3 F Prereq
520 Provides an understanding of the group
counseling process with focus on issues and trends in
a multicultural and diverse society school counseling
skills classroom management learning theory and
assessment and evaluation of change.

Co Ed 541 Educational Consulting I (3-0) Cr 3 S
Prereq 530 and 535 Historical philosophical and
societal cultural economic and political dimensions of schools and their relationships to communities
general principles of community intervention prevention consultation and outreach evaluation of programs
and systems school counseling skills classroom management and working with exceptional children.

Co Ed 545 Educational Consulting II (3-0) Cr 3 S
Prereq 530 and 535 An understanding of the consulting
process with focus on consulting theories and
systematic perspective the role of the counselor as a
consultant in a variety of settings relationships
between consultants and other professionals in these
settings organization businesses fiscal and legal
dimensions of the institutions and settings in which consultants practice.
Co Ed 550 Management of School Counseling Programs (3-0) Cr 3 F Prereq 505 Design implementation and evaluation of a comprehensive developmental school counseling program coordination with resource persons: specialists: businesses and agencies outside the school to promote program objectives: promotion of the program within the total school community: integration of guidance curriculum in the total school curriculum: data gathering methods for program planning and evaluation: time management referral procedures.

Co Ed 599 Special Topics Cr 1 to 2 Prereq 9
graduate hours in counselor education

Co Ed 591 Internship Cr 1-6 F Prereq 541 and 548
Actively engaged within the school setting: counseling students: consulting with teachers and parents and coordinating activities that enhance student development and growth both in the cognitive and affective domains.
A Elementary Internship
B Secondary Internship
C Community Counseling Internship

Co Ed 583 Workshop in Counseling and Guidance Cr 1 to 3 SS Prereq 9 hours in counselor education
Workshops are designed to give practice counseling an in depth exposure to a counseling issue or a counseling model with concurrent opportunity for application of the model. Offered when demand warrants.
B Counseling with Exceptional Children
D Substance Abuse Counseling
F Working with Parents and Families
G Advanced Brief Counseling
H Crisis Intervention
M Play Therapy
N Counseling Children and Adolescents at Risk

Co Ed 599 Creative Component Cr 1 to 2 Prereq 9 credits in counselor education

Co Ed 601 Advanced Counseling Theories and Methods (3-0) Cr 3 FS Prereq 591A or 591B or 591C
Comparative study of counseling theories supervised experience facilitating and processing groups practice in skill training labs with master's students.

Co Ed 602 Advanced Group Theories and Methods (3-0) Cr 3 Prereq 591A or 591B or 591C and permission of instructor
Critical analysis of group theories: supervised experience facilitating and processing groups: practice in skill training labs with master's students.

Co Ed 603 Supervision of Counselors (3-0) Cr 3 Prereq 601
Theories of supervision are examined in depth: Advanced counseling students provide clinical supervision of students enrolled in 591A, 591B, and/or 591C.

Co Ed 604 Group Counseling Practicum Cr 1 FS Prereq 591A, 591B or 591C and permission of instructor
Supervised experience facilitating and processing groups
A Skill Training Lab
B Group Counseling

Co Ed 605 Research in Counseling (3-0) Cr 3 Prereq 802
A student prepares relevant research proposals and reviews of literature

Co Ed 606 Supervision of Counseling Cr 2 FS Prereq Minimum of 2 practicum credits and permission of instructor
Advanced counseling students provide clinical supervision for students enrolled in 591A, 591B, or 591C

Co Ed 615 Seminar Cr 1 to 2 Prereq 9 hours in counselor education
Seminars are designed to meet venous needs of advanced master's students and practicing counselors Offered when demand warrants.
C Current Issues and Trends in Counseling
D Consultation
F Group Intervention Strategies

Graduates of the Master's Program with a specialization in educational administration and the Principal Licensure Program possess administrative and leadership skills necessary for PreK 12 building level leadership roles. By the time of graduation, students will demonstrate the necessary skills and knowledge to:
- Serve as visionary building level leaders with effective skills in curricular and instructional leadership
- Work effectively with individuals and groups to create and sustain a positive school culture
- Engage in ethical decision making and effective management of human material and financial resources to accomplish district goals
- Express ideas clearly to various publics both orally and in writing
- Articulate their values, beliefs, and philosophies of education
- Relate sensitively to individuals from diverse backgrounds
- Access and utilize research information and technology to assist with organizational improvement
- Translate educational administration concepts and theories into sound management and leadership practices.

Graduates of the Ph.D. Program with a specialization in educational administration will possess skills and knowledge related to the six core domains of leadership: educational research, communication, educational evaluation, educational foundations, and educational technology. By the time of graduation, students will demonstrate the necessary skills and knowledge for those outcomes as listed under the ELPS Ph.D. program outcomes.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

EdAdm 541 Principles of Educational Administration (3-0) Cr 3 F Prereq 509, 512 Licensure and permission of instructor
Purposes of education in a democratic society. Basic principles of school administration and educational organization. Planning and organization. Co-op and work-study experiences are offered as opportunities for students to apply the concepts learned in class.

EdAdm 511 Supervision of Instruction (3-0) Cr 3 FSS Prereq 547 Evaluating and improving the performance of teachers and administrators of K-12 public and independent schools. Intermediate and college-level education opportunities for those interested in K-12 education.

EdAdm 562 The Principalship (3-0) Cr 3 S SS Prereq 541 Current thinking in administration and organization and theoretical approaches to administration analysis of functions and processes of administration as they apply to education.
EdAdm 554 Community and Interagency Partnerships (3 Cr) 3 FSS Prereq 541 Concept and development of community/school partnerships with family and juvenile service agencies to enhance pupil learning and resiliency via increasing family stability and mental and physical health practices which promote interagency collaboration with the school, legal and administrative issues will be explored.

EdAdm 556 Cultural Analysis of Administrative Problems (3 Cr) 3 FSS Prereq 541 Practical and theoretical perspectives on school administrative problems from critical pedagogical studies and research. Deals with school-related issues such as cultural literacy, diversity, equity, authority and control, and other historical problems of schools in dealing with minorities and culturally different groups and persons.

EdAdm 558 Developmental Needs of Diverse Learners (3 Cr) 3 FSS Prereq 541 Learner needs are examined from dominant psycho/social perspectives with stress on developmental phases of normal growth along with common problems encountered in schools. Other issues examined are racism, gender bias and socio-economic problems which impact learner responsiveness to school curricula, routines, regulations and legal requirements.

EdAdm 569 Design and Delivery of School Curriculum (3 Cr) 3 FSS Prereq 541 Genetic administrative approaches to the design and delivery of elementary and secondary school curriculum including quality control, validation concepts of balance, planning and alignment. Development of curriculum guidelines, implementation and student assessment strategies employing national standards and benchmarks.

EdAdm 563 Leadership for Staff Development (3-0) Cr 3 S SS Prereq 541 For educators who will serve as consultants and directors of staff development programs. Course content will include needs assessment, delivery of staff development programs and evaluation. Adult learning theory will be the focus of facilitation skills, problem-solving skills and conflict resolution strategies. The relationship between supervision and staff development will also be explored.

EdAdm 575 Fundamentals of Education Law (3-0) Cr 3 S SS Prereq 541 Constitutional statutory and judicial provisions as a basis for the legal operation of public schools. The law is examined as it affects the local school districts, boards of education, administration, teachers, and students at the elementary and secondary school levels.

EdAdm 590 Special Topics Cr 1 to 4 Prereq 9 credits in education

EdAdm 591 Supervised Field Experience Cr R or 1 to 8 Prereq 541 and ad mission to program and instructor's approval. Supervised on the job field experience in special areas:
A. Elementary Principal (Cr 18)
B. Secondary Principal (Cr 18)
C. Superintendent/Central Office (Cr 18)

EdAdm 593 Workshops Cr 1 to 4 Prereq 9 credits in education

EdAdm 599 Thesis Research or Creative Component Development Cr 1 to 3 Prereq 9 credits in educational administration

Courses for Graduate Students

EdAdm 601 Planning Systems, Operations and School Environments (3-0) Cr 3 FSS Prereq 541 Planning and management theories, assumptions, strategies and tactics within belief systems, development of mission and mission positions, strategic goals and objectives, and operational tactics to attain them with emphasis on facility renovation and school construction processes.

EdAdm 602 Human Resource Development and Negotiations (3-0) Cr 3 S SS Prereq 541 Development and practice of collective negotiations within human resource development concepts and strategies with emphasis on creating and implementing win-win approaches that enhance system productivity and performance. Specific contract language and contracts which enhance system effectiveness will be highlighted.

EdAdm 603 Personnel Evaluation and System Assessment Practices (3-0) Cr 3 Pre req 541 Theory strategies and systems for supervising programs and personnel in school districts and independent schools. Focuses on the principal, cabinet level administrator and assistant principal, assistant director or assistant supervisor. Instruction.

EdAdm 604 Theories of Leadership (3-0) Cr 3 FSS Pre req 541 Specific leadership theories and models will be studied with an emphasis on organization building and constructivist strategies for teachers developing and assessing internal forces for growth and organizational capacity building.

EdAdm 606 Current Practices of the Superintendent (3-0) Cr 3 S SS Prereq 541 Reviews the historical development of the American superintendency in public education, problems and pitfalls, and politics and tensions separating executive actions from board policy formulation. Executive challenges among contemporary educational problems of resource acquisition and allocation, collaborative relationships, unions/systems, issues, system changes and capacity building models.

EdAdm 608 The Administration of Technology Systems (3-0) Cr 3 FSS Prereq 541 The design, acquisition and operations of technology in educational administration. Accounting personnel record keeping and system interfaces. Compensation practices, staff development and instruction record keeping, maintenance and groups.

EdAdm 609 Instructional Management (3-0) Cr 3 FSS Prereq 541 Theories and practices of instruction. Management. Emphasis is made on curriculum audit, classroom observation and analytical models assessing teacher interactions with students. Strategies of improving assessment and teaching interactions with students. Strategies of improving pupil resiliency and achievement will be highlighted. Mapping of curriculum configurations in classrooms will be applied to the use of national/international standards.

EdAdm 611 Student/Teacher Relations (3-0) Cr 3 FSS Prereq 541 An historical analysis of the development of governance systems in American public education and contemporary issues and problems confronting effective school district governance.

EdAdm 612 School Finance and Business Management (3-0) Cr 3 S SS Prereq 541 Contemporary business and fiscal management practices including financial management and banking, investment of funds, cash flow projections, accounting practices and school budget development concepts and usage. The functions and duties of school business personnel will be related to specific business and fiscal duties.

EdAdm 615 Seminar Cr 1 to 3. In-depth study of administrative topics of contemporary interest and importance:
A. Client Focus
B. Research
C. Quality Improvement
D. Special Services

E. Assessment
F. Leadership

EdAdm 690 Advanced Special Topics Cr 1 to 3 Prereq 9 credits in educational administration

EdAdm 691 Internship (3-0) Cr 3 Pre req 541 Admission to program and instructor's approval. Supervised on the job field experience in special areas.

EdAdm 699 Dissertation Research Cr 1 to 3 Pre req 9 credits in education

Educational Leadership and Policy Studies (ELPS)

Barbara L. Locklider, Program Coordinator

Courses for Graduate Students

ELPS 615 Thematic Seminars Cr 1 S SS Pre req 541 Admission to educational leadership doctoral program.
A. Communication and Team Building
B. Governance, Politics and Policies
C. Law: Equity
D. Ethics, Justice, and Care
E. Problem Solving and Planning
F. Critical and Creative Thinking

ELPS 616 Capstone Experience Cr 3 FSS Pre req 6 credits of 615. This experience is designed to explore a topic addressed in one of the thematic seminars. The product of the capstone experience is a written paper of sufficient quality to be submitted to a scholarly journal for review.

Higher Education (Hg Ed)

Nancy J. Evans, Program Coordinator

Degrees: Higher Education offers work for the master of science degree with thesis and master of education degree (non-thesis) and a specialization in higher education, as well as postgraduate professional development. A community college leadership certificate program and a community college teaching and learning certificate program are also offered.

The Master's Program in Higher Education

Emphasis: The Higher Education Program provides graduate instruction and leadership development in community college education, student affairs practice, institutional research post secondary curriculum and higher education administration.

Prerequisites: Prerequisite to major graduate work in educational leadership is completion of an undergraduate degree with coursework appropriate to the program in specialization, and evidence that the student ranks above average in scholastic achievement and promise of professional competence.

Learning Opportunities: Master's students in Higher Education will complete courses practical experiences and independent research or a culminating experience that will enable them to serve as leaders in various educational settings.

Careers: Master's students in Higher Education are prepared for entry level positions in student affairs administration, general institutional administration, teaching positions in community colleges and support positions in post secondary settings.

Outcomes: Graduates of the Master's Program in Higher Education will be prepared for a specialization in student affairs with demonstrated skills and leadership in student affairs settings. By the time of graduation, students will possess the necessary skills and knowledge to:

- Demonstrate effective oral communication
- Effectively communicate in writing
- Work effectively with a diverse student population
- Employ interventions designed to facilitate the development and learning of college students
- Create and implement programs and interventions
- Effectively advise students individually and in groups
- Organize and administer student services in post-secondary settings
- Conduct basic assessment evaluation and research.
Graduates of the Master's Program in Higher Education with a specialization in community college teaching and learning will possess teaching and learning leadership skills. By the time of graduation, students will possess the necessary skills and knowledge to:
- Facilitate college student learning
- Employ pedagogical techniques
- Demonstrate a clear understanding of the foundations of education grounding their work in theory and philosophy
- Use technology effectively in learning and organizational processes
- Articulate the concepts, theories, and practices related to the content of higher education as emphasized in their course work
- Develop curriculum
- Assess student learning
- Understand the philosophy, organization, functions, and current issues of community colleges

Graduates of the Master's Program in Higher Education with a specialization in community college administration will demonstrate leadership in community college settings. By the time of graduation, students will possess the necessary skills and knowledge to:
- Create positive environments for community college students
- Perform administrative functions in community college settings
- Assist community college students with the academic and personal issues they face
- Develop effective teaching and learning strategies
- Work effectively with diverse student populations
- Shape community college curricula

The Ph.D. Program in Higher Education

Emphasis: The Ph.D. in education with a specialization in educational leadership includes an emphasis on higher education. This program is designed to prepare leaders for post-secondary settings and is concerned with advanced study and independent research on various topics related to post-secondary settings. See departmental overview of the Ph.D. degree in educational leadership.

Prerequisites: Prerequisite to major graduate work in educational leadership is completion of an undergraduate degree with coursework appropriate to the planned specialization and evidence that the student ranks above average in scholastic achievement and promise of professional competence. In addition, students are expected to have completed a master's degree and 3 years of professional work experience in higher education.

Learning Opportunities: Doctoral students will complete courses, laboratory experiences, field experiences, independent research, a capstone experience, and a dissertation so that they can serve as leaders in various post-secondary educational settings such as colleges and universities, private and state agencies, and other organizations concerned with post-secondary education.

Careers: Typical careers available to graduates include leadership positions in post-secondary institutions and other organizations concerned with post-secondary education. Special opportunities are available to those who are interested in a career as a faculty member in post-secondary settings.

Outcomes: Graduates of the doctoral program with an emphasis in higher education will possess knowledge and skills related to six core domains: leadership, educational research, communication, evaluation, educational foundations, and educational technology. By the time of graduation, students will demonstrate the necessary skills and knowledge for these outcomes as listed under ELPS Ph.D. program outcomes.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Hg Ed 420: Introduction to Vocational Technical Teaching at Community Colleges (Dual listed with 521) (3-0) Cr 3
Hg Ed 420: Develops competencies necessary to identify, develop, implement, and evaluate collaborative learning in teaching and learning. A focus on classroom and lab/clinic teaching techniques.

Hg Ed 422: Vocational Technical Curriculum at Community Colleges (Dual listed with 522) (3-0) Cr 3
F PreReq: F PreReq 421. A focus on alignment and accountability develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 423: Vocational Technical Assessment at Community Colleges (Dual listed with 523) (3-0) Cr 3
S PreReq: F PreReq 422. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 504: Higher Education in the United States (3-0) Cr 3
S PreReq: Graduation classification. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 521: Vocational Technical Teaching Methods at Community Colleges (Dual listed with 521) (3-0) Cr 3
S PreReq: F PreReq 420. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 522: Vocational Technical Curriculum at Community Colleges (Dual listed with 422) (3-0) Cr 3
F PreReq: F PreReq 521. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 523: Vocational Technical Assessment at Community Colleges (Dual listed with 423) (3-0) Cr 3
S PreReq: F PreReq 522. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 550: Teaching, Learning, and Leadership (3-0) Cr 3
F PreReq: Teacher Licensure. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 561: College Teaching (3-0) Cr 3
PreReq: 6 graduate credits. This course will review educational theories, methods, and strategies for the improvement of college instruction. It seeks to assist potential college instructors in developing knowledge of college instruction, and the scholarship and art of teaching. This course will emphasize the unique challenge of college teaching in a changing student population environment.

Hg Ed 562: Curriculum Development in Colleges (3-0) Cr 3
PreReq: Graduate classification. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.

Hg Ed 688: Global Education Policy Analysis (3-0) Cr 3
PreReq: Graduate classification. A focus on classroom assessment develops competencies necessary to identify, develop, implement, and evaluate outcome-based vocational technical courses and programs in community colleges.
Hg Ed 590 Special Topics Cr 1 to 4 Prereq 9 credits in education. Independent study on specific topics arranged with an instructor.

A Student Services
B Community Colleges
C Current Issues
D International Higher Education
E Federal and State Affairs
F Law in Higher Education
G Institutional Research

Hg Ed 591 Supervised Field Experience Cr 1 to 4 Prereq 9 credits graduate work. Supervised on the job field experience.

Hg Ed 593 Workshops Cr 1 to 5 Prereq 15 credits in education.


Hg Ed 598 Capstone Seminar (3-0) Cr 3 S Prereq Completion of 30 credits in EL FS. This course is designed to integrate the learning experiences of students completing the Master’s Degree Program in Higher Education. Such aspects as ethics, containing professional development, career planning and leadership will be explored.

Hg Ed 599 Creative Component Cr arr. Prereq 9 credits in education.

Courses for Graduate Students

Hg Ed 615 Seminars in Higher Education Cr 1 to 4
A Student Services
B Community Colleges
C Current Issues
D International Higher Education
E Federal and State Affairs
F Law in Higher Education
G Institutional Research
H Research Designs in Higher Education

Hg Ed 664 College Organization and Administration (3-0) Cr 3 S Prereq 504 Administrative organization and behavior communications leadership finance strategic planning and institutional governance.

Hg Ed 665 Financing Higher Education (3-0) Cr 3 F Prereq 504. Lectures discussions and individual investigations related to financial administration in colleges and universities. Budgeting, auxiliary enterprises administration of financial planning, fund raising, examination of theories on expenditures. Designed for persons aspiring to serve as college administrators.

Hg Ed 666 Academic Issues and Culture (3-0) Cr 3 S Prereq 504. This course will examine institutional culture and issues in higher education focusing on the roles and responsibilities of faculty and academic administrators.

Hg Ed 676 Student Development Theory I (3-0) Cr 3 S Prereq 578. This course will examine life-span approaches to student development: racial, ethnic and sexual identity development, and spiritual development. The emphasis is on application of these theories in student affairs practice.

Hg Ed 690 Advanced Special Topics Cr 1 to 4 Prereq 9 credits in education.

Hg Ed 699 Research Cr arr. Prereq 9 credits in education.

Organizational Learning and Human Resource Development (OLHRD)

Deborah I. Kidgore Program Coordinator

Degrees: Work for the master of education degree (M Ed.) with a specialization in organizational learning and human resource development is offered. Courses are scheduled with consideration of the full time work schedules of the majority of our students.

Emphasis: The OLHRD Program focuses primarily on three components of positive organizational development: learning performance and change, student learning and career development, and professional development. Teachers are encouraged to pursue professional development, including the development of their own knowledge and skills, through participation in professional organizations and conferences.

Prerequisites: The students majoring in educational psychology are required to complete an undergraduate degree with coursework appropriate to the planned specialization. The department offers a variety of courses in organizational learning and human resource development, including courses in leadership, management, and evaluation.

OLHRD 544. Performance Improvement and Change in Educational Organizations (3-0) Cr 3 Prereq OLHRD 541. Examining the characteristics and elements of the performance improvement and change process with special attention to the roles and responsibilities of individuals within organizations.

OLHRD 545. Learning and Organizational Development (3-0) Cr 3 Prereq OLHRD 541. Examining the process of learning and organizational development, focusing on the role of the individual in the process.

OLHRD 546. Human Resource Development (3-0) Cr 3 Prereq OLHRD 543. Understanding the roles and responsibilities of human resource development professionals, managers, and employees in the organization and the processes of human resources development.

Research and Evaluation (ResEd)

John H. Schueller Program Coordinator

Degree: Research and Evaluation students receive a broad foundation in the areas of quantitative and qualitative research methodology, data analysis, and evaluation. Students select one area for in depth study.

Prerequisites: The students majoring in educational leadership are required to complete an undergraduate degree with coursework appropriate to the planned specialization. The department offers a variety of courses in organizational learning and human resource development, including courses in leadership, management, and evaluation.

OLHRD 541. Adult Learning (3-0) Cr 3 Prereq OLHRD 540. Examining the process of learning and resource development. The emphasis is on the role of the individual in the process.


OLHRD 544. Performance Improvement and Change Through Learning Interventions (3-0) Cr 3 Prereq OLHRD 541. Examining the characteristics and elements of the performance improvement and change process with special attention to the roles and responsibilities of employees, managers, and organizations when improving individual and organizational learning.

OLHRD 545. Learning Acquisition Transfer and Evaluation (3-0) Cr 3 Prereq OLHRD 541. Examining the process of learning, acquisition, transfer, and evaluation. The emphasis is on the roles and responsibilities of human resource development professionals, managers, and employees in the organization and the processes of human resources development.

OLHRD 546. Human Resource Development Consulting (3-0) Cr 3 Prereq OLHRD 543. Understanding the roles and responsibilities of human resource development consultants. The emphasis is on the consulting process to solve performance and organizational problems.
Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

ResEve 550 Educational Research (3) Cr 3 SS Prereq: Graduate classification. Understanding the nature of quantitative and qualitative research reviewing the literature, developing research problems and questions, research designs, data collection, and analysis issues evaluating research studies

ResEve 552 Basic Educational Statistics (3) Cr 3 F Prereq: 550 Statistical concepts and procedures for analyzing educational data descriptive statistics correlation tests t tests and chi square with computer applications

ResEve 553 Intermediate Educational Statistics (2) Cr 2 Prereq: 552 A continuation of statistical concepts and procedures for analyzing educational data inferential techniques including simple and multiple regression multiple analysis ANOVA etc with educational computer applications

ResEve 554 Intermediate Research Methods (3) Cr 3 SS Prereq 550 560 Stat 410 or 562 Intermediate qualitative and quantitative research methodology in preparation for carrying out thesis and dissertation research project formulation design data collection and analysis interpreting and summarizing research findings

ResEve 560 Assessing Student Learning (3) Cr 3 Prereq: 550 or basic statistical skills The purpose and techniques of formal and informal classroom assessment rubrics performance assessment portfolios paper and pencil tests communicating assessment findings emphasis on both theory and practical applications

ResEve 580 Qualitative Research Methodology (3) Cr 3 Prereq: 550 Qualitative research procedures in education particularly historical philosophical biographical ethnographic and case study use of sources principles of qualitative research methods of data collection and analysis field techniques and writing of research results

ResEve 590 Special Topics Cr 1 to 3 each time taken FS SS Prereq: Graduate standing Guided reading and research and evaluation study on special topic

ResEve 593 Workshop Cr 1 to 3 each time taken FS SS Prereq: Graduate standing Intensive concentrated exposure to a special educational research or evaluation problem

ResEve 597 Program Evaluation (Same as Hg Ed 597) (3) Cr 3 C Preq: 550 Evaluation models and professional standards techniques of evaluating educational programs emphasis on both theory and practical applications

Electrical Engineering
(Administered by the Department of Electrical and Computer Engineering)

Subrahmanyan Venkata, Chair of Department
Professors J Bowler Dalal Geiger Horton Jiles Kamal Kothan Lamont Melia Rover Sheble Somani Venkata Vitali Weber Woods

Professors (Collaborators) Hassoun Khammassh L Udpa S Udha

Distinguished Professors (Emeritus) Brown Fouad Lord Nilsson Ponn

University Professors (Emeritus) Jones

Professors (Emeritus) Anderson Bratley Brockman Comstock Fanslow Hale Haish Koerber Kopplin Potter Road Smay Stewart Swift Townsend Turkka

Associate Professors Ayaguru Aunu Bartlett Berleeizh Chang Chen Cruz Niera Davidson Davis Dickerson Jacobson Kleitsch Knuepelm Kulmar McCallel Rustie Tuttle Yaggr

Associate Professors (Adjunct) N Bowler

Asst Professors (Adjunct) Cooey McMane Meleliv Scott Stephenson

Assistant Professors Chu Danields Dogondzic Elia Govindaraju Guiaa Ma Patterson Salapaka Song Tirthapura Wang Zhang

Assistant Professors (Adjunct) Amin Bode Minn Assistant Professors (Collaborators) Barton Chandramouli Lee

Undergraduate Study

For undergraduate curriculum in electrical engineering leading to the degree bachelor of science see College of Engineering Currilum This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

The Department of Electrical and Computer Engineering at Iowa State University provides undergraduate students with the opportunity to learn electrical and computer engineering fundamentals to study applications of the most recent advances in state of the art technologies and to prepare for the practice of engineering. The student faculty interaction necessary to realize this opportunity occurs within an environment that is motivated by the principle that excellence in undergraduate education is enhanced by an integrated commitment to successful long term research and outreach programs

The electrical engineering curriculum offers a number of specialization areas at the undergraduate level including computer networking security computer architecture and digital systems control systems electromagnetics microelectronics VLSI power systems and communications and signal processing An attractive feature of the curriculum is that seniors may choose among course sequences each of which focuses on one of these areas therefore graduated students have substantial depth in specific areas to complement the breadth obtained in the required curriculum

The mission of the electrical engineering program at Iowa State University is to enable the graduated student to make significant and substantive contributions to solving electrical engineering problems throughout the student's professional career The following objectives are identified as critical to the accomplishment of this mission

A Objective I Impart and enhance knowledge in the domain of electrical engineering The graduated student should understand

1 engineering and basic science fundamentals including mathematics probability statistics physical sciences and information technology

2 the design and manufacturing processes

3 the fundamentals of business including entrepreneurship and revenue streams

B Objective II Expand and hone engineering abilities

1 identify and solve engineering problems

2 analyze and design electrical and computer and multidisciplinary systems

3 design and conduct experiments and analyze resulting data

4 use modern engineering hardware and software tools such as computers and instrumentation

C Objective III Instill and nurture social awareness abilities and understanding The graduated student should

1 desire to engage in lifelong learning and should expect and embrace change

2 be able to function effectively as a member of a multidisciplinary team to communicate effectively and to think critically and creatively both independently and with others

3 apply standards of professional conduct in view of the value of science and technology in a global societal context

As a complement to the instructional activity the ECPE Department provides opportunities for each student to have experience with a broadening activities Through the Cooperative Education and Internship Program students have the opportunity to gain practical industry experience See College of Engineering Cooperative Programs Through the Undergraduate Research Program students have the opportunity to participate in advanced research activities and through international exchange programs students learn about engineering practices in other parts of the world see also Other Junior and seniors in electrical engineering who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both B S and M S degrees See Graduate Study for more information

Students are required to prepare and to maintain a portfolio of their technical and non technical skills This portfolio is evaluated for student preparation during the student's curriculum planning process Results of the evaluation are used to advise students of core strengths and weaknesses Prerequisite material exams may be given at key points in the curriculum These exams are to assist student evaluation of progress made during the academic experience as the material covered in several courses are the foundation of more advanced courses. These outcome assessments are also used to assess and to improve the quality of the curriculum

Courses for students who are not in the electrical engineering program 441 442 448 Credit in these courses may not be counted toward a degree in electrical engineering or computer engineering Credit for only one of the following courses may be counted towards graduation E E 501 441 and 442

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy with major in electrical engineering and minor work to students with other majors Minor work for electrical engineering majors is usually selected from a wide range of courses outside electrical engineering

The degree master of science with thesis is recommended for students who intend to continue toward the doctor of philosophy degree or to undertake a career in research and development The nonthesis master of science degree requires a creative component

The normal prerequisite to major graduate work in electrical engineering is the completion of undergraduate work substantially equivalent to that required for electrical engineering students at this university Because of the diversification in the electrical engineering curriculum
Electrical Engineering

engineering graduate program however it is possible for a student to quality for graduate study in certain areas of electrical engineering even through the student’s undergraduate or prior graduate training has been in a discipline other than electrical engineering. Supporting work if required will depend on the student’s background and area of research interest. Prospective students other than electrical engineering are required to submit with the application for admission a statement of the proposed area of graduate study. The department requires submission of GRE aptitude test scores by applicants from other countries. All students whose first language is not English and who have no US degree are subject to TOEFL examination scores. Ph.D. students must pass a department qualifying examination. 

In cooperation with the College of Liberal Arts and Science the College of Engineering offers a graduate minor in Complex Adaptive Systems. It is open only to students who have met the basic program requirements and are accepted into the graduate program. The CAS minor consists of one common core course at least two CAS specific techniques courses and at least two supporting courses. Both techniques and supporting courses must be selected from lists approved by the advisory committee. A minor in CAS must include at least nine credits that are beyond the total used to meet curriculum requirements. An interdisciplinary faculty committee supervises the minor. Interests in specific areas may contact the electrical and computer engineering department to obtain more specific guidelines and requirements. 

The Department of Electrical and Computer Engineering is a participating department in the interdepartmental M.S. and Ph.D degree programs in bioinformatics and computational biology. Students interested in these programs may earn their degrees while working under an adviser in electrical and computer engineering. 

The Department of Electrical and Computer Engineering is also a participating department in the interdepartmental master of science in information assurance program. Students interested in this program may earn a degree in computer engineering or in information assurance. (See bulletin section on information assurance) 

The Department of Electrical and Computer Engineering offers a graduate certificate in electric power systems engineering. Completion of the certificate requires at least nine credits, including 553 and 554. Students accepted from 555, 556, and 553. We qualified juniors or seniors in Electrical Engineering who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both B.S. and M.S. degrees. Under concurrent enrollment students are eligible for assistance on the basis of their undergraduate record. They may take undergraduate and graduate courses. Details are available in the Student Services Office and on the department’s web site. Courses open for nonmajor graduate credit: all 300 and 400 level courses except 322, 396, 397, 398, 463. 468, 491, 491, 492, 494, and 498. 

Courses Primarily for Undergraduate Students 

E E 166 Professional Programs Orientation (Same as CEE 166) D. 1: I 10 C. R. FS Overview of the nature and scope of electrical engineering and computer engineering professions. Portfolio construction. Departmental rules and advising center operations degree program. Requirements of study planning career options and student organizations. 

E E 165 Introduction to Electrical Engineering and Problem-Solving (2) D. 2 C. 3 FS Pre Req: Math 140 and credit or enrollment in Math 141 or 142. Introduction to Electrical Engineering C and MATLAB programming. Project based examples from electrical engineering. Group skills needed to work effectively in teams. Group problem solving. Individual interactive skills for small and large groups. Electrical/Computer based projects. Solving engineering problems and presenting solutions through technical reports and oral presentations. 


E E 203 Electronic Devices and Circuits (Same as CPR 203) D. 3 I 4 C. 4 F. Pre Req: 201 Math 267. Phys 222 and credit or enrollment in CPE 210. With emphasis on mathematical tools. Operational amplifier models and applications. DC large-signal and small-signal dependent and frequency dependent models and characteristics for diodes bipolar junction transistors and field-effect transistors. SPICE simulation applied to electronic circuit analysis and design. IC technology for MOS and bipolar analysis and design. Characteristics of IC logic families. Laboratory design projects. 

E E 224 Signals and Systems I (4-0) C. 4 F. Pre Req: 201 Math 267. Phys 222 Examples of continuous and discrete time signals and systems. 


E E 298 Cooperative Education C. R. FS SS Pre Req: Permission of department. First professional work period in the cooperative education program. Students must register for this course before commencing work. 


E E 324 Signals and Systems II (3) D. 3 C. 3 F. Pre Req: 224 Frequency response of LTI systems. 

E E 332 Semiconductor Materials and Devices (Same as Mat E 332) D. 3 I 3 C. 3 S. Pre Req: 211 or 221. Introduction to semiconductor material and device physics. Quantum mechanics and band theory of semiconductors. Charge carrier distributions generation/recombination transport properties. Electronic and optical properties and fabrication of semiconductor devices. MOSFET bipolar transistors. Laser diodes and LEDs. 


E E 396 Summer Internship C. R. SS Pre Req: Permission of department. Summer professional work period. Students must register for this course before commencing work. 

E E 397 Engineering Internship C. R. FS Pre Req: Permission of department. One semester maximum per academic year professional work period. Students must register for this course before commencing work. 

E E 408 Interdisciplinary Problem Solving (Same as E 408) D. 4 I 4 C. 3 F. Pre Req: Junior or senior standing. 


E E 411 Electromagnetic Radiation, Antennas and Propagation (Dual listed with 511.) D. 3 I 4 C. 4 S. Pre Req: 311. 


EE 423 Microelectronics Fabrication Techniques (Dual-listed with 532. Same as Mat E 432) (2-4) Cr 4. Semester varies. Preq: EE 332 or Mat E 332. Techniques used in modern integrated circuit fabrication including diffusion oxidation ion implantation lithography vacuum deposition and etching. Process integration. Process evaluation and final device testing. Extensive laboratory exercises utilizing fabrication methods to build electronic devices. Use of computer simulation tools for predicting processing outcomes. Recent advances in processing CMOS ICs and micro-electro-mechanical systems (MEMS). Nonmajor graduate credit.


EE 448 Introduction to AC Circuits and Motors (3) Cr 2. Half semester course. FS. Preq: 303 or 442. Magnetic circuits. Power transformers. AC steady state and three phase circuit analysis. Basic principles of operation and control of induction and single phase motors. Nonmajor graduate credit.


EE 463 Design of Electrical Systems (1-10) Cr 5. SS. Preq: 322 and completion of 24 credits in the EE core professional program. Eng 314. Distance education students only. Team project design experience. Emphasis on defining and planning to achieve project objectives. A Make a claim experience with due consideration to professional and technical considerations of engineering design. Oral poster and written presentations.

EE 465 Digital Integrated Circuit Design (Same as Cpr E 465 I) 3 Cr 3 I. S. Preq: 334. Digital design of integrated circuits employing very large scale integration (VLSI) methodologies. High level hardware design languages. Logic synthesis and silicon compilers. Datapath architectures and systems on a chip (SOC) considerations. VLSI chip hardware design project. Nonmajor or graduate credit.


EE 476 Control System Simulation (3) 3 Cr 3 S. Preq: 475. Computer-based techniques for feedback control system design: simulation and implementation. Nonmajor graduate credit.

EE 490 Independent Study Cr arr. Preq: Senior classification in electrical engineering. Investigation of an approved topic commensurate with the student's prerequisites. Honors.

EE 491 Senior Design Project I and Professionalism Seminar (Cpr E 491) (2) Cr 2, FS. Preq: 322 or Cpr E 301. Completion of 24 credits in the EE core professional program or 29 credits in the Cpr E core professional program. Eng 314. Preparing for entry to the workplace. Selected professional topics. Use of technical writing skills in developing project plan and design report. Project poster. First of two semester team-oriented project design and implementation experience.

EE 492 Senior Design Project II (Same as Cpr E 492 I) (3) Cr 2. FS. Preq: 491 or Cpr E 491 Second semester of a team design project experience. Emphasis on achieving professional. as defined in Cpr E 491 or EE 491. Implementation of Project Design. Technical writing of final project report. Oral presentation of project achievements.

EE 494 Portfolio Assessment (Same as Cpr E 494) (1) Cr 1. S. Preq: Credit or enrollment in 491. Portfolio update and evaluation. Interviewing skills with portfolios.

EE 498 Cooperative Education Cr R. FS. SSS. Preq: 398. Permission of department. Third and subsequent professional work periods in the cooperative education programs. Students must register for this course before commencing work.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students


EE 502 Complex Adaptive Systems Seminar (Same as CAS S 502 or Com S 502 I 1 I 10) Cr 1. Core techniques in artificial intelligence. Complex analysis methods such as evolutionary computation. Neural networks. Agents and simulations. Large-scale simulations.


EE 507 VLSI Communication Circuits (Same as Cpr E 507 I 3 Cr 3 Alt S. offered 2005) Preq: 434 or 501. Phase locked loops. Frequency synthesizers. Clock and data recovery circuits. Theory and
Engineering

Loren W Zachary, Assistant Dean for Undergraduate Programs

Professors (Emeritus) Masahaw Sanders

Associate Professors Dowling

Most of the courses with the designator of Engr are broad based engineering courses applicable to all engineering disciplines. Several of these courses are part of the basic program which is required for engineering students. Course-related questions should be directed to the department or unit with responsibility for that course. The following is a list of those responsibilities.

Engr 101 Engineering Undergraduate Programs

Engr 160 Materials Science and Engineering

Engr 170 Agricultural and Biosystems Engineering

Courses Primarily for Undergraduate Students

Engr 101 Engineering Orientation (1 Cr) R FS Introductory course to the College of Engineering and the engineering profession. Considerations in choosing an engineering curriculum. Information concerning university and college policies, procedures, and resources. Opportunities to interact with departments.

Engr 104 LEAD Program Orientation (1 Cr) R FS Orientation for LEAD Living/Learning Community participants. Applications of problem solving engineering design teamwork, study and time management techniques and skills. Engineering professional development. Offered on a satisfactory fail grading basis only.

Engr 105 LEAD Program Seminar (1 Cr) R FS Seminar for LEAD Program participants in the residential learning community. Industrial tours and orientation to engineering profession. Offered on a satisfactory fail grading basis only.

Engr 160 Engineering Problems with Computer Applications Laboratory (2-2Cr) FS SS Pre requisites: satisfactory scores in mathematics placement examinations. credit or enrollment in Math 142 165. Solving engineering problems and presenting solutions through technical reports. Significant features of C-1 languages. Graphing and curve fitting. Flowcharting. Introduction to material handling, mechanics. electrical circuits, statistics and engineering economics. Use of spreadsheet programs to solve and present engineering problems. Solution of engineering problems using computer programming languages. (The honors section includes application of programming to mobile robotics.) H Honors F

Engr 170 Engineering Graphics and Introductory Design (2-2Cr) R FS Prerequisite: satisfactory scores in mathematics placement examinations. credit or enrollment in Math 142 165. Integration of fundamental graphics computer modeling and engineering design applications of multimedia drawings and dimensioning techniques for visualizing analyzing and communicating 3D geometries. Application of the design process including written and oral reports. Hand and computer methods.

Undergraduate Study

The courses in mechanics are intermediate between those in physics and mathematics and the professional design courses of the several engineering curricula. In the work of this department the student is expected to acquire an understanding of the principles underlying the technique of analysis and a knowledge of those properties of materials which influence the manner and extent of their use for engineering purposes. Physical properties of engineering materials are studied in the classroom and are evaluated in the laboratory. General laws such as those of Newton are given mathematical expression and are made suitable for use in the solution of specific problems in machine and structural design and in the flow and measurement of fluids.

Graduate Study

The department offers work for the degrees master of science and doctor of engineering.
phility with major in engineering mechanics and minor work to students taking major work in other departments.

The master of science degree requires a thesis and a minimum of 8 research credits. It has strong research emphasis and is recommended for students who anticipate entering a doctoral program later. At least 30 credits of acceptable graduate work are required for the degree.

The master of engineering degree does not require either research credits or a thesis. However, at least two credits of acceptable creative component and at least 26 credits of acceptable graduate coursework are required. A minimum of 30 credits of acceptable graduate work is required for the degree. The program is intended to give students additional instruction at the graduate level to better qualify them for advanced professional engineering work. By careful selection of electives and perhaps additional courses during the senior undergraduate year, students should be able to qualify for the master of engineering degree with an additional year of full-time study after receiving their baccalaureate degree in one of the several engineering curricula.

Credits for creative component will be obtained by registering for E M 599 A written report and an oral presentation will be given to the student’s graduate committee.

The normal prerequisite to major graduate work is the completion of a curriculum substantially equivalent to that required of undergraduate students in engineering at this university. However, because of the diversity of interests in graduate work in engineering mechanics, it is possible for a qualified graduate student even though undergraduate or prior graduate training has been in a discipline other than engineering—e.g., physics or mathematics.

Courses open for non-major graduate credit. All 300 and 400 level courses except 490.

Courses Primarily for Undergraduate Students

E M 274 Statics of Engineering (3 C O) 3 FS SS Prereq. Credit is not given for Math 166; credit or enrollment in Phys 111 or 221 Vector and scalar treatment of coplanar and noncoplanar force systems. Resultant of frictional centripetal and tangential forces. Elementary considerations of theorems of failure buckling Nonmajor graduate credit.

E M 324 Mechanics of Materials (3 C O) 3 FS SS Preq: Math 221 Plane stress, plane strain, strain, stress, and strain relationships. Elements of material behavior. Application of stress and deformation analysis to members subject to centric, torsional, flexural, and combined loadings. Elementary considerations of theories of failure buckling. Nonmajor graduate credit. Credit or enrollment in Math 324.

E M 327 Mechanics of Materials Laboratory (3 C) 1 FS SS Preq: Credit or enrollment in 324. Experimental determination of mechanical properties of selected engineering materials. Experimental verification of assumptions made in 324. Use of strain measuring devices. Preparation of reports. Students who are not present for the laboratory meeting of their own sections may qualify for continuation in the course only by attending the first laboratory meeting of some other section of the course. Nonmajor graduate credit.


E M 350 Introduction to Nondestructive Evaluation Engineering (3 C O) 3 S Prereq: Math 266. Introduction to the fundamentals of ultrasonic and x-ray testing. The generation, transmission, scattering, and reception of ultrasonic waves and x-rays. An NDE inspection.


E M 362 Principles of Nondestructive Testing (Same as Mat E 362) See Materials Engineering Nonmajor graduate credit.

E M 362L Nondestructive Testing Laboratory (Same as Mat E 362L) See Materials Engineering Nonmajor graduate credit.


E M 417 Experimental Mechanics (2 C) 3 S Prereq: 324. The use of strain gages and strain gage equipment. The production and use of strain gage transducers. Reading and recording data from strain gages. Nonmajor graduate credit.


E M 425 Introduction to the Finite Element Method (3 C) 3 S Prereq: Math 266 or Math 221. Introduction of finite element analysis through applications to one-dimensional steady state problems such as elastic deformation, heat and fluid flow, and consolidation. Beam bending and stress analysis. Two-dimensional triangular and quadrilateral elements. Plane problems of torsion, thermal, and potential flow stress analysis. Simple computer programs for one- and two-dimensional problems. Nonmajor graduate credit.


E M 490 Independent Study Credit or Prereq: Permission of instructor. Nonmajor graduate credit.

Courses Primarily for Graduate Students. Open to Qualified Undergraduate Students

E M 510 Continuum Mechanics (3 C) 3 S Prereq: Math 385. Presentation of the basic equations of engineering mechanics and their conservation of momentum, energy, mass, and energy conservation of energy principles of selection of constitutive equations. Constitutive relations for classical elastic materials and classical fluids. Simple rheological models for viscoelastic materials. Introduction to the Cartesion tensors.

E M 514 Advanced Mechanics of Materials (Same as A E 514) (3 C) 3 S Prereq: Math 324. Theory of stress and strain, stress-strain relationships. Limitations of flexure and torsion formulas.

E M 514 Advanced Mechanics of Materials (Same as A E 514) (3 C) 3 S Prereq: Math 324. Theory of stress and strain, stress-strain relationships. Limitations of flexure and torsion formulas.


E M 517 Experimental Mechanics (Same as A E 517) (3 C) 3 S Prereq: Math 510. Fundamental concepts of force displacement stress, strain, and stress measurement. Full field deformation measurements with laser interferometry and digital image processing. Nonmajor graduate credit.


E M 548 Advanced Engineering Dynamics (3 C) 3 S Prereq: Math 385. Presentation of the basic equations of engineering mechanics and their conservation of momentum, energy, mass, and energy conservation of energy principles of selection of constitutive equations. Constitutive relations for classical elastic materials and classical fluids. Simple rheological models for viscoelastic materials. Introduction to the Cartesion tensors.

English

www.engl.iastate.edu/
Charles J. Kostelnick Chair of Department
Distinguished Professors Bowers Swander
University Professors Burnett Nekede

Asssoicate Professors Allen Caton Consigny
Daves Haas J Hagge Herndal Krentzer Kupfer
Larson Marquart Niday W Payne Pett Post Price
Herndal Roberts Schwarte Slagell St Germain
Tremmel Yager

Associate Professors Emeritus Galyon Gwasda
Matthis Ross Speer Whittaker

Assistant Professors Armay Berg Cortes
Dulfeimeyer Goodwin Gehlherfeld Honeycutt
LaWare Lewis Miehe Winkel

Assistant Professors (Adjunct) Betcher R Payne
Valleri

Assistant Professors (Emeritus) Kaufman McCully

Instructors (Adjunct) Anderson Barratt Bassis
Brown Douglas L Hagga Langenberg Mahoney
Morgan Myers Noland Regenold Schmid
Shivvers

Lecturers Benner Demary DeWall Gdhurst
McDough Messenger Minkler Schabel Tremmel
Thornburg

Undergraduate Study
The department offers a wide variety of courses for students seeking a degree in English or Technical Communication as well as for students wishing to broaden their general education. Offerings include classes in introductory college writing, literature film, creative writing, rhetoric and professional communication. Technical communication English education linguistics and teaching English as a second language applied linguistics.

The discipline of English helps to develop students understanding of how language functions in literature mass media and both personal and professional writing. Students not pursuing an English or Technical Communication major may select English courses to fulfill electives to pursue a minor or to complement their training in other majors.

Graduates majoring in English will possess a broad based knowledge and understanding of the discipline. They will also understand their particular disciplinary specialization whether it be literary studies rhetorical studies teacher education creative writing or teaching English as a second language applied linguistics.

Graduates in Technical Communication will learn how to communicate scientific and technical information through coursework both in English and in scientific and technical fields. Graduates in either major will be able to write well organized well reasoned essays that demonstrate their ability to read and think critically.

Introductory writing courses in the department are designed to improve the skills in communication and reading comprehension necessary for successful university work.

Through the Intensive English and Orientation Program the department offers special courses in English for both undergraduate and graduate students who are native speakers of other languages. Students who graduate with a major in English often enter fields that require special communication skills such as publishing public service research business and technical writing or human resources.

An undergraduate major in English can be a solid basis for the professional study of law medicine theology or business management. Students in English Education can qualify to teach English in middle or high school. (See Index Teacher License) English majors may also pursue graduate studies in a number of communication related fields.

Careers for Technical Communication Majors Students who graduate with a major in Technical Communication will be prepared for careers in scientific and technical writing and editing. They will typically seek positions in companies or nonprofit organizations in communication based units of local state and federal government. In the documentation units of software developers or publishers or in areas of design and communication consulting. Technical Communication majors may also pursue graduate study in rhetoric and professional communication or other communication related fields.

English Major Requirements

English majors choose one of three programs of study. Literary Studies Rhetorical Studies or English Education. Students interested in creative writing typically choose Literary Studies as a program of study. English majors are required to take in addition to first year composition at least 36 credits in English those in English Education must have 48 credits in English in addition to required teaching related courses taken in other departments. English majors transferring from other institutions must take at least 18 of their credits in English while in residence at Iowa State.

To graduate with a major in the English Department a student must earn at least a C (not a C) in English 104 and 105 as well as in each of the courses taken to fulfill the program of study. Earning at least a C in first year composition and in one advising writing course also meets the departmental English proficiency requirement.

Finally all English majors must take at least one pre 1800 literature course and one pre 1900 literature course.

Distributed Requirements

All English majors must take at least one course in writing for each of the following subjects:

Rhetoric

English 350 Rhetoric and the History of Ideas
English 300+ Rhetoric and Professional Communication
English 418 Argumentative Writing
English 400+ Rhetoric and Professional Communication

Advanced Study Requirements

Each program of study has its own requirements for advanced work.

Literary Studies

English 339 Literary Theory
English 360 English Elective
English 440 463 Literature Seminars

Rhetorical Studies

English 350 Rhetoric and the History of Ideas
English 300+ Rhetoric and Professional Communication
English 418 Argumentative Writing
English 400+ Rhetoric and Professional Communication

English Education

English 219 Intro to Linguistics
English 300+ English Literature Elective
English 339 Literary Theory
English 392 Practice & Theory of Teaching
English 420 History of the English Language
English 494 Prac & Theory of Teaching Literature in the Secondary Schools

There are a number of other course requirements outside of English for English Education majors. These requirements may overlap with General Education requirements for the college.

C 1 201 Instructional Media
C 1 204 Social Foundations of American Education
3
C 1 280 A Pre-Student-Teaching Experience 4
C 1 466 Freshmen Gender Fair Education
3
C 1 415 Senior Seminar R
C 1 426 Principles of Secondary Education 3
Eng 417 Student Teaching 16
Cl 1 35 World Literature
3
Psyc 230 Developmental Psychology
3
Psyc 3 33 Educational Psychology
3
Hist or Pol S American History or Government
3
Sp Cm 2 12 or Thre 3 50 Health Dance Safety or Exercise or Sport Science
1

Technical Communication Major Requirements

Technical Communication majors must take 43-45 credits within the major as well as 18 credits in a declared minor or concentration in a technical field.

Majors develop advanced skills in multiple aspects of technical communication and apply their knowledge of technical communication to a specific discipline.

Theory and History

Engl 3 10 Rhetorical Analysis
3
Engl 3 50 Rhetoric and the History of Ideas
3
Engl 4 11 Technology Rhetoric and Professional Communication or

Engl 4 12 Rhetoric in Organizational Culture
3

Linguistics and Literature

Engl 2 19 Introduction to Linguistics
3
Engl 2 20 Descriptive English Grammar
3
200 or 300 level literature course
3

Principles Practices and Technologies

Engl 2 13 Computers in the Study of English
3
Engl 3 34 Technical Communication
3
Engl 4 16 Visual Aspects of Business and Technical Communication
3
12 additional credits at least 9 at 400 level from Engl 3 39 Engl 4 10 Engl 4 13 Engl 4 14 Engl 4 15 Engl 4 18

Communication Elective

Engl 4 87 Internship 13
Declared Minor or Concentrated Study in a Technical Field

35-18

Declared minor in a scientific or technical field or where no official minor exists a concentrated study in a scientific or technical field approved by the English department.

Minors and Second Majors

English majors are encouraged to seek a minor or a second major to complement their English studies. To find out the requirements for particular majors or minors consult the section in this bulletin relating to the department offering the major or minor. Students in English Education are particularly encouraged to acquire second specialization in another teaching area. Consult ISU's certification officer in the College of Education for a list of lower certification requirements in various subject areas.

Degree Choices

English majors may earn a bachelor of arts or a bachelor of science degree. Technical Communication majors may earn a bachelor of science degree only. For English majors, the b s degree requires an extra 12 credits beyond the general education requirements; these credits must be taken in linguistics, natural sciences, mathematics, social science, or selected courses in Exercise and Sport Science.

English Minor Requirements

The department offers a minor in English which students may earn by completing at least 18 credits in English courses beyond the 100 level. A student earning an English minor must take 9 of the 18 credits at the 200 level or above and must earn a grade of C or better in each course taken in the minor. No specific courses need be taken; students may design their minor programs around their own interests.

Technical Communication Minor Requirements

The department offers a minor in Technical Communication which students may earn by completing 18 credits in Technical Communication courses. E from Theory and History and 12 from Principles Practices and Technologies. At least 9 of these credits at the 300 level or above and students must earn a grade of C or higher in each course taken in the minor. Although students may design their minor programs around their career interests, they are encouraged to work with a departmental adviser in Technical Communication.

Departmental Awards and Scholarships

Each spring the English department offers many scholarships and awards for both undergraduate and graduate students. Some undergraduate awards are for returning English and Technical Communication majors only. Others are for returning students of any major demonstrating excellence in some aspect of English or Technical Communication. A list of current awards and application forms is available in the Advising Office 306 Ross Hall for undergraduate students and in the Graduate English Office 403 Ross for graduate students during the second February. Award winners are announced each year on May 1 or shortly before.

Other Programs Associated with English

The English Department participates in interdepartmental programs in African American Studies, American Indian Studies, Latin American Studies, Asian American Studies, Theatre and Women's Studies. (See the Index for requirements for these interdepartmental programs.)

Graduate Study

The master of arts degree programs in English and TESL/Applied Linguistics offer various possibilities for the advanced study of writing, literature, and linguistics. Students are admitted to one of three areas of specialization for the M A in English creative writing, literature and rhetoric, and professional and technical communication. These areas of specialization are designed to prepare students for teaching at the secondary college level, in beginning college and university levels for graduate student in language and literature for creative writing or for technical writing. Business communication, editing, and professional writing. Students can be admitted to one of the optional specializations for the M A in TESL/Applied Linguistics: Computer Assisted Language Learning (CALL) Language Assessment, English for Specific Purposes (ESP): Literacy, and Language in ESL.

The master's degree requires 30 semester credits including a thesis or project, 12 credits of literature specialization of the M A in English and the M A in TESL/Applied Linguistics have language requirements that may be met through a number of options including previous foreign language study, graduate linguistics, English as a second language, or special test required in a test-out exam. A student whose native language is other than English is considered to have met the language requirement after satisfying the Graduate College English requirement.

The Ph D in rhetoric and professional communication (RPC) focuses on the theory of rhetoric and the practice of writing that take place in professional communities such as business and government. The degree qualifies graduates for academic positions in rhetoric and in business and technical communication as well as for work in the professional sector as writers and editors. Professional and communications production managers. Prospective students must first secure admission to the graduate study program through the Department of English. Candidates for the degree are required to complete 72 hours of graduate credit and a dissertation and pass a portfolio examination. Preliminary examination consisting of a comprehensive examination and an special field examination and an oral defense of the dissertation.

The department offers graduate students an opportunity to gain professional experience through professional writing internships selected departmental research activities and the intensive English and Orientation Program. The First Year Composition Program and the Interpersonal and Rhetorical Communication Program. Teaching and research assistantships are available for qualified graduate students. Teaching assistants are responsible for teaching with faculty supervision in first-year composition classes. In public speaking in English as a second language and in business and technical communication. Research assistantships are assigned to individual faculty members, participating in projects in writing English or literature. One or more Peer Högrefe Fellowships are awarded each year to outstanding graduate students. Several Fredrick Honors Graduate Teaching Fellowships are available to first year PhD students. Miller Fellowships are also available to highly qualified PhD students.

With prior written approval from the College of Education, students may take English courses to meet part of the requirements for certification to teach English in two-year and community colleges. Selected courses may also be used to meet requirements for ESL endorsement.

A graduate minor in English at the M A level requires 9 credits of English 6 of which must be in 500 or 600 level courses. A graduate minor in English at the Ph D level requires 12 credits of English 9 of which must be in 500 or 600 level courses.

Courses open for nonmajor graduate credit: 302 309 313 314 315 316 335 340 345 346 347 348 357 358 391 410 411 412 413 414 415 416 418 420 422 425 440 441 450 451 452 453 460 461 463 469

Courses Primarily for Undergraduate Students

Engl 101 English for Native Speakers of Other Languages FS Prereq Recommendation of the English Department. Full-time study of English for speakers of other languages. Although available from the IEOP Office 307 Ross Hall, only on a limited basis.

Engl 101 English for Native Speakers of Other Languages FS Prereq Recommendation of the English Department. Placement in various sections is determined by examination. (See English Requirement for International Students in Index.) For undergraduates. Completion of English 101 requirement prepares students for English 104 for graduates.

Completion of English 101 satisfies the English requirement of the Graduate College. English 101 courses are for students who are nonnative speakers of English. Credit from 101 does not count toward Graduate College B Academic English I—Cr 3 Available P/NP to graduate students at the department's option.

Academic English II—Undergraduates Cr 3 Available P/NP to graduate students at the department's option.

L Strategies for Learning Cr 2 Available P/NP to graduate students at their department's option.

R Strategies for Reading Cr 1 Available P/NP to graduate students at their department's option.

Engl 104 First-Year Composition I II 3 Cr 3 FS SS Introduction to college level writing strategies with emphasis on critical reading and thinking skills. Six to eight major writing assignments with readings from a variety of sources.

Engl 105 First-Year Composition II III 3 Cr 3 FS SS Prereq from 104 or exemption from 104. Credit for or concurrent enrollment in Lib 180 Development of college level writing strategies with emphasis on argumentation analyzing texts and using primary and secondary sources. Five to seven major writing assignments.

Engl 105 Honors First-Year Composition, Honors 3-0 Cr 3 FS SS Prereq from 104 and admission to Freshman Honors Program. Credit for or concurrent enrollment in Lib 180. A rhetorical approach to topics in language literature and culture. Reading and writing assignments may be organized around a course theme or focus. Writing intensive.
Eng 180 Communication Skills for International Teaching Assistants (Same as USt 180) Cr 1 to 3 FS Placement based upon SPEAK/TEACH test results. Persons whose native language is English cannot take 180 for credit. No more than one section of 180 may be taken per semester up to two sections total. Credit does not apply toward graduation. Offered on a satisfactory-fail grading basis only.

A. Speaking Skills
1. Emphasis on pronunciation improvement and greater fluency in spoken English for teaching purposes
2. Intermediate Spoken English Cr 3
3. Advanced Spoken English Cr 3 For students who have completed 180 or 188 but have not reached the passing level on the SPEAK/TEACH test

B. Presentation Skills
1. Developing explanations, leading discussions and handling questions in a teaching environment

C. Supervised Independent Study
1. Cr 1 Seminar with individual observation and consultation

Eng 199 Introduction to the Study of English (2-0) Cr R FS 8 weeks. General introduction to the discipline discussion of the various fields in English consideration of career opportunities. Offered on a satisfactory-fail grading basis only.

Eng 201 Introduction to Literature (3-0) Cr 3 FS Prereq Credit in or exemption from 104. Study of selected works of modern and contemporary literature. Emphasis on the critical approaches to the integral text.

Eng 205 Popular Culture Analysis (Same as So Cm 205) Cr 3 FS Prereq Credit in or exemption from 104. Analysis of how information and entertainment forms persuade and manipulate audiences. Study of several forms that include newspapers, speeches, television, film, advertising, fiction and magazines. Special attention to verbal and visual devices.

Eng 207 Introduction to Creative Writing (3-0) Cr 3 FS Prereq Credit in or exemption from 104. Course introduces students to the fundamentals of writing fiction, poetry and creative non-fiction. Extensive readings in all three genres. Students learn creative processes through writing exercises, workshops and conferences.

Eng 213 Computers in the Study of English (3-0) Cr 3 FS Prereq 105. Introduction to the role that computers play in English studies. Use of discipline specific databases applications and online resources. Theoretical and practical understanding of online environments and management of research and writing procedures. Work with computer applications for writing, editing, imaging and World Wide Web site development. Study of the impact of cybercultural practices on the discipline of English.

Eng 219 Introduction to Linguistics (Same as Ling 219) Cr 3 FS Prereq Sophomore classification. Introduction to linguistic concepts and principles of linguistic analysis with English as the primary source of data. Sound and writing systems, sentence structure, vocabulary and meaning. Issues in the study of usage, regional and social dialects, language acquisition and language change.

Eng 220 Descriptive English Grammar (Same as Ling 220) Cr 3 FS Prereq 105. Overview of grammatical structures and functions. Parts of speech, phrase, clause and sentence, structure, sentence types and sentence analysis. Theoretical grammar and sentence style terminology. Not a remedial English composition or ESL course.

Eng 230 Readings in British Literature and Culture (3-0) Cr 3 FS Prereq Credit in or exemption from 104. Selected literary texts read in the context of important trends and ideas.

Eng 231 Readings in American Literature and Culture (3-0) Cr 3 FS Prereq Credit in or exemption from 104. Selected literary texts read in the context of important trends and ideas.

Eng 237 Survey of Film History (3-0) Cr 3 FS Prereq Credit in or exemption from 104. A survey of the history of film both as a U.S. and international art form in the late nineteenth century to the present.

Eng 240 Introduction to American Indian Literature (Same as Am In 240) Cr 3 FS Prereq Credit in or exemption from 104 Basic principles of literary study. Emphasis on or interpretation and critical essays. Particular attention to poetry designed for English majors.

Eng 301 Cultural Studies (3-0) Cr 3 Each time taken maximum of 9 FS Prereq 105 Literature and related arts and cultural phenomena. Focus on a specific group subgroup identity and culture or phenomenon. Selected texts. Art and cultural experiences.

Eng 302 Business Communication (3-0) Cr 3 FS SS Prereq 105 junior classification. Theory and principles of effective written communication. Emphasis on a variety of formats, including business letters, memorandums, reports, and personal letters. The course is designed for students in business, management and marketing.

Eng 303 Free Lance Writing for Popular Magazines (3-0) Cr 3 S Prereq 105 not open to freshmen. Practical workshop in writing nonfiction articles for popular magazines. Emphasis on writing market research preparation of manuscripts methods of submission. Major goal of the course is production of marketable material.

Eng 304 Creative Writing—Fiction (3-0) Cr 3 FS Prereq 105. Not open to freshmen. Progresses from practice in basic techniques of short fiction writing to fully developed short stories. Emphasis on writing, analytical reading, workshop criticism and individual conferences.

Eng 305 Creative Writing—Nonfiction (3-0) Cr 3 FS Prereq 105. Not open to freshmen. Workshop in writing imaginative essays both critical and personal. Analytical reading development of literary techniques and individual and small group conferences.

Eng 306 Creative Writing—Poetry (3-0) Cr 3 FS Prereq 105. Not open to freshmen. Progresses from traditional to contemporary forms. Emphasis on writing, analytical reading, workshop criticism and individual conferences.

Eng 307 Writing Young Adult Fiction (3-0) Cr 3 S Prereq 105. Not open to freshmen. Workshop in writing and reading short stories that explore coming of age themes. Emphasis on coming of age literature and as well as the craft and technique of short fiction. Individual and group story conferences.

Eng 309 Report and Proposal Writing (3-0) Cr 3 FS Prereq 105 junior classification. Introduction to the theory and practice of preparing and analyzing reports and proposals intended for businesses, government agencies, and private and corporate foundations. Individual assignments and group projects include text documents and oral presentations. Non-major credit.

Eng 310 Rhetorical Analysis (3-0) Cr 3 FS Prereq 105. Fundamental principles of rhetorical criticism. Focus on selected works for analyzing cultural texts including essays and films. Analysis of historical, scientific and media texts. Emphasis on identifying artifacts, formulating research questions and designing methodology.

Eng 313 Writing for the World Wide Web (3-0) Cr 3 FS Prereq 105 Rhetorical principles of hypertextual writing and publishing. Group and individual projects using Hyper Text Markup Language to construct interactive sites for the World Wide Web. Special emphasis on business and technical applications. Non-major graduate credit.

Eng 314 Technical Communication (3-0) Cr 3 FS SS Prereq 105 junior classification. Theories principles and processes of effective written communication development of the technologies of the future. Emphasis on the methods for composing technical documents and the impact of digital technologies on design, readability, and technical writing. Attention to the major strategies for composing technical documents and design and writing situations and for organizing data and information. Honors Non-major graduate credit.

Eng 316 Creative Writing—Playwriting (Same as Thrr 316) Cr 3 S Prereq 105. Not open to freshmen. Progresses from production of scenes to fully developed one act plays. Emphasis on action staging writing analytical reading workshop criticism and individual conferences. Non-major graduate credit.

Eng 330 Science Fiction (3-0) Cr 3 FS Prereq 105. Development of science fiction from its origins in nineteenth-century fantastic fiction to present. Emphasis on reading protocols developed through Golden Age of the Silver Age and post-1970s fiction.

Eng 335 Film (3-0) Cr 3 Each time taken maximum of 9 FS Prereq 105. Principles of film art and the traditional vocabulary of literature as applied to film influence on modes of thought and behavior. Non-major graduate credit.

Eng 339 Literary Theory and Criticism (3-0) FS Prereq 105. Development of science fiction from its origins in nineteenth-century fantastic fiction to present. Emphasis on reading protocols developed through Golden Age of the Silver Age and post-1970s fiction.

Eng 340 Survey of Women's Literature (Same as WS S 340) Cr 3 FS Prereq 105. Historical and thematic survey of literature by and about women. May include autobiography, journals, letters, poetry, fiction and drama. Non-major graduate credit.

Eng 344 U.S. Latino/a Literature (3-0) Cr 3 S Prereq 105. An introduction to the literature of Mexican Americans, Puerto Ricans, Cuban Americans, and other Latino/a subgroups. Special emphasis on themes such as ethnic relations and comparisons with European American literary traditions.

Eng 345 Women and Literature: Selected Topics (Same as WS S 345) Cr 3 Each time taken maximum of 9 FS Prereq 105. Literature by and/or dealing with the images of women as study of individual authors or related schools of authors. Emphasis on specific themes in women's literature analysis of recurrent images of women in literature. Non-major graduate credit.

Eng 346 American Indian Literature (Same as Am In 346) Cr 3 S Prereq 105. Survey of Literature by Native Americans from pre-Columbian tales and songs to contemporary novels and poetry. Non-major graduate credit.

Eng 347 Survey of African American Literature (Same as Am In 347) Cr 3 FS Prereq 105. An introduction to the literature by African Americans from the beginning to the 1960s. Non-major graduate credit.

Eng 348 Contemporary African American Literature (Same as Am In 348) Cr 3 FS Prereq 105. An introduction to the literature by African Americans from the present to the present. Non-major graduate credit.

Eng 349 Selected Topics in Multicultural Literatures of the United States (3-0) Cr 3 Each time taken maximum of 9 FS Prereq 105. Literature by writers from U.S. multicultural groups. May include literature of several groups or focus upon one of the following: Asian American, Latino/a American, African American, Latin/o American, American Indians. Non-major graduate credit.
Engl 539 Poetry (3) Cr. 3 each time taken maximum of 6 Alt S offered 2004 Prereq 6 credits in literature Selected English considered in representative groups Some emphasis on 20th-century poets and poets

Engl 540 Drama (3) Cr. 3 each time taken maximum of 6 F Prereq 6 credits in literature Primary texts in dramatic genres from various literary periods in critical and cultural contexts Frequently considered in English Renaissance and the Shakespearean stage

Engl 541 Autobiography Biography Memoir (3) Cr. 3 each time taken maximum of 6 Alt S offered 2004 Prereq 6 credits in literature Study of lifewriting e.g. autobiography biography memoir cross genre writing autobiographical criticism Readings may be arranged by period nationality or subgenre e.g. autobiography of childhood experience celebrity autobiography

Engl 544 Multicultural U.S. Literatures (3) Cr. 3 each time taken maximum of 6 Alt S offered 2005 Prereq 6 credits in literature Primary texts by U.S. multicultural writers Development of U.S. literary traditions discourse of race and gender counter storytelling myths of origin phases and movements within the national literary canon Readings in several genres

Engl 545 Women's Literature (Same as W S 545) (3) Cr. 3 each time taken max. of 6 Alt F offered 2004 Prereq 6 credits in literature Primary texts by women writers thematic formal or thematic approaches secondary readings e.g. Nineteenth Century Women Writers American Women's Personal Narratives Southern Women Writers and of the U.S.

Engl 546 Issues in the Study of Literature (3) Cr. 3 each time taken maximum of 6 Alt S offered 2005 Prereq 6 credits in literature Intensive study of current and emerging topics and problems concerning literature and its relationship to theory and to language study e.g. Theory of Metaphor Renegotiating the Canon Feminist Theory

Engl 547 The History of Rhetorical Theory I: From Plato to Bacon (3) Cr. 3 F Prereq 6 credits in English Rhetorical theory from the classical period of ancient Greece and Rome through the Middle Ages and the Renaissance attention to its relation to communication and pedagogy

Engl 548 The History of Rhetorical Theory II: From Bacon to the Present (3) Cr. 3 S Prereq 6 credits in English Rhetorical theory from the early modern period (Bacon Descartes and Locke) to the present attention to its relation to communication and pedagogy

Engl 553 American Literature to the Present (3) Cr. 3 each time taken maximum of 6 Alt F offered 2003 Prereq 6 credits in literature Selected texts in American literature from the Civil War to the present Study may include Realism Naturalism Modernism and Postmodernism with significant attention to race/gender and identity and to contemporary critical views Range of authors and genres

Engl 555 Advanced Imaginative Writing The Long Project (3) Cr. 3 each time taken maximum of 12 Prereq Enrollment in the English M A Program Individual long creative writing project ideas developed in course Portions of long creative writing project workshops revised discussed in conferences

Engl 556 Advanced Imaginative Writing Fiction (3) Cr. 3 each time taken maximum of 12 Prereq Graduate classification Individual projects in short fiction on a workshop and conference basis Readings in short fiction Discussion of elements of narrative such as plot point of view characterization theme setting

Engl 557 Studies in Creative Writing (3) Cr. 3 each time taken maximum of 12 Prereq Graduate classification Specialization不限妥Creative Writing issues and techniques in creative writing Subject matter may include generic aspects of the creative writing process or themes of particular interest Significant readings and written work required previous workshop experience helpful

Engl 558 Teaching Creative Writing (3) Cr. 3 Prereq Graduate classification Pedagogical approaches that are effective for grade school through adult education creative writing teaching Writing exercises workshops text evaluation and visits from creative writers

Engl 559 Creative Writing/Teaching Internship (1 to 3) Prereq Concurrent enrollment in an 858 permission of participating instructor Students assist in an introductory creative writing class Some supervised teaching but mainly evaluation of submissions and individual conferences Requirements and grades determined by participating instructors

Engl 563 Writing Manuals and Instructional Materials (3) Cr. 3 Alt S offered 2005 Prereq A course in business or technical communication Application of rhetorical strategies to analysis and design of print and online instructions Principles and processes for developing business and technical manuals

Engl 564 Editing Principles and Practice (3) Cr. 3 Alt S offered 2004 Prereq 567 Principles of technical editing in business scientific and professional fields Emphasis on policymaking project management and methodology Both group and individual editing projects involving diverse fields audiences and formats

Engl 568 Visual Communication in Professional Writing (3) Cr. 3 Alt F offered 2003 Prereq A course in business or technical communication Rhetorical theory and research in graphics document design and related principles of visual communication Methods of designing text data displays illustrations and other visual elements in business and technical communication

Engl 567.1 University Business Technical and Professional Communication (3) Cr. 1 to 3 each time taken maximum of 8 S Prereq 507 plus 3 additional graduate credits in business and technical writing or composition and rhetoric permission of instructor Limited to master's and doctoral degree candidates in the English Department An opportunity to write edit design business and technical documents in a professional setting Projects include recommendations manuals brochures newsletters

Engl 568 Supervised Practicum in Teaching English as a Second Language (1 to 3) Cr. 3 FS Prereq 15 credits toward the TESL/English masters degree Observational experience of ESL instruction and supervised practice in teaching learners of English in a context appropriate to the practicum student's goals Seminar discussion of observed practices in relation to language teaching theories and methods

Engl 590 Special Topics (Var Prereq Permission of the Graduate Studies Committee according to guidelines available in the department office A Literature B Teaching English as a Second Language TESL/English linguistics same as Ling 590B C Composition and Rhetoric D Rhetoric and Professional Communication F Creative Writing

Engl 591 Studies in Applied Linguistics (Same as Ling 591) (3) Cr. 3 each time taken maximum of 6 Prereq 6 credits in TESL/linguistics Intensive study of advanced applied linguistic theory as it relates to specific issues in language acquisition teaching use

Engl 592 Studies in Rhetoric and Professional Communication (3) Cr. 3 each time taken maximum of 9 Prereq 12 hours in rhetoric linguistics or literature excluding 104/105 Seminar on selected topics in rhetoric and professional communication or composition
mosquito abatement agents, inspectors, and research aides. Entomologists may also find employment with urban or agricultural pest management or consulting firms, large private farms and ranches, and horticultural nurseries.

All graduates understand the principles of insect structure and function. They understand the evolutionary and ecological relationships of insects with other life forms and the impact of insects relative to human and animal health, as well as the relationships between insects and humanity’s food fiber, structural, and aesthetic needs and expectations. Graduates understand the principles and methods available to manage beneficial and pest insect populations. They are skilled in identifying insects and related groups and understand the biology, ecology, behavior, and diversity of the major groups of insects. They understand the application of the scientific method in problem solving and the principles of experimental design and analysis. Graduates are able to communicate research and educational materials properly and competently orally and in writing and are able to work effectively with others.

Grades of the agricultural and horticultural insect management option are skilled in determining pest levels and impact on plant and animal hosts and the management of insect pests. They understand the environmental, legal, and ethical issues involved in insect population management.

Graduates of the insect biology option have achieved an understanding of the biochemical and physiological processes governing insect metabolism and growth. They understand the evolutionary and ecological significance of insects and the role they play in the biochemistry of the ecological sciences. Assuming good academic performance, graduates of this option are prepared to enter graduate or professional school.

Entomology participates in the interdepartmental undergraduate majors in plant health and protection and in integrated pest management.

The department offers a minor in entomology that may be earned by completing 370, 374, 376, and 6 credits in courses selected from an approved list supplied by the department.

A preprofessional program is available in entomology.

Graduate Study

The department offers work for the degrees of master of science and doctor of philosophy with a major in entomology or toxicology. Within the entomology major, the student may concentrate in aquatic entomology, biocological chemistry, genetics, forest entomology, host plant resistance, medical/veterinary entomology, morpho-biology, pathogen management, physiology, population ecology/gene systems, or insecticide toxicology.

Graduates have a broad understanding of entomology and related disciplines and an in-depth command of their area of concentration. They are able to communicate effectively with scientistic colleagues and the general public in both formal and informal settings. Graduates are able to address complex problems facing entomology or toxicology professionals, taking into account related ethical, social, legal, economic, and environmental issues. They are skilled in research methods, data analyses, and interpretation of results. They are also skilled in working effectively with colleagues and writing concisely and persuasively grant proposals. They have an understanding of and can critically evaluate current entomological literature.

Requirements to the entomology major and minor graduate programs in the department are completion of at least two years of zoological courses for part of which credit in other closely allied biological sciences may be substituted. Specific course requirements for advanced degrees depend partly upon previous training and experience in the major field of specialization.

Any student receiving the M.S. in entomology shall have at least one course in insect physiology, one course in insect systematics, two courses of Ent 590 selected from topics A through D, F through I, and N inclusive, and 1 credit of Ent 600. Any student receiving the Ph.D. in entomology shall have at least one course in insect physiology, one course in insect systematics, four additional courses of Ent 590, and a credit of Ent 600. In addition, Ph.D. students majoring in Entomology or Toxicology shall have two semesters of teaching experience taken as Ent 590K both semesters of Ent 590K one semester and Ent 590L the other semester.

Entomology participates in the interdepartmental majors in ecology and evolutionary biology and genetics and in the interdepartmental major in toxicology (see index).

The Federal Corn Insects and Crop Genetics Research Unit and the Central Plant Introduction Station are available for advanced study in certain phases of entomological research.

More information about the department such as current research faculty resumes, physical facilities and graduate students can be viewed on the department's world wide web page.

Courses open for non-major graduate credit: 370, 372, 374, 376, 483, 493.

Courses Primarily for Undergraduate Students

Ent 110 Technical Lecture (1-0 Cr F) Orientation to areas of and opportunities in entomology.

Ent 201 Introduction to Insects (1.0 Cr) 1 FS 5S weeks. Classroom section spring only: World Wide Web section of course offered all semesters. Obrzycki, Van Dyk. Biological and ecological aspects of insects.

Ent 211 Insects and Society (3.0 Cr) 2 FS 11 weeks. Classroom section spring only: World Wide Web section offered all semesters. Pereg 201 Holtzsch/Holscher. Biological and ecological aspects of insects.

Ent 212 Livestock Entomology (3.0 Cr) 1 S 5S weeks. Pereg 201 Holtzsch. Overview of the biology, ecology, and economic importance of the insects that affect livestock production.

Ent 214 Ecologically Based Management of Horticultural Pests (3.0 Cr) 1 F 5S weeks. Pereg 201 Obrzycki. Overview of ecologically-based management of pest and beneficial insects in horticultural crops.

Ent 283 Pesticide Applicator Certification (Same as Agronomy 283, Horticulture 283, IPM 283). (2.0 Cr) 2 S. Holscher. Core background and specialty topics in agricultural forestry and horticultural pesticide applicator certification. Students select certification categories and are eligible for pesticide applicator certification upon completion of course. Commercial certification emphasized.

Ent 340 Insect Behavior (Dual listed with 560) (3.0 Cr) 3 S 5S Prereq: Blod 202. Baker The mechanisms underlying the behavior of insects. Emphasis on neuroendocrinology and evolutionary bases of insect orientation, reproduction, feeding, oviposition, defense, learning, and sociality.

Ent 370 Insect Biology (2-3 Cr) 2 F Prereq 109 or 201 Jurekaj Structure, physiology, evolution, behavior, life histories, and recognition of insects. Collection required. Voluntary field trips. Nonmajor graduate credit.

Ent 3711 Introduction to Insect Ecology (Same as IS 3711). See Iowa Lakeside Laboratory.

Ent 372 Livestock Entomology (2.0 Cr) 1 Alt S offered 2005. ICN and Videotape sections. 12 weeks. Holtzsch/Blod Recognition behavior and behavior: economic importance and management of insects and other arthropods affecting livestock and poultry production. Nonmajor graduate credit.
Entomology 2003-2005

Ent 374 Insects and Our Health (Same as Biol 374) Micro 374 (3) 0 Cr 3 S Prereq 3 credits in biological sciences Rowley Identification biology and significance of insects and arthropods that attack people and animals, particularly those that are vectors of disease. Nonmajor graduate credit

Ent 375 Plant Protection Using Natural Enemies (Dual listed with 575) (3-0) 3 Cr 3 Alt S offered 2004 Prereq 370 or 376 Bonning. Obrycki. Overview of the biology ecology, and classification of insect pathogens, predators, and parasites. Discussion of the use of these organisms in plant protection including an emphasis on genetic alteration of natural enemies.

Ent 376 Fundamentals of Entomology and Pest Management (Same as P M 376 and PI HP 376) (2-3) 3 Cr 3 Prereq Biol 109 or 201 Tollison. Introduction to entomology and insect pest management including life processes, ecology, economic aspects of population suppression and ecological backwash. Credit for either 375 or 368 but not both may be applied toward graduation. Nonmajor graduate credit.

Ent 386 Management of Insect Pests (2-0) 2 Alt S offered 2004 Prereq Biol 109 or 201 Tollison. Introduction to insects and their life styles. Theory and application of pest-management practices. Examples drawn primarily from field crops. Nonmajor graduate credit. Credit for either 375 or 368 but not both may be applied for graduation.

Ent 425 Aquatic Insects (Dual listed with 525 same as a E E 424) (3-2) 3 Alt S offered 2005 Prereq Biol 312 or equivalent. Courtyard morphology ecology, diversity, and significance of aquatic insects with emphasis on the collection identification and taxonomy of invertebrate streams and lakes.

Ent 452 Integrated Management of Diseases and Insect Pests of Turfgrasses (Dual listed with 552 same as PL P 452) Hort 452 (3) 0 Cr 3 Alt S offered 2004 Prereq Hort 351. Gleason Lewis. Identification and biology of important diseases and insect pests of turfgrasses. Development of integrative pest management programs in various turfgrass environments.

Ent 478 Global Protozoology - Molecular Biology of Protozoa (Dual listed with 578 same as V Pth 478) (See Veterinary Pathology. Graduate credit given for 578)

Ent 483 Wood Deterioration and Preservation (Same as for 483) (See Forestry. Nonmajor graduate credit.

Ent 490 Independent Study (1 to 3 each time taken) Prereq 15 credits in biological sciences. Junior or senior classification. A maximum of 6 credits of 490 may be used toward the total of 12 credits required for graduation.

E Research or work experience.

U Laboratory teaching experience. For students registering to be undergraduate laboratory assistants.

Ent 493 Workshop on Insect Management Cr 1 SS Prereq 370 372 376 or 386 Tollison. Holsher. Insect recognition and sampling will be practiced in agricultural systems. The applications of current pest management practices will be demonstrated in both crop and livestock systems. Nonmajor graduate credit.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students Ent 511 Integrated Management of Tropical Crops (Same as P M 511) (See Plant Pathology.

Ent 525 Aquatic Insects (Dual listed with 525 same as E E 525) (2-3) 3 Alt S offered 2005 Prereq Bio1 312 or equivalent. Courtyard morphology ecology, diversity, and significance of aquatic insects with emphasis on the collection identification and taxonomy of taxa in local streams and lakes.

Ent 530 Ecologically Based Pest Management Strategies. (Same as SusAg 530) (See Sustainable Agriculture.

Ent 550 Pesticides in the Environment. (Same as T ox 550) (2) 2 S Prereq Graduate classification.

Costs Fete and significance of pesticides in soil water plants, animals, and the atmosphere.

Ent 552 Integrated Management of Diseases and Insect Pests of Turfgrasses (Dual listed with 452 same as P L P 552) Hort 552 (3-0) 3 Alt S offered 2004 Prereq Hort 351. Gleason Lewis. Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments.

Ent 555 Insect Physiology (3-3) 3 Cr 4 Prereq 370 Jurek. Life processes of the insects including reviews of current problems in insect physiology and behavior.

Ent 568 Advanced Systematics (Same as Biol 568) See Botany.

Ent 570 Host Plant Resistance to Insects (2-0) 2 Alt S offered 2004 Prereq 370 or 376 Tollison. Principles of insect and host interactions and mechanisms of insect control by host resistance.

Ent 573 Advanced Insect Pest Management (3-3) 3 Cr 4 Alt S offered 2005 Prereq 370 Tollison. Contemporary concepts of insect biology and applications of insect population management.

Ent 574 Medical Entomology (3-3) 3 Cr 4 Alt S offered 2004 Prereq 3 credits in biological sciences. Rowley. Identification biology and significance of insects and other arthropods that attack people and animals primarily those that are vectors of disease.

Ent 575 Plant Protection Using Natural Enemies (Dual listed with 375 i (3-0) 3 Alt S offered 2004 Prereq 370 or 376 Bonning. Obrycki. Overview of the biology ecology, population dynamics, and control of insects including pathogens, predators, and parasites. Discussion of the use of these organisms in plant protection including an emphasis on genetic alteration of natural enemies.

Ent 576 Systematic Entomology (3-0) 3 Cr 5 Alt F offered 2003 Prereq 370. Courtney. Classification distributions and natural history of insects including fundamentals of phyllogenetic systematics biogeography taxonomic procedures and insect collection and curations.

Ent 578 Global Protozoology - Molecular Biology of Protozoa (Dual listed with 578 same as V Pth 578) (See Veterinary Pathology.

Ent 580 Sustainable Agriculture Seminar (Same as An S 580) (See Animal Science.

Ent 590 Special Topics (Cr 1 to 3 each time taken) Prereq 15 credits in zoological sciences. Biological Control and Pathology.

B Chemical Ecology and Behavior.

C Ecology and Pest Management.

D Evolution and Systematics.

E Special Research Topics.

F Medical and Veterinary Entomology.

G Molecular Entomology.

H Morphology and Physiology.

I Toxicology and Biochemistry.

K Teaching Experience.

L Extension internship.

M Immature insects.

N Insect Genetics.

Courses for Graduate Students.

Ent 600 Seminar (Cr 1) 1 SS Presentation of research results.


Ent 675 Insecticide Toxicology (Same as Tax 675) (2) 3 Cr 3 Alt F offered 2004 Prereq 555 or Tax 501. Costs Principles of insecticide toxicology classification mode of action metabolism and environmental effects of insecticides.

Ent 699 Research Cr var.

Entrepreneurial Studies (Interdepartmental Undergraduate Minor).

Supervisory Committee: Howard E. Van Auken (Business) Chair; Draper (Vet Med); Eric O. Hoborg (Ag); Pat Patterson (Engineering); Linda Nehm (Family and Consumer Science); Kate Schwensen (Dental); Peter Orazem (LAS); Roger A. Smith (Education)

Entrepreneurial Studies is an interdisciplinary program that provokes opportunities to students to learn about entrepreneurship—the starting of new business ventures. It serves to complement the student's major area of study whether it be technical, engineering, agriculture, textiles, and clothing or veterinary medicine by offering a means of putting theory and science into practice. The goal of the Entrepreneurial Studies program is to provide the knowledge and skills needed to start and manage new ventures. In addition to feasibility analysis and business planning the program deals with the topics of innovation, technology transfer, industry analysis, and competitive strategy. Although the program introduces some fundamental concepts from accounting, finance marketing and management it does not attempt to substitute for any business courses in those areas.

A minor in entrepreneurial studies is available to all undergraduate students at ISU (Students majoring in the College of Business may major or minor in Management with an option in Entrepreneurship and Strategy and are thus not eligible for the entrepreneurial studies minor). Students must follow college specific rules in selecting courses and must consult with the representative of that college to the Entrepreneurial Studies Supervisory Committee. The college representatives to the supervisory committee will be responsible for advising students in their college and will inform students about the details of the college rules.

Minor: A student seeking a minor in entrepreneurial studies must successfully complete a minimum of 15 credits in courses approved for use in the entrepreneurial studies program including the two required courses Management 310 and 313, Management 310 Entrepreneurship and Innovation: the introductory course and provides an overview of the entire field. Management 313 Feasibility Analysis and Business Planning serves as the capstone course through its emphasis on developing an idea for a new venture conducting a feasibility study researching the potential market analyzing the competition and preparing a formal business plan. Up to six of the 15 credits required for the minor may also be used in the student's required program of study. Interested students should see a representative of the Entrepreneurial Studies Supervisory Committee in the college of their primary major for the list of approved courses.

Environmental Science.

www.enso.iastate.edu

(Interdepartmental Undergraduate Program)

William G. Crumpton, Coordinator.

Environmental Science provides an integrated quantitative and interdisciplinary approach to the study of environmental systems. The magnitude and
EnSc 487 Aquatic and Wetland Microbial Ecology (Same as Bot 487) [Micro 497] 3 Cr 3 S Prereq: 6 credits in biology and 6 credits in chemistry
Crumpton Interfunctional groups of autotrophic and heterotrophic microorganisms and their roles in aquatic and wetland ecosystems. Emphasis on energy flow and nutrient dynamics. Nonmajor graduate credit
EnSc 490 Independent Study Cr Var Prereq: Permission of the instructor and approval of the Environmental Science coordinator
EnSc 495 Current Topics and Case Studies in Environmental Science Cr 1 to 3 each taken maximum of 3 credits S Shultz Current topics and case studies related to the analysis and management of environmental systems. Open to Environmental Science majors only. 48556 include field trips and cooperative group projects to assess environmental problems in heavily impacted landscapes and develop alternative management plans. A 1 (0) Cr 1 each time taken Prereq: Junior classification in Environmental Science B 12 (2) Cr 2 Prereq: Senior classification in Environmental Science

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
EnSc 505I Watershed Modeling and GIS (Same as IA 505I) See Iowa Lakeside Laboratory
EnSc 508I Aquatic Ecology (Same as IA 508I) See Iowa Lakeside Laboratory
EnSc 513I Ecological Toxicology (Same as A Ecl 513 I) See Animal Ecology
EnSc 518I Stream Ecology (Same as A Ecl 518 I) See Animal Ecology
EnSc 535I Restoration Ecology (Same as A Ecl 535 I) See Animal Ecology
EnSc 536I Restoration Ecology (Same as IA 536I) See Iowa Lakeside Laboratory
EnSc 544I Aquatic Toxicology (Same as A Ecl 544 I) See Animal Ecology
EnSc 564I Wetland Ecology (Same as Bot 564 I) See Botany
EnSc 565I Wetland Ecology (Same as IA 565I) See Iowa Lakeside Laboratory
EnSc 584I Ecosystem Ecology (Same as Bot 584 I) See Botany

Environmental Studies

www.envs.iastate.edu
(Interdepartmental Undergraduate Program)
William G. Crumpton Coordinator
The Environmental Studies Program deals with the relationship between humans and nature or between humans and natural systems. The curriculum is designed to give students an understanding of regional and global environmental issues and an appreciation of different perspectives regarding these issues. Courses are provided for students pursuing careers related to the environment and for others who simply want to know more about environmental issues. In addition, students in any college may elect to take a secondary major or minor in Environmental Studies. Additional information is available in the Environmental Programs Office, 131 Bossey Hall

Secondary Major

The Environment: Studies secondary major is taken in addition to one’s first major and provides the breadth of preparation and integrated perspective necessary to understand environmental issues. Students seeking a major in Environmental Studies complete 24 credits of Env S coursework including (1) at least one general survey course chosen from Env S 101 120 121 and 201 (2) at least one integrative/ issues course chosen from Env S 324 340 342 404 424 and 450 and (3) at least two human/social perspectives courses chosen from Env S 362 334 346 360 382 472 482 484 and 491. Beyond these three requirements any Environmental Studies course and up to six credits of approved departmental coursework may be applied toward the 24 credit total for the major. Regardless of their home college, Environmental Studies majors must complete 12 credits of approved coursework in natural science including coursework from life sciences and physical sciences. Since Environmental Studies is a secondary major courses used in the minor may also be used to satisfy general education and other requirements of departments and colleges. A combined average grade of C or higher is required in courses applied to the major.

Minor

Students seeking a minor in Environmental Studies must complete 15 credits in Environmental Studies courses including (1) at least one general survey course chosen from Env S 101 120 121 and 201 (2) at least one integrative/ issues course chosen from Env S 324 340 342 404 424 and 450 and (3) at least one human/social perspectives course chosen from Env S 303 334 345 380 382 472 482 484 and 491. Beyond these three requirements any Environmental Studies course may be applied toward the 15 credit total for the minor. A combined average grade of C or higher is required in courses applied to the minor and the minor must include at least 9 credits that are not used to meet any other department or university requirement. Courses open for nonmajor graduate credit 303 330 334 343 404 407 416 421 461 472 480 482

Courses Primarily for Undergraduate Students

Env S 101 Environmental Geology. Earth in Crisis (Same as Geol 101) [3 Cr 3] Cr 3 or (3) Cr 4. FS Window: an introduction to geologic processes and the consequences of human activity from local to global scales. Discussion of human population growth, resource depletion, pollution, and waste disposal, global warming and ozone depletion, desertification and geologic hazards such as earthquakes, landslides, flooding, and volcanism.


Env S 120 Introduction to Renewable Resources (Same as Agron 120, AST 120, NREM 120) [3 Cr 3 Cr 3] FS Overview of soil water plants and animals as renewable natural resources in an ecosystem context. History and organization of resource management. Cycles of matter. Nonmajor graduate credit.

Env S 123 Environmental Biology (Same as Biol 123) [3 Cr 3] FS Introduction to the structure and functioning of natural systems at scales from the individual to the biosphere and the complex interactions between humans and their environment. Discussion of human effects on biodiversity, sustainability, resource use, and pollution.

Env S 201 Introduction to Environmental Issues (4 Cr 2) FS First 8 weeks. Prereq: Sophomore classification. Ecological and human/social dimensions of environmental issues, how humans and their institutions interact with and affect the environment; human activities are affected by environmental change. Selected issues such as human population growth, loss of biodiversity, and effects of agriculture on the environment.

Env S 293 Environmental Planning (Same as CPR 293) DS CPR 293 [3 Cr 3] Prereq Sophomore classification. Environmental assessment and decision making within the framework of environmental relationships and the efforts being made to organize control and coordinate environmental action and water.

Env S 303 Great Environmental Writings (4 Cr 0) Cr 2 FS Second 8 weeks. Students will read works by such authors as Thoreau, Muir, Leopold, and Abbey Nonmajor graduate credit.

Env S 324 Energy and the Environment (Same as Geol 324) [3 Cr 3] Cr 3 or 3. Renewable and nonrenewable energy resources. Origin, occurrence and extraction of fossil fuels. Nuclear wind and solar energy. Energy efficiency Environmental effects of energy production including air pollution, acid precipitation, and global change.


Env S 334 Environmental Ethics (Same as Phil 334) [2] Cr 2 Second 8 weeks. Prereq: One course in philosophy or junior classification. Thorough study of some of the central moral issues arising in connection with human impact on the environment. e.g., human popula- tion, species extinction, forest and wilderness management, pollution, and control. Several world views of the proper relationship between human beings and nature will be explored. Nonmajor graduate credit.

Env S 340 Biodiversity (Same as Bot 340) [4 Cr 4] Cr 2 Second 8 weeks. Prereq: One course in biology or society classification. clay Survey of the major groups of organisms and their ecological systems. Definition, measurement, and patterns of distribution of organisms. Sources of information about biodiversity. Not intended for major credit in the biological sciences.

Env S 342 World Food Issues: Past and Present (Same as Agron 342) FS HHN 342 T SC 342 U St 342) [3 Cr 3] S Salvador World food problems in context of historical development of agriculture in major cradles of civilization. Emphasis on population trends and socioeconomic policies to understand disparities between potential agricultural production and present distribution in key areas of the developing world. Team projects. Nonmajor graduate credit.

Env S 345 Population Problems and Society (Same as Soc 345) [3 Cr 3] Prereq Soc 130 or 134 Human population impacts on food resources and agricultural productivity. Emphasis on the development of demographic projections for the population of the United States and other societies throughout the world.

Env S 380 Environmental and Resource Economics (Same as Econ 380) [3 Cr 3] F Prereq Econ 101 Natural resource availability use conservation and government policy including energy issues. Environmental quality and pollution control policies.

Env S 382 Environmental Sociology (Same as Soc 382) [3 Cr 3] F Prereq Soc 130 or 134 or Env S 201. Environmental society relations. social construction of nature and the environment. local and environmental impact of resources extract production and consumption environmental inequity. Environmental mobilization and movements. U.S. and international examples.

Env S 390 Internship in Environmental Studies Cr var. Prereq Approval of the Environmental Studies Coordinator. Practical experience with nature centers, government agencies, schools, private conservation groups, and other organizations. Offered on a satisfactory fail grading basis.

Env S 404 Global Change (Same as Agron 404) EnSci 404. M tee 404 [3 Cr 3] Prereq: Courses in physical or biological sciences or engineering. Talkie
Recent changes in global biogeochemical cycles and climate models of future changes in the climate system impacts of global change on agriculture water resources and sustainability ethical issues of global environmental change Nonmajor graduate credit

Env S 407 Watershed Management (Same as NREM 407) (3-0) Cr 4 S Prerequisites A course in general biology Mangesing human impacts on the hydrologic cycle Field based course based on management practices for modifying the impacts on water quality quantity and timing are discussed Field project includes developing a management plan using landscape buffers Nonmajor graduate credit

Env S 415 Environmental Studies Seminar (1-0) Cr 1 each time taken Offered on an irregular basis Prerequisites Junior classification and approval of the professor Environmental topics in Environmental Studies Nonmajor graduate credit

Env S 421 Field Seminar (0-0) Cr 1 to 2 Offered on an irregular basis Field trips during semester or break to varied sites of environmental interest in or outside of Iowa preceded by readings lectures and examinations about the areas to be visited Nonmajor graduate credit

Env S 424 Sustainable and Environmental Horticulture Systems (Same as Hort 424 (2-0) Cr 2 F Inquiry into ethical issues and environmental consequences of horticultural cropping systems and production practices Emphasis on production systems that are environmentally sound economically and socially acceptable

Env S 450 Issues in Sustainable Agriculture (Same as Agron 450) (2-0) Cr 2 F Salvador Agroecological agriculture a science as a human activity contemporary agricultural issues from an ecological perspective Comparative analysis of intended and actual consequences of development and industrial agricultural practices

Env S 461 Introduction to GIS (Same as la LL 461) See Iowa Lakeside Laboratory Nonmajor graduate credit

Env S 472 American Environmental History (Same as Hist 472 (3-0) Cr 3 F Prerequisites Sophomore classification Taylor Conceptual approach to human history in North America by examining the impact of nature from precontact through the 20th century Explores material interactions intellectual roles aesthetic relationships and management strategies from aboriginal society through the environmental age Nonmajor graduate credit

Env S 480 Introduction to Environmental Planning (Same as la LL 480) See Iowa Lakeside Laboratory Nonmajor graduate credit

Env S 482 Environmental Politics and Policies (Same as Pol Sci 482 (3-0) Cr 3 F Prerequisites 3 credits in Political Science or 3 credits in Environmental Studies junior classification Major ideologies related to conservation and ecology Processes participants and institutions involved in national and global environmental policymaking Case studies of environmental controversies and proposals for policy reform Nonmajor graduate credit

Env S 484 Sustainable Communities (Same as C R P 484 Dru S 484 (3-0) Cr 3 S Prerequisites Senior status The theory and application of sustainability to the physical and social planning of communities We will examine environmental ethics as a basis for sustainability the history of the idea itself and the movement toward indicators as outcome measures in the U S and internationally We then explore how these ideas have been or might be applied in communities here and abroad

Env S 490 Independent Study Cr var Prerequisites Permission of instructor and approval of Environmental Studies coordinator

Env S 491 Environmental Law (Same as CRP 491 Dru S 491 (3-0) Cr 3 S Prerequisites 6 credits in natural sciences Legal precepts and alternative policies for environmental protection rights to and regulations for uses of water air and land Federal environmental control acts and federal court cases

Family and Consumer Sciences

Master of Family and Consumer Sciences (M F C S )

The College of Family and Consumer Sciences offers a nonthesis degree program designed to enhance the skills of post baccalaureate individuals whose work or family obligations preclude study on the Ames campus Completion of the MFCS degree has permitted many individuals to obtain the credential needed for advancement while continuing their current employment The program is considered to be a professional masters degree and not preparation for further graduate study

Students select either a comprehensive option or a specialization option The comprehensive option can be followed on or off campus and requires 36 credits covering a variety of family and consumer sciences subject matter Off campus courses are offered at several locations via the Iowa Communications Network (ICN) or the World Wide Web (WWW) Specializations are available in Nutrition Dietetics Human Development and Family Studies Foodservice and Lodging Management and Textiles and Clothing In addition students may select a 42 credit specialization in Family Financial Planning (FFP) or a 36 credit specialization in Gerontology The FFP and Gerontology specializations offered in collaboration with six other universities in the Great Plains are exclusive to students enrolled in the Web The FFP program has been approved by the Board of Examiners of the Certified Financial Planner Board of Standards as a program with the competencies required to permit those completing the degree to sit for the CFPE Certification Examination CFPS is a certification mark owned by the Certified Financial Planner Board of Standards

The Program of Study committee in consultation with the student establishes the courses to be taken and the acceptability of transfer credits The major professor is selected from the discipline in which the concentration of coursework will be taken Written and oral final integrative examinations are required in lieu of a thesis or creative component A thesis or creative component could be included on mutual agreement of the student and major professor with approval of the Graduate College

Admission requirements for the MFCS include a bachelor's degree in a family and consumer sciences/ home economics subject area or related disciplines Graduation Record Examination (GRE) scores official transcripts three letters of recommendation a goal statement and graduation in the upper half of class with a bachelor's degree from a regionally accredited U S institution or graduation in the upper 10% of class from a recognized foreign institution Non English speaking international students are required to have a TOEFL score of at least 550 at time of admission

Graduate Certificates

To meet the requirements of the American Dietetics Association for the professional development of registered dietitians graduate certificates are available in Dietetics Community Counseling Dietetics Management and Advanced Medical Nutrition Therapy and Family Financial Planning For detailed information about the certificates contact the Department of Food Science and Human Nutrition or Foodservice and Lodging Management program in the Department of Apparel Educational Studies and Institution Management

For additional information students should contact the CFCS Research and Graduate Education Office 126 MacKay Hall Ames Iowa 50011 MFCS@iastate edu

Undergraduate Study

For undergraduate curricula in family and consumer sciences education and studies leading to the degree bachelor of science see Family and Consumer Sciences Education and Studies

The program offers one curriculum for the bachelor's degree in Family and Consumer Sciences Education and Studies Students in the curriculum choose one of three options Technical Services Educational Services or General Studies General Studies of the teacher licensure option teach in general vocational and occupational programs of family and consumer sciences in middle junior and senior high schools Graduates of the Educational Services option develop implement and evaluate family and consumer sciences programs for intended audiences in a variety of educational settings such as Cooperative Extension Service community agencies community colleges and public school adult education Graduates of the General Studies option may pursue individualized career goals in family and consumer sciences that apply integrative knowledge of family and consumer sciences in diverse careers for domestic and international settings

Admission to all three options is initiated in the course FCEEd 206 In addition students in Teacher Licensure follow program and university procedures for admission to the university teacher education program This program option is approved by the Iowa Department of Education for the preparation of vocational family and consumer sciences teachers For additional teacher education requirements see College of Education

Graduates in Family and Consumer Sciences Education and Studies have a broad understanding of individual and family well being Graduates apply knowledge of family and consumer sciences content in domestic and international professional settings They use research findings to improve the well being of individuals families and communities Due to the integrative and synergistic nature of family and consumer sciences graduates address and act on complex problems confronting individuals families and communities Opportunities are available for obtaining a minor from other departments through careful selection of elective credits and consultation with an adviser For example students pursuing the Educational Services and General Studies options are encouraged to consider obtaining a minor in journalism and mass communications or in one of the subject matter areas of family and consumer sciences such as resource management and consumer sciences or housing and the near environment They also are encouraged to enhance their program by electing additional courses in an area of business Studies in the Teacher Licensure option may choose to add a second teaching area specialization such as middle school health education or coaching
The program offers a minor in educational services in family and consumer sciences. The minor is earned by successfully completing FCEDS 205 306 315 415 and 416. See program for details.

English Proficiency Requirement: C or better in ENG 104 and 105.

Graduate Study
The program offers work for the degrees master of science master of education and doctor of philosophy each with the major family and consumer sciences education. The M.S. degree requires a thesis the M.Ed degree requires a creative component the Ph.D. requires a dissertation. Minors are also available.

Programs for advanced degrees with a major in family and consumer sciences education are tailored to fit the educational background, experience, and professional goals of the student. Areas of study provided by the department include program planning curriculum evaluation, teaching, creative methods, supervision and administration, international education, and development and teacher education. Opportunities are available for strengthening one's background in subject matter in other departments in the College of Family and Consumer Sciences.

Students who complete a graduate program are professional family and consumer sciences educators and teacher educators who foster program planning, implementation, and evaluation at the state and national levels. They are producers and disseminators of research and scholarship in family and consumer sciences education and are leaders in programs and services for clientele in diverse settings.

The program cooperates in the gerontology interdepartmental minor.

Courses Primarily for Undergraduate Students
FCEDS 110 College of Family and Consumer Sciences Orientation (1-0) Cr. 5 to 1 F.S., Orientation to the university, the college, and the college curriculum. Adjustment to the college, discussion of student responsibilities, interpersonal and study skills, and management of time and energy. Development of a long-term plan for college. Offered on a satisfactory-fail grading basis only.

FCEDS 160 Foundations of Family and Consumer Sciences (1-0) Cr. 1 F.S. Historical development and philosophical basis of family and consumer sciences. Integration of topics for disciplines and areas of specialization.

FCEDS 205 Professional Roles in Family and Consumer Sciences and Family Sciences (2-3) Cr. 3, F Prereq. 160 or concurrent enrollment. Introduction to various roles in professional settings, e.g., community agencies, secondary schools, businesses, and industry. Coop/Ext. Observation, participation, and teaching experiences in educational settings.

FCEDS 305 Educational Principles for Family and Consumer Sciences (2-2) Cr. 3, F Prereq. 15 credits in family and consumer sciences subject matter. Principles of teaching and learning applied to family and consumer sciences content. Instructional methods appropriate for formal and informal educational settings. Specific strategies for diverse audiences. May be used for family life certification.

FCEDS 318 Occupational Career and Technical Programs (Dial listed with 518) (2-0) Cr. 2, S Prereq. 205 and 400 hours of experience in a family and consumer sciences-related job. Planning and implementing programs in occupational family and consumer sciences including FCCLA, Impact of selected legislation on family and consumer sciences programs. Techniques for cooperative education, school-to-work, and work-based education programs. May be used toward Multi-Occupational Cooperative endorsement.

FCEDS 379 Educational Aspects of Family and Consumer Social Issues (3-0) Cr. 3, F Examination of family and consumer social issues from diverse perspectives. Application of critical thinking and reflection to family and social issues within formal and nonformal educational settings.

FCEDS 403 Student Assessment for Vocational Family and Consumer Sciences (2-3) Cr. 3, F Prereq. 413. Philosophy of student assessment: Development and critique of tests and authentic assessment tools to measure cognitive affective, psychomotor, and perceptual learning. Procedures for grading, testing, and reporting assessment data. Includes 40 hours of experience in public school setting.


FCEDS 415 Program Planning and Evaluation in Family and Consumer Sciences (3-0) Cr. 3, S Prereq. 15 credits in family and consumer sciences subject matter. Includes needs analysis, planning, instruction, evaluation, development, grant writing, and reporting. Approaches appropriate for diverse groups. Environmental and cultural conditions affecting programs. Nonformal and formal educational settings.

FCEDS 417 Supervised Teaching in Family and Consumer Sciences (1-0) Cr. 1, F Prereq. 413. 24 credits in family and consumer sciences subject matter. Cumulative grade point of 2.5 full admission to teacher education. Supervised teaching experience in secondary schools. Emphasis of ways to implement actions that reflect a professional philosophy of family and consumer sciences for teaching middle and high school level students. May be taken more than once for credit. Reservation required.

A Vocational family and consumer sciences (Cr. 5, B Family and consumer sciences Cr. 5 or 8 B Family and consumer sciences Cr. 3 or 8 B General Studies Prereq. 421. 24 credits in family and consumer sciences.

FCEDS 418 Supervised Experiences in a Professional Setting (Cr. 2 to 8) SS Supervised professional experience in an approved setting such as Cooperative Extension, community health service, or government agency. May be taken more than once for credit. Reservation required.

A Educational Services Prereq. 415. 24 credits in family and consumer sciences.

FCEDS 421 International Perspectives of Family and Consumer Sciences (2-3) Cr. 3, S Prereq. 6 credits in family and consumer sciences. Examination of family and consumer sciences from an international perspective. Focus on the roles and responsibilities of women in developing countries. Application and adaptation of content to working with families in other countries and cultures.

FCEDS 424 International Study Abroad Seminar (Dial listed with 524) (1-0) Cr. 1 to 3 SS Orientation to study abroad program considering topics related to country and location. Travel arrangements and preparation for study abroad. On-site fieldwork and academic experiences in an international setting.

FCEDS 460 Integrative Approaches in Family and Consumer Sciences (1-0) Cr. 1, S Prereq. 160. Selective classification in Family and Consumer Sciences Education Seminar on ways professional's work across disciplines to address contemporary issues that affect individuals and families. Methods to initiate public policy at the local, national, and international levels. Transition from student to professional role.

FCEDS 490 Independent Study (Cr. 1 to 3) Prereq. Departmental approval.

A Adult Education
C Curriculum
D Evaluation
E Cooperative Extension
G General

H Honors
I International
K Occupational Education
N Human Relations
P Special Needs/Mainstreaming
R Vocational Education
S Distance Education

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
FCEDS 501 Trends, Issues and Public Policy (3-0) Cr. 3 Alt. F offered 2003. Alt. SS offered 2004 Prereq. 6 credits in family and consumer sciences or education. Discussion of current topics affecting the family and consumer sciences profession.

FCEDS 507 Program Development in Family and Consumer Sciences (4-0) Cr. 3, Alt. F offered 2004. Alt. SS offered 2005 Prereq. Professional experience in family and consumer sciences or related area. Application of principles of program development to formal and nonformal educational settings. e.g., secondary school family and consumer sciences programs training positions in business, Cooperative Extension, human service agencies.

FCEDS 508 Models for Teaching Family and Consumer Sciences (3-0) Cr. 3 Alt. S offered 2005 Prereq. 6 credits in family and consumer sciences. Selecting teaching strategies and instructional materials based on theories of learning and human development that reflect a professional philosophy of family and consumer sciences. Application to formal and nonformal educational settings with diverse audiences.

FCEDS 511 Research Methods (3-0) Cr. 3, F Prereq. Graduate classification. An overview of diverse research approaches focusing on methods for collecting and analyzing quantitative and qualitative data. Critique of research reports and development of research proposals.

FCEDS 515 Assessment in Family and Consumer Sciences (3-0) Cr. 3 Alt. S offered 2004. Alt. SS offered 2005 Prereq. Introductory statistical and program development skills. Role of assessment in family and consumer sciences education programs. Planning and constructing test items and other assessments of school and nonschool learning.

FCEDS 518 Occupational, Career and Technical Programs (Dial listed with 518) (2-0) Cr. 2, S Prereq. 400 hours work experience in a family and consumer sciences-related job. Planning and implementing programs in occupational family and consumer sciences, including FCCLA. Impact of selected legislation on family and consumer sciences programs. Techniques for cooperative education, school-to-work, and work-based education programs. Critique of national occupational competency standards. May be used toward Multi-Occupational Cooperative endorsement.

FCEDS 510 Supervision in Family and Consumer Sciences (3-0) Cr. 3 Alt. F, offered 2003. Alt. SS offered 2004. Prereq. 6 credits in family and consumer sciences or education. Discussion of current topics affecting the family and consumer sciences profession.

Courses Open to Qualified Undergraduate Students
FCEDS 501 Trends, Issues and Public Policy (3-0) Cr. 3 Alt. F offered 2003. Alt. SS offered 2004 Prereq. 6 credits in family and consumer sciences or education. Discussion of current topics affecting the family and consumer sciences profession.

FCEDS 507 Program Development in Family and Consumer Sciences (4-0) Cr. 3, Alt. F offered 2004. Alt. SS offered 2005 Prereq. Professional experience in family and consumer sciences or related area. Application of principles of program development to formal and nonformal educational settings. e.g., secondary school family and consumer sciences programs training positions in business, Cooperative Extension, human service agencies.

FCEDS 508 Models for Teaching Family and Consumer Sciences (3-0) Cr. 3 Alt. S offered 2005 Prereq. 6 credits in family and consumer sciences. Selecting teaching strategies and instructional materials based on theories of learning and human development that reflect a professional philosophy of family and consumer sciences. Application to formal and nonformal educational settings with diverse audiences.

FCEDS 511 Research Methods (3-0) Cr. 3, F Prereq. Graduate classification. An overview of diverse research approaches focusing on methods for collecting and analyzing quantitative and qualitative data. Critique of research reports and development of research proposals.

FCEDS 515 Assessment in Family and Consumer Sciences (3-0) Cr. 3 Alt. S offered 2004. Alt. SS offered 2005 Prereq. Introductory statistical and program development skills. Role of assessment in family and consumer sciences education programs. Planning and constructing test items and other assessments of school and nonschool learning.

FCEDS 518 Occupational, Career and Technical Programs (Dial listed with 518) (2-0) Cr. 2, S Prereq. 400 hours work experience in a family and consumer sciences-related job. Planning and implementing programs in occupational family and consumer sciences, including FCCLA. Impact of selected legislation on family and consumer sciences programs. Techniques for cooperative education, school-to-work, and work-based education programs. Critique of national occupational competency standards. May be used toward Multi-Occupational Cooperative endorsement.
FCEDS S21 International Perspectives of Family and Consumer Sciences (Dzial with 421L 3-0) Cr 3 Alt SS offered 2004 Prereq & credits in family and consumer sciences. Examination of family and consumer sciences from an international perspective, focuses on the roles and responsibilities of women in development. Application and adaptation of content to working with families in other cultures and students participating in cultural activities and critique of international research articles.

FCEDS S24 International Study Abroad Seminar (Dzial with 424 I 1 to 3 FS SS. Orientation to study abroad programs considering topics related to country and location travel arrangements and preparation for study abroad. On site fieldwork and academic experiences in an international setting. Individual developed research project on a topic related to study abroad.

FCEDS S90 Special Topics Cr 1-3 Prereq & credits in family and consumer sciences or education A Adult Education B Administration C Curriculum D Evaluation E Teacher Education F Occupational Career and Technical Education G General H Research Methodology I International Education J Industrial Education K Human Relations L Special Needs M Family Life Education N Human Sexuality O Technology P Supervision Q Family/Individual Health R Consumer Education S Distance Education

FCEDS S93 Workshop Cr 1 1 to 3 FS SS. Prereq & credits in family and consumer sciences or education Concentrated group study of new developments in family and consumer sciences education, Sections offered will vary from year to year. May be taken more than once for credit.

FCEDS S99 Creative Component

Courses for Graduate Students

FCEDS 807 Curriculum Theory and Philosophy in Family and P. Prereq 507 or curriculum development course Integration of philosophies of education and family and consumer sciences into an operant philosophy of curriculum development. Study of various curriculum theories and approaches to curriculum development.

FCEDS 810 Seminar Cr 1 FS SS. Prereq Graduate classification. Exploration of trends and issues in the profession. May be taken more than once for credit Offered on a satisfactory-fail grading basis only.

FCEDS 811 Program Evaluation in Family and Consumer Sciences (3-0) Cr 3 Alt SS offered 2004 Prereq 511 515 Application of program evaluation approaches for family and consumer sciences programs. Standards for program evaluation.

FCEDS 818 Coordination of Educational Programs in Family and Consumer Sciences (3 0) Cr 3 Alt SS offered 2004 Prereq 507 Approaches to coordination of family and consumer sciences programs in adult education extension state department of education and teacher education. Study of undergraduate programs in family and consumer sciences education observation and participation in undergraduate courses and practical experience.

FCEDS 820 Theories of Administration in Family and Consumer Sciences (3-0) Cr 3 Alt SS offered 2004 Prereq Professional Experience Review of administrative theory, application to family and consumer sciences programs with emphasis on higher education Administrative leadership roles and their interrelationships Consideration of current issues.

FCEDS 899 Research

Family Financial Planning

www.fcs.iastate.edu/gge/education/programs /

Intrenational Programs

Contact Mary Winter

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Family Financial Planning is an international distance education program offered through the Web. The student selects a home institution which grants the degree. After admission at the home institution the student takes courses from each of the seven institutions. Iowa State University Kansas State University Oklahoma State University Montana State University University of Nebraska North Dakota State University and South Dakota State University. Upon completion of the student is eligible to sit for the CRP Certification Examination.

At Iowa State University Family Financial Planning is a specialization within the Master of Family and Consumer Sciences degree program (MCFCS FFP) that consists of 42 semester credit hours of which 12 credits must be taken from the Iowa State University. Neither a thesis nor a creative component is required. Students typically complete the program in three years while employed full-time. A computer with minimum specifications Web access and relational database software are required for completing the course.

FFP Graduate Certificate Program

The Graduate Certificate in Family Financial Planning consists of the six courses from the MFCS FFP that contain the competencies required for the CFP(R) Certification Examination. Students interested in attaining the CFP(R) credential and not a master’s degree should enroll in the certificate program. Courses included in the FFP graduate certificate program include:

FFP 520 540 545 555 565 583 Admission Procedure: Admission to the FFP Certificate Program requires exactly the same procedures as admission to the Graduate College. See Graduate College section in the catalog.

Registration

Students choosing to receive their degree from Iowa State University complete the advisor registration and fee payment processes through ISU.

Courses Primarily for Graduate Students

FFP 520 Family Systems Cr 3 The research and theory related to family functioning throughout the life cycle. Especially financial decision making during crisis and conflict. Emphasis is given to factors that shape family values attitudes and behaviors from a multicultural perspective. New and emerging issues critical to family functioning are addressed.

FFP 525 Family Economics Cr 3 SS Major issues relating to the economics of families including household production and human capital development. Emphasis on the economic crisis periods in the family life cycle. Current and emerging issues are addressed.

FFP 530 Fundamentals of Family Financial Planning Cr 3 The nature and functioning of financial systems including analyzes of financial systems in the household with a focus on the use of family budgeting, current and emerging issues as well as current research and theory related to financial systems.

FFP 535 Financial Counseling Cr 3 Theory and research regarding the interactive processes between the client and the practitioner. Emphasis on communication techniques and strategies building the counseling environment ethics and methods of data intake, verification, and analysis. Other topics include legal issues compensation, laws and regulations to identify resources information management and current and emerging issues.

FFP 540 Estate Planning for Families Cr 3 Fundamentals of the estate planning process, including taxes, and the protection of the family. Study of micro and macro considerations for retirement planning. Survey of various types of retirement plans, ethical considerations in providing retirement planning services, and considering financial needs in retirement and estate planning.

FFP 541 Housing and Real Estate in Family Financial Planning (Same as HD 541) See Human Development and Family Studies.

FFP 545 Retirement Planning, Employee Benefits, and the Family Cr 3 Study of micro and macro considerations for retirement planning. Survey of various types of retirement plans, ethical considerations in providing retirement planning services, and considering financial needs in retirement and estate planning.

FFP 555 Insurance Planning for Families Cr 3 An in-depth study of risk management concepts, tools, and strategies for individuals and families including the use of traditional life insurance property and casualty insurance liability insurance accident disability health and long term care insurance and government subsidized programs. Current and emerging issues, as well as ethical considerations, are a integral part of the course.

FFP 565 Personal Income Taxation Cr 3 Each of the income tax laws and their application to individuals and families, including tax regulations and tax return preparation. The
tax audit processes the appeals process preparation for an administrative or judicial forum and ethical considerations of taxation New and emerging issues related to taxation are covered Familiar individual case studies provide practice in applying and analyzing tax information and recommending appropriate tax strategies

FPP 570 Professional Practices in Financial Planning Cr 3 5 Challenges of managing financial planning practices including not limited to business valuation personal marketing client services ethics and technological applications Relying both on a theoretical as well as an applied approach students analyze case studies that provide relevant practical exposure to management issues with a strong emphasis on current research findings

FPP 583 Investing for the Family’s Future (Same as HD FS 583) See Human Development and Family Studies

FPP 593 Practicum Cr 3 5 FS SS Supervised experience in family financial planning

FPP 595 Financial Planning Case Studies Cr 3 3 SS Prereq Completion of FPP courses Professional issues in financial planning including ethical considerations regulation and secondary marketing requirements communication skills and professional responsibility Students are expected to utilize skills obtained in other courses and work experiences in the completion of personal finance case studies the development of a comprehensive financial plan and other related financial planning assignments

Finance

Richard B Carter, Chair of Department

Professors Carter Hayes Power Stover

Associate Professors Campbell Cowen Dark Koppenhaver

Assistant Professors P. Gawer Sapp

Undergraduate Study

For undergraduate curriculum in business major in finance see College of Business Curricula

In addition to the basic business requirements finance majors must also complete (1) Fin 310 320 (2) select four from Fin 330 361 371 380 415 424 425 445 462 and 472 of which two must be at the 400 level and (3) select one from Acc 383 384 386 387 any 400 level accounting course and Finance courses listed in (2) above Statistics 326 is highly recommended to be taken prior to Fin 310 and Fin 320 Statistics 326 is required for Fin 380 and 400 level finance courses

The courses in finance constitute a broad program of study designed to provide a descriptive and analytical background of financial management to enable students to qualify for opportunities in financial services insurance brokerage government real estate and financial management of business enterprises Finance is also an exciting area for those who wish to become knowledgeable as consumers particularly in the areas of investments insurance and real estate Areas of study in the field of finance include financial management investments insurance real estate and financial services Upper level courses include a review of contemporary literature in the field case studies and practical problem analysis integrating finance courses previously taken

The instructional objective of the Finance program is to provide a well rounded professional education in finance Such an education should provide the student with (1) a mastery of basic financial concepts and methods of analysis (2) an understanding of financial operations a global setting and of the role of financial institutions in the economics system (3) an ability to effectively communicate and work with others as the finance member of a team (4) an ability to demonstrate leadership capabilities in financial analysis and portfolio management

The department also offers a minor in non-Finance majors in the College of Business The minor requires 15 credits from an approved list of courses of which 9 credits must be 300 level courses culminating in a thesis The M BA program is a 48 credit nonthesis noncreative component curriculum Twenty four of the 48 credit hours are core courses and the remaining 24 are graduate electives Within the M BA program develop an area of specialization in finance This specialization requires that 12 of the 24 credit hours of the graduate electives be from an approved list of graduate finance courses Courses open for nonmajor graduate credit 415 424 445 462 472

Courses Primarily for Undergraduate Students

Fin 301 Principles of Finance (3 0) Cr 3 5 FS SS Prereq Account 28426 Introduction to financial management with emphasis on corporate financial and investment decision making time value of money asset valuation capital budgeting methods cash budgeting and financial markets

Fin 310 Corporate Finance (3 0) Cr 3 5 FS SS Prereq 301 Theory used in a firm’s investment and financial decisions of an environment in which financial decisions are made applications of analytical techniques to financial management problems

Fin 320 Investments (3 0) Cr 3 5 FS SS Prereq 301 Introduction to various investment media and markets from the viewpoint of the individual investor Emphasis on mechanics of trading behavior of security prices and bonds mutual funds individual asset and portfolio selection techniques and performance evaluation

Fin 330 Financial Markets and Institutions (3 0) Cr 3 5 FS Prereq 301 Introduction to the structure and operations of the United States financial system and its markets and institutions Emphasis on developing and integrated understanding of markets and financial service provider’s including global linkages

Fin 351 Personal Risk Management and Insurance (3 0) Cr 3 5 FS Prereq Econ 101 Risk concepts and the use of insurance by individuals and families Emphasis on the insurance mechanism and methods of dealing with income property and liability risks

Fin 371 Real Estate Principles (3 0) Cr 3 5 FS Prereq Econ 101 Legal and financial aspects of real estate including property rights contracts mortgage instruments tax factors brokerage valuation and return analysis analytical techniques and investments

Fin 380 International Finance (3 0) Cr 3 5 FS Prereq 301 and Stat 326 Advanced study of contemporary topics and issues in international finance

Fin 415 Business Financing Decisions (3 0) Cr 3 5 Prereq 301 and Stat 326 In depth study of the firm’s external financing decision Emphasis on the development of cash flow statements projected financing needs and the selection of the appropriate financing instrument Focus on case studies and application of development techniques on actual field project Nonmajor graduate credit

Fin 424 Financial Futures and Options (3 0) Cr 3 5 Prereq 320 and Stat 326 Advanced study of the pricing and use of derivative market instruments current topics and issues Nonmajor graduate credit

Fin 425 Security Analysis and Portfolio Management (3 0) Cr 3 5 FS Prereq 320 326 and permission of instructor Advanced study of security analysis security selection techniques and portfolio management Emphasis on the applications of methods learned via the selection and evaluation of a portfolio of actual securities purchased in securities markets in the U S or abroad Tracking and periodic reporting of the portfolio's performance relative to selected benchmarks is also required with decision making

Fin 445 Bank Management Decisions (3 0) Cr 3 5 FS Prereq Stat 326 and Fin 320 or Econ 353 Analysis of operations of depository financial institutions from management viewpoint Emphasis on evaluating performance policy formation asset and liability management the role of capital and the operating environment Nonmajor graduate credit

Fin 462 Corporate Risk Management and Insurance (3 0) Cr 3 5 FS Prereq 301 and Stat 326 Analysis of an organization’s approaches to the management of price risk and pure risk Emphasis on the consideration and selection of risk control and financing strategies and the framework underlying the alternatives selected Covers commercial insurance self insurance and alternative financing arrangements Nonmajor graduate credit

Fin 472 Real Estate Finance (3 0) Cr 3 5 Prereq 301 and Stat 326 Introduction to the techniques of assessing the value of real estate and real estate financing instruments Nonmajor graduate credit

Fin 490 Independent Study Cr 1 5 3 each term taken Prereq 301 Stat 326 and permission of instructor

Fin 499 Finance Internship (3 0) Cr 1 5 3 FS Prereq GPA 2 5 permission of internship coordinator Stat 326 346A 330 445 445B 361 486C 472 Supervised experience in a private sector banking insurance or real estate profession or in a governmental agency that regulates such organizations Offered on a satisfactory/unsatisfactory grading basis only A Banking B Insurance C Real Estate

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Fin 505 Financial Valuation and Corporate Financial Decisions (2 0) Cr 2 Prereq Graduate classification Shareholder wealth maximization as the goal of the firm financial math valuation of securities the financial market place as the test of value estimation of cost of capital capital investment decisions capital structure policy working capital management

Fin 510 Advanced Financial Management (3 0) Cr 3 5 Prereq 505 Modern theory of corporate finance and its application to financial management problems Advanced treatment of firm investment financing and dividend decisions and survey of related research Examples of potential topics are the investment banking process convertible securities and warrants financial derivatives asset lending mergers and divestitures leveraged buyouts international financial management executive compensation and pension fund strategy

Fin 515 Case Studies in Financial Decision Making (3 0) Cr 3 5 Prereq 505 This course focuses on case studies to develop an integrated set of financial decisions Topics include working capital capital structure dividend and merger acquisition decisions The objective of the course is to examine different firm settings and establish a framework within which to apply financial tools

Fin 520 Investments (3 0) Cr 3 5 Prereq 505 A comprehensive survey of the classical and contemporary theories of optimum portfolio construction the determination of risk impact trade-off in selection of securities emphasis on the theory and evidence of efficient capital markets and implications for security selection and portfolio management

Fin 534 Agricultural Markets (3 0) Cr 3 5 Prereq Graduate classification A method based course in agricultural product markets Topics include futures and options markets option pricing use and trading of insurance products in agriculture alternative forms of reinsurance emerging forms of vertical coordination
Food Science and Human Nutrition

www.fcs.ilstu.edu/~fshn

Diane Birt Chair of Department

University Professors: Glatt Hammond Murphy Sebranek P White

Professors: Birt Fiskold Hendrich Hurburgh Jane Johnson Kaplan Nikolau Pomotto Pruso Robson Sharp Stomper Wilson Watek Wurtele

Professors (Collaborators): Nikolau

Distinguished Professors (Emeritus): Jacobson Roderick

University Professors (Emeritus): Parrish

Professors (Emeritus): Dupont Garcia Kraft Lagrange McMahan Runyan Rust Schafer Swan Topel Walker

Associate Professors: Alekel Ford J Lova M Love Madden Myers Oakland Reiterman R White

Associate Professors (Collaborators): Lewis

Associate Professors (Emeritus): Bohnenkamp McComer

Assistant Professors: Boyston Gonzalez Hansen Litchfield Marquis Mendonca Reddy Schalinske Wang

Assistant Professors (Collaborators): Robinson

Instructors (Adjunct) Anderson Baswell Hansen Olich Strom Svensden

The Department of Food Science and Human Nutrition is jointly administrated by the College of Agriculture and the College of Family and Consumer Sciences. All curricula offered by the department are available to students in either college. These curricula include dietetics, food science, and nutritional science. Visit our website at: www.fcs.ilstu.edu/~fshn/

Undergraduate Study

The general dietetics curriculum is approved by the American Dietetic Association (ADA) and meets the academic requirements for admission to accredited dietetics internships. The dietetic program includes study in basic sciences, nutrition and food science with applications to medical dietetics and community nutrition. Foodservice management is also an important aspect of the program. Graduates work in hospitals, clinics, long-term care facilities, food and pharmaceutical industries and government nutrition programs. Some are private and home health care nutrition consultants. There is a $30 fee for a statement of account of the approved program. For information about verification statements provided to non-ISU students or students with degrees from international universities see the departmental website www.fcs.ilstu.edu/~fshn/

Food science is a discipline in which the principles of biological and physical sciences are used to study the nature of foods, the causes of their deterioration and the principles underlying the processing and preparation of food. It is the application of science and technology to the provision of a safe wholesome and nutritious food supply. Biotechnology and toxicology interrelate with food science in the area of food safety. In the food industry, food scientists work in research and development, food products or processes, food production supervision, quality control, marketing and sales, test kitchens and recipe development, product promotion and communication. Food scientists also serve in government regulatory agencies and academic institutions.

Three options are available in food science. Food science and technology, food science and industry, and consumer food science. The food science and technology option is approved by the Institute of Food Technologists, the national professional organization of food science. Students interested in quality control, assurance, production supervision, management and sales or research careers in the food industry government or academia should elect either the food science and technology or the food science and industry option. Students who wish to go to graduate or professional schools or who are biotechnology scholars in the College of Agriculture should elect food science and technology. Students who wish to emphasize business journalism or specific aspects of food science should elect food science and industry. Students interested in test kitchen positions, food product formulation and recipe development, food promotion and consumer services in government and industry should elect the consumer food science option.

Students who wish to combine education in engineering with food science may select additional courses in chemical or civil engineering. Double majors are available and may require an additional year.

Nutritional science offers students a strong basic science and general education that can serve as a preprofessional program for medicine, veterinary medicine or for graduate study in nutrition or other biological sciences. This curriculum enables students to gain the knowledge and skills necessary to work in research laboratories of colleges and universities, government agencies, industries and foundations.

Students graduating with degrees in dietetics, food science and nutritional science will be able to: 1) demonstrate technical competency in chosen field of study; 2) demonstrate proficiency in interpersonal communication and the ability to work successfully in teams to solve multidisciplinary problems; 3) effectively prepare and deliver technical information to food science and human nutrition professionals as well as to the general public; 4) find, evaluate and accurately interpret research literature; 5) critically evaluate information including the ability to distinguish verifiable facts, detect bias and identify sources of conflict; 6) understand the dimensions of issues facing professionals in the field including ethical, cultural and environmental components.

See also the B.S.M.S. program under Graduate Study.

The department offers minors in food science and nutrition and in the interdisciplinary minor in food science. See department office or web site for requirements.

English proficiency is certified by a grade of C or better in 6 credits of coursework in composition (Eng 104 and 105 or other communication intensive courses) and a grade of C or better in 3 credits of coursework in oral communication.

Postbaccalaureate Program

A dietetic internship program has received initial accreditation from the American Dietetic Association. For more information refer to Special Interest Programs listed under the College of Family and Consumer Sciences or visit our website at www.dietetics.ilstu.edu. There is a nonrefundable application fee of $30 and a program fee of $500 payable upon acceptance into the program.

Food Safety Minor

Patricia A. Murphy (Coordinator)

The Interdepartmental Food Safety Minor is designed to provide undergraduate students with exposure to the principles of food safety to complement their current major and offer new opportunities for their future careers. The Food Safety minor provides training in human health risks and issues that arise from globalization of agriculture, intensification of food production and food processing, effects of global warming and environmental changes on food safety and the prevention of agricultural bioterrorism. Depending on the student’s major, the minor enhances the student’s expertise in food safety issues pertinent to the student’s major. Student learning outcomes include awareness of food safety issues as they appear in each step of the food chain. Ability to analyze a situation, identify food safety problems, use resources to gather additional information, develop a procedure for solution or identify problems, examine proposed solutions for validity and effectiveness, and to be able to speak and write about food safety issues at professional meetings. ISU graduates with Food Safety minor are better prepared for employment in agricultural medical and veterinary medical agencies and with state, national and international businesses.

The Food Safety minor requires 15 credits of course work with 9 credits drawn from 3 core courses with the balance of courses to supplement the training in the minor. Students electing the minor will receive core training in basic food processing or food service (FIS HN 201 or 272 or HRS 435 for food microbiology or food borne hazards (FIS HN 422 or 419) food laws (FIS HN 403) and a food safety issues seminar (FIS HN/AN 475/4754/469). Students will then elect three additional credits from the Food Science area and three credits from the Food Processing area. See approved list for minor elective courses at www.fcs.ilstu.edu/~fshn/~ugrad/ugmnrns.htm

Graduate Study

The department offers work for the degrees of master of science and doctor of philosophy with majors in food science and technology and in nutrition. The master of science in food science and technology and in nutrition. Graduate work in meat science is offered as a co-major in animal science and food science and technology.

Prerequisite to major work is a baccalaureate degree in food science nutrition or other physical or biological sciences or engineering that is substantially equivalent to that at lower state university.

Students taking major work for the degree do not have to be in food science and technology or in nutrition may choose minors from other fields including anthropology, biochemistry, biology, economics, education, journalism, microbiology, psychology, physiology, sociology, statistics, toxicology or other related fields.

Faculty in the department participate in the major in microbiology, the interdepartmental majors in genetics, MCB3 (molecular cellular and development biology), biorenewable resources, sustainable agriculture, toxicology and water resources and the interdisciplinary minors in gerontology and biorenewable resources.

The department, in conjunction with the Hotel Restaurant and Institution Management department offers three dietetics certificates of 11 credits each and participates in the Master of Family and Consumer Sciences with a dietetics specialization. The dietetics program meets all the dietetics education requirements of The American Dietetic Association for advanced preparation in communication and counseling, dietetics management and medical nutrition therapy. The graduate certificate courses may be applied to the Master of Family and Consumer Sciences. Dietetics specialization. These programs are open only to registered dietitians. A second Master of Family and Consumer Sciences specialization offered in the area of nutrition does not require certification as a registered dietitian for admittance.
Those interested in these programs should contact the department for details.

The department offers a B S or M S program that allows students to obtain both the B S and M S degrees in 5 years. The program is available to students in the food science and technology option or the nutritional science curriculum. Students interested in these programs should contact the department for details. Application for admission to the Graduate College should be made by the end of the year prior to entering the program. Students begin research for the M S thesis during the summer after their junior year and are eligible for research assistantships.

Students graduating with advanced degrees in Nutrition and in Food Science and Technology will demonstrate competence in their chosen discipline. Measurable outcomes will include the ability to: 1) design conduct and interpret research; 2) apply theoretical information to solve practical problems; 3) prepare and communicate discipline-specific information in written and oral forms to scientific and lay audiences; 4) facilitate learning in the classroom; and 5) submit a paper for publication in a peer-reviewed journal. Secure professional level positions in academia, industry, government, or health care.

Courses open for nonmajor graduate credit: 311 342 351 360 361 362 403 405 410 411 412 419 420 421 463 471

Courses Primarily for Undergraduate Students

FS HN 101 Food and the Consumer (3 Cr) 3 F, S Preq: High school biology and chemistry or 3 credits of biology and chemistry. The food system from point of harvest to the consumption of the food by the consumer. Properties of food constituents. Protection of food against deterioration and microbial contamination. Introduction of foods into the marketplace Processes for making various foods Government regulations. Use of food additives. Current and controversial topics. Electronic communication from web emphasized for class reports and assignments.

FS HN 110 Orientation (1 Cr) 3 F Orientation to the department to Iowa State University and to careers in food science nutrition and dietetics. Curriculum and career planning. Offered on a satisfactory-fail grading basis only.


FS HN 167 Introduction to Human Nutrition (3 Cr) 3 F S Preq: high school biology and 2 credits of biology. Understanding and implementing present day knowledge of nutrition. The role of nutrition and food intake in the health and well being of the individual and family.

FS HN 203 Contemporary Issues in Food Science and Human Nutrition (3 Cr) 3 F Discussion of current domestic issues in family and consumer sciences and agriculture and the relationship to food science nutrition and dietetics. Emphasis on professional ethics and communication.

FS HN 214 Scientific Study of Food (3 Cr) 3 F Preq: 167 or 261 Chem 231 or 331 Composition and structure of foods Principles and practice of preparation of standard food products. Behavior and interactions of food constituents.

FS HN 261 Fundamentals of Human Nutrition (2 Cr) 3 F Preq: Credit or enrollment in BBMB 301 or Biol 302 Sources of nutrients nutrient requirements and dietary recommendations. Fundamentals of digestion absorption functions and metabolism. Nutrient deficiency and toxicity.

FS HN 272 Basic Principles of Food Processing (3 Cr) 3 F Preq: Credit or enrollment in Chem 231 and 231L and Biol 202. Biological and physicochemical principles of food processing as they determine the quality of foods.

FS HN 298 Cooperative Education. 3 Cr F S Preq: Permission of the department chair. Must complete one course of all cooperative education students. Students must register for these courses prior to commencing each work period.

FS HN 311 Food Chemistry (2 Cr 3 F Preq: Chem 231 and 231L or 331 and 333L credits in statistics. The structure properties and reactions of food constituents. Nonmajor graduate credit.

FS HN 340 Introduction to Dietetics (1 Cr 1 F) Preq: 3 credits of biology and nutrition. The field of dietetics: history and current practices. Offered on a satisfactory-fail grading basis only.

FS HN 342 World Food Issues Past and Present (Same as Agron 342 Env Sci 342 TSC 342 U 342) (3 Cr) 3 S World food problems in context of historical development of agriculture in major cradles of civilization. Emphasis on population trends and socioeconomic policies to understand disparities between potential agricultural production and present energy and nutritional deficiencies in key areas of the developing world. Team projects. Nonmajor graduate credit.

H Honors Section (For students in the University Honors Program only)

FS HN 351 Unit Operations in Food Processing (3 Cr) 3 S Preq: A course in calculus and Physics 106. Introduction to unit operations and energy balances. Fluid flow physical and thermal properties of food materials. Fundamentals of heat and mass transfer Application of momentum and heat transfer to unit operations in food processing. Calculations and computer applications in food processing. Nonmajor graduate credit.

FS HN 360 Advanced Human Nutrition and Metabolism (3 Cr) 3 F Preq: 261. 3 credits in biochemistry 3 credits in physiology recommended. Physiological and biochemical basis for nutrient needs assessment of nutrient deficiency and toxicity evaluation of nutrient functions and regulation of metabolism. Nonmajor graduate credit.

FS HN 361 Human Nutrition Laboratory (1 Cr 1 Cr) 3 F Preq: Credit or enrollment in 360. 3 credits in statistics. The assessment of nutritional status in healthy individuals. Laboratory experience in food composition and assessment of dietary intake. Body composition and biochemical indices of nutritional status. Nonmajor graduate credit.

FS HN 382 Nutrition in Growth and Development (3 Cr) 3 S Preq: 360 credit or enrollment in a course in physiology. Nutrient needs throughout the life cycle Interrelationships of genes gene expression and nutrients with physiological outcomes during human development and aging. Nonmajor graduate credit.

FS HN 398 Cooperative Education. 3 Cr F S Preq: Permission of the department chair. Junior classification. Required of all cooperative education students. Students must register for these courses prior to commencing each work period.

FS HN 403 Food Laws, Regulations, and the Regulatory Process (2 Cr) 2 S Preq: 3 credits in food science coursework at 200 level or above. History of the development of the current federal and state food regulations. Guidelines that govern the practice of regulating the wholesomeness of red meats poultry and eggs. Presentations by state and federal food regulators. Nonmajor graduate credit.

FS HN 405 Food Quality Assurance (2 Cr) 3 S Preq: 214 or 272 or 471 Stat 101 or 104 Basis of food quality control insurance programs and establishment of decision-making processes using official (government and industry) instrumental chemical and sensory procedures. Statistical process and quality control procedures and their applications to various food systems. Development of hazard analysis procedures specifications grades and standards. Nonmajor graduate credit.

FS HN 406 Sensory Evaluation of Food (Dual listed with 506) (2 Cr 3 F Preq: 214 or 311 or An S 360 3 credits in statistics. Sensory test methods and procedures used to evaluate the flavor color and texture of foods. Relationships between sensory and instrumental measurements. Sensory panel testing. Acceptance and preference testing.

FS HN 407 Microbial Safety of Food (Same as Micro 407) See Microbiology.

FS HN 410 Food Analysis (3 Cr) 3 S Preq: Preqe 203 214 or 311 or BBMB 311 or Chem 211 An introduction to the theory and application of physical and chemical methods for determining the constituents of food. Modern separation and instrumental analysis. Use of food composition data bases. Nonmajor graduate credit.

FS HN 411 Experimental Study of Food (2 Cr 3 F Preq: 214 or 311 a course in biochemistry. Experimental approach to the study of factors influencing behavior of foods. Nonmajor graduate credit.

FS HN 412 Food Product Development (Dual listed with 512) (2 Cr 3 S Preq: 411 or 471 Principles of developing new and reformulated packaged food products. Application of skills gained in food chemistry formulation microbiology and processing. Some pilot plant experiences. Electronic communication. Web emphasis on computer-based reports and assignments. Nonmajor graduate credit.

FS HN 419 Foodborne Hazards (Same as Micro 419) 3 Cr 3 F Preq: S offered 2004 Preqe 201 or 302. A course in biochemistry. Pathogenesis of human microbiological foodborne infections and intoxications. Principles of toxicology and disease mechanisms of toxicants in the food supply. Governmental regulation of foodborne hazards. Only one of 419 and 519 may count toward graduation. Nonmajor graduate credit.

FS HN 420 Food Microbiology (Same as Micro 420) 3 Cr 3 F Preq: Micro 201 or 302. Effects of microbial growth in foods. Methods to control detect and enumerate microorganisms in food and water. Foodborne infections and intoxications. Nonmajor graduate credit.

FS HN 421 Food Microbiology Laboratory (Same as Micro 421) 1 Cr 3 S Preq: Preqe 201 or 302 or 201L Credit or enrollment in 420 (Micro 420). 201L. Standard techniques used for the microbiological examination of foods. Independent group project on student generated questions in food microbiology. Emphasis on oral and written communication and group interaction. Nonmajor graduate credit.

FS HN 441 Dietetics Management (1 Cr 5 S S) For students enrolled in the dietetic internship program. Supervised participation in and analysis of food production delivery and other functions related to quantity food and nutrition services. Offered on a satisfactory-fail grading basis only.

FS HN 442 Medical Dietetics (3 15) 3 F Dietetics for students enrolled in the dietetics internship program. Biological basis of medical drug and diet therapy for selected pathological factors in planning and conducting nutritional care of patients. Integration of principles of clinical experience. Offered on a satisfactory-fail grading basis only.

FS HN 443 Medical Dietetics II (1 Cr 3 F Preq: Concurrent enrollment in 442. For students enrolled in the dietetics internship program. Supervised clinical experience in implementing and evaluating nutritional care of patients in specialized clinical settings. Offered on a satisfactory-fail grading basis only.

FS HN 445 Experience in Community Dietetics (1 12) 3 S S For students enrolled in the dietetic internship program. Supervised experience in planning and providing nutritional care for individuals and
groups in a variety of community settings. Offered on a satisfactory fail grading basis only

FS HN 446 Experience in Dietetics (2.0) Cr 2 FS Preq 3 For students enrolled in dietetics internship supervised experience in planning and providing nutrition education for individuals and groups in a variety of dietetic settings. Offered on a satisfactory fail grading basis only

FS HN 448 Professional Development Assessment (Dual listed with 548) (3.0) Cr 1 FS SS Preq Concurrent enrollment dietetics internship. For students enrolled in the dietetics internship program Web-based course providing information and practice for students to assess and evaluate their own professional development and continuing professional education needs. Offered on a satisfactory fail grading basis only

FS HN 461 Disease and Medical Nutrition Therapy I (Dual listed with 561) (3.0) Cr 4 FS Preq 360 credits in nutrition, Pathophysiology of selected disease states and medical problems Clinical nutrition applications in acute and chronic disease Assessment of nutritional problems nutrition care planning and documentation Specific attention will be directed to nutrition needs and treatment of each disease state with medical nutrition therapy

FS HN 463 Community Nutrition (3.0) Cr 3 S Preq 203 362 credits or enrollment in 466 Survey of current public health nutrition programs among nutritionally vulnerable individuals and groups Discussion of the natural history of those problems and of community programs designed to help solve them The role of community nutritionists in grant writing for project development Significant emphasis on written and oral communication Nonmajor graduate credit

FS HN 464 Disease and Medical Nutrition Therapy II (Dual listed with 564) (2.0) S Preq Cr 3 S Preq 465 Pathophysiology of selected disease states and medical problems Clinical nutrition applications in acute and chronic disease Assessment of nutritional problems nutrition care planning and documentation Specific attention will be directed to nutrition needs and treatment of each disease state with medical nutrition therapy

FS HN 466 Nutrition Counseling and Education Methods (Dual listed with 566) (2.0) Cr 3 FS Preq 203 362 Sp Crm 212 Application of counseling and learning theories with individuals and groups in community and clinical settings. Includes discussion and exposure in building rapport data assessment and interpretation developing goals outcomes selecting learning activities evaluation and documentation

FS HN 471 Food Processing (3.0) Cr 3 F Preq Micro 201 or 302 Chem 163 Phys 106 Food preservation including packaging fermentation irradiation canning freezing dehydration additives Sanitation and plant design Applications to food products Nonmajor graduate credit

FS HN 472 Food Processing Laboratory (Dual listed with 572) (1.0) Cr 2 F Preq 351 credit or enrollment in 472 Food processing techniques such as thermal processing food fermentations oilseed processing food extrusion corn wet milling and industrial baking Special emphasis on interpreting data and writing project reports

FS HN 480 Professional Seminar in Food Science and Human Nutrition (1.0) Cr 1 F Preq Senior classification Discussion and presentation of current research and issues in food science and human nutrition with emphasis on communication in the profession

FS HN 488 Issues in Food Safety (Same as An S 488) HRI 489 VDPM 489 (0.0) Cr 1 Alt S offered 2000 Preq Credit or enrollment in FS HN 101 or 272 or HN 233 FS HN 419 or 420 FS HN 403 Capstone seminar for the food safety minor Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective

FS HN 490 Independent Study (Cr 1) FS SS Preq Permission of instructor A maximum of 6 credits of 490 may be used toward graduation Independent work in food science nutrition or dietetics

FS HN 491 Supervised Work Experience (Cr 1) FS SS Preq Advancement of instructor advisor and department chair A maximum of 6 credits of 491 may be used toward graduation Supervised off-campus work experience relevant to the academic major Offered on a satisfactory fail grading basis only

FS HN 496 Food Science and Human Nutrition Travel Course (Dual listed with 566) Cr 2 to 4 May be repeated (0.0) Cr 2 per week traveled FS SS Preq Permission of instructor Limited enrollment Tour and study of food industry dietetic and nutritional agencies in different regions of the world Pre travel session arranged Travel expenses paid by students Offered on a satisfactory fail grading basis only

FS HN 498 Cooperative Education Cr 2 FS SS Preq Permission of the department chair senior classification Required of all cooperative education students Students must register for these courses prior to commencing each work period

FS HN 499 Undergraduate Research Cr 1 FS SS Preq Permission of staff member with whom student proposes to work A maximum of 6 credits of 499 may be used toward graduation Research under staff guidance

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

FS HN 500 Short Course Cr 1 FS SS Preq Permission of instructor

A Nutrition

B Food Science

FS HN 502 Advanced Food Science Chemistry (1-0) Cr 1 S Preq 3 credits in organic chemistry Key principles and applications in the chemistry of food

FS HN 503 Advanced Food Science Processing (1.0) Cr 1 S Preq 3 credits each in physics and mathematics Key principles and applications in the processing of food

FS HN 504 Advanced Food Science Microbiology (1.0) Cr 1 S Preq 3 credits each in microbiology and organic chemistry Key principles and applications in the microbiology of food

FS HN 506 Sensory Evaluation of Food (Dual listed with 406) (2.0) Cr 3 F Preq 214 or 311 or An S 380 3 credits in statistics Sensory test methods and procedures used to evaluate the flavor color and texture of foods. Relationships between sensory and instrumental measurements of color and texture Acceptance and preference testing

FS HN 507 Microbial Safety of Food (Same as Micro 507) See Microbiology

FS HN 512 Food Product Development (Dual listed with 412) (2.0) Cr 4 S Preq 311 or 411 417 Principles in developing consumer packaged food products Application of skills gained in food chemistry formulation microbiology and processing Some pilot plant experiences Electronic communication from web emphasized for class reports notes and assignments

FS HN 519 Food Toxicology (Same as Tox 519) (3.0) Cr 3 F offered 2004 Preq course in biochemistry Basic principles of toxicology Toxins in the food supply modes of action toxicant defense systems toxicant/nutrient interactions risk assessment Only one of 419 and 519 may count toward graduation

FS HN 542 Introduction to Molecular Biology Techniques (Same as Zool 542) See Zoology and Genetics

FS HN 543 Medical Diabetics (1-6) Cr 3 S FSS For students enrolled in the dietetics internship Discussion of the assessment diagnosis intervention and outcomes of nutritional problems in complex medical conditions with supervised practice experience

FS HN 548 Professional Development Assessment (Dual listed with 448) (1.0) Cr 1 FS SS Preq Concurrent enrollment dietetics internship or MFPC Dietetics Option For students enrolled in dietetics specialization Web-based course providing information and practice for student to assess and evaluate own professional development and continuing professional education needs Completion of professional 5 year plan Offered on a satisfactory fail grading basis only

FS HN 553 Biochemical and Physiological Basis of Nutrition Macronutrients (Same as An S 553) (3.0) Cr 3 S Preq BBMB 420 or BBMB 404 and credit or enrollment in BBMB 405 Integration of the molecular, cellular and physiologic aspects of macronutrient and energy metabolism in mammalian systems Dietary energy carbohydrates fiber lipids proteins nutritional interactions and metabolic consequences

FS HN 554 Biochemical and Physiological Basis of Nutrition Vitamins and Minerals (Same as An S 554) (1-3) Cr 3 F Preq BBMB 420 or BBMB 404 and credit or enrollment in BBMB 405 Integration of the molecular cellular and physiologic aspects of vitamin and mineral metabolism in mammalian systems Interactions among nutrients metabolic consequences of deficiencies or excesses relevant polymorphisms and current topics related to micronutrients and non-nutrient components

FS HN 561 Disease and Medical Nutritional Therapy I (Dual listed with 461) (3.0) Cr 4 F Preq 362 or 553 or 554 3 credits in physiology Pathophysics of selected disease states and medical problems Clinical nutrition applications in acute and chronic disease Assessment of nutritional problems nutrition care planning and documentation Specific attention will be directed to nutrition needs and treatment of each disease state with medical nutrition therapy

FS HN 562 Assessment of Nutritional Status (3.0) Cr 3 Alt S offered 2006 Preq 461/461/553 or 553 Overview and practical applications of methods for assessing nutritional status including theoretical framework Nutritional and disease dietary intake biochemical indices clinical examination and body composition

FS HN 564 Disease and Medical Nutrition Therapy II (Dual listed with 464) (2.0) Cr 3 S Preq 561 Pathophysiology of selected disease states and medical problems Clinical nutrition applications in acute and chronic disease Assessment of nutritional problems nutrition care planning and documentation Specific attention will be directed to nutrition needs and treatment of each disease state with medical nutrition therapy

FS HN 566 Nutrition Counseling and Education Methods (Dual listed with 466) (1.2) Cr 3 S Preq 561 Nutrition counseling and assessment of malnutrition in low income countries Social cultural political economic and geographic determinants of malnutrition Protein-energy malnutrition vitamin and mineral deficiencies Intervention approaches International efforts and lessons learned

FS HN 568 Nutrition Counseling and Education Methods (Dual listed with 468) (1.2) Cr 3 S Preq Graduate student status Application of counseling and learning theories with individuals and groups in community and clinical settings includes

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discussion and experience in building rapoport data assessment and interpretation developing goals outcomes selecting learning activities evaluation and documentation.

FS HN 567 Nutrition for Dietitians 3 (3) C 3 Alt. F offered 2005 PPRE 360 BBMB 301 undergraduate course in physiology For students enrolled in Dietetics Certificates programs and the Master of Family and Consumer Sciences. Dietetics Speciation. Study of the current scientific literature to evaluate current trends and issues in nutrition science and dietetic practice. Emerging areas of research investigating the role of nutrients in health and disease in humans will be explored. Emphasis on the impact of emerging research on nutrition recommendations and interventions designed to promote human health.

FS HN 572 Food Processing Laboratory (Dual listed with 472) (1) C 2 F PPRE 503 or equivalent Pilot plant experiences such as thermal processing fermentation of seed processing food extrusion corn wet milling and milk processing. Special emphasis on interpreting data and writing project reports.

FS HN 575 Processed Foods (3) C 3 F PPRE 214 or 311 a course in nutrition Survey of the effects of home and commercial food preparation and processing on the nutrients in food.

FS HN 580 Orientation to Food Science and Nutrition Research (1-0) C 1 F Orientation to and discussion of research interests in food science and nutrition research and the conduct of research intending for entering students in FS HN and related disciplines Offered on a satisfactory-fail grading basis.

FS HN 581 Seminar 1-0) C 1 S Discussion and practice of oral presentation of scientific data in a professional setting. Discussion of issues related to data presentation Offered on a satisfactory-fail grading basis only.

FS HN 590 Special Topics Cr arr FS SS PPRE Permission of instructor.

FS HN 596 Food Science and Human Nutrition Travel Course (Dual listed with 406) C 2-t 0 May be repeated. (One credit per week) Travelled FS SS PPRE Permission of instructor. Limited enrollment. Tour and study of food industry dietary and nutritional agencies in different regions of the world. Presentation of selected topics. Pre travel session arranged Travel expenses paid Students Offered on a satisfactory-fail grading basis only.

FS HN 599 Creative Component Cr Var Nonth option only.

Courses for Graduate Students

FS HN 606 Instrumental Measurement of Food Quality 2-3 C offered 2004 PPRE 311 or 411 or 502 or BBMB 404 Principles of instrumental measurements of color aroma and flavor. Rheological techniques and instrumentation for measuring the mechanical properties of foods relationship of these properties to food textural qualities. Analysis of methods to various foods and biorenewable materials.

FS HN 610 Food Enzymology (2) C 3 Alt. F offered 2004 PPRE 311 or 411 or 502 or BBMB 404 Properties of enzymes important in food processing and production. Experimental determination and quantitative evaluation of the influence of concentration of substrates and inhibitors on enzyme activity and temperature. Specificity and mechanisms important to food and agricultural biochemistry.

FS HN 612 Food Lipids 3(3) C 3 Alt. S offered 2004 PPRE 311 or 411 or 502 or BBMB 404 Structure and analysis of food lipids glycolipid structure crystal form and texture autoxidation.

FS HN 613 Food Proteins (3) C 3 Alt. F offered 2005 PPRE 311 or 411 or 502 or BBMB 404 Properties of proteins found in milk, eggs, meat, legumes, and cereals. Effect of processing on food proteins.

FS HN 614 Carbohydrates in Foods (3) C 3 Alt. S offered 2005 PPRE 311 or 411 or 502 or BBMB 404 Study of chemical and physical properties of carbohydrates in foods and changes they undergo during processing and storage of food.

FS HN 626 Advanced Food Microbiology (Same as Micro 626) (3) C 3 Alt. S offered 2004 PPRE 420 or 421 or 504 Topics of current interest in food microbiology including new foodborne pathogens rapid identification methods effect of food properties and new preservation techniques on microbial growth and mode of action of antimicrobials.


FS HN 665 Selected Topics in Nutrition (2) C 1-2 each taken Alt. F offered 2003 PPRE 554 555 Graduate course in physiology Series of courses on such topics as proteins vitamins minerals lipids energy metabolism evaluation of nutritional status. Classical and current research methods in each area.

FS HN 680 Modern Views of Nutrition. (Same as An S 680) See Animal Science.

FS HN 681 Seminar (1-0) C 1 FS SS Presentation of thesis or dissertation research. May be taken for M S program and twice for the Ph D program.

FS HN 686 Special Problems Cr var FS SS PPRE 552 or 554 or 555 or 554.

FS HN 685 Grant Proposal Writing (1-0) C 1 Alt. F offered 2004 PPRE 3 credits of graduate course work in food science and nutrition. Grant proposal preparation experiences including writing and critiquing of proposals and budget planning. Formation of grant writing teams in food science and nutrition. Offered on a satisfactory-fail grading basis only.

FS HN 689 Research Cr var FS SS Offered on a satisfactory-fail grading basis only.

A Nutrition

B Food Science

Foreign Languages and Literatures

Dawn Bratsch Prince Chair of Department

University Professors Courtois

Professors Bernard Bratsch Prince Dow Judhw Lacace Leonard M Rectorus

Professors (Emeritus) Fink

Associate Professors Henry James Lacace

Manner Matzeg Matson McGlew Mack Masbrotny

Associate Professors (Adjunct) Rosenbusch

Associate Professors (Emeritus) Dial Thogmarin

Assistant Professors Allen Anderson Bowles Gasta Lhotte Mu O Neil Sunchombo Thomas

Assistant Professors (Emeritus) Chaffield Johnson

Instructors (Adjunct) Kottman Liu E Rectorus

Lecturers Megropava Taotul

Undergraduate Study

Foreign language study should be a part of the program of most students. The theoretical understanding of and practical experience in language underlie many intellectual disciplines that try to meet the complex problems of contemporary society. Courses offered by the Department of Foreign Languages and Literatures are designed to offer students an understanding of a second culture through the language spoken by that culture as well as a thorough knowledge of the fundamentals of the language itself.

Graduates will achieve both linguistic proficiency and cultural literacy through the study of the language and culture. The program of study contributes in achieving the ability to function effectively in the target language and the ability to communicate competently with native speakers of the target language. (This will vary somewhat for students of Latin and Ancient Greek.) Cultural literacy includes knowledge of the culture’s history, familiarity with its literature and basic knowledge of its social and political institutions.

The Department offers both majors and minors in the French, German, Russian studies, and Spanish leading to the bachelor of arts degree in Chinese Studies, Latin, and Portuguese, and instruction in Italian and Classical Greek. A minor in any foreign language or any area studies program requires at least 15 credits, none of which must be at the 300 level or higher. These 3 credit must be in literature or culture. Courses numbered in the 200's generally may not be used toward the minor or major. Please consult the specific requirements for each language group. A full statement of requirements for majors and minors may be obtained from the Department. For a complete statement of all college requirements see Liberal Arts and Sciences Curriculum. Current and detailed information about the department including placement information is available online at www.public.expedia.edu/~ling_info/hompage.html

Students who have had formal training in foreign languages offered at Iowa State may obtain credit by passing appropriate examinations. Students with native fluency in languages taught at Iowa State may not enroll or take the Exam for Credit in elementary or intermediate courses (100 and 200 level) in their native language. Students with questions about this issue should consult the Department. Students with native fluency may be eligible to enroll in literature and civilization courses in their native language at the 300 level or above. Students must also consult the department office to determine eligibility for advanced composition and conversation courses (300 level and above).

Students who have completed three or more years of high school foreign language study may not enroll in or receive credit for 101 102 or 110 in those languages credit may be obtained by passing the appropriate Exam for Credit or by completing an advanced sequence (200 level or higher) in that language. 101 102 may not be taken on a remedial basis.

Students who have completed more than one year but less than three years of high school foreign language study may not enroll in 101 in the same language. Before enrolling in 102 these students are recommended but not required to take the first year Exam for Credit. Students who pass the Exam for Credit at the 101 102 level receive credit for two semesters of first year language study. Students wishing to continue their study in the language should consult with the Department's academic advisor. Students who pass the Exam for Credit at the 101 level receive credit for one semester of first year language study. These students may enroll in 102 and participate in 97 an intensive review module. Students who fail to pass at the 101 level may enroll in 102 with the required review module 101 may not be taken on a remedial basis. Students who receive a grade of C or higher in 102 and who have taken 97 receive credit for 101.

Students with disabilities who need to satisfy the foreign language requirement may direct questions to the Advising Coordination in the Foreign Language Department and the Disability Resource Office. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 201 and 202 is available only to students who are...
not currently enrolled in the course. Credit by examination for other courses in the Department is not normally available.

The Department of Foreign Languages and Literatures participates in the Iowa Board of Regents foreign language summer programs in France and Spain and the Regents semester program in Spain. The Department also offers summer programs in Bolivia, Greece, Russia, Spain and Mexico and a semester program in Mexico and Spain. Information concerning these programs can be obtained directly from the Department. The Department also hosts the Classical Studies Program.

Language and literature courses numbered 300 and above are principally taught in the target language. Courses numbered in the 370s are taught in English. For courses taught in English about Classical Greek or Latin, see Classical Studies. Students may not take intermediate (200 level) courses for credit after successfully completing any advanced (300/400 level) course except those in the 370 series or courses taught in English translation. Students who have successfully completed any course in the intermediate (200 level) sequence may not take a lower numbered course in that sequence for a grade.

Courses numbered 110 are essentially equivalent to 101 and 102 combined. Credit toward graduation may not be acquired in more than one of these options.

Students at all levels of foreign language study will have access to the Language Learning Resource Center located in 312 Pearson. The resource center contains an extensive collection of foreign language materials including films, music, books, computer software and hardware and course related materials.

Materials fees. A materials fee is assessed for all courses offered in this Department except those with the F Lang designation.

English proficiency requirement. The Department requires a grade of C- or better in each of Eng 104 and 105 (105H and 105B) or better in any course numbered between 370 and 373 (with the exception of Rus 375 and Rus 376) taught by the Department of Foreign Languages and Literatures.

Graduate Study

The Department of Foreign Languages offers a graduate minor in French, Latin, Persian, Russian, Spanish and Spanish. The graduate minor in each of these languages is designed to provide an opportunity for graduate students to further their knowledge of that language to complement their work in their major disciplines. The graduate minor provides formal recognition of student achievement and expertise in one of the languages above. Graduate minor credits are also offered in Greek and Portuguese.

Graduate Minor

Program Requirements

Prerequisites: Graduate students who wish to minor in one of the languages above must have 400-level proficiency in that language. When this is not the case, the student may be required to take a language course below the 400 level which would not count towards the graduate minor requirements.

Course Requirements: For the M.A. or M.S.

Three courses in the language of the minor. No more than three credits may be in courses numbered 401, 402 and 403. For the Ph.D., four courses in the language of the minor which must include at least one three credit course at the 500 level. No more than three credits may be in courses numbered 401, 402 or 403. At least two courses for the M.A. and at least two courses for the Ph.D. minors must be taken in residence at Iowa State University. Papers for these courses are expected to have a content and depth commensurate with the graduate status of the student.


Courses Prerequisite for Undergraduate Students

Chinese (Chin)

Minors in Chinese Studies are required to take Chin 201, 202, 300, and 305. Of these the 300 level and at least 3 additional credits are in Chinese (courses taught in Chinese or English) and 3 credits in one of the following: Chin 375, Hist 337, Pol 342. The remaining 3 credits are chosen from: AntR 326, Arch 430, Chin 301, 302, 370, 375, 490, Hist 338, Pol 337, 342.

Chin 101 Elementary Mandarin Chinese I (5.1 Cr.)

Int. 5 Introduction to spoken and written colloquial Chinese through practical exercises. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Chin 102 Elementary Mandarin Chinese II (5.1 Cr.)

S. 5 Prereq: 101. Introduction to spoken and written colloquial Mandarin through practical exercises. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Chin 201 Intermediate Mandarin Chinese I (5.1 Cr.)

S 5 F Prereq: 102. Development of speaking, writing, and listening skills. Review and expansion of grammar skills, introduction to traditional characters and dictionaries. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Chin 202 Intermediate Mandarin Chinese II (5.1 Cr.)

S 5 S Prereq: 201. Development of speaking, writing, and listening skills. Review and expansion of grammar skills, introduction to traditional characters and dictionaries. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Chin 301 Advanced Chinese Readings I (3 Cr.)

S 3 F Prereq: 202 or equivalent. Continuing study of Chinese beyond intermediate level with a focus on reading and writing skills. Cultural literacy through a variety of texts from the humanities, social sciences, mass media and business.

Chin 302 Advanced Chinese Readings II (3 Cr.)

S 3 S Prereq: 301 or equivalent. Continuing study of Chinese beyond intermediate level with a focus on reading and writing skills. Cultural literacy through a variety of texts from the humanities, social sciences, mass media and business.

Chin 370 Chinese Literature in English Translation (3 Cr.)

S 3 F Prereq: Eng 105 or equivalent. Topics may include traditional prose, poetry, and drama of the Chinese novel, twentieth-century fiction and film, gender and cosmology in Chinese literature. All readings and class discussions in English.

Chin 375 China Today (3 Cr.)

S 3 S Prereq: Eng 105 or equivalent. Topics may include traditional prose, poetry, and drama of the Chinese novel, twentieth-century fiction and film, gender and cosmology in Chinese literature. All readings and class discussions in English.

Chin 490 Independent Study (1 to 6 Cr.)

Each time taken. Prereq: B credits in Chinese and permission of department chair. Designed to meet the needs of students who seek work in areas other than those in which courses are offered or who desire to integrate a study of literature or language with special problems in major fields. Nonmajor graduate credit.

French (Frnc)

Mayors are required to complete at least 30 credits in French beyond the intermediate (201/202) level. Courses required for the major are 301, 310, 314, 333, 354, 380, 440, 475, and 480. Credit by examination for the courses numbered 300, 400/400 level, 475 and 472 and at least 3 credits of 440 must be completed on campus.

Minors are required to complete at least 16 credits in French beyond the intermediate (101/102) level. Option 1, 16 credits in French at least 10 of which at the 200 level including 301, 310, 314, and 333. Option 2, 18 credits in French at least 10 of which at the 300 level including 354.

Courses Prerequisite for Undergraduate Students

Frnc 97 Review Module (0-4 Cr.)

Prereq: More than one year but less than three years of high school French Module: 200 is available course preparing students for 102. Course components include: review of key language skills covered in high school audio components, help sessions and testing.

Frnc 101 Elementary French I (4 Cr.)

Beginning level development of reading, listening, comprehension and speaking in French within the context of French culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Frnc 102 Elementary French II (4 Cr.)

Beginning level development of reading, listening, comprehension and speaking in French within the context of French culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Frnc 201 Intermediate French I (4 Cr.)

Prereq: 102. Intermediate level development of reading, listening, understanding comprehension and speaking in French within the context of French culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Frnc 202 Intermediate French II (4 Cr.)

Prereq: 201. Intermediate level development of reading, listening, understanding comprehension and speaking in French within the context of French culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Frnc 301 Reading and Writing French (3 Cr.)

Prereq: 201. Emphasis on developing functional language skills in reading and writing. Selective review of grammar within the context of cultural and literary prose. Concurrent enrollment in Frnc 305 and/or 310 is encouraged.

Frnc 304 Business French (3 Cr.)

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

French 390 Special Topics in French Cr 2 to 4 each time taken. Prereq: Permission of instructor. 6 credits of 400 level French.
A. Literature or Literary Criticism
B. Linguistics
C. Language Pedagogy
D. Civilization

German (Ger)
Major in German is required to complete at least 30 credits beyond the intermediate (220 level) French.
Requirements for the major are 301 or 302 305 320 or 330 at least one 440 course for 4 cr. and 471 472 each for 4 cr. Majors may enroll in no more than three of the following courses in the fourth credit: 371 412 and F 498.
The minor in German requires at least 15 credits none of which must be at the 300 level or higher of these three credits must be in literature or culture taught in German.

Courses Primarily for Undergraduate Students

Ger 57 Review Module (0-4) Cr 0 FSS Prereq
More than one year but less than three years of high school German
Modular self-paced review course preparing students for 102 German.
Course components include review of key language skills covered in 101 audio cloze helps sessions and tests. Students who have taken two semesters of college German or three years of high school German are not eligible to enroll.

Ger 101 Elementary German I (4-1) Cr 4 FSS Introduction to German language within the context of German culture practice in the basic skills Credit by examination in the Department of Foreign Languages and literatures for courses numbered 101 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Ger 102 Elementary German II (4-1) Cr 4 S Prereq 101 or 97 Continuation of Ger 101 Credit by examination in the Department of Foreign Languages and literatures for courses numbered 101 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Ger 201 Intermediate German I (4-1) Cr 4 F Prereq
202 Review of grammar selected readings, further practice in oral and written communication. Credit by examination in the Department of Foreign Languages and literatures for courses numbered 101 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Ger 202 Intermediate German II (4-1) Cr 4 S Prereq 201 Continuation of Ger 201 One section will emphasize the use of German in professional contexts. Credit by examination in the Department of Foreign Languages and literatures for courses numbered 101 102, 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Ger 301 Reading (3-0) Cr 3 F Prereq 202 Emphasis on the development of reading skills through the use of a variety of texts with a focus on German culture from circa 1900 to Post WWII.

Ger 302 Composition (3-0) Cr 3 S Prereq 301 Emphasis on writing skills with further development of grammar and reading skills.

Ger 304 German for Business and Professions (3-0) Cr 3 F Prereq 202 Communication in business and professional contexts in German speaking countries. Development of effective communication strategies and project management in the workplace. Contextual cultures of business and professional practice.

Course 390 Preparation for internships and the German Profession.

GER 305 Advanced Conversation and Listening Comprehension (3 Cr) or S Prereq 202 concurrent enrollment in 302 recommended intensive conversational and listening practice in German with an emphasis on a major German speaking city.

GER 320 Germany Today (3-0) Cr 3 S Prereq 301 or 304 Selected topics dealing with contemporary German society and culture. Introduction to materials and resources and forms of communication available on the Internet and in other electronic and print media.

GER 330 Introduction to German Literature (3-0) Cr 3 F Prereq 3 credits at 300 level or concurrent enrollment in 302 and 304 readings in German literature from Classicism to present Emphasis on techniques of reading and analysis of literary texts.

GER 370 German Studies in English (3-0) Cr 3 Alt F offered 2004 Topics vary according to faculty interest.

GER 771 The Holocaust in Film Image and Memory (3-0) Cr 3 or 3 2 Cr 4 Alt F offered 2003 Prereq For credit six credits in the 300 level Examination of such topics as the origins and expressions of Anti-Semitism in central Europe the political events and structures of the Holocaust the reality of ghettos and concentration camps the impact of political and ideological solutions resistance and resistance to the Nazis. Materials will include fictional literature art and music Taught in English Fourth credit supplementary readings and compositions in German.

GER 475 Germs Tales (3-0) Cr 3 or 3 2 Cr 4 Alt S offered 2005 Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society and culture in the modern period. Emphasis on the visual arts and their role in society. Taught in English Fourth credit supplementary readings and compositions in German.

GER 478 German Film and Media Studies (3-0) Cr 3 or 3 2 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.

GER 480 Study Abroad (1-0) Cr 10 Prereq 2 years university-level German Supervised instruction in language and culture of Germany Formal class instruction at level appropriate to student's study augmented by practical living experience.

GER 480 Seminar in German Studies (3-0) Cr 3 or 4-0 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.

GER 480 Study Abroad (1-0) Cr 10 Prereq 2 years university-level German Supervised instruction in language and culture of Germany Formal class instruction at level appropriate to student's study augmented by practical living experience.

GER 440 Seminar in German Studies (3-0) Cr 3 or 4 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.

GER 440 Seminar in German Studies (3-0) Cr 3 or 4-0 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.

GER 440 Seminar in German Studies (3-0) Cr 3 or 4 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.

GER 440 Seminar in German Studies (3-0) Cr 3 or 4-0 Cr 4 F Prereq For credit six credits in the 300 level. An analysis and interpretation of film or media in German society. Study of media production and reception within multicultural and global contexts. Thematic emphasis based on faculty and student interest including 1 film directors and genres native to New Germany 2 film and the Other Cinematic aesthetics and cinematography 2 media studies (e.g. television mass press popular culture) Taught in English Fourth credit supplementary readings and compositions in German.
Ger 490 Independent Study Cr 1 to 6 each time taken. Prereq: 6 credits in German and permission of department chair. No more than 9 credits of Ger 490 may be counted toward graduation. Designed to meet the needs of students seeking work in areas other than those in which courses are offered or who desire to integrate a study of literature or language with special problems in major fields.

Ger 499 Internship in German Cr 13 each time taken. F5 SS. Prereq: 9 credits of German at the 300 level, permission of advisor and FLL Internship coordinator. Work experience using German language skills in the public or private sector combined with academic work under faculty supervision. Offered on a satisfactory-fail grading basis only. May be repeated to a maximum of 6 credits. Available only to majors and minors. Credits do not apply to major or minor requirements.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Ger 690 Special Topics in German Cr 2 to 4 each time taken. Prereq: Permission of instructor. 6 credits of 400 level German.
- Literature or Literary Criticism
- Linguistics
- Language Pedagogy
- History and Culture

Greek (Greek)

For courses in Greek literature taught in English see Classical Studies.

Courses Primarily for Undergraduate Students

Greek 101 Elementary Classical Greek I (4) Cr 4 S. Prereq: 101 Grammar and vocabulary of ancient Attic Greek within the context of Greek culture reading knowledge through texts adapted from classical authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Greek 102 Elementary Classical Greek II (4) Cr 4 S. Prereq: 101 Grammar and vocabulary of ancient Attic Greek within the context of Greek culture reading knowledge through texts adapted from classical authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Greek 201 Intermediate Classical Greek (4) Cr 4 S. Prereq: 202 Emphasis on grammatical principles composition and reading classical or Hellenistic texts Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Greek 332 Introduction to Classical Greek Literature (3-0) Cr 3 S. Prereq: 201 Readings in ancient Greek literature with emphasis on critical analysis of style structure or thought includes composition

Greek 441 Advanced Readings in Greek Literature (3-0) Cr 3 F. Prereq: 332 Study of individual authors or genres intensive reading in the original supplemented by modern criticism and analysis in English Authors and genres will vary courses may be repeated to a maximum of 6 credits each. Nonmajor graduate credit.

Greek 442 Advanced Topics in Greek Literature (3-0) Cr 3 S. Prereq: 332 Advanced study of authors or topics relating to Greek literature Authors and topics will vary courses may be repeated to a maximum of 6 credits each. Nonmajor graduate credit.

Greek 490 Independent Study Cr 1 to 6 each time taken. Prereq: 6 credits in Greek and permission of department chair. No more than 9 credits of Greek may be counted toward graduation. Designed to meet the needs of students who seek work in areas other than those in which courses are offered or who desire to integrate a study of literature or language with special problems in major fields.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Greek 600 Special Topics in Greek Cr 2 to 4 each time taken. Prereq: Permission of instructor. 6 credits of 400 level Greek.
- Literature or Literary Criticism
- Linguistics
- Language Pedagogy
- History and Culture

Italian (Ital)

Courses Primarily for Undergraduate Students

Italian 101 Elementary Italian I (4) Cr 4 S. Prereq: Introductory course to grammar and structure of the language use of audio materials supplemented by graded readings within the context of Italian culture. Especially recommended as a second area of language study for majors in French and Spanish. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201, and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Italian 102 Elementary Italian II (4) Cr 4 S. Prereq: 101 Introduction to basic grammar and structure of the language use of audio materials supplemented by graded readings within the context of Italian culture. Especially recommended as a second area of language study for majors in French and Spanish. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201, and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Italian 201 Intermediate Italian I (4) Cr 4 S. Prereq: 102 Review of first year principles and expanded study of grammar development of written and spoken skills introduction to Italian civilization and literature through extracts from noted authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201, and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Italian 202 Intermediate Italian II (4) Cr 4 S. Prereq: 201 Review of first year principles and expanded study of grammar development of written and spoken skills introduction to Italian civilization and literature through extracts from noted authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201, and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Italian 490 Independent Study Cr 1 to 6 each time taken. Prereq: 6 credits in Italian and permission of department chair. No more than 9 credits of Italian may be counted toward graduation. Designed to meet the needs of students who seek work in areas other than those in which courses are offered or who desire to integrate a study of literature or language with special problems in major fields.

Portuguese (Port)

The minor in Portuguese requires at least 15 credits nine of which must be at the 300 level higher. Of these credits must be in literature or culture taught in Portuguese.

Courses Primarily for Undergraduate Students

Port 101 Elementary Brazilian Portuguese I (4-1) Cr 4 F. Introduction through the conversational approach within the context of Lusophone culture Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, 201, and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Port 600 Special Topics in Portuguese Cr 2 to 4 each time taken. Prereq: Permission of instructor. 6 credits of 400 level Portuguese.
- Literature or Literary Criticism
- Linguistics
- Language Pedagogy
- History and Culture

Modern Languages and Literatures

Courses Primarily for Undergraduate Students

Latin 101 Elementary Latin I (4) Cr 4 S. Prereq: Grammar and vocabulary of classical Latin within the context of Roman culture reading knowledge through texts adapted from classical authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Latin 102 Elementary Latin II (4) Cr 4 S. Prereq: 101 Grammar and vocabulary of classical Latin within the context of Roman culture reading knowledge through texts adapted from classical authors. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Latin 201 Intermediate Latin (4) Cr 4 S. Prereq: 102 Emphasis on grammatical principles composition and reading Latin texts Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101, 102, and 201 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

Latin 332 Introduction to Latin Literature (3-0) Cr 3 S. Prereq: 201 Readings in Latin literature with emphasis on critical analysis of style structure or thought includes composition

Latin 441 Advanced Readings in Latin Literature (3-0) Cr 3 F. Prereq: 332 Study of individual authors or genres intensive readings in the original supplemented by modern criticism and analysis in English. Authors and genres will vary courses may be repeated to a maximum of 6 credits each. Nonmajor graduate credit.

Latin 442 Advanced Topics in Latin Literature (3-0) Cr 3 S. Prereq: 332 Advanced study of authors or topics relating to Latin literature. Authors and topics will vary courses may be repeated to a maximum of 6 credits each. Nonmajor graduate credit.

Latin 490 Independent Study Cr 1 to 6 each time taken. Prereq: 6 credits in Latin and permission of department chair. No more than 9 credits in Latin may be counted toward graduation. Designed to meet the needs of students who seek work in areas other than those in which courses are offered or who desire to integrate a study of literature or language with special problems in major fields.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Latin 600 Special Topics in Latin Cr 2 to 4 each time taken. Prereq: Permission of instructor. 6 credits of 400 level Latin.
- Literature or Literary Criticism
- Linguistics
- Language Pedagogy
- History and Culture
Courses Primarily for Undergraduate Students

RUS 101 Elementary Russian I (4 Cr) Cr 4 S 4 Prereq 101 Introduction to the Russian language, grammar, and syntax. Practice in the four basic skills (listening, speaking, reading, and writing); within the context of Russian culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 202 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

RUS 102 Elementary Russian II (4 Cr) Cr 4 S Prereq 101 Introduction to the Russian language, grammar, and syntax. Practice in the four basic skills (listening, speaking, reading, and writing); within the context of Russian culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 202 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

RUS 103 Elementary Russian III (4 Cr) Cr 4 S Prereq 104 Introduction to the Russian language, grammar, and syntax. Practice in the four basic skills (listening, speaking, reading, and writing); within the context of Russian culture. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 202 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

RUS 201 Intermediate Russian I (4 Cr) Cr 4 F Prereq 102 Thorough review of grammar and growth of vocabulary. Selected readings. Continued use of the four basic skills. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 202 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

RUS 202 Intermediate Russian II (4 Cr) Cr 4 S Prereq 201 200 Thorough review of grammar and growth of vocabulary. Selected readings. Continued use of the four basic skills. Credit by examination in the Department of Foreign Languages and Literatures for courses numbered 101 202 201 and 202 is available only to students who are not currently enrolled in the course. Credit by examination for other courses in the Department is normally not available.

RUS 301 Composition and Conversation I (3 Cr) Cr 3 F Prereq 202 Thorough study of the Russian language with emphasis on strengthening proficiency in written and oral language. Focus on syntax and word formation.

RUS 304 Russian for Science and Business (3 Cr) Cr 3 Prereq 302 Designed to meet the needs of students who desire to integrate a study of Russian language and business studies. Emphasis on scientific or business language. Focus on reading, grammar, and standards for writing scholarly papers or business documents. Taught in Russian.

RUS 314 Reading Russian Literary and Cultural Texts (3 Cr) Cr 3 Prereq 301 Selected readings in Russian literature and culture. Emphasis on techniques of reading and analysis of literary and cultural texts.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Courses in Russian Studies are required to complete at least 3 credits beyond the intermediate level (101 202 201)

RUS 321 Russian Civilization I (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 322 Russian Civilization II (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 1855 to the present.

RUS 370 Russian Studies in English Translation (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 375 Topes in Russian, East European and Eurasian Studies (3 Cr) Cr 3 Selected topics dealing with a particular area or period or individual in Russian, East European, and Eurasian Studies. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 375 does not fulfill the English proficiency requirement for FLL majors.

RUS 376 Topics in Russian, East European, and Eurasian Studies (3-6 Cr) Cr 3 Selected topics dealing with a particular area or period or cultural pattern in Russian, East European, and Eurasian Studies. 3-6 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 376 does not fulfill the English proficiency requirement for FLL majors.

RUS 385 Study Abroad Cr 1 to 6 Supervised instruction in language and culture of Russian far from the home country. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 385 does not fulfill the English proficiency requirement for FLL majors.


RUS 440 Seminar in Russian Studies (3 Cr) Cr 3 Prereq 314 A study of a selected topic in history, politics, or linguistics. Nonmajors register for RUS 440.

RUS 490 Independent Study Cr 1 to 6 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 490.

RUS 590 Special Topics in Russian Studies Cr 2 to 4 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 590.

Courses Primarily for Graduate Students

Courses in Russian Studies are required to complete at least 3 credits beyond the intermediate level (101 202 201)

RUS 321 Russian Civilization I (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 322 Russian Civilization II (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 1855 to the present.

RUS 370 Russian Studies in English Translation (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 375 Topes in Russian, East European and Eurasian Studies (3 Cr) Cr 3 Selected topics dealing with a particular area or period or individual in Russian, East European, and Eurasian Studies. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 375 does not fulfill the English proficiency requirement for FLL majors.

RUS 376 Topics in Russian, East European, and Eurasian Studies (3-6 Cr) Cr 3 Selected topics dealing with a particular area or period or cultural pattern in Russian, East European, and Eurasian Studies. 3-6 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 376 does not fulfill the English proficiency requirement for FLL majors.

RUS 385 Study Abroad Cr 1 to 6 Supervised instruction in language and culture of Russian far from the home country. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 385 does not fulfill the English proficiency requirement for FLL majors.


RUS 440 Seminar in Russian Studies (3 Cr) Cr 3 Prereq 314 A study of a selected topic in history, politics, or linguistics. Nonmajors register for RUS 440.

RUS 490 Independent Study Cr 1 to 6 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 490.

RUS 590 Special Topics in Russian Studies Cr 2 to 4 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 590.

Courses Primarily for Graduate Students

Courses in Russian Studies are required to complete at least 3 credits beyond the intermediate level (101 202 201)

RUS 321 Russian Civilization I (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 322 Russian Civilization II (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 1855 to the present.

RUS 370 Russian Studies in English Translation (3 Cr) Cr 3 Study of a particular period or phenomenon (e.g., cultural pattern, myth, or archetype) in Russian cultural history from 988 to 1855.

RUS 375 Topes in Russian, East European and Eurasian Studies (3 Cr) Cr 3 Selected topics dealing with a particular area or period or individual in Russian, East European, and Eurasian Studies. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 375 does not fulfill the English proficiency requirement for FLL majors.

RUS 376 Topics in Russian, East European, and Eurasian Studies (3-6 Cr) Cr 3 Selected topics dealing with a particular area or period or cultural pattern in Russian, East European, and Eurasian Studies. 3-6 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 376 does not fulfill the English proficiency requirement for FLL majors.

RUS 385 Study Abroad Cr 1 to 6 Supervised instruction in language and culture of Russian far from the home country. 3 credits awarded for the course to a student registering in the Department of Foreign Languages and Literatures. RUS 385 does not fulfill the English proficiency requirement for FLL majors.


RUS 440 Seminar in Russian Studies (3 Cr) Cr 3 Prereq 314 A study of a selected topic in history, politics, or linguistics. Nonmajors register for RUS 440.

RUS 490 Independent Study Cr 1 to 6 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 490.

RUS 590 Special Topics in Russian Studies Cr 2 to 4 Supervised instruction in a selected topic in Russian literature, language, or culture. Nonmajors register for RUS 590.
Span 326 Hispanic Art in a Cultural Context (I) Dual listed with 526 I (3) Cr. 3 S. Prereq. One course at the 300 level Survey of major figures and currents in Spanish and Spanish American art alongside selected literary and documentary texts and films Taught in Spanish

Span 330 Survey of Spanish Literature to 1700 (3) Cr. 3 F Prereq. 314 Introduction to Spanish literature from the earliest times through the Golden Age techniques of literary criticism Lectures discussion and analysis of individual selections in Spanish Taught in Spanish Nonmajor graduate credit

Span 331 Survey of Spanish Literature from 1700 to the Present (3) Cr. 3 S. Prereq. 314 Introduction to Spanish literature from the eighteenth century to the present techniques of literary criticism Lectures discussion and analysis of individual selections in Spanish Taught in Spanish Nonmajor graduate credit

Span 332 Survey of Spanish American Literature (3) Cr. 3 S. Prereq. Introduction to Spanish American literature from the earliest times to the present techniques of literary criticism Lectures discussion and analysis of individual selections in Spanish Taught in Spanish Nonmajor graduate credit

Span 335 Introduction to Spanish English Translation (3) Cr. 3 F Prereq. 301 303 or 304 Introduction to the techniques and problems of translation Consideration of material from business literature and the social sciences Taught in Spanish Nonmajor graduate credit

Span 352 Introduction to Spanish Phonology (Same as Ling 352) (3) Cr. 3 S. Prereq. 301 303 or 304 An introductory study of the articulation classification distribution and regional variations of the sounds of the Spanish language Taught in Spanish Nonmajor graduate credit

Span 370 Hispanic Topics in English Translation (3) Cr. 3 F Prereq. Sophomore classification Study of a selected period theme genre or author Readings discussions and written work in English May be repeated for a maximum of 6 credits

Span 380 Seminar for Spanish Minors (1) Cr. 1 S. Prereq. One Spanish course at the 300 level Overview of Hispanic culture and language presented by specialists in the field Taught in Spanish

Span 394 Study Abroad Orientation (1) Cr. 1 F Prereq. Overview of Spanish life and customs family religion politics economics system sports entertainment and consumer practices

Span 396 Study Abroad Cr. 1 to 12 Prereq. Equivalent to 2 years undergraduate level Spanish Supervised instruction in Spanish and Hispanic culture formal class instruction at level appropriate to student's training enhanced by practical living experience

Span 401 Advanced Composition and Grammar (3) Cr. 3 F Prereq. 301 or 302 Advanced study of Spanish grammar and syntax Students writing of compositions incorporates an advanced understanding of grammar syntax and principles of organization of thought and ideas Taught in Spanish Nonmajor graduate credit

Span 402 Advanced Conversation (3) Cr. 3 S. Prereq. 301 or 303 Intensive oral practice Development of fluency in the oral expression of ideas and application of grammar and syntax concepts to conversational skills Emphasis on organization of speeches and other oral presentations Taught in Spanish Nonmajor graduate credit

Span 440 Spanish Literature of the Middle Ages (Beginnings to 1500) (formerly Cr. 3 S. Prereq. 330 Discussion and analysis of major trends and figures in Medieval prose drama and poetry May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 441 Literature of the Golden Age (from 1500 to 1700) (3) Cr. 3 S. Prereq. 330 Discussion and analysis of major trends and figures in Renaissance and Baroque prose drama and poetry. May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 442 Spanish Literature of the 18th and/or 19th Century (3) Cr. 3 Prereq. 330 or 331 Discussion and analysis of representative works authors and literary trends from Romanticism through Generacion de 98 May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 443 Spanish Literature of the 20th Century (3) Cr. 3 Prereq. 330 or 331 Topics may include such themes as social protest in the post war novel modernism and surrealism in poetry and drama etc May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 444 Spanish American Literature from Earliest Times to Independence (3) Cr. 3 S. Prereq. 330 or 332 Study and analysis of representative works literary schools and movements of this period May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 445 Spanish American Literature from Independence to the Present (3) Cr. 3 S. Prereq. 330 or 332 Critical and analytical study of Spanish American prose poetry and drama May be repeated for a maximum of 6 credits Taught in Spanish Nonmajor graduate credit

Span 462 Contrastive Analysis of Spanish/English for Translators (Same as Ling 462) (3) Cr. 3 S. Prereq. 351 Linguistic study of the major differences between the Spanish and English grammatical systems and their applications in the translation of Spanish to English Taught in Spanish Nonmajor graduate credit

Span 480 Seminar in Hispanic Literature or Culture (3) Cr. 3 each time taken Prereq. 330 331 or 332 Advanced study of a selected topic in Hispanic literature and literary criticism Taught in Spanish Nonmajor graduate credit

Span 490 Independent Study Cr. 1 to 6 each time taken Prereq. 6 credits in Spanish and permission of department chair No more than 9 credits in Span 490 may be counted toward graduation Designed to meet the needs of students in areas other than those in which classes are offered or who desire to integrate a study of literature or language with special problems in major fields

Span 493 Cultural Workshop for Second Language Teachers (Spanish) (1) Cr. 1 to 3 S. Prereq. Experience in teaching Spanish Review of special language problems within the context of Hispanic culture May be repeated for a maximum of 9 credits Nonmajor graduate credit

Span 498 Internship in Spanish Cr. 1 each time taken FS SS Prereq. 8 credits in Spanish at the 300 level permission of advisor and FLL Internship Coordinator Work experience using Spanish language skills in the public or private sector combined with academic work under faculty supervision Offered on a satisfactory 4.0 grading basis only May be repeated to a maximum of 6 credits Available only to majors and minors Credits do not apply to major or minor requirements

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students Span 499 Advanced Hispanic Art in a Cultural Context (I) Dual listed with Span 326 (3) Cr. 3 S. Prereq. 6 credits in Spanish literature or culture at 400 level Survey of major currents and figures in Spanish and Spanish American art alongside selected literary and documentary texts and films
Genetics - Interdisciplinary

www.genetics.istate.edu

e-mail genetics@istate.edu

(Interdepartmental Graduate Major)

Supervisory Committee T Baum Chair
P Schnable Associate Chair S Carpenter P Beecroft
B Bonning J Powell Coffman

Participating Faculty L Ambrosio D Bassham
T Baum G Beetstra P Beecroft J Beetham
P J Berger M Bhattacharya A Bogdanove
B Bonning V Brandel C R Bronson C Brummer
S Carpenter P Chitnis H H Chou G Culver
J Dekkers D Dobbs R Fernando C F Ford
J R Garon X Gu R B Hall H Halverson
D J Hannah T Harlow G H Henderson
M G James J Janicki F Janzen K M Johansen
A Kanthasamy S J Lamont C Lashbrook M Lee
C Link J E Mayfield W A Miller F C Minchin
R Mettler A M Myers J Nelson G Naylor
B J Nikolau M J Nelson Hamilton D Oliver
R G Palmer R Peters P A Peterson T Peterson
G Phillips J Powell Coffman J Raey
S R Rodermal M F Rothschild P S Schnable
M P Scott R C Shoemaker M H Spalding
L C Stephens R W Thornsburg C K Tuggle

D F Voytas K Wang J F Wendel S Whitham
R P Wise E Wurtele

Undergraduate Study

Undergraduates wishing to prepare for graduate study in genetics should elect courses in basic biology and chemistry at least through organic chemistry. One year of college-level physics, mathematics at least through calculus, and at least one thorough course in basic transmission and molecular genetics. One year of upper-level statistics and a year of biochemistry are strongly encouraged.

A bachelor of science degree in genetics is offered by the Department of Zoology and Genetics.

Graduate Study

Work is offered for the master of science and doctor of philosophy degree with a major in genetics in fourteen cooperating departments: Agronomy Animal Science Biochemistry Biophysics and Molecular Biology Botany Entomology Food Science and Human Nutrition Horticulture Plant Pathology Statistics Microbiology Natural Resource Ecology and Management Veterinary Microbiology and Preventive Medicine Veterinary Pathology and Zoology and Genetics.

The diversity of faculty in the Interdepartmental Genetics major ensures a broad, well-balanced education from the best instructors while offering flexibility in choice of research area. Genetics faculty have strengths in many areas from fundamental studies at the molecular, cellular, and population levels to research with immediate practical applications. Ongoing research projects span all the major areas of theoretical and experimental genetics including molecular studies of gene regulation, gene mapping, transposable element studies, development, and genetic mapping and quantitative and mathematical genetics. Genetical and computational molecular biology, evolutionary genetics, and population genetics.

First-year students majoring in genetics may enter the Interdepartmental Genetics major by either of two routes: direct admission to the Interdepartmental Genetics major or by admission to a department participating in the major followed by formal admission to the major. Students admitted directly into the Interdepartmental Genetics major will take General 697 (graduate research rotation) in their first two semesters and then submit a departmental application to participate in the Interdepartmental Genetics major.

All PhD candidates take a core curriculum comprising one course each from the following four categories: genetics and animal research (150), molecular genetics (150 or 25B 602), quantitative population and evolutionary genetics (15 A 680 or 150 611 or 250 602), or 250 602 or 150 607 or 250 680). Biochemistry (250 402 or 250 502). Students may make research presentations at genetics faculty seminars and participate in small groups in genetics (Genet 698) in the training program. First-year graduate students will also attend Seminars in the Conceptual Foundations of Genetics. Ph D students may elect a computational molecular biology specialization within the genetics major. This requires that the research project be in the field of computational molecular biology. IG majors will be expected to complete all of the courses required for the major except that one semester of graduate research Seminar in Computational Biology may be substituted for one semester of GENET 690. Students will be expected to take additional courses in the area of specialization. M S students will take the above core courses and seminars but will participate in only two workshops in Genetics. Additional coursework may be selected to satisfy individual interests or departmental requirements. The foreign language requirement and teaching requirement are determined by the student's department.

The course designator Genet applies to graduate courses taught by the interdepartmental major in Genetics. The course designator Genet applies to courses taught by the department of Zoology and Genetics (see separate listing). Students minoring in Genetics at the Ph D level must meet the following requirements. Completion of three of the four categories of the common-core required lecture courses listed. One semester of seminar in Genetics (Genet 680 or 681 or 682) is recommended. One member of the POM committee must be a Genetics faculty member.

Student Outcomes Most students awarded doctoral degrees continue their training as postdoctoral associates at major research institutions in the U.S. or abroad in preparation for research and teaching positions in academia or government. A few go directly to permanent research positions in industry. Most students awarded master's degrees continue their training as doctoral students however some choose research support positions in academia or government. A complete list of outcomes is available on our Web site.

Courses for Graduate Students

Genet 590 Special Topics Cr arr.
Genet 591 Workshop in Genetics (1 0 0) Cr 1 each time taken S Prereq Permission of instructor Current topics in genetics research. Lectures by off-campus experts. Students read background literature attend preparatory seminars attend all lectures meet with lecturers.
Genet 690 Seminar in Genetics (1 0 Cr 1 each time taken S Prereq Permission of instructor Student research presentations.
Genet 691 Seminar in Genetics (1 0 Cr 1 each time taken S Prereq Permission of instructor Faculty research.
Genet 692 Seminar in the Conceptual Foundations of Genetics (1 0 Cr 1 S Prereq Permission of instructor Student and faculty presentations of landmark papers in genetics. Brief history of ideas of the period included as background material.
Genet 897 Graduate Research Rotation Cr var each time taken F S SS Graduate research projects performed under the supervision of selected faculty members in the Interdepartmental Genetics major.
Genet 899 Research

Geological and Atmospheric Sciences

www.geology.istate.edu

Carl E Jacobson Chair of Department

Professors Chen Guotov; Jacobson Sandor
Spry Takle

Professors (Collaborators) Brantlott Tribba

Distinguished Professors (Emeritus) Vondra

Professors (Emeritus) Nordre Seifert Yarger

Associate Professors Baresnev Burrus Gallus
Iamsen Simpkins Thompson Windom

Associate Professors (Collaborators) Burkart

Tomey Valier

Associate Professors (Emeritus) Cody

Assistant Professors Cervato Fang Mara Sorge
Wu

Assistant Professors (Adjunct) Dawson Ewing Kramer

Undergraduate Study

The department offers courses in Geology and Meteorology. Majors can choose either geology (B.A. B.S.) or geography (B.S.) and meteorology (B.S.). Candidates for both degrees must satisfy the requirements established by the College of Liberal Arts and
Genetics - Interdisciplinary

www.genetics.istate.edu

e mail genetics@istate.edu

(Departmental Graduate Major)

Supervisory Committee T Baumb Church P Schnabl Associate Chair S Carpenter P Boccal H Bonning J Powell Coffman


D F Voyer K Wang J F Wendel S Whism R F Wise E Wurtele

Undergraduate Study

Undergraduates wishing to prepare for graduate study in Genetics should elect courses in basic biology chemistry at least through organic chemistry one year of college level physics and mathematics at least through calculus and at least one thorough course in basic transmission and molecular genetics. One year of upper level statistics and a course in biometry are strongly encouraged.

A bachelor of science degree in Genetics is offered by the Department of Zoology and Genetics

Graduate Study

Work is offered for the master of science and doctor of philosophy degrees with a major in Genetics. Research in the department involves the following opportunities. The areas of special emphasis include evolutionary genetics, population genetics, development genetics, quantitative genetics, and molecular biology. Research opportunities in the area of population genetics include the development of statistical methods for the analysis of genetic data. Research opportunities in the area of development genetics include the study of gene expression and the regulation of gene expression. Research opportunities in the area of quantitative genetics include the study of the genetic basis of complex traits. Research opportunities in the area of molecular biology include the study of the structure and function of genes and the regulation of gene expression. Research opportunities in the area of evolutionary genetics include the study of the evolutionary processes that have shaped the diversity of life on earth. Research opportunities in the area of population genetics include the study of the genetic basis of complex traits. Research opportunities in the area of development genetics include the study of gene expression and the regulation of gene expression. Research opportunities in the area of quantitative genetics include the study of the genetic basis of complex traits. Research opportunities in the area of molecular biology include the study of the structure and function of genes and the regulation of gene expression. Research opportunities in the area of evolutionary genetics include the study of the evolutionary processes that have shaped the diversity of life on earth.
Geological and Atmospheric Sciences

Sciences (see Liberal Arts and Sciences Curriculum) In addition the department has requirements for each major

The bachelor of science in Geology prepares the student for a professional career and/or graduate study in the geological sciences. Students selecting geology as a major will receive training in the theoretical or environmental geology/hydrogeology. The traditional option prepares a student for employment in state and U.S. geological surveys, mineral and petroleum exploration and graduate study in most aspects of geological sciences. Required courses in this option include Geol 100 100L 102L 302 311A (596 365 368 451 at least 6 credits of geology electives. The environmental geology/hydrogeology option prepares a student for environmental consulting, state and U.S. geological surveys regulatory agencies and graduate study in the environmental aspects of geology. Required courses in this option include Geol 100 100L 102 102L 302 311B (56 368 411 422 475) at least 8 credits of geology electives. Required supporting courses include Chem 163 163L 164 164L, Phys 111 112 Math 165 166 or Math 181 182 at least 6 additional credits of mathematics statistics and computer science from an approved departmental list. More than 9 credits in 400 level may be counted toward a degree in Geology.

A minor in Geology may be earned by taking 15 credits of geology coursework including Geol 100 and 100L (or 201) 102 and 102L. The remainder should be at the 300 level or above.

Graduates work to understand natural processes on Earth and other planets. They are able to apply their knowledge of Earth science to shape the Earth to reconstruct the past and anticipate the future. Graduates provide essential information for solving problems for resource management, environmental protection and public health and safety. They work as consultants on engineering and environmental problems explorers for new minerals and hydrocarbon resources researchers teachers writers editors and museum curators.

Graduates are able to integrate field and laboratory data to prepare reports. They are able to make presentations that include maps and diagrams that illustrate the results of their studies.

The study of Meteorology involves the description of the earth's atmosphere and the processes responsible for its behavior. Students majoring in meteorology learn the basic principles of atmospheric sciences. Successful preparation for professional or graduate work in Meteorology requires that the student develop and integrate a broad and large range of knowledge and skills. These include weather observing, the physics and dynamics of the global atmosphere, the application of new weather technologies advanced mathematical tools, computer programming and modeling, and effective oral and written communication.

The faculty view the senior thesis (Meteorology 498) in particular as a capstone experience in which students demonstrate they have achieved the integration. Also contemporary meteorology is an earth system science with ties to a variety of human experiences. The electives and general education requirements of the college are further experiences that the meteorology student must integrate with their core meteorology knowledge in order to function effectively in a global oriented profession. The program requires the following courses: Meteo 111 201 206 301 311 342 411 417 432 443 454 462 499 and C 312. Supporting work is required in areas that are equivalent to Chem 163 165L, Phys 121 125L, Math 220, 225L, 226 and 256

Corn S 207 Stat 106 Sp Cm 212. A grade of C or better (not C-) is required in each of the following courses to meet minimum graduation requirements: for a bachelor of science degree in Meteorology 205 301 311 342 411 417 422 443 and 454.

Several co-op programs are available for upper division undergraduates. Although a range of opportunities exists for men and women who terminate their studies with a bachelor of science, students who meet the necessary academic standards are encouraged to continue their studies in a graduate program. For these students minor work is recommended in a major or physical science. Other students can choose a wide range of supporting courses that will contribute to their particular area of interest in meteorology.

The department offers a minor in Meteorology which may be earned by completing 15 credits including Mteo 111 Mteo 206 and Mteo 301. Further information concerning programs of study including sample degree programs is available from the department.

The Earth Science major is a broad program that typically emphasizes an interdisciplinary field of study. Programs leading to the bachelor of science degree may be individually designed but will include required courses in Geology and Meteorology and required supporting work in chemistry physics and mathematics. Specific programs have been designed for students interested in a geology, meteorology or an environmental earth science emphasis. Programs leading to the bachelor of arts for earth science teaching are available. The latter program must satisfy the requirements of the Teacher Education Program (see Index Teacher Education).

English proficiency requirement. The department requires a grade of C or better in each of English 104 and 105 (or 104H) and a C or better in English 314 or 302 or Jl MC 347.

Graduate Study

The department offers programs leading to the master of science and doctor of philosophy with majors in Earth Science Geology and Meteorology. Program options are available for the M.S. and Ph.D. degrees in earth science leading to the master of science degree in Water Resources (see Index). Students desiring a major in the above fields normally will have a strong undergraduate background in the physical and mathematical sciences. Individuals desiring to enter graduate programs are evaluated by considering their undergraduate background and performance and their expressed goals.

Programs of study are designed on an individual basis in accordance with requirements of the Graduate College and established requirements for each departmental major. Minor work is normally taken in aerospace engineering, agronomy (soil science), chemistry, civil and construction engineering, computer engineering, computer science, engineering mechanics, materials engineering, mathematics, mechanical engineering, microelectronic physics or statistics. Departmental requirements provide a strong and broad background in the major and allow considerable flexibility in the program of each individual.

A dissertation is required of all Ph. D. candidates. M.S. students in Geology are required to complete a thesis.

The M.S. in Earth Science is available to students electing the non-thesis program in Geology or Meteorology. A nonthesis option is also offered for the M.S. degree in Meteorology.

Graduates in Geology specialize in a subspecialty but they comprehend and can communicate the basic principles of geology and supporting sciences. They possess the capacity for critical and independent thinking. They are able to write a fundable research proposal, evaluate current relevant literature and carry out the proposed research and communicate the results of their research to both professional and general public. They work as consultants on engineering and environmental problems, explorers for new minerals and geohazard resources researchers teachers writers editors and museum curators. All candidates for an advanced degree in Meteorology are expected to complete Mteo 542 543 and 555. In addition, students without prior synoptic course work must complete Meteorology 511. Other students must complete Meteo 507 or Agron 507. Students must also complete Meteo 504 (or Agron 504) or Meteo 605 or Agron 605.

Graduates in Meteorology have a good comprehension of basic principles a capacity for critical and independent thinking and an ability to communicate effectively with scientific colleagues. They have an appropriate breadth in their understanding of meteorology with a suitable specialization. Graduates are able to undertake thorough research and explain the results in a scientifically reasonable fashion.

Courses open for nonmajor graduate credit: Geol 302 311 316 365 402 433 412 422 434 451 457 471 485 Meteo 301 306 311 342 344 404 406 407 411 412 432 443 454 455 and 475.

Geology (Geol) Courses Primarily For Undergraduate Students

Geol 100 Earth Science 5 Cr. 3 FS SS. How does the earth work? What is it made of and how does it change through time? Plate tectonics, earth materials, landforms, climates, climate and natural resources. Emphasis on the observations and hypotheses used to interpret earth system processes. Students may also enroll in Geol 100L.

Geol 100L The Earth Laboratory 5 Cr. 1 FS Prereq: Credit or enrollment in 100. Characterization of rocks and minerals. Interpretation of structures and landforms.

Geol 101 Environmental Geology Earth in Crisis (Same as Env 101) 3 C Cr. 3 FS. An introduction to geologic processes and the consequences of human activity from local to global scales. Discussion of human population growth, resource depletion, pollution and waste disposal, global warming and ozone depletion, desertification and geologic hazards such as earthquakes, landslides, flooding and volcanism.

Geol 102 History of the Earth 3 Cr. 3 FS Prereq 100 or 201. The earth's physical and biological evolution and the control of global processes. Methods used to decipher earth history. Students majoring in geology may also enroll in Geol 102L.

Geol 102L History of the Earth Laboratory 5 Cr. 1 FS Prereq: Credit or enrollment in 102. Introduction to the use of sedimentary rocks and fossils in reconstructing the earth's history.

Geol 103 Introduction to Oceanography (Same as Env 105) 3 Cr. 3 FS. Introduction to study of the ocean. Exploration of curries, Shape structure and origin of the ocean basins. Sedimentary record of oceanic life. Composition of seawater and its significance for life. Ocean circulation and its influence on climate. Life of the oceans and coral reefs. Study of sea floor spreading and its impact on the ocean environment.

Geol 201 Geology for Engineers and Environmental Scientists 2 Cr. 2 FS. Prereq: Mteo 111. Introduction to earth materials and processes with emphasis on engineering and environmental applications.

Geol 290 Independent Study 2 to 4 cr. Each time taken: Prereq: Permission of instructor

Geol 298 Cooperative Education Cr. 3 FS Prereq: Geol 102 or 102L. Approval of the department. Cooperative education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to commencing the work period.

Geol 303 Summer Field Studies 5 Cr. 5 FS. Prereq: 102 356 366 Aerial mapping, structural stratigraphy and geomorphologic analysis. Written reports with appropriate illustrations required. 6 week summer field course required of all geology majors. Students who enroll for the 8 cr. option must participate in a two week excursion to selected regions of the western U.S. Nonmajor graduate credit.
Geol 3041 Physical Geology (Same as la LL 3041)
See Iowa Lakeside Laboratory

Geol 306 Geology Field Trip Cr 2 each time taken FS May be taken more than once Prereq: 100 or 201 permission of instructor Geology of selected regions studied by correlated readings followed by a field trip to points of geologic interest Ten day field trip required

Geol 311 Mineralogy and Earth Materials (A 36 or B 2) Cr 4 or Cr 5 S Prereq 100 or 201 Chem 163 Introduction to mineral classification elemental crystal chemistry and physical properties. Mineralogy emphasizes the stability and associations. Laboratory problems in mineral identification methods including hand-spectrum identification and x-ray diffraction. 311A includes more in-depth treatment of crystallography and optical properties. 311B emphasizes mineral assemblages of minerals in the weathering environment and environmental mineralogy. Students in the traditional geology option and in earth science should enroll in 311-A. Students in the environmental geology/hydrogeology option should enroll in 311-B. Nonmajor graduate credit

Geol 324 Energy and the Environment (Same as Env S 324 Mteor 324) 3 Cr 3 S Renewable and nonrenewable energy resources. Origin occurrence and extraction of fossil fuels. Nuclear wind and solar energy. Energy efficiency. Environmental effects of energy production including air pollution and acid precipitation and global climate change. Does not count toward credits required in the Geology major

Geol 356 Structural Geology (3-6) Cr 5 S Prereq 100 or 201 Phys 111 or 221 (preferred) Math 165 or 181 Principles of stress and strain. Biotite and ductile behavior of rocks. Description and classification of joints and faults. Fractures. Fissures. Fissiobreak and linear region. Plate tectonics and regional geology. Laboratory includes application of geometrical techniques to solve structural problems. Emphasizes map interpretation and use of computer and other methods. Nonmajor graduate credit

Geol 365 Petrology (3-6) Cr 5 F Prereq 311 Nature and origin of igneous. metamorphic and sedimentary rocks. Emphasis on important rock forming environments and processes and their influence on rock characteristics. Laboratory includes thin section study of rock textures and mineralogy and the interpretation of these features. Field trips. Nonmajor graduate credit


Geol 398 Cooperative Education Cr R FS SS Prereq Geol 100 or 201 102 102L and permission of the department Cooperative education coordinator. Junior classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Geol 402 Watershed Hydrology and Surficial Processes (Same as Agr 402 Enso 402) For 402 (3 3) Cr 4 F Prereq Credit or enrollment in Enso 330 or Geol 100 or 201 Math 165 or 181 Examination of watersheds as systems wherein biological and physical factors control hydrology soil formation and nutrient transport. Laboratory emphasizes field investigation of watershed scale processes. Nonmajor graduate credit

Geol 403 Environmental Biogeochemistry (Same as Bot 403 Enso 403) (3 2) Cr 4 S Prereq Enso 330 or permission of instructor. Biological chemical and physical phenomena controlling material energy and elemental fluxes in the environment. Human interactions with and effects on environmental systems. Nonmajor graduate credit

Geol 410 Field Methods in Hydrogeology (Dual listed with 510) (4) 4 Cr 2 Alt SS offered 2004 Prereq 411 or CSE 271. Geophysical methods used in groundwater investigations. In field implementation of pumping tests slug tests monitoring well installation and drilling techniques geochemical and water quality sampling seepage metering. Microresistivity. Imaging marine geologic instrumentation for data collection and geophysics. Local field trips to investigate water resource water quality and remediation projects

Geol 411 Hydrogeology (Dual listed with 511) same as Enso 411 (1) S Cr 4 F Prereq 100 or 201 Math 165 or 181 Phys 111 or 221. Physical principles of groundwater flow and recharge. Water flow and confining units. Well hydraulics and contaminant transport. Lab emphasizes applied field and laboratory methods for hydrogeological investigations. Nonmajor graduate credit

Geol 412 Paleohydrology (2 2) Cr 3 Alt S offered 2004 Prereq 402. Introduction to the principles of analysis and major controversies within paleohydrology. Examination of the fossil record and its application to processes in modern biogeochemistry. Geohydrology and paleo-environmental history. Application of fossil materials to living organisms. Field/lab-based project. Nonmajor graduate credit

Geol 422 Environmental Geohistory (Dual listed with 522 same as Enso 422 (1 2) F Cr 3 F Prereq 402 or 411 or equivalent) Geology of natural waters including nonconservative constituents and water rock interactions. Interpretation of water quality data. Geochronology. Equilibrium modeling and introduction to geochronology. Laboratory emphasizes chemical analysis of waters and computer modeling. Nonmajor graduate credit

Geol 434 Contaminant Hydrogeology (Dual listed with 534 same as 434 or 543) (3 3) Cr 3 S Prereq 411 or equivalents. Brief review of organic and inorganic contaminants in industrial and agricultural settings. Processes-oriented approach to abiotic and biogeochemical fate and transport of contaminants. Investigation of complex contaminant mixtures using classical techniques (electroacoustic dispersion sorption and biodegradation) using computer models. Groundwater remediation strategies. Nonmajor graduate credit

Geol 451 Applied and Environmental Geophysics (Dual listed with 551) (2 2) Cr 3 S Prereq 100 or 201 Math 165 or equivalent experience. Seismic gravity magnetic resistivity electromagnetic and ground penetrating radar techniques for shallow subsurface investigations and imaging. Data interpretation methods. Lab emphasizes computer interpretation packages. Field work with seismic and resistivity imaging systems and radar. Nonmajor graduate credit

Geol 457 Exploration Geology (Dual listed with 571) (2 2) Cr 3 Alt F offered 2004 Prereq 100 or 201 Math 165 or equivalent experience. Physics of elastic wave propagation. Seismic surveys in environmental modeling. Engineering and petroleum exploration. Refraction techniques. Data collection processing and geological interpretation. Field work with state-of the-art equipment. Nonmajor graduate credit

Geol 474 Glacial and Quaternary Geology (Dual listed with 574) (1 2) Cr 3 Alt S offered 2005 Prereq 100 or 201 or equivalent experience. The study of the depositional and erosional history of glaciers using modern glacial analogs and landforms. Discussion of glaciology glacier hydrology. Quaternary history and stratigraphy. Glacial geomorphology and climate. Glacial processes. Laboratory emphasizes study of glacial mire and moraine in the Quaternary and glacial geology of Iowa. Two required field trips. Nonmajor graduate credit

Geol 475 Surficial Processes (Dual listed with 575 same as Enso 475) (1 2) Cr 3 F Prereq 100 or 201 or equivalent experience. Study of surficial processes in modern and ancient geological environments. Topics include weathering sediment transport and landform genesis with emphasis on fluvial glacial hill slope and coastal processes. Relations of surficial processes to engineering and environmental problems. Laboratory emphasizes aerial photo and topographic map interpretation. Nonmajor graduate credit


Geol 490 Independent Study Cr 2 to 4 each time taken Prereq 6 credits in geology and permission of instructor. No more than 9 credits of Geol 490 may be counted toward graduation

Geol 498 Cooperative Education Cr R FS SS Prereq Geol 100 or 201 102 102L and permission of the department Cooperative education coordinator. Junior classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students Geol 504 Economic Geology Field Trip Cr 2 each time taken. May be taken more than once. Prereq Graduation classification. Geology of selected regions studied by correlated readings followed by a field trip to points of geologic interest. Ten day field trip

Geol 507 Mineral Resources Field Trip Cr 1 each time taken. May be taken more than once. Prereq Graduation classification. Geol 365. On site inspection of various coal and ore deposits mining operations and mineral processing plants. Offered on a satisfactory fee grading basis only

Geol 510 Field Methods in Hydrogeology (Dual listed with 410) (1 4) Cr 2 Alt SS offered 2004 Prereq 500 or CSE 271 Introduction to field methods used in groundwater investigations. Field implementation of pumping tests slug tests monitoring well installation and drilling techniques geochemical and water quality sampling seepage meters microresistivity. Imaging electronic instrumentation for data collection and geophysics. Local field trips to investigate water resource water quality and remediation projects

Geol 511 Hydrogeology (Dual listed with 411) (3 2) Cr 4 F Prereq 100 or 201 Math 165 or 181 Phys 111 or 221 Introduction to the principles of groundwater flow and storage. Determination of aquifer properties and contaminant transport. Laboratory emphasizes applied field and laboratory methods for hydrogeological investigations

Geol 522 Environmental Geochronology (Dual listed with 422) (3 2) Cr 3 F Prereq 511 or equivalent Geochronology of natural waters including inorganic and organic contaminants and environmental interactions. Interpretation of water quality data. Geochronology. Equilibrium modeling and introduction to geochronology Laboratory emphasizes chemical analysis of waters and computer modeling

Geol 534 Contaminant Hydrogeology (Dual listed with 434) (3 3) Cr 3 S Prereq 511 or equivalent. Laboratory emphasizes applied field and laboratory methods for hydrogeological investigations

Geol 541 Geochronometry and Mineral Chemistry (3 3) Cr 3 Alt F offered 2003 Prereq 311 physical chemistry recommended. Thermodynamics and kinetic methods for interpreting geochronological
processes and environments particularly those at elevated temperature and pressure. Emphasis on crystal chemistry, chemical bonding, phase relations in binary and ternary systems and hydrothermal systems.

Geol 542 Optical Mineralogy (1-2) Cr 2 S Prereq 311 Introduction to using the microscope for mineral identification. Optical properties of minerals in immersion oils and in thin section. Research project required.


Geol 551 Applied and Environmental Geophysics (2-2) Prereq 100 or 201 Math 165 or equivalent experience. Seismic gravity magnetic resistivity electromagnetic and ground penetrating radar techniques for shallow subsurface investigations and imaging. Data interpretation methods. Lab emphasizes computer interpretation packages. Field work with seismic and resistivity imaging systems and radar.

Geol 555 Soil Clay Mineralogy (Same as Agron 555) See Agronomy.

Geol 555L Soil Clay Mineralogy Laboratory (Same as Agron 555L) See Agronomy.

Geol 557 Exploration Seismology (Dual listed with 4571) (2-2) Cr 3 Alt F offered 2004. Prereq 100 or 201 Math 165 or equivalent experience. Seismic surveys in environmental imaging, engineering and petroleum exploration. Reflection and refraction techniques. Data collection processing and geological interpretation. Field work with state-of-the-art equipment.


Geol 574 Glacial and Quaternary Geology (Dual listed with 4741) (2-2) Cr 3 Alt S. offered 2005. Prereq 100 or 210. The study of depositional and erosional processes of glaciers utilizing modern glacier analogs and landforms. Discussion of glaciation. Glacial hydrology, Quaternary history and stratigraphy, paleomagnetism. Ice cores of glacial laboratory. Emphasis on glacial, photo- and topographic map interpretation and the Quaternary stratigraphy of Iowa. Two required field trips.

Geol 575 Surficial Processes (Dual listed with 4751) (2-2) Cr 3 F. Prereq 100 or 201 or equivalent experience. Study of surficial processes in modern and ancient geologic environments. Topics include weathering, sediment transport, and landform genesis with emphasis on fluvial, glacial, and coastal processes. Applications to engineering and environmental problems. Laboratory emphasizes aerial photo and topographic map interpretation.


Geol 596 Graduate Seminar Cr R F. Prereq Senior or graduate classification. Weekly seminar on topics of current research interest. All students seeking a graduate degree in geology must enroll during each semester of residence. Students pursuing a non thesis option for the M.S. in Earth Science must enroll for one semester.

Geol 599 Creative Component Cr var

Courses for Graduate Students


Meteorology (Meteoro)

Courses Primarily for Undergraduate Students

Meteoro 101 Synoptic Applications (1-0) Cr 1 F. Prereq. Credit or enrollment in Math 166. Current weather conditions and introduction to synoptic scale interpretation of meteorological application and use of calculus in meteorology. Course restricted to majors. Others with permission of instructor.

Meteoro 201 Introductory Seminar Cr (1-0) Cr 2 F. R. F. An overview of the atmospheric sciences, the meteorology program at Iowa State and the major research journals used in the discipline. 

Geological and Atmospheric Sciences 231

Meteoro 206 Introduction to Meteorology (Same as Agron 206) (3-0) Cr 3 F. Basic concepts in meteorology, including atmospheric measurements, radiation, stability precipitation and frontal forecasting. Severe weather. Topics include global warming, ozone depletion, world climates, weather safety and atmospheric optics.

Meteoro 265 Scientific Balloon Engineering and Operations (Same as Aer 265). See Aerospace Engineering.

Meteoro 288 Cooperative Education Cr R F. Prereq. Permission of the department cooperative education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to commencing the work period.


Meteoro 306 Use of Weather Data in Agriculture (Same as Agron 306). See Agronomy. Nonmajor graduate credit.

Meteoro 311 Introduction to Synoptic Meteorology (1-2) Cr 2 F. Prereq. 301. Concepts of weather map plotting and analysis. Introduction to forecasting and to the use of real time UNICATA computer products. Nonmajor graduate credit.

Meteoro 321 Meteorology Internship Cr 1 or 2 each time taken. Prereq maximum of 3 cr. F. Prereq. 311. Junior or senior standing. Permission of co-op program coordinator or acceptance by sponsoring agency. Supervised practical experience in a professional meteorological agency. Experience may include providing weather information for radio TV utilities government agencies construction or agriculture.

Meteoro 324 Energy and the Environment (Same as Env S 324) (3-0) Cr 3 S. Prereq. Math 222 credit or enrollment in Math 266. Basic laws of thermodynamics, thermodynamics of water vapor mixtures of gases, stability, hydrostatics, cloud physics. Nonmajor graduate credit.

Meteoro 342 Atmospheric Physics I (3-0) Cr 3 F. Prereq. Math 222 credit or enrollment in Math 266. Basic laws of thermodynamics, thermodynamics of water vapor mixtures of gases, stability, hydrostatics, cloud physics. Nonmajor graduate credit.

Meteoro 398 Cooperative Education Cr R F. Prereq. Permission of the department cooperative education coordinator. Junior classification. Required of all cooperative education students. Students must register for this course prior to commencing the work period.

Meteoro 404 Global Change (Dual listed with 594 same as Agron 404) (EnSci 404). Env S 404) (3-0) Cr 3 S. Prereq. Math 222. Four courses in physical and biological sciences or engineering. Recent changes in global biogeochemical cycles and climate models of future changes in the climate system impacts of global change on agriculture, water resources and human health and issues of global environmental change. Nonmajor graduate credit.

Meteoro 406 Climates of the Continents (Same as Agron 406). See Agronomy. Nonmajor graduate credit.

Meteoro 407 Mesoscale Meteorology (Dual listed with 507 same as Agron 407) (3-0) Cr 3 S. Prereq. Math 166 and Meteo 454. Physical nature and practical consequences of mesoscale atmospheric phenomena Mesoscale convective systems fronts terrain for aircircuits. Observations analysis and

Meteoro 408 Cooperative Education Cr R F. Prereq. Permission of the department cooperative education coordinator. Junior classification. Required of all cooperative education students. Students must register for this course prior to commencing the work period.

Meteoro 409 Air Pollution (Dual listed with 509 same as Agron 409) (EnSci 409). Envs 409) (3-0) Cr 3 S. Prereq. Math 222. Four courses in physical and biological sciences or engineering. Recent changes in global biogeochemical cycles and climate models of future changes in the climate system impacts of global change on agriculture, water resources and human health and issues of global environmental change. Nonmajor graduate credit.

Meteoro 406 Climates of the Continents (Same as Agron 406). See Agronomy. Nonmajor graduate credit.

Meteoro 407 Mesoscale Meteorology (Dual listed with 507 same as Agron 407) (3-0) Cr 3 S. Prereq. Math 166 and Meteo 454. Physical nature and practical consequences of mesoscale atmospheric phenomena Mesoscale convective systems fronts terrain for aircircuits. Observations analysis and
prediction of mesoscale phenomena. Nonmajor.

Mteor 411 Synoptic Meteorology (Dual listed with 511) (1-4) Cr 3 Sr Prereq: Credit or enrollment in 454 Crrrent weather forecasting and discussion of applications of atmospheric physics and dynamics in real-time weather situations. Use of UNIDATA computer products. Nonmajor graduate credit.

Mteor 417 Mesoscale Forecasting Laboratory (Dual-listed with 517) (0-6) Cr 2 Sr Prereq: Credit or enrollment in 417 Real-time computer analysis of current weather with emphasis on small scale features. Includes surface weather, lake-effect snow storms, cold air damming. Nonmajor graduate credit.

Mteor 432 Instrumentation and Measurements (Dual listed with 532) (3-0) Cr 3 Sr Prereq: Credit or enrollment in Stat 105 Math 266 Phys 222 Measurement of meteorological variables and instruments used to include surface upper air and remote sensors measurement errors. Signal processing, recording and archiving. Quality assurance. Nonmajor graduate credit.

Mteor 443 Dynamic Meteorology I (3-0) Cr 3 Sr Prereq: 341 Conservation laws, governing equations, circulation and vorticity, Development of quasi geostrophic theory. Nonmajor graduate credit.

Mteor 454 Dynamic Meteorology II (3-0) Cr 3 Sr Prereq 443 Planetary boundary layer line perturbation theory, atmospheric wave motions, baroclinic and convective instability, and circulations. Nonmajor graduate credit.

Mteor 455 General Circulation/Advanced Dynamics (Dual listed with 555) (3-0) Cr 3 Sr Prereq 454 Numerical simulation of fundamental physical laws applied to weather and climate processes. General circulation theory including energy, water and momentum balances. Forecast and analysis systems with emphasis on their utility to end users. Nonmajor graduate credit.

Mteor 480 Independent Study Cr 1 to 3 each time taken. Prereq 6 credits in meteorology permission of instructor. No more than 9 credits in Mteor 480 may be counted toward graduation.

A Synoptic Meteorology
B Dynamic Meteorology
C Physical Meteorology
D Instrumentation

Mteor 498 Cooperative Education Cr R F S SS Prereq: Permission of the department cooperative education coordinator. Senor classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Mteor 499 Senior Research (2-0) Cr 2 Sr Prereq: Required of all senior meteorology majors. Research projects in collaboration with faculty. Written and oral presentations of results at the end of the semester.

Courses for Undergraduate Students

Open to Qualified Undergraduate Students


Mteor 505 Biometricology. [Same as Agron 505.] See Agronomy.


Mteor 511 Synoptic Meteorology. [Dual listed with 411] (1-4) Cr 3 Sr Prereq: Credit or enrollment in 454 Current weather forecasting and discussion of applications of atmospheric physics and dynamics in real-time weather situations. Use of UNIDATA computer products.

Mteor 517 Mesoscale Forecasting Laboratory. [Dual listed with 417] (3-0) Cr 2 Sr Prereq: Credit or enrollment in 417 Real-time computer analysis of current weather with emphasis on small scale features. Includes surface weather, lake-effect snow storms, cold air damming.

Mteor 532 Instrumentation and Measurements. [Dual listed with 432] (3-0) Cr 3 Sr Prereq: Credit or enrollment in Stat 105 Math 266 Phys 222 Measurement of meteorological variables and instruments used to include surface upper air and remote sensors measurement errors. Signal processing, recording and archiving. Quality assurance.

Mteor 542 Physical Meteorology. (3-0) Cr 3 Sr Prereq: Credit or enrollment in Stat 105 Math 266 Phys 222 Measurement of meteorological variables and instruments used to include surface upper air and remote sensors measurement errors. Signal processing, recording and archiving. Quality assurance.

Mteor 543 Advanced Dynamic Meteorology I. (3-0) Cr 3 Sr Prereq: Credit or enrollment in 542 The first half of a two semester sequence. Governing equations, scale analysis, simple types of wave motion in the atmosphere. Instability theory.

Mteor 544 Advanced Dynamic Meteorology II. (3-0) Cr 3 Sr Prereq: Credit or enrollment in 543 General circulation and dynamics of zonally symmetric circulations. Atmospheric energetics, nonlinear dynamics of planetary waves.

Mteor 555 General Circulation/Advanced Dynamics. [Dual listed with 555] (3-0) Cr 3 Sr Prereq 454 Numerical simulation of fundamental physical laws applied to weather and climate processes. General circulation theory including energy, water and momentum balances. Forecast and analysis systems with emphasis on their utility to end users.

Mteor 561 Geophysical Fluid Dynamics. (3-0) Cr 3 Sr Prereq: Credit or enrollment in 545 or M 378 or M 435 or Phys 367 Basic concept of rotating fluid dynamics. Governing equations and boundary conditions. Dynamics of vorticity potential vorticity and geostrophic motion. Wave motion in a rotating system. Dynamics of Ekman and Stottwollen layers. Ocean circulation.

Mteor 590 Special Topics Cr 1 to 3 each time taken. Prereq: Permission of instructor. Topics of current interest.

A Boundary layer Meteorology
B Tropical Meteorology
C Mesoscale Meteorology
D Global Climate Systems
E Climate Modeling
F Numerical Weather Prediction
G Satellite Observations
H Statistical Methods in Meteorology
I Field Observation theory
J Low Frequency Modes
K Cloud Physics
L Atmospheric Radiation

Courses for Graduate Students

Mteor 605 Micrometeorology. (3-0) Cr 3 Sr Prereq: Credit or enrollment in 443 Atmospheric boundary layer structure and dynamics. Turbulence. Soil moisture measurements and empirical relations for wind and temperature profiles near the ground. Simulation of boundary layer structure and dynamics.

Mteor 689 Research Cr var.

Courses Offered at the Gulf Coast Research Laboratory (GCRL).

Ocean Springs, Mississippi.

The Gulf Coast Research Laboratory is affiliated with the University of Southern Mississippi. Students may register for the following University of Southern Mississippi/GCRL courses and transfer them to their ISU degree programs. Written permission of the ISU coordinator for the GCRL is required for the arrangement. Inquire at 201 Bessey for further information.

MAR 300 Oceanography. 3 Cr SS. Prereq: College algebra. 8 semester hours of chemistry. 8 semester hours of biology. An introduction to biological, chemical, geological, and physical marine sciences. For upper division science majors.

Gerontology

(Interdepartmental Minor)

Advisory Committee P Martin Coordinator K Bertram C Cook M L Damhurst W Rankie M Kohut N Meridith D Russell M Yarns

The gerontology program is designed for students desiring careers in aging-related fields and for students interested in improving their understanding of aging persons in American society. Students are expected to take courses to develop the necessary interdisciplinary breadth which in combination with other disciplinary training, can prepare them to work with the aged.

Graduates understand the ways in which individual and societal aging influence and are impacted by developments in their major field of study. They have an appreciation and understanding of the cross-disciplinary aspects of human aging.


Undergraduate Study

Nancy Meredith Coordinator

Undergraduate study in this program provides the student with an opportunity to develop a minor in gerontology. A balanced grouping of courses allows the student in developing both a sensitivity to the issues and the ability to synthesize ideas from the variety of disciplines important to the study of the aging process.

Undergraduate students may minor in gerontology by taking 16 semester hours of gerontology related courses. Nine of these credits must come from the following courses: Geron 377, 443, 461, 463, 471, 475. Students will participate in a prepracticum seminar. Geron 466 and will complete a supervised field practicum after all gerontology coursework is completed. Geron 467. A minimum of 3 semester credits must be selected from a list of supportive gerontology related courses. Supportive courses include units or topics related to aging and can be used to complement the student's major interests. The student's minor program must be approved by the undergraduate gerontology coordinator.

Graduate Study

Christine Cook, Coordinator

A declared graduate minor in gerontology consists of a minimum of 12 credits taken from a list of acceptable courses and from at least two departments. Nine of the 12 credits must be in courses that are focused specifically on aging. One 590 course (3 credits maximum) can be taken as part of the 12 credits. Geron 510 is required for all minor students. At least one member of the graduate faculty will be on a student's advisory committee. This person must be a member of the Graduate Faculty.
the coordinator to determine whether courses other
than those listed below are available.

Courses open for nonmajor graduate credit 448 471 476

Courses Primarily for Undergraduate Students
Geran 377 Aging and the Family (Same as HD FS 377) See Human Development and Family Studies
Geran 448 Economics of Aging (Same as HD FS 448) See Human Development and Family Studies Nonmajor graduate credit
Geran 461 Life Course Sociology (Same as Soc 461) See Sociology
Geran 463 Housing for the Aging (Dual listed with 563 same as HD FS 463) See Human Development and Family Studies
Geran 466 Gerontology Prepracticum Seminar (1.0) Cr 1 F S Prereq 3 credits in core courses for the gerontology minor and approval of the gerontology undergraduate coordinator Prepracticum training for students planning a gerontology practicum Exploration of possible agencies for the practicum in depth study of a selected agency and development of goals and objectives for the practicum
Geran 467 Gerontology Practicum Cr 3 to 6 each time taken F S Prereq 466 advance reservation Supervised field experience related to aging Offered on a satisfactory-failing basis only
Geran 471 Design for All People (Same as Arch 471) See Architecture Nonmajor graduate credit
Geran 476 The Aged in American Society (Same as Soc 476) See Sociology Nonmajor graduate credit
Geran 490 Independent Study Cr arr Consult program coordinator for procedure

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
Geran 501 Seminar Cr arr Alt S offered 2004
Geran 510 Survey of Gerontology Cr 1-3 Alt S offered 2005 May be repeated At least 3 credit hours required Provides an overview of important gerontological issues
Geran 534 Adult Development (Same as HD FS 534) See Human Development and Family Studies
Geran 561 The Life Course (Same as Soc 561) See Sociology
Geran 563 Housing for the Aging (Dual listed with 463 same as HD FS 563) See Human Development and Family Studies
Geran 566 Housing for Specific Groups (Same as Arch 566) See Architecture
Geran 577 Aging and Intergenerational Relations (Same as HD FS 577) See Human Development and Family Studies
Geran 590 Special Topics Cr arr Consult program coordinator for procedure

Graduate Studies

No major is granted in Graduate Studies. At the recommendation of the major professor and/or the department chair graduate students may enroll in the following graduate courses to fulfill certain enrollment requirements

Courses for Graduate Students
Gr St 585 Preparing Future Faculty Introductory Seminar Cr 1 Prereq One year of graduate coursework admission into PFF program Introduction to faculty life issues such as hiring tenure teaching and service at a variety of higher education institutions Includes presentations from faculty at other institutions
Gr St 586 Preparing Future Faculty Intermediate Seminar Cr 1.5 Prereq Admission into PFF program completion of 585 or permissions of instructor

Consideration of a wide range of faculty life issues. Includes topics such as higher education trends diversity issues learning styles assessment grant and proposal writing and legal and ethical issues Written components include job and teaching portfolios
Gr St 600 Examinations Only C R R Reserved for graduate students the term they take the final oral examination Students must have completed all required coursework and not be registered for another course
Gr St 601 Required Enrollment C R R Reserved for graduate students who must be registered for a particular term but are not required to take additional coursework
Gr St 680 Continuous Registration C R Course may be repeated. Reserved for Ph D candidates only See the Graduate College Handbook for specific requirements

Health and Human Performance

www.edu.state.ufl.edu/hhp/homepage.html

Jerry R Thomas, Chair of Department

Professors Anderson Boedeker King Sharp J Thomas

Distinguished Professors (Emeritus) Forster Toman Professors (Emeritus) Frye Hutchinson Schneider Professors (Emeritus Adjunct) Beran Associate Professors Conover Engelson Franke K Thomas

Associate Professors (Emeritus) Wood Assistant Professors Baker Derrick Ekkekakis Gillette Kohut Kwon Moorhead Schabel Smith-Taylor Weil

Assistant Professors (Collaborators) Buck Assistant Professors (Emeritus) McDonald Instructionals Adjunct Coblerley Harklau Meier Miller Naspor Norris Pax Peil Instructors (Collaborators) Docter

Lecturers Atkinson Denton Lipsy Martin Power

Mission

The Department of Health and Human Performance promotes health and well being through discovery learning and engagement in the study of physical activity

Goals

The department has identified the following goals to support this mission

1 We seek to improve the lives of citizens of Iowa the United States and the world by the creation and dissemination of knowledge about physical activity and its relationship to health and well being

2 We prepare scholars and professionals in the study of physical activity at the undergraduate and graduate levels

3 We educate the public and the University community in the scientific aspects of physical activity especially exercise sport and the role of movement throughout the lifespan

Overview of Programs

The Department of Health and Human Performance provides opportunities for matriculation leading to the degrees of Bachelor of Science Master of Science Master of Education and Doctor of Philosophy. At both the undergraduate and graduate level there are opportunities for study in the department's two main areas the behavioral and biological bases of physical activity

Undergraduate Study

Dance Coursework in dance provides opportunities for students to develop an understanding and appreciation of dance as part of a liberal education Those interested in teaching dance and Physical Education in the public schools may major in health and human performance (teacher licensure option) and minor in dance

An interdepartmental Performing Arts major with a dance emphasis is available through the College of Liberal Arts and Sciences. Further information see Index Theatre and Performing Arts

The department offers a minor in dance that may be earned by completing the following courses 220 222 270 320 360 384 385 or 386 and three additional credits selected from dance courses numbered 200 or above Participation in Orchesis 1 or 11 is recommended

Health and Human Performance. The undergraduate curriculum in Health and Human Performance is comprised of four components general education the Basic Core the Advanced Core and the specialization option component. The intent of the general education component is to promote intellectual and personal growth and to prepare students for success in the basic advanced and option components. The Basic Core enables students to understand define and explore their own health and physical activity through the cognitive affective and psychomotor domains The Advanced Core extends this learning to include disciplinary concepts and tools of inquiry that comprise scientific literacy associated with health and physical activity Finally coursework within each specialization option builds upon this personal and scholarly learning by enabling students to master content and skills specific to career applications The specialization Options comprise a focused area of study within Health and Human Performance Options available are 1 Athletic Training 2 Community and Public Health 3 Exercise Science 4 Health Fitness Management 5 Physical Education Licensure 6 Sport Management Enrollment in the Athletic Training and Physical Education Licensure options is limited because of accreditation requirements and provision of more individualized field experiences

Academic options within the undergraduate program Students in the CAAMPH accredited Athletic Training option are prepared for the National Athletic Training Association Board of Certification examination or for graduate work in athletic training Graduates of this option will use their expertise to plan strategies aimed at the prevention treatment and rehabilitation of athletic injuries

Students in the Community and Public Health option are prepared for professional employment at local state or national health agencies medical centers and other public organizations that seek to promote health in the population. The curriculum prepares students to take the Certified Health Education Specialist certification examination upon graduation

Students in the Exercise Science option utilize an interdisciplinary approach to the study of human movement. In so doing, they become prepared for graduate study in Health and Human Performance or advanced study leading to careers in medicine physical therapy or other allied health programs

Students in the Health Fitness Management option are prepared for professional roles as health and fitness leaders or program managers. Employment opportunities include work in corporate fitness programs health clubs, rehabilitation programs or personal training Graduates are able to plan implement and supervise exercise programs which will improve fitness and health. Graduates also have a basic understanding of economic and management issues related to business applications in the health and fitness field

Students in the Physical Education Licensure option are prepared to teach Physical Education in grades K-12 and to meet the State of Iowa learning outcomes for teachers. Graduates can plan developmentally appropriate physical education and individualize instruction and assessment for diverse audiences
Graduate Study
The Department of HHP offers three graduate programs. These programs seek to integrate discovery and learning by preparing graduate students at the master’s and Ph.D. levels to understand and create basic and applied knowledge in the study of physical activity, exercise and sport. Learning outcomes for the Graduate Program can be found on the department website.

The department also participates in the Master of Education degree by offering specializations in behavioral basis of physical activity and other educational courses.

Content knowledge. The student has a broad conceptual view of physical activity and health, recognizes and understands the potential impact of these activities on health and performance.

Discovery and critical thinking. The student can use accurate techniques of discovery and apply critical thinking within and outside of the discipline area. The student will be able to solve problems independently and evaluate opinions and outcomes at the personal and professional level.

Communication. The student uses knowledge of effective verbal, nonverbal and media communication techniques to foster inquiry collaboration in community activity and physical activity education.

Numeracy. The student understands and uses quantitative and qualitative reasoning through formal and informal assessment strategies.

Technology. The student understands and uses a variety of technological applications to improve personal understanding and to enhance scholarly pursuits and professional practice in their chosen area of study.

Learning in the following domains occurs both in and outside the Iowa State University experience. The department will foster development in these domains through its courses and other activities.

Citizenship. The student uses values and ethics based decision-making to demonstrate personal professionalism and respect for all individuals.

Lifelong learning. The student is a reflective professional who actively seeks to further self-knowledge and seeks opportunities to grow professionally.

Diversity. The student understands how individuals differ in their approaches to initiating and maintaining a physically active healthy lifestyle and creates appropriate environments for diverse participants.

The department offers a minor in athletic coaching. The minor may be completed by following the following steps:

1. Complete at least 12 credits, with at least 6 credits at the 300 level or above, in the following courses:
   - 101 Introduction to Athletic Coaching
   - 102 Advanced Athletic Coaching

Endorsement to Coach Intercollegiate Athletics
The State Department of Education has provided for the endorsement of licensed teachers for the coaching of athletic teams in schools. The endorsement does not lead to licensure to teach athletic education. For requirements of the program leading to the coaching endorsement, see Teacher Education Requirements for Areas of Specialization.

Basic Activity Instruction Program
The department offers a wide selection of beginning intermediate and advanced courses in the areas of aquatics, dance and sports. These courses are designed to serve general education purposes for all students.

Health Studies (H S)
H S 105 First Aid and Emergency Care (1-2) Cr 2
FS Discussion and application of the basic techniques of administering first aid and cardiopulmonary resuscitation. ARC certification available.

H S 110 Personal and Consumer Health (3-0) Cr 3
FS Physical, mental, and social aspects of health as a basis for understanding and preventing health problems. False advertising, effect and localism and its effects on consumer health. Study of legislation and agencies concerned with consumer protection and health insurance.

H S 215 Drug Education (3-0) Cr 3 Prereq. Psych 101 or 233. Use and abuse of mood modifying substances in contemporary society. Includes study of tobacco, alcohol, and other drugs.

H S 280 Foundations in Health Education (3-0) Cr 3 A review of the development of health education as a profession. CHES foundational theory and skills in health education.

H S 275 Health Education in the Elementary School (3-0) Cr 3 Prereq. HD 102 or 226. An overview of school health services. Healthful school living and health instruction for teachers at the elementary level. Credit for both 275 and 375 may not be applied toward graduation.

H S 292 Acquired Immune Deficiency Syndrome and Sexually Transmitted Diseases (3-0) Cr 3 An introductory non-technical examination of the biological, psychological, and ethical aspects of AIDS and sexually transmitted diseases.

H S 294 Health Issues for Women (3-0) Cr 3 Examine health and health care issues related to women.

H S 305 Instructor’s First Aid and Cardiopulmonary Resuscitation (1-2) Cr 2 Prereq. 105 current Standard First Aid and Competent CPR Certification. Discussion and practice of skills needed to teach first aid and cardiopulmonary resuscitation.

ARC certification available.

H S 310 Community and Public Health (3-0) Cr 3 Prereq. 110 Introduction to community health. Problems programs of prevention, environmental health agencies and health services. Study of local state and national community health agencies in other purposes and functions.

H S 350 Human Diseases (3-0) Cr 3 Prereq. 110 Disease of process and ill health. In the twentieth century emphasis on epidemiology treatment and the understanding of the etiology of communicable and noncommunicable diseases.

H S 375 Teaching Learning Process in Health Education (3-0) Cr 3 Prereq. 105, 110, 215 Principles methods materials and resources involved in health teaching. Includes organization and development of the health curriculum. Credit for both 275 and 375 may not be applied toward graduation.

H S 380 Worksite Health Promotion (3-0) Cr 3 Prereq. 288, 366 FS 116 The design and implementation of worksite health promotion. The benefits these programs have for both employees and employers. Review of various health appraisal and planning theory based incentive programs designed to promote positive lifestyles.

H S 385 Search Strategies for Field Experience and Employment (Same as Ex Sp 385) (1-0) Cr 1 FS Prereq. Junior classification. To be taken in minimum of two semesters prior to H S 386. Search techniques and preparation of materials utilized for acquisition of internship and jobs in HHP. Internship procedures and policies will be covered. Offered on a satisfactory/fail grading basis only.

H S 390 Administration of the School Health Program (3-0) Cr 3 F Prereq. 310 History and legal background of school health programs. Procedures for developing, organizing, administering, and evaluating a modern program of school health services. Healthful school living and health instruction includes administration community and school relationships.

H S 395 Substance Abuse Prevention Theories and Programs (3-0) Cr 3 Prereq. 215 Current approaches to substance abuse prevention programs. Learning risk and resiliency factors in children's community and institutional contexts. Examination of legal and ethical concerns and considerations of career and professional opportunities in the substance abuse prevention field.

H S 417 Supervised Teaching in Health Education in the Secondary Schools (12-0) FS Prereq. 375 Advance registration required.

H S 430 Community Health Program Development (3-0) Cr 3 F Prereq. 380 Techniques of needs assessment program design, administration and evaluation of community health education programs in various settings.

H S 485 Directed Field Experience in Health Education (3-0) Cr 116 Prereq. All required health studies.
courses and permission of coordinator. Advance registration required. Supervised experience in health education. Offered on a satisfactory-fail grading basis only.

H S 490 Independent Study Cr 1 to 3 maximum of 6 Prereq: 6 credits in health studies and permission of coordinator.

**Dance (Dance)**

**Dance 120 Modern Dance (0-3) Cr 1 FS**
Introduction and practice of basic dance concepts including preparatory techniques and guided creativity problems. No previous modern dance experience required. Offered on a satisfactory-fail grading basis only.

**Dance 130 Ballet I (0-3) Cr 1 FS** Introduction to the basic skills vocabulary and tradition of ballet with concentration on control and proper alignment. No previous ballet experience required. Offered on a satisfactory-fail grading basis only.

**Dance 140 Jazz I (0-3) Cr 1 FS** Introduction to the modern jazz style with concentration on isolation and syncopation. No previous jazz experience required. Offered on a satisfactory-fail grading basis only.

**Dance 150 Tap Dance I (0-3) Cr 1 FS** Instruction and practice in basic tap technique and terminology. No previous tap experience required. Offered on a satisfactory-fail grading basis only.

**Dance 160 Ballroom Dance I (0-2) Cr 1 FS** Instruction and practice in foxtrot, waltz, swing and selected contemporary dances. Offered on a satisfactory-fail grading basis only.

**Dance 199 Dance Continuum Cr 0.5 to 2 each time taken maximum of 6 credits FS Prereq Permission of instructor. Advance registration required. Continued instruction and experience in either modern dance or recreational dance. Ballroom jazz and/or composition skills. Offered on a satisfactory-fail grading basis only.

**Dance 210 Aspects of Rhythm, Movement and Dance (0-3) Cr 1 FS** Survery and practice of the relation of rhythm to movement and basic dance concepts. Emphasis on methods of teaching rhythm.

**Dance 211 Fundamentals and Methods of Social and Work Dance (1-3 Cr 2 S Prereq Eligible for admission to HHP Teacher Education Program. Skill enhancement teaching progression with emphasis on world and social dance. Designed for exercise and sport science majors. Open to others.**

**Dance 220 Modern Dance Composition (1-3 Cr 2 Prereq: 120 or previous modern dance experience. Theory and practice of the creative skills involved in solo and small group composition.**

**Dance 222 Modern Dance II (0-3) Cr 1 FS Prereq 120 or previous modern dance experience. Dance techniques emphasizing strength, balance, endurance, rhythm, activity, and combined repertoires.**

**Dance 223 Modern Dance III (0-3) Cr 1 FS Prereq: 222 Continued experience in dance techniques and extended combinations. Emphasis on maturation of skill and artistic developments. Create a variety of modern dance technical styles.**

**Dance 224 Concert and Theatre Dance (Same as Thre 224) (0-3) Cr 0.5 to 2 maximum of 6 credits FS Prereq By audition only. Choreography, rehearsal and performance in campus dance concerts and/or musical theatre productions. Offered on a satisfactory-fail grading basis only.**

**Dance 232 Ballroom II (0-3) Cr 1 Prereq 231 Previous ballroom experience. Technical skills in the classical movement vocabulary. Emphasis on alignment. Technique sequence development, and performing quality.**

**Dance 233 Ballet III (0-3 Cr 1 Prereq 232 Concentration on technical proficiency at the intermediate level. Pointe work and partnering opportunities available.**

**Dance 242 Jazz II (0-3) Cr 1 Prereq Previous jazz dance experience. Dance concepts within the jazz idiom. Instruction in extended movement sequences and artistic interpretation.**

**Dance 243 Jazz III (0-3 Cr 1 Prereq 242 Integration of the concepts of jazz dynamics, phrasing, and skills into performance situations. Some repertory work of historical and contemporary pieces.**

**Dance 262 Ballroom Dance II (0-2) Cr 1 Prereq Previous ballroom dance experience. Practice in ballroom dance routines. Emphasis on style, posture and footwork.**

**Dance 270 Dance Appreciation (0-3 Cr 3 FS** Introduction to the many forms and functions of dance in world cultures. Develops abilities to distinguish and analyze various dance styles. No dance experience required.

**Dance 320 Sound and Movement (2 Cr 3 S Prereq: 220 Intermediate composition based on the relationship of movement to improved sounds. Rhythm scores and the musical works of composers from various periods.**

**Dance 360 History and Philosophy of Dance (3-0 Cr 3 At S: Prereq: 270 Study of the history of dance from early to modern times with emphasis on the theorems and philosophes of contemporary modern dance and dance educators.**

**Dance 370 Advanced Studies in Dance Cr 1 to 3 in any one semester to a maximum of 8 credits. FS Prereq: 2 credits in advanced dance. Offered by arrangement only.**

**Dance 384 Teaching Children's Dance (1-3 Cr 2 S Prereq: 270 or equivalent. Content includes experiences and methods of a comprehensive dance program at the elementary school level. Theories and practice in guiding elementary school children in expressive movement experiences.**

**Dance 385 Methods of Teaching Dance (1-3 Cr 2 F Prereq: 270 Methods and techniques of teaching social and world dance forms. Introduction to teaching educational modern dance.**

**Dance 386 Teaching Dance Technique and Composition (1-3 Cr 2 Prereq: 320 Teaching dance as an expressive art form with emphasis on technique, rhythm, and the creative teaching process.**

**Dance 490 Independent Study Cr 1 to 3 maximum of 6 Prereq: 6 credits in dance and permission of instructor. Independent study of problems or areas of interest in dance.**

**Exercise and Sport Science (Ex Sp)**

**Ex Sp 101 Swimming I (0-3) Cr 1 FS**
Basic course for nonswimmers. Emphasis on two fundamental strokes and personal water safety skills. Offered on a satisfactory-fail grading basis only.

**Ex Sp 102 Swimming II (0-3) Cr 1 FS Prereq 101 or equivalent. Course for intermediate skill. Emphasis on learning and improving the basic strokes and personal safety skills. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 108 Aquatic Fitness (0-3 Cr 1 Prereq 102 or equivalent. Water related exercises and activities and swimming workouts to improve physical fitness. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 109 Basic Skin and Scuba Diving (1-3 Cr 2 FS Prereq: Swim Prerequisite. Course offered on a satisfactory-fail grading basis only.**

**Ex Sp 113 Scuba Assistant Instructor Practicum (0-2 Cr 1 Prereq 109 and permission of instructor. Supervised experience in conduct of basic scuba diving program. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 114 Lifeguard Training (0-3) Cr 1 FS Prereq: Ability to swim 500 yards continuously. Front crawl sidestroke and breaststroke. Perform a standing and surface dive. Swim under water and tread water for one minute. Minimum age 16. Special training for Red Cross Lifeguard certification. First aid and CPR included. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 115 WSI and Lifeguard Training Instructor (0-5) Cr 2 FS Prereq Minimum age 17 current Lifeguard first aid and CPR certifications. Strokes analysis and methods of organizing and teaching instruction of swimming, water safety and rescue skills. Red Cross Water Safety Instructor and Lifeguarding Instructor certifications. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 116 Water Safety Instructor Practicum (0-3 Cr 1 Prereq 115 HS 106 CPR certification and permission of instructor. Supervised teaching experience in swimming, aquatic fitness, Lifeguarding training and WSI courses. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 119 Archery (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 122 Badminton (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 126 Pocket Billiards (0-2) Cr 1 FS Introduction to basic strokes. Top Draw Follow and contemporary game forms associated with pocket billiards. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 129 Bowling (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 132 Fencing (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 135 Golf I (0-2) Cr 1 FS** Beginning skills only. Offered on a satisfactory-fail grading basis only.

**Ex Sp 136 Golf II (0-2) Cr 1 Prereq 135 or equivalent. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 139 Gymnastics (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 144 Racquetball (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 151 Cross Country Skiing (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 153 Ice Skating (0-2) Cr 1 FS** Offered on a satisfactory-fail grading basis only.

**Ex Sp 158 Tennis I (0-2) Cr 1 FS SS Introduction to basic skills (forehand, backhand, serve) and basic knowledge of game play. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 159 Tennis II (0-2) Cr 1 Prereq 158 Expansion of basic skills to include volley and spins. Introduction to basic strategy. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 162 Triathlon Training (0-3) Cr 1 FS Prereq 102 or equivalent. Introduction to the sport of triathlon integrating the discipline of running, cycling, and swimming. Emphasis on cross training systems and skill enhancement. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 163 Physical Fitness (0-3) Cr 1 Prereq: 1 Evaluation of fitness status. Exercises activities and programs to improve physical fitness. Relationship between physical activity and weight control. Offered on a satisfactory-fail grading basis only. Credit for only 163 or 268 may be applied toward graduation.**

**Ex Sp 164 Walking for Fitness (0-3) Cr 1 FS**
Walking as an activity to improve health and fitness values of this type of activity as a lifetime endeavor. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 165 Aerobics (0-3 Cr 1 Exercise class designed to improve fitness incorporating exercise to music along with various dance styles. Offered on a satisfactory-fail grading basis only.**

**Ex Sp 166 Weight Training (0-3 Cr 1 FS** Offered on a satisfactory-fail grading basis only.**
Ex Sp 232 Fundamentals of Indoor Team Sports (0.3 Cr 1 S, Pre req: Eligibility for admission to HHP teacher education program) Fundamentals of indoor team sports for example basketball, volleyball, team handball. Skill enhancement analysis, understanding practice and the development of progressions.

Ex Sp 233 Fundamentals of Outdoor Team Sports (0.6 Cr 1 F, Pre req: Eligibility for admission to HHP teacher education program) Fundamentals of outdoor team sports for example flag football, soccer. Skill enhancement analysis, understanding practice and the development of progressions.

Ex Sp 235 Fundamentals of Racquet Sports (0.3 Cr 1 S, Pre req: Eligibility for admission to HHP teacher education program) Fundamentals of racquet sports for example tennis, badminton, racquetball. Skill enhancement analysis, understanding practice and the development of progressions.

Ex Sp 236 Fundamentals of Individual Sports (0.3 Cr 1 F, Pre req: Eligibility for admission to HHP teacher education program) Fundamentals of individual sports for example track and field, golf, archery and bowling. Skill enhancement analysis, understanding practice and the development of progressions.

Ex Sp 237 Fundamentals of Self Defense (0.3 Cr 1 S, Pre req: Eligibility for admission to HHP teacher education program) Skill enhancement analysis, understanding practice and the development of progressions.

Ex Sp 238 Fundamentals of Outdoor and Adventure Activities (0.3 Cr 1 F, Pre req: Eligibility for admission to HHP teacher education program) Techniques of individual and group facilitation for initiatives involving outdoor adventure activity. Topics include ropes challenge course events, activity preparation and sequencing, safety techniques, preparation principles and new games philosophy. Participation is required in one weekend of fieldwork.

Ex Sp 240 Introduction to Strength and Conditioning, Taping, Equipment, and Bracing Techniques (0.6 Cr 1 F, Pre req: Ex Sp 221 222) Permission of program director. Basic information and laboratory instruction regarding strength and conditioning, basic taping techniques, athletic equipment fitting procedures, and the use and proper fitting of prophylactic braces. Open to students in the athletic training option. Offered on a satisfactory fail grading basis only.

Ex Sp 254 Physical Fitness and Conditioning (0.3 Cr 2 S, Pre req: Health and human performance majors only. Development of personal fitness using a variety of conditioning and exercise techniques such as aerobic, weight training and aquatic fitness. Introduction to acute and chronic responses to exercise and the role of exercise in health promotion and weight management. Credit for only one of the following courses may be applied toward graduation: 163, 259.

Ex Sp 259 Leadership Techniques for Fitness Programs (1.0 Cr 2 FS Pre req: 258) Development of exercise leadership skills for a variety of activities including planning and teaching of techniques for developing fitness in others using a variety of exercise modalities including aerobic, weight training and aquatic fitness.

Ex Sp 270 Principles of Sport Management (3.0 Cr 3 Pre req: Psych 101 Sp Cm 212 Soc 134 An overview of the ethical decision making role in organizational management and management in the sport industry and the development, implementation and evaluation of strategic plans for sport organizations. Topics include fundamentals of leadership theory, human resources, organizational communication, financial planning and law.

Ex Sp 276 Movement Education in Elementary School Physical Education (2.3 Cr 3 Pre req: Concurrent enrollment in Ex Sp 280) Planning for management and instruction of developmentally appropriate physical education for children in preschool through elementary grade 5. Laboratory experience required. Credit for only one of the following courses may be applied toward graduation: 275, 284.

Ex Sp 280 Directed Field Experience in Elementary Physical Education (0.3 Cr 0.5 S Pre req: Concurrent enrollment in 275) Observing, planning, and facilitating movement experiences of children in an elementary school setting.

Ex Sp 281 Directed Field Experience in Physical Education (1.0 Cr 3 SF SS Pre req: Credits in human development and family studies. Approaches to teaching movement skills to pre-school and elementary school age children. Emphasis on planning and conducting developmentally appropriate movement experiences for preschool and elementary aged children based upon motor development research. Practical experience provided. Credit in only one of the following courses may be applied toward graduation: 275, 284.

Ex Sp 316 Coaching Theory and Administrative Issues (2.3 Cr 3 Study in the theory, ethics, strategy, and mechanics of coaching various intercollegiate and/or intramural sports. Emphasis on formulating a philosophy identifying goals and psychological aspects teaching skills and developing strategies.

Ex Sp 323 Therapeutic Modalities for Athletic Trainers (1.0 Cr 2 F Pre req: 228 permission of program director) Theory and technique of athletic modalities used in the management of athletic injuries.

Ex Sp 324 Athletic Training Practicum (0.3 Cr 1 Pre req: Credit or enrollment in 322 and permission of program director) Training room experience to accompany 322. Open to students in athletic training option. Offered on a satisfactory fail grading basis only.

Ex Sp 326 Rehabilitation of Athletic Injuries (2.0 Cr 3 S Pre req: 323 Theory and practical application of rehabilitation principles used in the management of athletic injuries.

Ex Sp 327 Athletic Training Practicum (0.3 Cr 1 Pre req: Credit or enrollment in 326 and permission of program director) Training room experience to accompany 326. Open to students in the athletic training option. Offered on a satisfactory fail grading basis only.

Ex Sp 345 Management of Health Fitness Programs and Facilitates (0.0 Cr 3 Application of management concepts to the fitness industry e.g. understanding customers, marketing programs, management financial management, legal issues and evaluation and planning.

Ex Sp 350 Sport Marketing (3.0 Cr 3 Pre req: 270 Mkt 340 Econ 101 J Mie 220 or Advrt 230 Application of fundamentals in the sport industry including marketing strategies, research information management, identification of target markets and the segmentation process. Topics include sport consumer behavior, corporate sponsorship, and promotion and public relations in sport.

Ex Sp 362 Sport Facility and Event Management (0.0 Cr 3 Pre req: 270 J Mie 220 or Advrt 230 Factor related to planning and managing a variety of events including major tournaments, intramural, and intercollegiate competitions and community recreational activities. Examination of topics associated with sport facility operation to include financing new funds, generating capital, and conducting feasibility studies.
Ex Sp 365 Biomechanics (2.2) Cr 3 FS Prereq Ex Sp 256 258 HS 110 Phys 106 or 111 Mechanical basis of human performance Organize mechanical principles to exercise sport and other physical activities Nonmajor graduate credit
Ex Sp 358 Physiology of Exercise (2.2) Cr 3 FS Prereq Ex Sp 256 258 HS 110 Zool 255 255L 256L Physiological basis of human performance effects of physical activity on body functions Nonmajor graduate credit
Ex Sp 360 Sociology of Sport and Exercise (3.0) Cr 3 FS Prereq Ex Sp 255 258 HS 110 Soc 134 and one of Stat 101 104 or 227 or Ex Sp 470 Sport and exercise as social systems and as institutions related to other institutions such as the policy the economy mass media and education
Ex Sp 365 Sport Psychology (3.0) Cr 3 FS Prereq Ex Sp 255 258 HS 110 Psych 101 or Psych 230 Psychological factors that influence performance in sport settings The influence of personality anxiety motivation social factors and psychological skills training
Ex Sp 366 Exercise Psychology (3.0) Cr 3 FS Prereq Ex Sp 256 Ex Sp 258 HS 110 Psych 101 or Psych 230 Paramec. of sport psychology of perception of and predicting health oriented exercise behavior Psychological and psychobiological responses to exercise Psychobiological interventions for increasing exercise participation and adherence rates
Ex Sp 372 Motor Control and Learning Across the Lifespan (2.2) Cr 3 FS Prereq Ex Sp 255 Ex Sp 258 HS 110 Zool 255L 256L An introduction to major concepts of neuromotor control behavioral motor control from an information processing perspective and motor learning across the lifespan but emphasizing the adult system
Ex Sp 376 Teaching Physical Education (2.3) Cr 3 S Prereq Ex Sp 257 and a minimum of 5 fundamentals classes Assistant to Physical Education Program one or more semesters prior to enrollment Current theory practice and research on teaching focusing on management instructional and learning styles of students in secondary schools
Ex Sp 386 Search Strategies for Field Experiences and Employment (Same as H S 395) (1.0) Cr 1 FS Prereq Junior classification to be taken minimum of two semesters prior to 485 Search techniques and preparation of materials utilized for acquisition of jobs and/or internships in health and human performance fields Internship process and polices/procedures will be covered
Ex Sp 395 Adapted Physical Education (Dual listed with 596) (2.3) Cr 3 FS Specific disabling conditions in terms of etiology characteristics needs and potential for movement experiences Techniques of assessment prescription adaptation of activities methods and program planning Laboratory experience required
Ex Sp 417 Supervised Teaching in Physical Education in the Secondary School Cr 8 FS Prereq 355 358 375 395 470 475 Students must be fully admitted to Teacher Education and must apply for approval to enroll at beginning of the semester prior to registering Supervised teaching in the secondary schools
Ex Sp 418 Supervised Teaching in Physical Education in the Elementary School Cr 8 FS Prereq 275 280 355 358 375 395 470 475 Supervised teaching in the elementary schools Students must be admitted to TPE Teacher Education and must apply for approval to enroll at the beginning of the semester prior to registering
Ex Sp 425 Organization and Administration of Athletic Training (3.0) Cr 3 F Prereq 323 senior classification Current administrative professional and legal issues pertaining to athletic training
Ex Sp 426 Business and Finance (3.0) Cr 3 Prereq Ex Sp 350 352 360 Econ 102 Mgmt 371 Math 104 Stat 101 Acct 284 Students will be able to explain financial expenses and detail sources of revenue for sport organizations create and communicate a sponsorship proposal and organize and administer a fundraising program
Ex Sp 445 Legal Aspects of Sport (3.0) Cr 3 Prereq Ex Sp 360 Students will understand legal concepts and terminology relevant to sport/activity identify strategies for limiting liability in sport/fitness programs and identify solutions for elimination of discriminatory practices in sport and physical activity
Ex Sp 450 Medical Concerns for the Athletic Trainer (3.0) Cr 3 S Prereq Permission of program director Current medical issues and concerns including pathology of illness and injury dermatological conditions exposure to allied health care professionals and pharmacological indications in relation to the profession of athletic training and in the care of an athletic population
Ex Sp 458 Principles of Fitness Assessment and Exercise Prescription (3.2) Cr 4 Prereq 358 Physiological principles of physical fitness design and administration of fitness programs testing evaluation and prescription cardiac risk factor modification
Ex Sp 459 Internship in Exercise Leadership (3.0) Cr 1 Prereq C or better in 250L CFR certification concurrent enrollment in 458 Observation and practice of exercise leadership techniques in an on campus adult fitness program
Ex Sp 462 Medical Aspects of Exercise (3.0) Cr 3 Prereq 358 The role of exercise in preventive medicine Impact of exercise on various diseases and the effect of various medical conditions on the ability to participate in vigorous exercise and competitive sports Principles of exercise testing and prescription for individuals with these conditions Environmental and nutritional aspects of exercise
Ex Sp 465 Physical Activity and Aging (2.2) Cr 2 Prereq Psych 230 Zool 155 The effect upon mental and physical health of physically activity as a part of healthy aging as well as chronic conditions associated with aging Methods of assessing fitness and teaching movement activities in relation to gerontological factors Nonmajor graduate credit
Ex Sp 470 Evaluation in Physical Education (3.2) Cr 3 Prereq A minimum of 5 fundamentals classes and admission to University Teacher Education Program Principles underlying process of evaluation Selected test and measurement procedures and tools within the field of physical education
Ex Sp 475 Physical Education Curriculum Design and Program Organization (3.0) Cr 3 F Prereq A minimum of 5 fundamentals classes and admission to University Teacher Education Program Current theory practices and principles applied to curriculum development for programs in physical education K 12 Organizing for teaching in a variety of school settings
Ex Sp 486 Internship in Sport and Exercise Science (1.0-1.5) Prereq Senior classification and advanced registration Observation and practice in selected sport and exercise science agencies Offered on a satisfactory fail grading basis only A Exercise Science Prereq C or better in 458 and 495 Sport and physical performance majors only Cumulative GPA 2.0 B Sport and Physical Activity Prereq Health and human performance majors only Cumulative GPA 2.0 C Sport Management Completion of the Sport Management core classes (Ex Sp 350 352 435 & 445) Cumulative GPA 2.0
Ex Sp 486 Supervised Coaching in Interscholastic Athletics (1-3) Prereq 220 315 355 356 365 Phys 230 senior classification admission to teacher education program and permission of instructor Advance registration required Open only to students in the coaching endorsement program Offered on a satisfactory-fail grading basis only
Ex Sp 488 Practicum in Athletic Training (1-2) maximum of 4 Prereq Permission of program director Experience in application of athletic training techniques under supervision of certified athletic trainers Offered on a satisfactory-fail grading basis only
Ex Sp 489 Review of Athletic Training Competencies (1-0) Cr 3 F Prereq Senior classification Preparation for professional certification by review of required conceptual and clinical competencies Offered on a satisfactory fail grading basis only Required for endorsement or approval to sit for National Athletic Trainers Association Board of Certification Exam
Ex Sp 490 Independent Study Cr 1-3 maximum of 6 Prereq 6 credits in health and human performance and permission of coordinator Independent study of problems of areas of interest in exercise and sport science and related areas A Exercise and Sport Science B Exercise and Sport Science H Honors
Ex Sp 495 Seminar in Exercise and Sport Science Cr 5 to 10 Prereq Senior classification Offered on a satisfactory fail grading basis only

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
Ex Sp 500 Research Methods in Physical Activity (3.0) Cr 3 Prereq Graduate classification in exercise and sport science Methodology and techniques used in the design and interpretation of research involving physical activity Emphasis on styles of writing research papers and use of computer applications
Ex Sp 501 Research Techniques in Exercise Physiology (0-0) Cr 2 Prereq 358 or equivalent courses with basic laboratory experience Application and use of laboratory research equipment in exercise physiology including operation calibration and use in selected situations
Ex Sp 510 Advanced Medical Aspects of Exercise (2.0) Cr 2 Prereq 358 The role of exercise in preventive medicine Impact of exercise on various diseases and the effect of various medical conditions on the ability to participate in vigorous exercise and competitive sports Principles of exercise testing and prescription for individuals with these conditions
Ex Sp 515 Qualitative Analysis of Human Movement (2.3) Cr 3 Prereq 355 The kinematic analysis of developmental movement tasks and sport skills
Ex Sp 516 Quantitative Analysis of Human Movement (3.0) Cr 3 Prereq 355 Application of the principles of mechanics to the analysis of human motion Investigation of the effects of kinematics and kinetics on the human body with special emphasis on exercise and sport applications Includes consideration of two-dimensional and the three-dimensional imaging techniques and force measurements
Ex Sp 520 The Social Analysis of Sport (3.0) Cr 3 Prereq 360 Sociological analysis of sport with emphasis on sociological theory sports structure and function in modern industrialized society The systems of sport in regard to their role structure formal organization and professionalization and its differentiation along social class age and sex
Ex Sp 521 Sport Psychology (3.0) Cr 3 Prereq 365 3 courses in psychology Aspects of psychology which form a basis for understanding and explaining behavior in a sport context Variables underlying individual as well as group performance will be analyzed A critical analysis of current research literature
Ex Sp 522 Social-Psychological Perspectives of Sport and Motor Performance (3.0) Cr 3 Prereq 360 Analysis of social psychological dimensions that modify and facilitate motor behavior focuses on the individual and small group behavior in the sports context
Ex Sp 523 Gender Roles and Sport (Same as W S 523). (3 cr.) Cr. 3. Prereq. 380. 3 courses in sociology and psychology. Analysis of the influence of sport on male and female sex role development. Survey of literature related to sport and sex role socialization: stereotyping and conflict. Discussion of future issues and alternative roles.

Ex Sp 540 Administration of Sport Programs (3 cr.) Cr. 3. Prereq. 270. Theory and practice of administration in physical education and sport development of concepts related to the process of administration types of administrative behavior tasks and responsibilities of the administrator evaluation of effectiveness of administration.

Ex Sp 541 Sport Marketing and Promotion (3 cr.) Cr. 3. Prereq. 350 or Mkt 340. Marketing of sport as a product and marketing of non sport related products through sport. Includes market definition consumer analysis market research market segmentation product positioning pricing promotion marketing communication distribution and sponsorship applied to sport.

Ex Sp 542 Sport Business. (3 cr.) Cr. 3. Prereq. 436 and Acct 215 or 284. Analysis of theoretical and applied principles of economics, finance, accounting and budgeting related to sport.


Ex Sp 550 Advanced Physiology of Exercise I (2 cr.) Cr. 3. Prereq. 505. Concepts and methods of assessing neurological musculature cardiovascular and respiratory adjustments to exercise.

Ex Sp 551 Advanced Physiology of Exercise II (2 cr.) Cr. 3. Prereq. 505. Analysis of factors affecting work capacity and performance. Human energy metabolism concepts and measurement.

Ex Sp 558 Physical Fitness—Principles, Programs and Evaluation (2 cr.) Cr. 3. Prereq. 358. Physiological principles of physical fitness design and administration of fitness programs: testing, evaluation, and prescription: electrocardiogram interpretation.

Ex Sp 560 Perceptual Motor Learning (2 cr.) Cr. 3. Prereq. 372. Emphasis on theories of perceptual motor learning characteristics of the learner and the learning environment with implications for the design of learning settings and further research.

Ex So 561 Motor Development (2 cr.) Cr. 2 to 3. Prereq. 284 or 275. Psych 230. The physical development and characteristic reactions of children in relation to motor performance identification of special psychomotor needs of various age groups of children. All literature and theories applied to the physical education environment.

Ex Sp 590 Special Topics. Cr. 1 to 3
A. Physical Education
B. Health and Exercise Promotion
C. Sport Management
D. Exercise Physiology
E. Sport Sociology
F. Sport Psychology
G. Motor Learning
H. Biomechanics

Ex Sp 591 Supervised Field Experience. Cr. 1 to 6. Prereq. 10 graduate credits in exercise and sport science and/or related areas. Supervised on the job field experience in special areas.

A. Physical Education
B. Health and Exercise Promotion
C. Sport Management
D. Exercise Physiology

Ex Sp 593 Workshops. Cr. 1 to 3

Ex Sp 595 Adapted Physical Education. (Dual listed with 395.12 cr.) Cr. 3. Prereq. 375. Specific disabling conditions in terms of etiology, characteristics, needs and potential for movement experiences. Techniques of assessment, prescription, adaptation of activities, methods and program planning. Laboratory experience required. May not be taken by students who have previously earned credit in 255.

Ex Sp 599 Creative Component. Cr. 1 to 3

Courses for Graduate Students

Ex Sp 615 Seminar. Cr. 1 to 3

Ex Sp 699 Research. Cr. 16

History

www.public.state.edu/history

Andrea Plakans, Chair of Department
Professors Cravens Hurt Kottman Marcus Plakans Wilson
Professors (Adjunct) Dobbs
University Professors (Emeritus) Schweder
Professors (Emeritus) Bennett Dobson Geiger Kellor Lowit Mclmsney Rawson Scholfield Wilt
Associate Professors Bix Lu Pope Ririe Kebrigh Taylor
Associate Professors (Emeritus) Avnamndes Whiraker
Assistant Professors Andrews Barri Melie Garcia Griffiths Hollander Monroe Rieger
Assistant Professors (Emeritus) Madison Ozbom Zaring

Instructors (Adjunct) Hill

The department offers a variety of survey courses (200 series) focusing on human civilization from ancient times to the present. These courses are designed to introduce students to a variety of perspectives on history. The survey courses are intended to provide a broad understanding of the development of human societies and cultures.

In addition to the survey courses advanced undergraduate courses are offered in the history of Africa Latin America the United States technology and science agriculture and of some selected topics.

Undergraduate Study

The History major: For a description of the undergraduate curriculum with a major in History see Liberal Arts and Sciences Curriculum. The History major may earn either a bachelor of arts or bachelor of science degree. Candidates for the B.A. must complete two years of university level study in one foreign language. The minimum required for a major in history is 30 credits of which at least 24 must be in courses numbered 300 or above. A minimum of 12 credits numbered 300 or above must be taken at Iowa State. History majors must complete two enrollments in Hist 495 (for 3 credits) or if qualified and willing one graduate level seminar in the program. The History major prepares a student with the ability to write and think clearly and to understand the nature of social organization. It specifically prepares the student to think historically to understand past events in their relation to the present. To carry out research with a variety of sources and to analyze and interpret past and present events. History majors who choose minors in other departments usually select from such complementary disciplines as Political Science English Sociology Psychology Economics Philosophy or Foreign Languages and Literatures.

English proficiency requirement: History majors must receive a grade of C or better in each of Engl 104 and 105 (or 105H) and Hist 495 or any graduate seminar.

For a description of the major in History as preparation for professional programs see Preprofessional Studies majoring in History. History majors may also earn a second major in International Studies see International Studies.

Although the department does not require specialization in majors and minors may elect to group their courses in one of several areas of emphasis. The following short list shows the department's undergraduate courses by such areas of emphasis. Qualified undergraduates may also take some level graduate courses with permission of the instructor. (See listing of graduate courses below.)

Consult the main list of courses for full description.

Europe 201 202 205 293 402 403 404 405 406
408 410 414 417 419 421 422 424 426 431

Asia Africa Latin America 207 310 311 336 337
340 341 441

United States 221 222 237 351 352 353 354 370
450 451 454 455 458 459 462 463 464 465 469
470 471 472

Technology and Science 280 281 284 285 323
360 387 388 482 483 484 486 489

Agriculture 365 366 460 461

Topical Courses 374 386 389 390 490 495

Courses dealing with the history of technology and science have been structured to offer a sequence leading from basic surveys through courses in the history of particular technologies and sciences. In this area of emphasis it is recommended that students elect courses 492 or 493 have taken a basic survey in the history of technology and science (either Hist 280 or 284 or 285) or have taken a college level course in an appropriate technology or science or seek permission of the instructor. The undergraduate emphasis in the history of technology and science could include either Hist 281 282 or 284 285 and some combination from Hist 320 380 397 398 482
483 484 488 488 and 489.

The department offers a minor in History which may be earned with 15 credits in History courses of which at least 6 must be in courses numbered 300 or above. A minimum of 9 credits numbered 300 or above must be taken at Iowa State. The History minor is most frequently chosen by students majoring in Political Science English Journalism Computer Science and Business.

Graduate Study

Graduate students may take any 400 level history course except 490 and 495 for graduate credit. No more than 12 credits of 400 level courses however may be used toward the minimum credits required for a graduate degree in history. Additional work is required for graduate credits 400 level courses.

Most history graduate courses are either seminars or seminars for courses are numbered above 400. Students are advised to consult the historical literature of a field and prepare them for careers in teaching and research. Seminars require students to conduct original historical research and to write extensive research papers reporting the results.

The M.A. in History for the M.A. in history students may elect a thesis or a non-thesis program. See the departmental brochure for the M.A. in History for a fuller discussion of the options and requirements. A student shall demonstrate proficiency in the use of a research tool such as a foreign language, statistics, computer programming or the like as prescribed by his or her advisory committee. The M.A. in history program serves as the basis for continued study in history law or business preparation for teaching in high school or junior college preparation for government service or as part of a general education for international students. A TOEFL score of 600 is required at the time of admission.

The M.A. and Ph.D. in history of technology and science. The graduate program in the history of technology and science examines the role of technology and science in the formation of modern societies and their impact on people and the world. The program is structured in a sequence of courses leading to the M.A. and Ph.D. degrees.
these courses approach their subject in the context of social and cultural change. They are also open to and appropriate for students in engineering, the sciences, and liberal arts.

The Ph.D. in agricultural history and rural studies program is designed as a Ph.D. program but students without an M.A. in history will be expected to qualify for the Ph.D. degree in history while progressing toward the doctorate. In some cases, the M.A. may be recommended as the terminal degree. Thirty semester hours of graduate credit are required for the M.A. and 72 for the Ph.D. Students who continue beyond the M.A. are expected to pass a qualifying examination in their general field of study and preliminary examinations in three areas of specialization complete a dissertation and defend it orally in the Ph.D. final examination. See the departmental brochure for the program for a full description of requirements.

The following list of the department's graduate courses is organized by areas of emphasis. See the main list for complete descriptions. Courses at the 500 level are taken by graduate students (major or minor) and at the 600 level by qualified undergraduates. Those at the 600 level are taken by graduate students (major or minor) only.

Europe: 512 series, 530 series, 594 series

Asia: Latin America: 510, 513, 592, 595

United States: 511 series, 572, 593 series

Technology and Science: 570, 571, 574, 575, 576, 603, 604, 605, 606, 607

Agriculture and Rural Studies: 550, 552 series, 556, 608, 610

Topical: 580, 583 series, 590

Courses open for nonmajor graduate credit: All courses numbered above 400 except 490 and 495

Courses Primarily for Undergraduate Students

History 201 Introduction to Western Civilization I (3:0 3 CR 3 F) Western civilization from ancientMedieval to 1500. Social and cultural developments economic and political ideas and institutions problems of historical change and continuity

History 202 Introduction to Western Civilization II (3:0 3 CR 3 F) Western civilization from 1500 to the present. Social and cultural developments economic and political ideas and institutions problems of historical change and continuity

History 207 Chinese Civilization (3:0 3 F) Confucian development and transformation of China from earliest times to present

History 221 Survey of United States History I (3:0 3 CR 3 F) Colonial foundations revolution constitution nationalism and democracy sectional disputes and reunion

History 222 Survey of United States History II (3:0 3 CR 3 S) Industrialization emergence as a great power boom and depression war internationalism and Cold War modern industrial society

History 240 Latin America History (3:0 3 CR 3 S) Pre-reform Spanish colonial civilization and cultural heritage of Latinamerican in the United States. The histories of Mexican, Puerto Rican, Cuban and other Latin American peoples in the U.S. emphasizing political and cultural convergence and congruences

History 280 Introduction to History of Science (Same as ME 280) (3:0 3 CR 3 F Ideas of nature from ancient Greece to the sevencentury scientific revolution

History 281 Introduction to History of Science II (Same as ME 281) (3:0 3 CR 3 S Science from seventeenthcentury scientific revolution to Darwin and Einsten

History 284 Introduction to History of Technology and Engineering (Same as ME 284) (3:0 3 CR 3 F Technology in various civilizations from Sumer and Egypt to early 19th-century Europe

History 285 Introduction to History of Technology and Engineering II (Same as ME 285) (3:0 3 CR 3 S Technology in Western world in the nineteenth and twentieth centuries

History 305 Cultural Heritage of the Modern World (3:0 3 CR 3 Prereq: Sophomore classification Marcus Examinations of parallel formal and structural elements in scientific and social thinking technology design and production in history and art from the late medieval period to the 20th century

History 307 American Popular Culture (3:0 3 CR 3 Prereq: Sophomore classification Social practices beliefs and material traditions of everyday life in America from the mid-19th century to the present includes literature music theater and popular entertainments Dimne novels vaudeville rock and roll music Hollywood and establishment of professional athletic leagues are among the cultural artifacts and phenomena considered

History 323 Science and Religion (Same as Relig 323) (3:0 3 CR 3 Prereq: Sophomore classification Wilson History of changing display of science and religion in our understanding nature from the time of Galileo to the reception of Darwin

History 325 Society and Politics in Europe, 1450-1625 (3:0 3 CR 3 F Prereq: Sophomore classification Social, cultural, demographic and economic experiences Religious Reformation Growth of the States and Emperors and the institutions

History 336 History of Modern China I (3:0 3 CR 3 F Prereq: Sophomore classification China from 1644 to 1912 internal and external stimuli on traditional structure leading to reform and revolution

History 337 History of Modern China II (3:0 3 CR 3 S Prereq: Sophomore classification China from 1912 to present search for a new order and continuing Chinese revolution

History 341 History of Latin America I (3:0 3 CR 3 F Prereq: Sophomore classification Colonial Latin America from European discovery and colonization to wars for independence

History 341 History of Latin America II (3:0 3 CR 3 S Prereq: Sophomore classification Modern Latin America national origins from 1800 to present

History 345 U S Immigration History (3:0 3 CR 3 S Prereq: Sophomore classification Garcia Examination of historical factors and structural forces that affect arrival of foreign and refugee communities from around the world

History 351 Social and Cultural History of American People I (3:0 3 CR 3 F Prereq: Sophomore classification Beck Cultural history of ordinary Americans since 1800 development of society dispersion of popular ideas living conditions work and play the arts music architectural styles material culture and urban lifestyles

History 352 Social and Cultural History of American People II (3:0 3 CR 3 S Prereq: Sophomore classification Beck Cultural history of ordinary Americans since 1800 development of society dispersion of popular ideas living conditions work and play the arts music architectural styles material culture and urban lifestyles

History 353 History of African Americans I (Same as Af Am 353) (3:0 3 CR 3 F Prereq: Sophomore classification Pope African roots of Black culture slavery and exploitation Civil War Reconstruction

History 354 History of African Americans II (Same as Af Am 354) (3:0 3 CR 3 S Prereq: Sophomore classification Pope Institutionalization of segregation and urban migration Harlem Renaissance Garvey movement Depression and world wars civil rights movement and Black Power

History 365 History of American Agriculture I (3:0 3 CR 3 F Prereq: Sophomore classification Lorentz American agriculture from the colonial times European background colonial period to 1865

History 366 History of American Agriculture II (3:0 3 CR 3 S Prereq: Sophomore classification Lorentz American agricultural development from 1865 to present

History 370 History of Iowa (3:0 3 CR 3 Prereq: Sophomore classification Survey of major social and cultural developments in Iowa from the late 1700s Emphasis on minority groups pioneer life early economic development industrial development educational and religious development and outstanding personalities

History 374 Women in the Ancient Mediterranean World (Same as Cl St 374) See Classical Studies

History 380 History of Women in Science, Technology, and Medicine (Same as W S 380) (3:0 3 CR 3 Prereq: Sophomore classification Buch History of women's relationship to the fields of science technology and medicine as students and professionals consumers subjects and patients family members workers and citizens Concentrates especially on 19th and 20th century United States concluding with an examination of current issues of opposing interest to women in science technology and medicine

History 386 History of Women in America (Same as W S 386) (3:0 3 CR 3 Prereq: Sophomore classification A survey of social economic and political aspects of women's role from colonial era to present emphasis on employment education concepts of sexuality and changing nature of the home

History 388 History of Astronomy and Physics (3:0 3 CR 3 Prereq: Sophomore classification Wilson From the seventeenth century triumph of Copernicanism to current ideas of an evolving universe Development of physical ideas and their increasing application to astronomy

History 390 Modern Military History I (3:0 3 CR 3 F Prereq: Sophomore classification Military History from wars of attention to the modern age in light of the American military relationships between war and society in America and Europe from 1750 to 1918

History 390 Modern Military History II (3:0 3 CR 3 S Prereq: Sophomore classification Military History from wars of attention to the modern age given the past two centuries of global wars from World War I to World War II and during the twentieth century emphasis on World War II experience

History 402 Ancient Greece (Same as Cl St 402) (3:0 3 CR 3 F Prereq: Sophomore classification Ancient Greece from the Bronze Age to Hellenistic Kingdoms evolution of Greek polis and its cultural contributions Nonmajor graduate credit

History 403 Ancient Rome I (Same as Cl St 403) (3:0 3 CR 3 S Prereq: Sophomore classification Political social and institutional history of ancient Rome and its cultural contributions studied through original sources Republican Era Punic Wars to the assassination of Julius Caesar Nonmajor graduate credit

History 404 Ancient Rome II (Same as Cl St 404) (3:0 3 CR 3 S Prereq: Sophomore classification Political social and institutional history of ancient Rome and its cultural contributions studied through original sources Imperial Age Augustus to the rise of Constantinople

History 405 History of Medieval Western Europe I (3:0 3 CR 3 F Prereq: Sophomore classification Development of political economic and social institutions Early and Central Middle Ages 284 1050 Nonmajor graduate credit

History 406 History of Medieval Western Europe II (3:0 3 CR 3 S Prereq: Sophomore classification Development of political economic and social
Horticulture 241

Honors courses and Honors sections of regular courses are offered by several departments and programs. These courses, open only to Honors Program members, have special enrollment and are taught by specially selected instructors. Most of these courses are listed by department or program (see Economics Engineering English Mathematics Physics Psychology and Speech Communication).

In addition to established Honors courses Honors students may design any course as an Honors course by making appropriate arrangement with the course instructor and obtaining approval of the Honors Program Director. Most departments offer opportunities for independent study and research under 205 and 490 when designated by an H these courses also carry Honors credit.

Research grants are available to support Honors research.

Listed below are those courses that are offered directly by the University Honors Program. Specific information about the full range of Honors courses and seminars for the current academic year including the Honors courses offered by individual departments and programs may be obtained from the Honors Program Office in Jackson Honors Building.

Hon 121 Freshman Honors Seminar (0.25 Cr. 1 F Prereq Membership in the Freshman Honors Program Orientation to Iowa State University and to the University Honors Program. Offered on a satisfactory fail grading basis only.

Hon 290 Special Problems Cr var Prereq Permission of the vice provost for undergraduate programs Independent study on topics of an interdisciplinary nature. Offered on a satisfactory fail grading basis only. Intended primarily for freshmen and sophomores.

H Honors U Undergraduate Research

Hon 302 Honors Leadership Seminar (1-2 Cr. 2 F Prereq Selection as a leader of a Freshman Honors Seminar For students serving as leaders of Freshman Honors Seminars. Under faculty supervision Development of teaching and leadership skills within the context of an Honors education experience. Offered on a satisfactory fail grading basis only.

Hon 321, 322, 323, 324 University Honors Seminars 1-0 Cr. 1 or 2 Cr. 2 FS SS Prereq Membership in the University Honors Program Interdisciplinary seminars on topics to be announced in advance. Offered on a satisfactory-fail grading basis only.

Hon 490 Independent Study Cr var Prereq Membership in the University Honors Program and permission of the vice provost for undergraduate programs Independent study on topics of an interdisciplinary nature. Intended primarily for juniors and seniors.

Horticulture

www.hon.iaastate.edu

Jeffery K. Iles Chair of Department University Professors Christians Professors Chapin Domoto Gleason Graves Nonnacke Tiber Professors (Emeritus) Bausch Hall Hodges Associate Professors Arora Gladon Hannapel Iles Minnar Stephens Assistant Professors Del F. Haynes Lashbrook Asstant Professors Collaborators W. Drehner Instructors (Adjunct) Dilley Gaul Osborn

Undergraduate Study

For undergraduate curriculum in horticulture leading to the bachelor of science degree see Horticulture.

Horticulture
The horticulture curriculum is designed to prepare commodity emphasis on general horticulture and landscape management, fruit and vegetable production, nursery management, turfgrass science and management, and public education. Students considering graduate degree work in the science option. Specialization options complete the educational goal by combining one of the above interest areas with those skills required in environmental horticulture, greenhouse management, and practical experience. Graduates understand the cultural and environmental dimensions of problems and issues facing horticultural professionals.

The rapidly expanding field of horticulture provides employment opportunities in nurseries, seed companies, interior landscaping firms, greenhouses, garden centers, nurseries, public gardens and arboretums, orchards, and vegetable farming. The allied industries associated with the horticulture provide employment in the areas of sales management and communication. Turf managers are needed for golf courses, athletic fields, sod production parks, and the lawn care industry. Further opportunities exist in sod production, landscape development, and maintenance and botanical gardens.

Opportunities also exist for further education in graduate schools for careers in research teaching and business. Students have the option of selecting a secondary major in the departmental programs in plant management, seed science, agricultural extension education, environmental studies, or international agriculture.

The department offers a minor in horticulture that may be earned by taking Hort 221 plus at least 12 credits in horticulture at the 200 level or above. Visit our departmental website at http://hort.iastate.edu.

Graduate Study

The department offers master of science and doctor of philosophy degrees in horticulture and the underlying sciences. Students majoring in horticulture usually take minor work in agronomy, botany, physiology, soil science, chemistry, entomology, food and nutrition, genetics, plant pathology, or statistics.

There is no uniform foreign language requirement for either the master of science or the doctor of philosophy degree. The department also cooperates in the interdepartmental majors of genetics, water resources, molecular cellular development, and biology education and applied physiology (see Index). Graduates possess a broad understanding of horticulture and the underlying plant sciences. They are able to communicate effectively with members of the scientific community, industry groups, and the general public. They are experienced in conducting and writing the results of research. They are capable of addressing and solving complex problems associated with the agricultural and plant science professions. They understand the ethical and social and environmental aspects associated with modern agricultural practices.

Courses open for nonmajor graduate credit: 320, 320L, 351, 422, 434, 436, 437, 442, 451, 453, 461, 471, 472, 493

Courses Primarily for Undergraduate Students

Hort 110: Orientation in Horticulture (1 Cr.) F Introduction to the field of horticulture

Hort 121: Home Horticulture (2 Cr.) F/S Growing plants in and around the home, including requirements for growing house plants, plant propagation: design and maintenance: fruit and vegetable, gardens, lawn tree and shrub maintenance

Hort 221: Principles of Horticulture (2 Cr.) F/S Prereq: Biol 201 Biological principles of growing horticultural crops including anatomy reproduction light, temperature, water, nutrition and growth and development. Laboratory exercises emphasize environmental factors and permit detailed observation of plant growth

Hort 282: Educating Youth Through Horticulture (Same as AgEd 282) (3 Cr.) S Planning, developing and implementing science-based educational programs in a public garden setting. Through hands-on experiences at Reiman Gardens students will learn about horticulture, learning theory and the application of science principles as they pertain to educating youth

Hort 283: Pesticide Application Certification (Same as Ent 283) S Entomology

Hort 320: Horticultural Plant Nutrition (Same as PLHP 320) (2 Cr.) S Prereq: 221 or Agron 114 or Biol 201 and Agron 154 or 155. Factors influencing nutrient absorption and composition criteria of essentiality and roles of the elements. Nutrient status and plant analyses. Techniques for determining plant nutritional status. Water quality and crop monitoring. Students will utilize hands-on equipment for field measurement. Nonmajor graduate credit

Hort 321: Horticulture Physiology (2 Cr.) F/S Prereq: 221 or Biol 201 Principles of plant physiology relating to problems including photosynthesis, respiration, metabolism, water relations, and developmental processes

Hort 322: Plant Propagation (2 Cr.) S Prereq: 221 or Biol 201 Fundamental principles underlying sexual and asexual propagation of plants. Practice in reproducing plants by use of seeds, cuttings, stumps and roots

Hort 330: Herbaceous Ornamental Plants (2 Cr.) Prereq: 221 Identifying botanical characteristics. Origins, propagation, uses and general culture of herbaceous annual and perennial plants

Hort 332: Greenhouse Operation and Management (3 Cr.) S Prereq: 221 Principles of greenhouse and other controlled environment operation and management. Methods and equipment for manipulating environmental factors such as light, temperature, fertility, production media etc. to maximize production rate and quality and minimize production costs and time. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required

Hort 338: Seed Science and Technology (Same as Agron 338) S Agronomy

Hort 340: Woody Landscape Plants (3 Cr.) Prereq: 220 Identification, botanical characteristics, landscape values and culture of native and introduced woody plants. Emphasis on plants used in managed landscapes in the midwest. Field trip(s) outside of scheduled class time required. Weekend/overnight field trips may be required

Hort 341: Woody Plant Cultivars: Shade Trees (1 Cr.) Prereq: 221. Offered 2003 Prereg: 241 Nine week course beginning first week of semester. Students will learn how to identify and care for the most horticulturally important shade tree taxa suitable for the Midwest. Cultivars of the most prevalent species will also be taught. Each class period will feature indoor and outdoor sessions.

Hort 342: Landscape Plant Establishment and Maintenance (2 Cr.) Prereq: 241 or L A 232 Principles and practices involved with establishment and maintenance of woody ornamental plants in the landscape. Laboratory work involves site evaluation and installation techniques. Post-plant care and maintenance of established landscape plants

Hort 344: Landscape Horticulture (4 Cr.) S Prereq: 241 or Hort 233 recommended Development of residential public and commercial landscape designs using design principles and the process of design. Projects encompass site analysis, program development, concept development, preliminary design, final design and graphic presentation techniques. Students develop master plans for residential sites, public gardens and commercial properties

Hort 345: History and Development of Public Gardens (2 Cr.) Prereq: 221 History and development of public gardens in the US and internationally. Emphasis on the relationship of gardens to local, national and international aspects of a garden of life of society

Hort 349: North American Public Gardens (2 Cr.) F Prereq: 221 or SS Prereq: 221 Recitation about and field trips to North American public gardens. No more than two credits of Hort 349 may be counted toward graduation. Tour/field trip expenses paid by students

Hort 351: Turfgrass Establishment and Management (Same as Agron 351) (3 Cr.) Prereq: 221 or Biol 201 Principles and practices of turfturfgrass propagation and management. Specialized practices relative to professional lawn care, golf courses, athletic fields, highway roadsides, and sod production. The biology and control of turfgrass pests. Nonmajor graduate credit

Hort 351L: Turfgrass Establishment and Management (Laboratory) (Same as Agron 351L) (3 Cr.) Prereq: 221 or Biol 201 Principles and practices of turfgrass propagation and management. Specialized practices relative to professional lawn care, golf courses, athletic fields, highway roadsides, and sod production. The biology and control of turfgrass pests. Nonmajor graduate credit

Hort 391: Horticultural Management Experience (Credit maximum of 2 F/S Prereq: 221 permission of instructor. A structured work experience for the student to gain insight into management operations associated with production of horticultural crops. A report of 10 or more pages describing the student's experience is required. One credit is given for each term the student is enrolled in the course. A maximum of two credits may be used toward the horticultural sciences course requirements and two additional credits may be used toward the 128 credits required for graduation

Hort 422: Postharvest Technology (3 Cr.) 4 Alt. F Prereq: 221. Junior or senior classification. Prerequisites, techniques related to postharvest maintenance of quality of horticultural commodities. Emphasis on the effects of handling, storage, facilities, and techniques and quality evaluation. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit

Hort 423: Plant Tissue Culture and Propagation (Dual listed with 523) (1 Cr.) 2 Alt. F Prereq: 2003 Prereq: Biol 301 and Hort 321 or Bot 320 Theory and techniques of plant tissue culture including organogenesis, somatic embryogenesis, micropropagation, anther and embryo culture

2003-2005
Hort 424 Sustainable and Environmental Horticulture Systems (Dual listed with 524 same as Enw 424) 3.0 Cr. 2 F. Inquiry into ethical issues and environmental consequences of horticultural cropping systems and production practices. Emphasis on production systems that are resource efficient, environmentally sound, socially acceptable and profitable.

Hort 425 Horticultural Plant Breeding (Dual listed with 525) 3.0 Cr. 2 Alt. F. offered 2004 Prereq Bot 201 or General breeding techniques and methods required for the improvement of horticultural plants.

Hort 433 Tropical and Foliage Plant Production and Intenscapes (2-3) Cr. 3 Alt. S. offered 2005 Prereq 221 332 Identification nonnative crop production and use of tropical and foliage plants for interior landscapes. Understanding plant needs in interior environments such as malls, offices, atria and lobbies. Planning, designing, installing, maintaining and selecting plants for intenscapes. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit.

Hort 434 Greenhouse Crop Production I (3-3) Cr. 4 Alt. F. offered 2003 Prereq 330 and 332 Principles and practices of greenhouse crop production. Emphasis is placed on production of common bulbous cut flower and containerized flowering species produced in greenhouses and other controlled environments. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit.

Hort 435 Greenhouse Crop Production II (3-3) Cr. 3 Alt. S. offered 2004 Prereq 330 and 332 Principles and practices of greenhouse crop production. Emphasis is placed on production of common flowering containerized and bulbous crops and flowering annual and perennial crops. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit.

Hort 436 Greenhouse Crop Production III (3-3) Cr. 2 Alt. F. offered 2004 Prereq 221 and 332 Principles and practices of greenhouse food crop production. Emphasis is placed on production of vegetable herbs and fruit species in greenhouses and other controlled plant environments. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit.

Hort 442 Nursery Production and Management (2-2) Cr. 3 Alt. F. offered 2003 Prereq 221 340 Cultural and management practices involved with a production nursery container vs field nursery nursery size and planting selection propagation and planting methods soil and nutrient management growth modification overwintering financial and personal management marketing shipping. Field trips outside of scheduled class time required. Weekend/overnight field trips may be required. Nonmajor graduate credit.

Hort 444 Landscape Construction (2-3) Cr. 3 F. Prereq Junior or senior classification. Theory and practice of landscape construction including erosion estimation methods contract administration construction materials installation of retaining walls paving edging irrigation and site lighting. Students take field trips to view various types of landscape installations and use of building materials at area design/build/bid. Encompasses construction projects using various landscape materials and techniques.

Hort 445 Public Horticulture Management and Administration (2-0) Cr. 2 F. Prereq 221 345 and 391 In depth presentation and discussion of techniques and requirements for the management and administration of a public horticultural facility. Topics include: oral and written presentation skills, proposal development, public relations, budgeting, fundraising, dealing with governing boards, interpersonal relationships and managing horticultural operations.

Hort 451 Professional Turfgrass Management (2-0) Cr. 2 Alt. S. offered 2005 Prereq 351 Turfgrass science including the study of: (1) specific information on soil chemistry and soil modification as they relate to the development and maintenance of turfgrass areas; (2) specialized management practices used in athletic field care, professional lawn care and golf course trades; and (3) construction methods for golf courses and athletic fields. Nonmajor graduate credit.

Hort 452 Integrated Management of Diseases and Insect Pests of Turfgrasses (Dual listed with 552 same as PI 452. Ent 452.) See Plant Pathology or Entomology.

Hort 453 Sports Turf Management (2-0) Cr. 2 Prereq 351 Management techniques for today’s specialized athletic fields. The horticultural and budgetary aspects of football, soccer, baseball and softball fields will be discussed. Field trips and laboratory exercises will develop a practical understanding of turf development and construction. Nonmajor graduate credit.

Hort 461 Fruit and Nut Crop Production (2-3) Cr. 3 Alt. S. offered 2005 Prereq 221 Principles and practices of small fruit, tree fruit, and nut culture and production. Morphology, physiology of growth and development, plant establishment, pest management, pruning, training, harvesting, storage and marketing. Nonmajor graduate credit.

Hort 471 Vegetable Production and Management (3-0) Cr. 3 Alt. S. offered 2004 Principles and practices of vegetable production. Methods of maximizing yield and quality of vegetables. Harvesting, storage and marketing. Nonmajor graduate credit.

Hort 475 Community Tree Management (Same as For 475) See Forestry.

Hort 490 Independent Study (Cr. 1-3) Prereq Senior classification in horticulture. Permission of instructor. A maximum of 4 credits may be used toward the total of 12 credits required for graduation. Investigation of topics held special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head.

A. Greenhouse Crops
B. Nursery Crops
C. Turfgrass
D. Fruit Crops
E. Vegetable Crops
F. Cross Community
H. Honors

Hort 491 Seed Science Internship Experience (Same as Agron 491) 1.0 Cr. 12 May be repeated once. FS SS 040 advanced approval and permission of employer and instructor. Staff professional work experience and creative project for seed science secondary majors. The project requires prior approval and participation of the employer and instructor. The student must submit a written report.

Hort 493 Workshop in Horticulture (Cr. 0-3) Offered as demand warrants. Workshops in horticulture. Nonmajor graduate credit.

Hort 495 Agriculture Travel Course Preparation (0-1) Cr. R. May be repeated FS SS Prereq Permission of instructor. Limited enrollment. Students enrolled in this course are also required to enroll in Hort 496. The following topics include preparation for international travel: the horticultural/agricultural industries, climate change, economics, geography, history, marketing, soils, culture traditions, and horticultural/development of the country to be visited. Students enroll in this course the term immediately before travel to the foreign country.

Hort 496 Agriculture Travel Course Cr. 1.3 May be repeated FS SS Prereq Permission of instructor. Limited enrollment. Study and tour of production methods in major horticultural regions of the world. Influence of climate econoconic, geography, soils, landscapes, markets, culture, and history of horticultural crops. Location and duration of tours will vary. Tour expenses paid by students.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Hort 511 Integrated Management of Tropical Crops (Same as PI 511) See Plant Pathology.

Hort 523 PlantTissue, Call and Protoplast Culture (Dual listed with 423) (1-2) Cr. F. offered 2003 Prereq Bot 301 and Hort 321 or Bot 320 Theory and techniques of plant tissue culture including organogenesis, somatic embryogenesis, micropropagation, anther and embryo culture, protoplast isolation and culture and transformation. Applications to agriculture.

Hort 524 Sustainable and Environmental Horticulture Systems (Dual listed with 424) (2-0) Cr. 2 F. Inquiry into ethical issues and environmental consequences of horticultural cropping systems and production practices. Emphasis on systems that are resource efficient, environmentally sound, socially acceptable and profitable.

Hort 525 Horticultural Plant Breeding (Dual-listed with 425) (2-3) Cr. 2 Alt. F. offered 2004 Prereq Bot 301 or Gen 320 Breeding techniques and methods required for the improvement of horticultural plants.

Hort 529 Publishing in Plant Science Journals (2-0) Cr. 2 S. Prereq Permission of instructor. Evidence of a publishable unit of the student's research data. Process of preparing a manuscript for submission to a refereed journal in the plant sciences. Emphasis on publishing self generated data from thesis or dissertation research.

Hort 530 Research Orientation (2.0) Cr. 1 F. Instruction in scientific methods and communication skills.

Hort 537 Environmental Stress Physiology (Same as Agron 537) Bot 537 (3-0) Cr. 3 S. Prereq Bot 320 or equivalent. Physiology and molecular biology of plant responses to environmental stress. Emphasis on the role of hormones and neuropeptides in governing stress responses. Lectures are prepared from journal papers that elucidate key mechanisms controlling responses to drought, flooding, salt, nutrient deficiencies, freezing, pathogens and herbivores. Plants studied include genetic model systems and crops of horticultural and agronomic value.

Hort 542 Introduction to Molecular Biology Techniques (Same as Zool 542) See Zoology and Genetics.

Hort 546 Organizational Strategies for Diversified Farming Systems (Same as Agron 546) Soc 546 SusAg 546 (3) Cr. 2 Alt. S. offered 2004 Prereq SusAg 208 Bell Lebman. Organization and operation of complex, diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, analytical frames for evaluating farming system sustainability, and problem solving. Participation in several field trips to Iowa farms is required.
Horticulture

Course 51 Growth and Development of Perennial Grasses [Same as Agron 551] (2-0) Cr 2 Alt S offered 2004 The grass plant: Selected topics on anatomy, morphology, and physiology relative to growth and development of perennial grasses. Emphasis on growth and development characteristics peculiar to grasses and variations of such characteristics under natural and managed conditions.

Course 552 Integrated Management of Diseases and Insect Pests of Turfgrasses [Dual listed with 452 same as Ent 452] PI P 552 I See Plant Pathology or Entomology

Course 565 Professional Practice in the Life Sciences [Same as Pl 565] I See Plant Pathology

Course 590 Special Topics Cr 1-3 Pr Req A major or minor in horticulture

Course 593 Workshop in Horticulture Cr 1-3 Workshops in horticulture with emphasis on off-campus instruction.
A Greenhouse Crops
B Nursery Crops
C Turfgrass
D Fruit Crops
E Vegetable Crops
F Cross-Commodity

Course 599 Creative Component Cr 1-3

Courses for Graduate Students

Course 610 Graduate Seminar Cr 1 each time elected FS


Course 690 Advanced Topics Cr var

Course 696 Seminar in Plant Physiology and Molecular Biology (Same as Bot 696) I See Botany

Course 698 Thesis and Dissertation Research Cr var
A Greenhouse Crops
B Nursery Crops
C Turfgrass
D Fruit Crops
E Vegetable Crops
F Cross-Commodity

Hotel, Restaurant, and Institution Management

(Administered by the Department of Apparel, Educational Studies and Hospitality Management)

Mary B Greigre Chair of Department

Professors Gilmore Greigre

Associate Professors Bartier Oh Sheed

Associate Professors (Emeritus) Brown Huss

Assistant Professors Jeong Sun Baris

Assistant Professors (Adjunct) Dana Strohbehn

Instructors (Adjunct) Burger Hanrod

Instructors (Collaborator) Thorus

Lecturers Moser Norvig Olver

The Hotel, Restaurant and Institutional Management program aspire to excellence in foodservice and lodging education research and outreach with a mission of developing leaders for the foodservice and lodging professions. Educational experiences are planned to contribute to the graduates effectiveness as a career professional and as a person familiar with and critical of the social, economic, and cultural issues within the foodservice and lodging industries.

the program is committed to serving the respective missions of Iowa State University and the College of Family and Consumer Sciences and to serving the needs of the state of Iowa.

Graduate Study

The program offers work for the degree bachelor of science in hotel, restaurant and institution management. Coursework is planned to provide students with a general education plus professional preparation for management and executive positions in hospitality organizations. Principles of business management are presented as well as fundamentals of hospitality operations.

Graduates understand the principles necessary to successfully practice hospitality management in an ethical manner. They are able to determine accept and implement management responsibilities. They can identify and evaluate environmental trends and adapt operating practices to meet these changing forces. They are able to make a positive contribution to the growth and improvement of the hospitality industry.

Learning experiences are provided in the quantity food production and service facility of the HRIM program and other approved establishments. Field trips and guest speakers are scheduled to introduce students to the diversity of career opportunities in the hospitality industry. These opportunities apply core content to specific work settings. Students are required to have 400 hours of relevant work experience prior to graduation.

The HRIM program offers a minor that may be earned by successfully completing at least 15 credits of HRIM courses in consultation with the undergraduate coordinator.

A hotel, restaurant and institution management area of concentration can be combined with a major in advertising or journalism and mass communication in the College of Liberal Arts and Sciences. See the HRIM undergraduate coordinator for details.

The program requires a grade of C or better in both Engl 104 and 105 or equivalent transfer courses. A student who does not get a C or better in these classes is required to get a C or better in Engl 302.

Graduate Study

The HRIM program offers work for the master of science and doctor of philosophy degrees in foodservice and lodging management (FLM). Graduates of the program are able to interpret trends and adapt operating practices of hospitality organizations to changing economic, social, political, technological and environmental conditions. They can manage a food or lodging enterprise successfully to achieve objectives of the operation or at the doctoral level, successfully carry out responsibilities of a hospitality educator. Graduates will make positive contributions to the growth and improvement of the hospitality industry using current research in the decision-making process.

A degree in hotel, restaurant, and institution management is the usual background for graduate study. However, an administrative preparation in dietetics, business, or closely related fields are encouraged to apply. Prior to admission students must have completed most prerequisite courses. These include basic principles classes in financial accounting, managerial accounting, business law, computer science, economics, human resources, management and marketing. In addition basic principles courses in nutrition food preparation and quantity food production are required.

The master of science degree requires either a thesis or non-thesis (creative component) project. Students also are required to take one HRIM course in three of four core areas (human resources: financial management; marketing; and strategic management).

The program participates in the Master of Family and Consumer Sciences degree by offering a specialization in FLM. The program also participates in the Master of Family and Consumer Sciences degree with specialization in Dietetics offered in cooperation with the Food Science and Human Nutrition Department.

A graduate minor in HRIM at the MS level requires a minimum of 9 credits. A course work of 6 credits must be at the 500 or 600 level.

The PhD program required 72 credits of which may be applied from the master's degree. Required courses include seminars, strategic management, marketing, human resource management, research methods statistics and college teaching. All students take a minimum of 15 research/selection credits.

Courses open for non-major graduate credit: 352 437 438 452 460

Courses Primarily for Undergraduate Students

HRI 101 Introduction to the Hospitality Industry (3) Cr 3 F Introduction to the foodservice, lodging and tourism components of the hospitality industry. Background: minimum current issues. Writing and future challenges in various segments of the industry.

HRI 233 Hospitality Sanitation and Safety (3) Cr 3 FS Sanitation and safety principles and issues in food service and lodging operations. Discussion of issues impacting consumers. Application of HACCP Program for sanitation and food safety. Certification examination. Characteristics of food supplies and equipment as related to sanitation and safety.

HRI 260 Global Tourism Management (3) Cr 3 S Overview of the global tourism industry, hospitality and related services destinations, attractions and transportation. Introduction to travel behavior, tourism planning and research and economic and social impacts of tourism development.

HRI 287 Principles of Hospitality Management (3) Cr 3 FS Introduction to management concepts and principles with application to the hospitality industry. Includes service quality management, professionalism, and social responsibility.

HRI 289 Private Club Operations (2) Cr 2 S Prereq: 101 The organization and management of various types of private clubs including country club and other recreational and social clubs. Field trips required.

HRI 333 Foodservice Operations Controls (3) Cr 3 F Prereq Credit or enrollment in 380, 380L, Math 140 or 150, Com S 103 Introduction to revenue and cost control in foodservice and hotel operations. Systems for controlling sales and food beverage labor and other costs. Application of principles related to procurement, production, and inventory controls. Specifications for food and equipment. Field trips required.

HRI 352 Lodging Operations Management (3) Cr 3 F Prereq: 101 Introduction to functional department activities of lodging organizations. Including front office housekeeping, purchasing, accounting, human resources and food and beverage. Introduction to property management systems. Principles of management applied to lodging operations. Nonmajor graduate credit.

HRI 380 Quantity Food Production Management (3) Cr 3 FS Prereq: 233 or 2 cr. Micro FS HN 111 or 214 Junior classification enrollment in 380L. Principles of and procedures used in quantity food production management including quality control, food costing, work methods, menu planning, sanitation, safety and service.

HRI 380L Quantity Food Production and Service Management Experience (0) Cr 2 F, S Prereq: 233 or 2 cr. Micro FS HN 111 or 214 Junior classification enrollment in 380. Observation with program required. Application of quantity food production and service management principles and procedures in the departmental foodservice operation.

HRI 381 International Study in Hospitality Cr 1-3 SS Prereq: Permission by application Limited
enrollment. Supervised study abroad of tourism and its impact on hospitality operations. Experiences include hospitality related tourist attractions and opportunities related to different cultures. Required pre-study sessions arranged. Expenses paid by student.

HRI 382 Field Study Cr 1 3 F SS Prereq Permission by application. Supervised study opportunity for students to observe and apply classroom theory to actual hospitality operations across the US. Hospitality operations may include hotels, restaurants, resorts, wineries, theme parks, clubs, hospitals, and tourism operations. Required pre-study sessions may be arranged. Expenses paid by student.

HRI 383 Introduction to Beverages (2) Cr 2 F Prereq Must be at least 21 years old and permission of the instructor. History and methods of production for a variety of wines, spirits, and other beverages. Product knowledge and service techniques related to sales.

HRI 391 Foodservice Systems Management I (3) Cr 3 F Prereq 380 380L. Principles and techniques related to basic management, organizational, leadership, and human resource management of foodservices in health care and other institutional settings. Not accepted for credit toward a major in HRIM.

HRI 392 Foodservice Systems Management II (3) Cr 3 S Prereq 391 Introduction to cost control in foodservice departments, procedures for controlling food labor and other variable costs. Application of principles related to food product selection, specification, purchase, and storage in health care and other institutions. Not accepted for credit toward a major in HRIM.

HRI 393 Hospitality Work Experience Cr 1 Prereq Adviser approval. Approved work experience for HRIM majors in food lodging, related operations, or experience in at least two different entry level positions or management responsibilities after high school graduation required. A minimum of 400 hours required. Offered on a satisfactory fail grading basis only.

HRI 433 Hospitality Managerial Accounting (Dual-listed with 533) (3) Cr 3 S Prereq 333, Act 294 Econ 101 credit or enrollment in Stat 101. Use of common financial statements: accounting ratios and financial techniques to impact management decisions.


HRI 438 Hospitality Human Resource Management (3) Cr 3 S Prereq 287 work experience junior classification. Principles and practices of human resource management relevant to hospitality organizations. Emphasis on the entry level manager's role in hospitality organizations.


HRI 440 Hospitality Marketing Strategies (Dual-listed with 540) (3) Cr 3 F Prereq 287 Stat 101 Mkt 340 Application of marketing theories to the hospitality industry. Emphasis on consumer behavior, market opportunities, marketing research, and strategies and marketing plans.

HRI 452 Lodging Operations Management II (3) Cr 3 S Prereq 352 and Com S 103. Advanced topics in lodging operations, including international project development operations and contracts. Property management systems including computer exercises.

HRI 455 Hospitality Strategic Management (Dual-listed with 555) (3) Cr 3 F Prereq Credit or enrollment in 433, 438, and 440. Senior classification. Introduction to the strategic management process as a planning and decision making framework in hospitality organizations. Integration of human resources, marketing, and financial management concepts. Use of case studies and group projects to facilitate development of conceptual and analytical skills.

HRI 460 Hospitality Law (3) Cr 3 S Prereq Actct 215 Laws relating to ownership and operation of hospitality organizations. The responsibility of management and employees to customers and society. Non-major graduate credit.

HRI 474 Entrepreneurship in Family and Consumer Sciences. Same as HDFS 474 T C 474 (3) Cr 3 S Prereq 6 credits in HRIM at 300-level or above. Explores entrepreneurship for family and consumer sciences related business. Includes family home-based rural and women owned businesses. Development of a feasibility analysis. Guest speakers.

HRI 480 Quantity Recipe Development (3) Cr 2 Alt S offered 2005 Prereq 380L or FS HN 214 Experimental approach to the development of quantity recipes. Emphasis on sensory evaluation parameters of time, equipment, ingredients, and reporting results.

HRI 485 Catering (Dual-listed with 585) (2) Cr 2 Alt S offered 2004 Prereq 380L Application of management principles in a catering business. Starting a catering business and developing a business plan.

HRI 487 Fine Dining Management (Dual-listed with 587) (2) Cr 3 F Prereq 380L Credit or enrollment in 333. Creative experiences with U S regional and international foods appropriate for fine dining. Application of management principles in food preparation and service in fine dining operations. Exploration of the historical and cultural development of the world food table.

HRI 488 Issues in Food Safety (Same as An S 488 FS HN 489 VDPAM 489) (1) Cr 1 Alt S offered 2004 Prereq Credit or enrollment in FS HN 101 or 272 or HRI 233 FS HN 419 or 420 FS HN 403. Casstone seminar for the food safety minor. Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.


HRI 491 Internship Cr 2 Prereq Advisor approval. Offered on a satisfactory fail grading basis only. A Foodservice Operations. B Lodging Operations.

HRI 498 Cooperative Education Cr 2 F Prereq Permission of departmental executive officer. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students. HRI 504 Seminar (0-2) Cr 1 F A (S) B (S) 504B may be taken more than once for credit. A Hospitality Research. B Current Issues.

HRI 533 Hospitality Managerial Accounting (Dual-listed with 433) (3) Cr 3 S Prereq 333, Actct 284 Econ 101 credit or enrollment in Stat 101. Use of common financial statements: accounting ratios and financial techniques to impact management decisions.

HRI 539 Advanced Hospitality Human Resources Management (Dual-listed with 439) (3) Cr 3 F Prereq 439 Emphasis on development of management personnel in hospitality organizations. Case studies.

HRI 540 Hospitality Marketing Strategies (Dual-listed with 440) (3) Cr 3 F Prereq 3 credits in principles of marketing and statistics. Application of marketing theories to the hospitality industry. Emphasis on consumer behavior market opportunities, marketing research and strategies and marketing plans.

HRI 555 Hospitality Strategic Management (Dual-listed with 455) (3) Cr 3 F Prereq Credit or enrollment in 433 and 440. Introduction to the strategic management process as a planning and decision making framework in hospitality organizations. Integration of human resource operations, marketing, and financial management concepts. Use of case studies and group projects to facilitate development of conceptual and analytical skills.

HRI 575 Professional Management Experience in the Hospitality Industry. Cr 2 F SS Prereq 9 credits in hotel restaurant and institution management at 400 level or above and permission of instructor. Analysis and interpretation of professional functions and data in a hospitality organization. Design and implementation of a management project.

HRI 585 Catering (Dual-listed with 485) (2) Cr 2 Alt S offered 2004 Prereq 380L Application of management principles in a catering business. Starting a catering business and developing a business plan.

HRI 587 Fine Dining Management (Dual-listed with 487) (2) Cr 3 F Prereq 380L Credit or enrollment in 333. Creative experiences with U S regional and international foods appropriate for fine dining. Application of management principles in food preparation and service in fine dining operations. Exploration of the historical and cultural development of the world food table.

HRI 590 Special Topics Cr 1 Credit maximum of 3 per topic. Prereq 9 credits in hotel restaurant and institution management at 400 level or above and permission of instructor. B Hospitality Management. D Lodging Operations. E Foodservice Operations.


HRI 608 Administrative Problems Cr 1 May take up to 4 cr. Prereq 9 credits in hotel restaurant and institution management at 400 level or above and permission of instructor. Consideration of advanced administrative problems. Case studies in foodservice, lodging, or other approved establishments.


HRI 639 Management of Professionals in Profit and Non-profit Organizations (3) Cr 3 Alt F offered 2004 Prereq 439 or 539 or 3 years in supervisory position. Theories of leadership and management applied to selected profit or non-profit organizations. Principles and practices related to recruitment, selection and development of professional personnel in hospitality, health care and similar service related work settings.
Human Development and Family Studies

Maureen M MacDonald, Chair of Department
Professors: Brooket Brotherson, Case Draper, Fletcher Hira Lampers, MacDonald Martin Meeks, Russell Winter
Professors (Adjunct): Phillips
Professors (Collaborators): Bruner
Distinguished Professors (Emeritus): Dienes, Meeks
Professors (Emeritus): Coulsen, Deacon, Engel, Joining, Marsch, Peterson, Pickett, Schneidew
Associate Professors: Allen, Bryant, Cook, Crull, Garasky, Hergut, Hering, N Miller, Peterson, Torrie, Wickrama, Yorks
Associate Professors (Adjunct): Melby
Associate Professors (Collaborators): Sallers
Associate Professors (Emeritus): Dall K Miller, Strong, Voelke
Assistant Professors: Garce, Godfrey, Graham, Grader, Luce, Michaelis, Murphy, Olson, Thesman, Werner, Wilson
Assistant Professors (Adjunct): Colbert
Assistant Professors (Emeritus): Glass
Instructors (Adjunct): Enloe, Jolly, Krogh, Oesterreich, Thom Walsh

Undergraduate Study
For undergraduate curricula in human development and family studies leading to the degree of bachelor of science see Family and Consumer Sciences/Curriculum.
The Department of Human Development and Family Studies offers courses that focus on the interactions among individuals, families, and their relationships to environments and institutions throughout the life span. The department offers work toward the Bachelor of Science degree in four curricula: child and adult family services, family resource management, and consumer sciences.

Curriculum
The department offers minors in family resource management and consumer sciences. The curriculum includes courses in family resource management, consumer sciences, housing, and the environment.

At the completion of undergraduate study in Human Development and Family Studies, graduates will demonstrate knowledge and understanding of:家族 systems and their relationships to environments and institutions b) life span development c) professional ethics and public policy issues for working with individuals and families d) special populations e) professional communication f) child and adult family services g) family resource management and consumer sciences. The curriculum includes courses in family resource management, consumer sciences, housing, and the environment.

Graduates of the program are prepared for employment in agencies and organizations serving children, youth, families and the elderly. Program development specialists, coordinators, directors, teachers, and administrators. The flexible program provides a broad emphasis in theory, research, and application in child and adult family services.

In human development and family studies programs, within the major of human development and family studies, students may choose different specializations. Specializations are available for both M.S. and Ph.D. candidates in child development early childhood education, early childhood education, family policy, family studies, life span studies, and marriage and family therapy. The program is approved by the Commission on Accreditation for Marriage and Family Therapy Education.
The Department of Human Development and Family Studies offers coursework and experiences leading to the National Council for Family Relations certification as a family life educator.
The department also participates in the Master of Family and Consumer Sciences degree offering a specialization in social work.
The department cooperates in the interdisciplinary minor in gerontology.

To work in the major is a related undergraduate program with basic courses in one or more of the following areas: architecture, child development, community and regional planning, economics, education, family studies, interior design, psychology, sociology, and social work. Additional coursework or prerequisites may be required depending on the undergraduate program and graduate area of specialization.

Guidelines for graduate programs in the department of human development and family studies are available. However, the student's program of study committee has the major responsibility for determining requirements for an individual program.

Courses open for nonmajor graduate credit: 448 449 455 456 479 483 488 489

Courses Primarily for Undergraduate Students.

HDFS 102 Individual and Family Life Development 3 Cr. 3 FS Developmental individuals and families and their reciprocal relationships as affected by external factors in a framework of life span developmental tasks.

HDFS 218 Study Tour and Service Learning Cr. 2 FS Prerequisite: Restricted to FS majors. The program offers professional development and the scope of problem-solving responsibilities and career exploration in child and adult family services. Study of and visits to programs that serve children and families in need of service.

HDPS 220 Development and Guidance Ages Birth through 2 Years Cr. 3 FS Prerequisite: 3 FS Development and guidance courses are designed for students in human development and family studies.

HDPS 221 Development and Guidance Ages 3 through 8 Cr. 3 FS Prerequisite: 1 FS Development and guidance courses are designed for students in human development and family studies.

HDPS 222 Development and Guidance in Middle Childhood and Early Adolescence Cr. 2 FS Prerequisite: 1 FS Development and guidance courses are designed for students in human development and family studies.
and socioemotional development of adolescents and young adults in the context of family relationships and culture.

HD FS 239 Housing and Consumer Issues (3 Cr) Cr 3 Fs Classroom enhanced www Alt S offered 2004 2004 www.onlinetextbook.org factors affecting housing consumption of individuals and families including current housing consumer issues related to housing choices, housing context of neighborhoods and communities, housing structure types and credit. Housing finance issues such as homelessness, housing discrimination, indoor air quality access. Design.

HD FS 240 Literature for Children (3 Cr) Cr 3 Fs PreReq 102 or Psych 250 Evaluation of literature for children. Roles of literature in the total development of children. Literature selection and use.

HD FS 269 Research in Human Development and Family Studies (3 Cr) Cr 3 SS FS PreReq 102 or Psych 250 Understanding and evaluating research. Use of primary and secondary data to identify and study problems related to human development and family issues including finance and housing. Introduction to statistical concepts and computer analysis. Research participation.

HD FS 270 Family Diversity Across Cultures (3 Cr) Cr 3 S PreReq 102 Psych 101 or Soc 134 Current psychosocial theories and methods research findings and applications to the understanding of families and cultures among diverse populations. Includes field work on various cultures.

HD FS 276 Human Sexuality (3 Cr) Cr 3 Fs Behavioral, biological, and psychological aspects of human sexuality within the social context of family culture and society. Role of sexuality in human development. Critical analysis of media and research. Communication and decision making skills relating to sexuality issues and relationships.

HD FS 283 Family Financial Management (3 Cr) Cr 3 SS FS Basic principles of money management. Budgeting, recordkeeping, checking and savings accounts. Consumer credit, insurance, investment taxes.

HD FS 317 Field Experiences Cr 3Fs SS Consult department office for procedure. Supervised field experience in human development and family studies programs. May be repeated on a satisfactory grade basis only.

A Early Childhood Education Programs PreReq 343 permission of instructor.
B Family Services Programs PreReq 9 credits in HD FS permission of instructor.
C Early Childhood Special Education Programs PreReq 222 permission of instructor.
D School Age Child Care Programs PreReq 226 permission of instructor.
E Infant/Toddler Programs PreReq 340 permission of instructor.
F Research PreReq 269 permission of instructor.
G Family Resource Management Programs PreReq 283 permission of instructor.
K Housing Programs PreReq Permission of instructor.

HD FS 340 Assessment and Curricula Ages Birth through 2 Years (3 Cr) Cr 3 FS Alt S offered 2004. PreReq 220 Assessment strategies for infants and toddlers: including those with special needs. Curricula learning environments. Teaching strategies for health and nutritional practices and schedules that are developmentally individually and culturally appropriate. Using assessment to plan, implement, and evaluate activities to promote physical motor, cognitive, and social emotional development.

HD FS 341 Housing Finance and Policy (3 Cr) Cr 3 F PreReq 6 credits in social sciences. Personal and family financial considerations in home ownership. Rental and home improvement. The social, economic, and governmental contexts of financial decision-making at the household level. Financial considerations for residential property management.

HD FS 343 Assessment and Programming Ages 3 through 6 Years (3 Cr) Cr 4 FS Alt S offered 2005. PreReq 221, 240, 269 or Psych 333 Assessment strategies for preschool and kindergarten children, including those with special needs. Learning environments and activities to include nutritional practices and teaching strategies that are developmentally individually and culturally appropriate. Using assessment to plan, implement, and evaluate activities to promote physical motor, cognitive, and social emotional development.

HD FS 345 Adapting Programming in Inclusive Settings (3 Cr) Cr 3 FS PreReq Credit or concurrent enrollment in 343 Sp Ed 260. Adapting needs and equipment to meet social, cognitive, nutritional, physical, motor, cognitive, communication, and social emotional development.

HD FS 347 Parenting and Family Diversity Issues (3 Cr) Cr 3 FS PreReq Sophomore classification. Diversity issues as they affect parenting practices and family relationships across cultures. Topics include gender differences, disabilities, and diversity family composition. Understanding of family diversity and the relationship of the family system to societal systems.

HD FS 367 Housing and Practices for Families with Special Needs (3 Cr) Cr 3 FS PreReq 6 credits in social sciences. Housing and services that assist families with special needs including the disabled, homeless, low-income, and single parents. Residential property management considerations for families with special needs. Experiential and innovative approaches to housing and services.


HD FS 370 Communication in Human and Family Development (3 Cr) Cr 3 FS Alt S offered 2005. PreReq 3 credits in social sciences. Application of communication processes in family, marital, and family development. Communication maintenance, enrichment, and change in family personnel and professional relationships through the life span.

HD FS 373 Death as a Part of Living (3 Cr) Cr 3 FS Alt S offered 2004. PreReq 102 Consideration of death in the life span of the individual and the family with special emphasis on exploration of personal and societal attitudes.

HD FS 377 Aging and the Family (Same as Geron 377I) (3 Cr) Cr 3 FS Alt S offered 2005. PreReq 102 Interchanges of the aged and their families. Emphasis on role changes, social interaction, and independence as influenced by health, finances, life styles, and community development.


HD FS 385 Children, Families, and Public Policy (3 Cr) Cr 3 FS PreReq 6 credits in social sciences. Public policy and politics as they affect children and families. Examination of how individuals and groups influence policy. Investigation of current issues and programs influencing the well-being and welfare of children and families.


HD FS 385 Supervised Student Teaching (3 Cr) Cr 5 may be repeated. Supervision of students required.

A Kindergarten Programs FS PreReq GPA 2.5 full admission to teacher education program 455. Teaching experience with children in kindergarten settings.

B Preschool Programs FS PreReq GPA 2.5 full admission to teacher education program 455. Teaching experience with young children from birth to 5 in group settings.

C Early Childhood Special Education Programs FS PreReq GPA 2.5 full admission to teacher education program 455. Teaching experience with preschool children with disabilities.


HD FS 445 Administration of Programs for Children (3 Cr) Cr 3 SS PreReq 340 or 343. Management principles and techniques including an introduction to financial management involved in programs for children with diverse needs and their families. Staff development, supervision, and evaluation in programs for children and families.

Government regulations concerning child and family programs, community relations, and advocacy for children and families.


HD FS 449 Linking Families and Communities (3 Cr) Cr 3 FS PreReq 269 or Psych 333. Assessing family needs and community resources across the lifespan. Characteristics of successful community-based family intervention and support programs. Strategies and skills needed by community-based professionals including educators, linking families to community resources.

HD FS 455 Curricula for Ages 3 through 6 Years (3 Cr) Cr 3 FS PreReq 340, 345. Program models and methods leading to development and organization of appropriate curricula in preschool and kindergarten programs for young children with diverse learning needs. Government regulations and professional standards for child programming. Team work with parents, colleagues, and paraprofessionals to plan, implement, and evaluate developmentally and culturally appropriate individualized education plans in inclusive settings. Integrated practicum setting. Nonmajor graduate credit.

HD FS 456 Family Focused Interventions for Young Children (3 Cr) Cr 3 FS PreReq 340, 345. Application of family systems theory in family focused service delivery models. Teaming with parents and interdisciplinary colleagues to plan, implement, and evaluate individualized family service plans. Focus on home base in natural environments. Family support and linking families to community resources.
physical sexual emotional and financial abuse implications for prevention intervention and policy


HD FS 570 Families Across the Life Span (3.0) Cr 3 F Preq Ac 9 credits in social sciences Theory and research in development and change in family systems and in their reciprocal relationships with the individual and the environment across the family life span

HD FS 571 Marital Therapy and Assessment (3.0) Cr 3 S Preq Ac 9 credits in social sciences Theories and techniques of couple therapy across the life cycle

HD FS 572 Family, Stress and Community Resources (3.0) Cr 3 Alt F offered 2004 Preq Ac 9 credits in social sciences Examination of strengths and challenges of marginalized families. Identification of barriers to services and support and exploration of approaches to assist families in overcoming these barriers

HD FS 573 Ethics and Professional Studies in Marriage and Family Therapy (3.0) Cr 3 Alt S offered 2006 Preq 571 Professional ethics and legal responsibilities relevant to family therapy. Professional socialization and the role of professional organizations and state licensure/certification

HD FS 574 History of Family Therapy (3.0) Cr 3 F Preq Ac 9 credits in social sciences A review of the development of family therapy theory from 1845 to 1985. Emphasis on the emergence of cybernetic theory second order cybernetics and theoretical underpinnings of practice models

HD FS 575 Cross cultural Perspectives on Families and Children (3.0) Cr 3 Alt S offered 2004 Preq 565 6 credits in social sciences Review of methods and findings on cultural influences on the development of children and youth and on family life. Comparison of child rearing practices, family roles, values and traditions in different cultures

HD FS 576 Marriage Across the Life Course (3.0) Cr 3 Alt S offered 2006 Preq 511 A development mental approach to the investigation of the formation maintenance and dissolution of intimate relationships across the life course. Understanding how intimate relationships develop and change over time beginning with the development of early adolescent relationships and continuing through later life

HD FS 577 Aging and Intergenerational Relations (Same as Gerons 577) (3.0) Cr 3 Alt S offered 2004 Preq Ac 9 credits in social sciences Theories and research related to personal and family adjustments in later life affecting older persons and their intergenerational relationships. Related issues including demographics are also examined through the use of current literature

HD FS 578 Models of Marriage and Family Therapy (3.0) Cr 3 F Preq Ac 9 credit in social sciences Major models of marriage couple and family therapy. Includes clinical assessment intervention and evaluation

HD FS 579 Family Interaction Dynamics (3.0) Cr 3 S Preq Ac 9 credits in social sciences. Current research and theory in family interaction with emphasis on family dynamics and family change across the life course

HD FS 580 The Family and the Law (3.0) Cr 3 Alt SS offered 2004 Preq Ac 6 credits in social science The effects of selected legislation and cases on individuals and families. The legal processes involved in the activities of individuals and families implications for effective functioning within the limits of the legal environment. Legal and quasi legal services available in the community

HD FS 581 International Study in Human Development and Family Studies (Dual listed with 581) Cr 3 Alt May be repeated. FS SS Preq Ac Permission by application. Limited enrollment. Supervised and international study experiences in Human Development and Family Studies. Countries vary A Practicum B Exchange C Group Study

HD FS 583 Investing for the Family’s Future. (Same as FFP 583) (1.0) Cr 3 F www only Preq 485 Evaluation of investment markets for the household. Analysis of how families choose where to put their savings. Emphasis is on the family’s overall financial and economic goals to help inform decisions about which investments to choose

HD FS 585 Family Policy Analyses. (3.0) Cr 3 Alt offered 2003 Preq Ac 9 credits in graduate level social sciences Theoretical and practical issues related to family policy program evaluation. Assessment of programs success in meeting goals. Examination of concepts related to family policy development in the United States. Examination of how individuals and groups can influence family policy and evaluation

HD FS 586 Sex Therapy. (3.0) Cr 3 Alt SS offered 2005 Preq 578 or 571 The course reviews gender orientation and sexual functioning as well as assessment and treatment of sexual problems. Focus on the psychological aspects of sexual functioning and the impact on well being in relationships. Emphasis on the role of power and the interaction of gender role expectations and sexual functioning. Discussion of the treatment implications of social oppression and discrimination on families

HD FS 588 Family Economics and Public Policy. (3.0) Cr 3 Alt F offered 2004 Preq Ac 6 credits in sociology or economics. Analysis of family income wealth and economic well being. Emphasis on effects of family behavior and public policies on the adequacy and security of income across the family life cycle. Implications of resource allocation within the family for adult and child well being

HD FS 589 Family Financial Counseling (Dual listed with 489) (3.0) Cr 3 F Preq Ac Graduate classification. Personal, social, psychological and cultural factors affecting family financial decisions. A life cycle approach to financial decision making. Development of financial counseling and planning skills to assist families and individuals to achieve financial stability and security

HD FS 591 Practicum. Cr 3 Alt May be repeated. FS SS Preq 10 graduate credits Supervised experience in an area of human development and family studies A Family Studies B Housing C Family Resource Management D Human Development E Child Development F Early Childhood Education G Early Childhood Special Education H Human Development and Family Studies
HD FS 673 Evidence Based Therapies (3-0) Cr 3 Alt F offered 2004 Prereq 571 574 Examination of evidence based therapies (EBTs) in the treatment of mental health problems and the use of EBTs is based on systematic/contextual theories in the treatment of professional populations.

HD FS 675 Preventive Intervention Research (3-0) Cr 3 Alt F offered 2005 Prereq 571 574 Theory, methodology, and ethical issues in preventive research. Emphasis on program design, evaluation, dissemination and funding for preventive interventions to eliminate or minimize mental health disorders in children and adolescents.

HD FS 679 Postmodern Family Therapy Theories (3-0) Cr 3 Alt F offered 2004 Prereq 571 574 Examination of postmodern theories such as social constructionism and postmodern feminism as a foundation for understanding postmodern marriage and family therapy.

HD FS 690 Advanced Topics Cr arr Prereq Permission of instructor and enrollment in Ph D program A Family Studies B Housing C Family Resource Management D Human Development E Child Development F Early Childhood Education G Early Childhood Special Education H Human Development and Family Studies M Marriage and Family Therapy N Family Policy

HD FS 691 Internship Cr arr May be repeated FS SS Prereq Permission of instructor Offered on a satisfactory-fail grading basis only. Supervised practice and experience in the following specified areas A College Teaching B Research C Marriage and Family Therapy.

HD FS 692 Family Therapy Supervision (3-0) Cr 3 Alt F offered 2004 Prereq 691C Preparation of marriage and family therapy supervisors. Emphasis on research practice and ethical issues in marriage and family therapy supervision.

HD FS 699 Research Cr arr Offered on a satisfactory-fail grading basis only. A Family Studies B Housing C Family Resource Management D Human Development E Child Development F Early Childhood Education G Early Childhood Special Education H Human Development and Family Studies M Marriage and Family Therapy N Family Policy

Immunochemistry (Interdepartmental Graduate Major)

Supervisory Committee R Rosenbusch Chair C Andreassen D Jones R Sacco E Thacker

The Graduate Faculty Mark Ackerman, Claire Andreassen, Amy Andreato, Jan Buss, Susan Carpenter, Nancy Connor, John Cunnick, Ronald Griffith, James Harper, Hank Harris, Jessie Hostetter, Julie Jarvinen, Doug Jones, Maran Kohut, Susan Lamont, F Chris Minion, Halcy Moon, Mark Nilsen, Hamilton Andy Norris, Brian Normolle, Evelyn Nystrom, Ken Platt, Don Reynolds, Donald Rosenbusch, Richard Ross, James Roth, Max Rothchild, Randy Sacco, Mary Schmitter, Judy Stabel, Louise Tahataba, Eileen Thacker, Charles Thoem, Mike Wannemueher, En-Min Zhou

Graduate Study

Work is offered for the master of science and doctor of philosophy degrees with a major in Immunobiology. Faculty are drawn from seven departments: Animal Science, Biochemistry, Biophysics, and Molecular Biology, Health and Human Performance, Microbiology, Veterinary Diagnostic and Production Animal Medicine, Veterinary Microbiology and Preventive Medicine, and Veterinary Pathology. The diversity of faculty expertise provides students with the opportunity for research in a broad range of immunologic areas, including microbial immunity and nutritional immunity. Students may enter the Immunobiology major by one of two ways: they may apply to and be directly accepted into the major or they may be admitted to a participating department followed by formal admission to the major. Students directly admitted into the Interdepartmental Immunobiology Major will take Imbo 697 (graduate research rotation) in their first two semesters and by the end of the second semester enter a department by choosing a major professor from the participating faculty. Students first admitted to a department will choose a major professor from the participating faculty in that department.

Students should have a strong background in the biological sciences including work in immunology genetics and biochemistry. Prior research experience is highly encouraged. Submission of scores of the GRE General Test is required.

Immunobiology students should include in their program of study a core of courses which will provide a broad coverage of the basic program in immunobiology. Formal courses should include immunology and biochemistry. Additional coursework may be selected to satisfy individual interests or departmental requirements. The foreign language and teaching requirements are determined by the student's department. All students will take a minimum of one seminar course per year.

Graduates have a broad understanding of the interdisciplinary field of immunobiology and can effectively integrate the principles of immunobiology with related disciplines. They are able to effectively communicate with scientific colleagues and the general public in both formal and informal settings.

Graduates are able to integrate theory and research to address complex problems facing scientific professionals' studying animal and human health taking into account related ethical social and legal and environmental issues. They are skilled at carrying out research communicating research results and writing persuasive grant proposals.

Courses for Graduate Students

Imbo 602 Current Topics Workshop in Immunobiology (1-0) Cr 1 each time taken. Lectures provided by off campus experts. Students are required to participate in discussion sessions with lecturers.

Imbo 604 Seminar in Immunobiology (1-0) Cr 1 each time taken. Student and faculty presentation.

Imbo 690 Special Topics Cr var each time taken. Advanced study of specific topics in specialized fields of immunobiology.

Imbo 697 Graduate Research Rotation Cr Var each time taken. Graduate research projects performed under the supervision of faculty members in the Interdepartmental Immunobiology major.

Imbo 699 Research

Industrial Engineering

Administered by the Department of Industrial and Manufacturing Systems Engineering

Patrick E Patterson Chair of Department

Professors Berta Heising Morris, Sanner Verdamen

Professors (Collaborators) Dittmar, Ebel, Distinsheng Charleston (Emeritus) Cowles

University Professors (Emeritus) David

Undergraduate Study

For the undergraduate curriculum in industrial engineering leading to the degree of bachelor of science in the College of Engineering Curricula. This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Industrial engineers are employed to design analyze and improve systems and processes found in manufacturing, consulting and service industries. Professional responsibilities are typically found in design management, analysis, optimization and modeling of industrial systems. An industrial engineer is focused on human factors, operations research, enterprise computing, engineering management, manufacturing, engineering and quality. Industrial engineers are typically found in organizations responsible for operations management, process design, automation, logistics, supply chain management, scheduling and equipment quality control and technical sales.

The goal of the industrial engineering undergraduate curriculum is to produce technically qualified industrial engineers who are capable of successful professional practice in the field. Graduates of the program are able to work effectively with other members of the work force to accomplish engineering and technical tasks. The program provides graduates with the necessary educational foundation to pursue advanced studies in industrial engineering or related fields.

Graduates of the program must demonstrate the ability to design, develop, implement, and manage systems and people. Structures and equipment and energy. The program includes in depth instruction to implement the system of systems using appropriate analytical computational and engineering practices.

In addition to the College of Engineering curriculum goals, the industrial engineering curriculum provides the following goals for each student:

1. Students should be able to design analyze and manage effective production distribution and service systems.

2. Students should be able to bridge the engineering and business functions of an organization.

3. Students should be able to integrate functions involving people, material, equipment, information, and control.

4. Students should have a global perspective of enterprise.

5. Students should be able to provide leadership in multiple functional areas.

The industrial engineering undergraduate curriculum provides students with fundamental knowledge in mathematics and science. Engineering science, social science and humanities as well as professional engineering courses for work. The graduate education program provides students with real world experience in the profession and a good perspective on career choices. Students are encouraged to participate in international experiences through scholarships and travel programs and industrial internships.

Graduate Study

The department offers work leading to the degrees of master of science and doctor of philosophy with a

Professors (Emeritus) Berger Even Griffen, Hampstead Clemschmidt, Mohr Montog Moore, C Smith G Smith, Squires Tammatnuaugn, Jackman Meeks Min Patterson Peters Ryan.

Associate Professors Adams Cruz-Neira, Gemmill, Jackman, Barlow, Mink, Patterson, Peters, Ryan.

Associate Professors (Emeritus) Love, Assistant Professors Naryanavanshi, Olafsson, Van Vehraas.
HD FS 673 Evidence Based Therapies (3-0) Cr 3 Alt F offered 2004 Prereq 571 574 Examination of evidence based therapies (EBTs) in the treatment of mental health problems. Emphasis is based on systematic/empirical evidence for the treatment of individuals and families.

HD FS 675 Preventive Intervention Research (3-0) Cr 3 Alt F offered 2005 Prereq 571 574 Theory and methodology and ethical issues in prevention research. Emphasis on program design, evaluation dissemination and funding for preventive interventions to eliminate or diminish mental health disorders in children and adolescents.

HD FS 679 Postmodern Family Therapy/Theories (3-0) Cr 3 Alt F offered 2004 Prereq 571 574 Examination of postmodern theories such as social constructionism and postmodern feminism as a foundation for understanding postmodern marriage and family therapy.

HD FS 690 Advanced Topics Cr 3 Prereq Permission of instructor and enrollment in Ph D program
A Family Studies
B Housing
C Family Resource Management
D Human Development
E Child Development
F Early Childhood Education
G Early Childhood Special Education
H Human Development and Family Studies
M Marriage and Family Therapy
N Family Policy

HD FS 691 Internship Cr 3 May be repeated FS SS Prereq Permission of instructor. Offered on a satisfactory-fail grading basis only. Supervised practice and experience in the following specified areas:
A College Teaching
B Research
C Marriage and Family Therapy

HD FS 692 Family Therapy Supervision (3-0) Cr 3 Alt F offered 2004 Prereq 691C Preparation of marriage and family therapy supervisors. Emphasis on research practice and ethical issues in marriage and family therapy supervision.

HD FS 699 Research Cr 3 Offered on a satisfactory-fail grading basis only
A Family Studies
B Housing
C Family Resource Management
D Human Development
E Child Development
F Early Childhood Education
G Early Childhood Special Education
H Human Development and Family Studies
M Marriage and Family Therapy
N Family Policy

Immunobiology
(Interdepartmental Graduate Major)
Supervisory Committee: R. Rosenbusch, Chair C. Andreasen, D. Jones, R. Sacco, E. Thacker.
The Graduate Faculty: Mark Ackerman, Claire Andreasen, Amy Arendt, Jan Buss, Susan Carpenter, Nancy Conn, Jean Cunnum, Ronald Griffth, James Harp, Hank Harris, Jessee Hestetler, Julie Jarvinen, Doug Jones, Manan Kohut, Susan Lamont, F. Chris Minion, Harley Moon, Mari Nilsen, Hamilton, Andy Norris, Brian Nunez, Evelyn Nystrom, Karen plush, Don Reynolds, Marcy Rosenbusch, Richard Ross, James Roth, Max Rothchild, Randy Sacco, Mary Schmer, Judy Stabel, Louisa Tabataba, Eileen Thacker, Charles Thoen, Mike Wannemuehler, En-Min Zhou.

Graduate Study
Work is offered for the master of science and doctor of philosophy degrees with a major in Immunobiology. Faculty are drawn from seven departments: Animal Science, Biochemistry, Biophysics, Molecular Biology, Health and Human Performance, Microbiology, Veterinary Diagnostic and Production Animal Medicine, Veterinary Microbiology, and Preventive Medicine. The diversity of faculty expertise offers students significant flexibility in choosing areas of specialization. Emphasis includes areas such as molecular biology, immunology, virology, and related fields.

Students may enter the immunobiology major in one of two ways: they may apply to and be accepted into the major, or they may be admitted to the program after formal admission to the major. Students who are newly admitted to the program must take course work in their first two semesters and by the end of the second semester enter a department by choosing a major professor from the corresponding faculty. Students who are newly admitted to the department will choose a major professor from the participating faculty in that department.

Students should have a strong background in the biological sciences, including work in immunology, genetics, and biochemistry. Prior research experience is highly encouraged. Submission of scores of the GRE General Test is required.

Immunobiology students should include in their program of study a core of courses which will provide a broad coverage of the basic program in immunobiology. Formal courses should include immunology, biochemistry, physiology, and introductory courses. The research and teaching requirements are determined by the student's department. All students will take a minimum of one seminar course per year.

Graduates in immunobiology are expected to have a broad understanding of the interdisciplinary field of immunobiology and to effectively integrate the principles of immunology in related disciplines. They are expected to communicate with scientific colleagues and the general public in both formal and informal settings.

Graduates are expected to study the research literature, and to participate in seminars and to present paper reports to their peers. The research experience will be evaluated by the department and the university.

Courses for Graduate Study
Imb 602 Current Topics Workshop in Immunobiology 1 Cr 1 each time taken. Lectures provided by off-campus experts. Students are required to participate in discussion sessions with lecturers.
Imb 604 Seminar in Immunobiology 1 Cr 1 each time taken. Students and faculty presentation.
Imb 690 Special Topics 1 Cr each time taken. Advanced study of specific topics in specialized field of immunobiology.
Imb 697 Graduate Research Rotation 1 Cr each time taken. Graduate research projects performed under the supervision of selected faculty members in the Interdepartmental Immunobiology major.
Imb 699 Research

Industrial Engineering
(Administered by the Department of Industrial and Manufacturing Systems Engineering)
Patrick E. Patterson, Chair of Department
Professors Barta Heising Morris, Sanner Verdamen
Collaborators: Ditmar Eggel, Distinguished Professors (Emeritus) Cowles, University Professors (Emeritus) David

Professors (Emeritus) Berger, Even Griften, Hampstead, Kleinshmidt, Mohr, Montag Moore, C. Smith, Smith, Squiers, Tamashina, Vauhn
Associate Professors: Adams, Cruz-Neira, Gemmill, Jackman, Keens Min, Patterson Petersen, Ryan
Associate Professors (Emeritus) Love, Assistant Professors: Naranbawas, Olafsson, Van Vroeth

Undergraduate Study
For the undergraduate curriculum in industrial engineering leading to the degree of bachelor of science see College of Engineering. This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Industrial engineers are employed to design and improve processes and systems found in manufacturing, consulting, and service industries. Professional responsibilities are typically in design, management, analysis, optimization, and modeling of industrial systems. An industrial engineer is focused on human factors, operations research, enterprise systems, computer engineering, manufacturing, engineering, and quality. Industrial engineers are typically found in organizations responsible for operations management, process engineering, automation, logistics, supply chain management, scheduling, plant engineering, quality control, and technical sales.

The goal of the industrial engineering undergraduate curriculum is to produce technically qualified industrial engineers who are capable of successful professional practice in the field. Graduates of the program will be effective with other members of the work force to accomplish engineering advances in their assigned areas. The program also provides graduates with the necessary educational foundation to pursue advanced studies in industrial engineering or related fields.

Graduates of the program must demonstrate the ability to: design, develop, implement, and improve systems that include people, materials, information, equipment, and energy. The program includes in-depth instruction to complete the integration of systems using appropriate analysis, computational, and engineering practices.

In addition to the College of Engineering's general education goals, the industrial engineering curriculum has the following goals for each student:
1. Students should be able to design, analyze, and manage effective production, distribution, and service systems.
2. Students should be able to manage functions of an organization.
3. Students should be able to integrate functions involving people, materials, equipment, information, and control.
4. Students should have a global perspective of enterprises.
5. Students should be able to provide leadership in multi-functional teams.

The industrial engineering undergraduate curriculum provides students with fundamental knowledge in mathematics and science, engineering science, social science, and humanities as well as professional industrial engineering course work. Manage ment electives provide students with an opportunity to become familiar with modern business practices that they will encounter in their career. A senior design capstone course provides students with an opportunity to solve open ended industrial problems with an industrial partner. This capstone education program provides students with real world experience in the profession and a good perspective on career choices. Students are encouraged to participate in international experiences through programs and internship opportunities.

Graduate Study
The department offers work leading to the degrees of master of science and doctor of philosophy with a
just in time (JIT) warehousing and supply chains Nonmajor graduate credit

I 348 Solidification Processes (2/2) Cr 3 S Prereq IE 248 Theory applications and quality issues related to metal casting, welding, polymer processing, powder metallurgy, electronic assembly and semi-conductor manufacturing Nonmajor graduate credit

I 361 Statistical Quality Assurance (Same as Stat 361) (3-3) Cr 3 F Prereq Stat 231 or 401 Statistical methods for process improvement. Simple quality assurance principles and tools: modern quality culture including TQM 6 Sigma ISO 9000 and Baldinger Measurement system precision and accuracy assessment. Control charts Process capability assessment. Experimental design and analysis for process improvement. Significant experimental project in process improvement Nonmajor graduate credit

I 375 Introductory Production Systems (3/3) Cr 3 S Prereq Junior classification Math 160 or 166 Principles and concepts in the design and control of production systems including demand forecasting fixed and variable capacity planning, master production scheduling, inventory control, types of production and work flow systems, quality control and project management. Not available for degrees in industrial engineering Nonmajor graduate credit

I 396 Summer Internship Cr R SS Prereq Permission of department Summer professional work period

I 397 Engineering Internship Cr R FS Prereq Permission Professional work period for a maximum of one semester per academic year

I 398 Cooperative Education Cr R FS SS Prereq Permission of department Second professional work period in the cooperative education program. Students must register for this course before commencing work

I 408 Interdisciplinary Problem Solving (Same as EE 408) (3/3) Cr 3 S Prereq Junior or senior classification Use the Theory of Constraints as a way of approaching problem solving. Win win negotiation project planning and effective delegation in the context of engineering/business systems. Team projects aimed toward specific design outcomes and Nonmajor graduate credit

I 409 Interdisciplinary Systems Effectiveness (Same as EE 409) (3/3) Cr 3 SS Prereq Junior or senior classification Focus on functions that determine the effectiveness of an entire organization. Genetic Theory of Constraints solutions to production distribution and project management are compared to traditional solutions. Strategy for improvements discovered using simulations and Nonmajor graduate credit

I 413 Stochastic Modeling Analysis and Simulation (4/4) Cr 4 F Prereq Math 266 Stat 231 Development and analysis of simulation models using a simulation language Application to various areas of manufacturing and service systems such as assembly material handling and customer queues. Utilizing model output to make important business decisions. Fitting of data to statistical distributions Introduction to Markov processes and other queueing models Nonmajor graduate credit

I 419 Manufacturing Systems Modeling (3/0) Cr 3 F Prereq Stat 231 Modeling and analyzing production systems inventory systems and production systems for performance analysis. Introduction to analysis and simulation of manufacturing systems. Simulation languages such as ARENA, ArenaSim and ProtModel Not available for degrees in industrial engineering Nonmajor graduate credit

I 439 Industrial Automation (2/2) Cr 3 S Prereq EE 441 Principles and practices of automating production and distribution systems Sensors actuators controllers and control algorithms Computer control and interfaces Integration of automated systems with enterprise wide computing systems networking and communication between devices. Nonmajor graduate credit

I 441 Industrial Engineering Design (1/2) Cr 3 FS Preq 271 305 312 348 417 A large open ended design project related to an enterprise Application of engineering design principles involving problem definition analyses synthesis and evaluation. Nonmajor graduate credit


I 466 Multidisciplinary Engineering Design (Same as E 466) See Electrical Engineering

I 471 Safety and Reliability in the Design of Work Systems (3/0) Cr 3 Alt F Preq 271 The quantitative study of work systems through the methods of engineering analysis and design. Human reliability analysis. The use of simulation to predict model and reduce or eliminate workplace hazards Nonmajor graduate credit

I 481 e-Commerce Systems Engineering (Dual listed with 5811) (3/0) Cr 3 Alt F offered 2003 Preq 148 Design analysis and implementation of e-commerce systems. Information infrastructure enterprise models. Enterprise processes and e-commerce systems. SQL, exchange protocols client/server model web-based views. Data structures and algorithms used in e-commerce systems. SQL, exchange protocols client/server model web-based views.

I 483 Knowledge Discovery and Data Mining (Dual listed with 5831) (3/0) Cr 3 F Preq 148 312 and Stat 231 Introduction to data warehouses and knowledge discovery techniques for data mining including probabilistic analysis, methods, genetic algorithms and neural networks. Visualization techniques and mathematical programming. Relationship to enterprise computing. Advanced topics include web-mining and mining of multimedia data. Case studies from both manufacturing and service industries. A computing project is required Nonmajor graduate credit

I 490 Independent Study Cr 1 to 5 each time elected Preq Senior classification permission of instructor. Independent study and work in the areas of industrial engineering design practice or research. A. Manufacturing B. Human Factors C. Operations Research D. Enterprise Computing and Information Management E. Engineering Management H. Honors

I 498 Cooperative Education Cr R FS SS Preq 238 permission of department. Third and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.

courses primarily for undergraduate students

an undergraduate student must have an academic standing in the upper one half of his/her class to enroll in any 500 level industrial engineering course
IE 508 Design and Analysis of Allocation Mechanisms (3) Cr 3 S Prreq: 312 or Math 307
Market based allocation mechanisms from quantitative economic perspective. Pricing and cost models designed and analyzed with respect to decentralized decision processes. Information requirements and coordination. Case studies and examples from industries such as regulated utilities, semiconductor manufacturers and financial engineering services.

IE 510 Network Analysis (3) Cr 3 Alt F offered 2004 Prreq 312 Formulation and solution of deterministic network flow problems including shortest path, minimum cost flow and maximum flow. Network optimization and computational aspects of combinatorial problems including assignment, matching, and spanning trees. Introduction to deterministic and stochastic dynamic programming.

IE 513 Analysis of Stochastic Systems (3-0) Cr 3 Alt S offered 2003 Prreq Stat 231 Introduction to modeling and analysis of manufacturing and service systems subject to uncertainty. Topics include the Poisson process, renewal processes, Markov chains, and Brownian motion. Applications to inventory systems, production system design, production scheduling, reliability and capacity planning.

IE 514 Production Scheduling (3-0) Cr 3 S Prreq 312 S 341 Introduction to the theory of machine shop production systems. Concepts and models for various production systems such as job shop and open shop. Applications of linear programming, integer programming, network analysis, enumerative methods for machine sequencing. Introduction to stochastic scheduling.

IE 519 Simulation Modeling and Analysis (3-0) Cr 3 S Prreq 312 S 341 Introduction to the theory of machine shop production systems. Concepts and models for various production systems such as job shop and open shop. Applications of linear programming, integer programming, network analysis, enumerative methods for machine sequencing, simulation and continuous modeling techniques. Probability and statistics related to simulation parameters including run length, inference design of experiments, variance reduction and stopping rules. Aspects of simulation languages.

IE 531 Quality Control and Engineering Statistics (Same as Stat 531) See Statistics

IE 533 Reliability (Same as Stat 533) See Statistics

IE 534 Linear Programming (3-0) Cr 3 S Prreq 312 Develop linear models. Theory and computational aspects of the simplex method. Duality theory and sensitivity analysis. Introduction to interior point methods and column generation. Multiobjective linear programs.

IE 537 Reliability and Safety Engineering (3-0) Cr 3 F Prreq Graduate classification in engineering, Mathematics background, and reliability data theory and analysis. Bayesian reliability analysis. Engineering ethics in safety evaluations. Case studies of accidents in large technological systems. Fault and event tree analysis.

IE 541 Inventory Control and Production Planning (3-0) Cr 3 S Prreq 312 S 341 Economic Order Quantity, dynamic lot size, newsvendor, box stock and (Q, r) models. Material Requirements Planning. Just in Time (JIT) variability in production systems. Push and pull production systems. Aggregate and workforce planning and capacity management.


IE 561 Continuous Quality Improvement of Process (3-0) Cr 3 S Prreq 361 Methods for continuous quality improvement in process analysis. The systems analysis for process improvement model based on W. Edwards Deming’s quality function deployment methods. Case studies of applications to manufacturing and other heavy industries. Use of process analysis computerized programs and tools for design analysis.

IE 565 Systems Engineering and Analysis (Same as AE 565, EE 606) (3-0) Cr 3 F Prreq Graduate classification in engineering, Mathematics background, and reliability data theory and analysis. Bayesian reliability analysis. Engineering ethics in safety evaluations. Case studies of accidents in large technological systems. Fault and event tree analysis.

IE 566 Applied Systems Engineering (3-0) Cr 3 S Prreq E 565 or E 650 Design for reliability, maintainability, usability, producibility, disposability and lifecycle costs in the context of the systems engineering process. Students will be required to apply the principles of systems engineering to a project including proposal plan, systems engineering management plan, test and evaluation plan. Not available for degrees in industrial engineering.

IE 570 Systems Engineering and Project Management (3-0) Cr 3 Alt SS offered 2005 Prreq Graduate classification or permission of instructor. Systems view of projects and the processes by which they are implemented. Techniques in planning, organizing, coordinating, and controlling system design projects. Specific systems concepts, methodologies, and tools for effective management of both simple and complex projects. Introduction to important performance metrics for planning, cost control, scheduling and productivity including discussions of traditional and state of the art tools techniques and systems.

IE 572 Design and Evaluation of Human Computer Interaction (3-0) Cr 3 Alt F offered 2004 Prreq Graduate classification or permission of instructor. Human factors methods applied to interface design prototyping, usability analysis, and design evaluation. Concepts related to understanding user characteristics, usability analysis and usability. Requirements and techniques for design and evaluation of the interface. The design of user interfaces. The design of information presentation characteristics of a wide variety of interfaces. Development of embedded software. Internet and web site design principles. Human interface and computer science.


IE 583 Knowledge Discovery and Data Mining (Dual-listed with 483) (3-0) Cr 3 F Prreq 148, 213 and 231 Introduction to data warehouses and knowledge discovery. Techniques for data mining including probabilistic and statistical methods. Advanced topics include web mining and mining of multimedia data. Case studies from both manufacturing and service industries. A computing project and an additional project with more theoretical content are required.

IE 588 Information Systems for Manufacturing (3-0) Cr 3 F Prreq 148 448 Design and implementation of systems for the collection, analysis, and use of information needed for manufacturing and service operations. Concepts and models for the design, implementation and use of information technology and information systems for manufacturing and service operations. Applications of information technology and information systems to the design, implementation and use of information technology and information systems for manufacturing and service operations.

IE 590 Special Topics (Cr 1 to 5) Each time a different topic is offered. Independent study and work to explore recent advances in computer science. Industrial experience in a given area of interest. Topics include new hardware, software and methodologies.

IE 613 Stochastic Production Systems (3-0) Cr 3 Alt S offered 2004 Prreq 513 Modeling techniques to evaluate performance and address issues in design, control and operation of systems. Markov models of single-stage make-to-order and make-to-stock systems. Approximations for non-Markovian systems. Impact of variability on flow lines and closed queueing networks.

IE 631 Nonlinear Programming (3-0) Cr 3 Alt S offered 2004 Prreq 534 Develop nonlinear models, the concepts and methods of nonlinear programming. Lagrangian duality, unconstrained minimization techniques. Constrained minimization techniques covering penalty and barrier functions. Sequential quadratic programming. Reduced gradient method.

IE 652 Integer Programming (3-0) Cr 3 Alt S offered 2005 Prreq 534 Integer programming techniques, including cutting plane, fractional rounding, branch and bound and Lagrangian relaxation. Introduction to complexity issues and search based heuristics.


IE 680 Advanced Topics (Cr var)
Industry Technology

Graduate Study

Degree The Department of Industrial Education and Technology offers programs for the master of science and doctor of philosophy degrees with a major in industrial education and technology and minor work for students taking major work in other departments. Within the industrial education and technology major a student may emphasize technology education, industrial technology training in industrial settings or occupational safety.

Prerequisites Preparation equivalent to the completion of the undergraduate curriculum in industrial technology at Iowa State University and adequate evidence that the student ranks above average in scholastic ability. The department stipulates no foreign language requirement for either the master of science or doctor of philosophy degree.

Learning Opportunities and Jobs Graduates have a broad understanding of industrial technologies and are able to communicate effectively with colleagues in industry leaders, career and technology educators and the general public in both formal and informal settings. They are prepared to carry out research, communicate research results, prepare grant proposals and address complex problems facing manufacturing, safety and health, and training professionals in industry and education.

Outcomes Graduates are committed to life-long learning and the pursuit of excellence in their chosen field.

Students not electing the thesis option at the master's degree level will be required to complete a minimum of 3 credits of a creative component project.

Industrial Technology Minor

All minors require at least 15 credits, including at least 6 credits taken at Iowa State University in courses numbered 300 or above. The minor must include at least 9 credits that are not used to meet any other department college or university requirement. Courses taken for a minor may not be taken on a pass/no pass basis.

For the undergraduate curriculum in industrial technology leading to the degree of bachelor of science, see College of Education Curricula.

Undergraduate Study

The Department of Industrial Education and Technology offers programs toward a bachelor of science degree in Industrial Technology.

10 Electives Select from 1 TEC courses 296 390 394 470 471 475
Courses open for nonmajor graduate credit 392 402 408 409

Industrial Technology (1 TEC)

Courses Primarily for Undergraduate Students

Course 110 Introduction to Industrial Technology (1-0) A first-year introduction to the field of industrial technology with an orientation to industrial technology as a field of study. Strategies for working together with faculty and industrial personnel in a learning community. Development of awareness of individual potential and career opportunities. Only for students who have not taken an introductory course in industrial technology.

Course 120 Introduction to Design in Industrial Technology (1-4) A 3-Dimensions and 3D, representations of objects national and international standards for documentation, manufacturing processes, design for manufacturability, design projects and teamwork. Freehand sketching, design and solid modeling using contemporary CAD tools will be covered.

Course 130 Introduction to Nonmetallic Manufacturing Materials and Processes (1-4) An introduction to selected nonmetallic materials used in manufacturing and the related processes.

Laboratory
and lecture activities focus on the understanding of thermal chemical and electrical mechanical properties of organic materials and related industrial processes.

I. Tec 140 Electrical Fundamentals (1-4) Cr 3 Preq: Math 160 Electrical phenomena theory will include but not be limited to Ohm's Kirchhoff's and Power Laws. Thevenin and Superposition Theorems will be presented. Students will become familiar with concepts such as waves, power, and various loads. Concepts of phase angle, transient timing, and step up-step down of voltages and current will be introduced. Safety issues concerning the use of electricity and electrical equipment will also be introduced.

II. Tec 202 Introduction to Training and Development in Industry and Business (3-0) Cr 3 Preq: Eng 105 A systems overview of the training and development function and its essential role in today's organizations. Systems theory needs assessment, learning objectives, learning theories, training program development, delivery, transfer, and evaluation are introduced.

II. Tec 216 Computer Applications in Industrial Technology (2-2) Cr 3 Provides a working knowledge of microcomputers and their application in industrial technology. Emphasis on computer languages useful in manufacturing.

II. Tec 224 Advanced Technical Graphics Interpreta tion and CAD (1-4) Cr 3 Preq: 120 Advanced design systems incorporating 2D and 3D design and productivity tools for use in manufacturing settings. Topics include Geometric Tolerancing, 3D models, welding symbols, gears, and advanced visualization solid modeling feature-based design assemblies. Use of AutoCAD and ProEngineer software.

II. Tec 231 Introduction to Metallic Materials and Processes (1-4) Cr 3 A study of selected metallic materials and related processes used in manufacturing. Lecture and laboratory activities focus on metallic materials, properties, and processes. Field trip.

II. Tec 240 Analog Manufacturing Applications (1-4) Cr 3 Preq: 140 Amplification fundamentals for voltage current and power Amplification techniques. By means of Bipolar Junction Field Effect transistors. Operational amplifiers and Darlington configurations applied to the design of switching circuits and relays and for motor control. Split Power supplies will be introduced for powering Op-amp circuits.

II. Tec 244 Integrated/Mechanical Fluid Systems (1-4) Cr 3 Preq: 140 Modern mechanical fluid power systems. Includes laws of mechanics components circuit layout and instrumentation. Emphasis on control and utilization.

II. Tec 270 Principles of Injury Prevention (3-0) Cr 3 Basic foundations of injury causation and prevention in home motor vehicle and work environments.

II. Tec 272 Introduction to Occupational Safety (2-0) Cr 2 Introduction to occupational safety and health administration and management. Includes accident investigation and response.

II. Tec 296 Fire Protection and Prevention (3-0) Cr 3 An overview of the current problems and technology in the fields of fire protection and fire prevention with emphasis on industrial needs focusing on the individual with industrial safety responsibilities.

II. Tec 330 Polymer and Composite Processing (1-4) Cr 3 Preq: 130 or equivalent Design and production of plastic parts including thermoplastics and thermosets. A study of plastic properties and their relationship to processing parameters and control techniques. Applying advanced CAE technology to check process feasibility. Depress is process conditions evaluate part and mold designs and estimate the cost of plastic injection processes.

II. Tec 338 Automated Manufacturing Processes (2-2) Cr 3 Preq: 224 231 NC programming operations for CNC machine tools. Transfer of part descriptions into detailed process plans: tool selection and NC machine code. CAD/CAM system programming for 2D machining is emphasized. Verification is accomplished through laboratory work.


II. Tec 390 Construction Safety (2-0) Cr 2. Identifies the hazards to life and property, particularly to the workers in the construction industry. Includes proper use of equipment, fall protection, and equipment for both construction and demolition.

II. Tec 392 Safety in Manufacturing (3-0) Cr 3 Preq: 270. Focus on safety and health hazards in industrial work environments. Particularly workers in manufacturing industries. Includes the prevention of workplace exposures and the safe use of equipment for materials handling and production operations. Nonmajor grade credit.

II. Tec 394 Legal Aspects of Occupational Safety and Health (3-0) Cr 3 Legal implications of legislation as it applies to health and safety in the workplace.

II. Tec 395 Seminar in Industrial Technology (1-0) Cr 1 or 2 Preq: Juniors. Contempory trends and issues in industrial technology. Career opportunities, requirements, and procedures included in seeking internships and employment. Development of the professional portfolio.

II. Tec 402 Facilitation of Workplace Learning (3-0) Cr 3 Application of theories of learning and motivation effective participative learning facilitation and delivery techniques. Analysis and maximization of learning styles. Learner goal setting and feedback and the incorporation of learning to learn skills are explored and practiced for the purpose of preparing workplace learning facilitators. Nonmajor graduate credit.

II. Tec 408 Interdisciplinary Problem Solving (Same as E 408 E E 408) See Industrial Engineering or Electrical Engineering. Nonmajor graduate credit.

II. Tec 409 Interdisciplinary Systems Effectiveness (Same as E 409 E E 409) See Industrial Engineering or Electrical Engineering. Nonmajor graduate credit.

II. Tec 410 Facility Planning (3-0) Cr 3 Preq: 120 or equivalent Stat 101 Principles and practices in designing evaluating creating facilities or creating new facilities. Includes flow analysis layout development, material handling, and office design. Field trip.

II. Tec 423 Statics and Strength of Materials for Industrial Technology (1-4) Cr 3 Preq: 224 Phys 111 Application of the standard analytical techniques of solving statics problems focusing on statics. The properties of materials and how to select appropriate materials for a particular design. Stress strain tension bending of beams.


II. Tec 435 Computer Automated Manufacturing Systems (2-2) Cr 3 Preq: 336 Reviews principles and concepts required for implementation of automated production techniques and for design of manufacturing systems. Includes sensors and control systems, robotics CAD/CAM simulation manufacturing economics. Emphasis on the computer technology to tools to improve production and control needs.

II. Tec 440 Electrical Outputs for Manufacturing (1-2) Cr 2 Preq: 240. Control of machine speed and timing by circuitry and/or programming. Dynamic control of electrical/mechanical relays and solid state relays.

II. Tec 446 Automation Systems (2-2) Cr 3 Preq: 340 Theory and applications of automation systems technology. Emphasizes features capabilities programming and application of programmable logic controllers and robots.

II. Tec 470 Industrial Hygiene Chemical and Biological Hazards (3-0) Cr 3 Preq: 272 Chem 163 165. A consideration of health-related problems found in the industrial setting with emphasis on toxic chemicals and noise.

II. Tec 471 Industrial Hygiene Physical Hazards (2-2) Cr 3 Preq: 272 Chem 163 165. The use and calibration of instruments designed to measure the quality and quantity of contaminants in the work environment.

II. Tec 475 Safety Analysis and Design (1-2) Cr 2 Preq: Instructor approval. Students review the use of systems safety as a management technique to control individual and group research projects are completed in conjunction with faculty or a business/industry partner.

II. Tec 481 Supervised Industrial Internship Experience (2) Cr 2 May be repeated for credit. Preq: 395 and permission of instructor. Internship supervised learning activity consisting of one work period. Internship. Offered on a satisfactory/unsatisfactory grading basis only.

II. Tec 490 Independent Study in Industrial Technology (1-0) Cr 1 to 5 Preq: Quality-point average of 2.5 or more for two preceding semesters and completion of an independent study contract. H Honors.

II. Tec 493 Workshop in Industrial Technology (1-0) Cr 4 each enrollment. Preq: 15 credits in industrial technology. Extension of technical competence in emerging technologies.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Prior to registration for graduate level courses the student shall be classified as a senior or have an earned bachelor's degree and be required to complete additional assigned readings term papers and graduate projects.

II. Tec 502 Advanced Design and Manufacturing (3-0) Cr 3 Preq: Permission of instructor. An integrated study of entrepreneurship, the development of new products, organizational production, control and business planning in contemporary manufacturing settings. Topics include project analysis design prototyping quality functional deployment in process and product design benchmarking, market cost estimation marketing strategies, documentation for productivity and quality strategies.

II. Tec 504 Principles of Training and Development (3-0) Cr 3 Preq: Permission of instructor. An examination of the training and development function in organizations: industry and business and the advancement of competencies in analysis, design development, implementation and evaluation of training in conjunction with analysis and synthesis of theoretical perspectives.

II. Tec 506 Facilitating Change Training and Development (3-0) Cr 3 Preq: Permission of
Information Assurance
(Interdepartmental Graduate Major)

Supervisory Committee: D. Jacobson (Chair) C. Bergman J. Davis A. Ho J. McCormack P. Premkumar J. Wong

Work is offered for the degree of Master of Science with a major in Information Assurance under a cooperative arrangement with the departments including Electrical and Computer Engineering, Computer Science, Political Sciences, Logistics and Management, Information Systems, Mathematics, Industrial and Manufacturing Systems Engineering. Students graduating from the major will help to fill the need for well educated system security specialists in the government private sector and academia. The program objectives identified as being critical to the accomplishment of this mission are: (1) Import and enhance knowledge about information infrastructure security. (2) Expand and develop ability to engineer complex systems. (3) Install and nurture social awareness and the ability to function in a team. (4) Instill a sense of ethics and develop an understanding of strategic and policy issues.

Students interested in the interdepartmental major and are admitted to both a home department (the department that is most closely aligned with the student’s research interest and background) and to the program. The home department sets the admission standards, course requirements and thesis standards.

The program is broadly based and uses courses in the various departments. The program will consist of 24 course credits with credits of research work for a Master of Science with thesis. A non-thesis Master of Science will consist of 27 credits of courses and 3 credits of creative component. The courses are divided into three categories: core electives and thesis research.

A student’s program of study committee, in consultation with the student, determines the elective courses that are to be taken and the acceptability of transfer credits. The major professor will be selected from the discipline where the student is admitted. Home department.

The basic prerequisite for admission to this program is a baccalaureate degree in engineering, mathematics, computer science, management information systems, political science, or closely related field. The GRE or GMAT examination may be required based on the standards of the home department. If the GRE or GMAT is not required it will be considered in admissions decisions if offered. Potential students with baccalaureate degrees in the physical sciences or other related fields will be considered on an individual basis. Possibility with provisional admission the degree awarded is a Master of Science in Information Assurance.

For additional information students should contact the chair of the Supervisory Committee, 2419 Hoover Hall, ISU Ames Iowa 50011 or www.isi.ist.edu/ elevins


Courses for Graduate Students

Course Title
Course No.
Credits

Prerequisites

Instructor Change and the change process diagnosis and defining planned change. Investigating various transformation theories and methodologies and team development opportunities to apply knowledge in experiential learning environment.

Tec 525 Parametric and Feature Based Design and Manufacturing (3-0) Cr. 3
Prereq. Permission of instructor

Covers fundamental and advanced feature based CAD concepts. Topics include geometric modeling, feature concepts, applications of features in design and manufacturing, and feature recognition. Pro/Engineering software is used as the design and modeling tool. Hands-on design projects are major components of this course.

Tec 531 Manufacturing of Plastics (2-2) Cr. 3
Prereq. Permission of instructor

Overview of current business environment and issues related to design for manufacturability of plastic products. Provide understanding of available materials and processes in manufacturing plastic parts. Utilize injection molding for an in-depth study of five elements for making successful plastic products consumer input part design mold design material selection and manufacturing process. Computer aided engineering exercises and laboratory practices included.

Tec 536 Comprehensive Modern Manufacturing Systems (3-0) Cr. 3
Prereq. Permission of instructor

The study design and implementation of PULL manufacturing systems and the integration with functions of the production infrastructure for the manufacture of superior quality low-cost products. Topics include cellular manufacturing, system group technology, cost estimation, just-in-time, dynamic cost control, JIT manufacturing, machine quality inventory control automation and CAD/CAM.

Tec 549 Internship in Industrial Technology (arr.)

Cr. 1 to 4 each enrollment.
Prereq. 10 hours in industrial technology. Emphasis on full experience in the industrial technology training and development and technical education as it relates to administration supervision and the curriculum-instruction and evaluation research.

Tec 554 The Historical and Philosophical Foundations of Industrial Technology (3-0)
Cr. 3
Historical evolution and philosophical foundations of industrial and technological studies.

Tec 575 Safety and Public Health Issues in Modern Society (2-0) Cr. 2
Exploration and analysis of current safety and public health issues impacting society. The focus will be on topics that impact individuals in work, public, and home environments.

Tec 580 Applied Techniques in AutoCAD (2-2) Cr. 3
Prereq. Graduate classification

Exploration of computer graphics design and drawing applications using AutoCAD. Complete two-dimensional concepts of data entry editing, screen display, layering libraries, dimensions and plotting. Three-dimensional coordinate systems, 3D entity creation, editing and solid modeling will be introduced.

Tec 590 Special Topics in Industrial Education and Technology (1-4) Cr. 1 to 4
Prereq. Graduate classification

Tec 599 Creative Component (1-3) Cr. 1 to 3

A discipline-related problem to be identified and completed under the direction of the program advisor. Three credits required for all nonthesis master’s degree students.

Courses for Graduate Students

Tec 615 Supervisory Committee Process: of selecting developing and researching a proposal Forum for dealing with professional and academic needs and issues.

Tec 652 Program and Learner Evaluation (3-0) Cr. 3
Prereq. Stat 401 or equivalent Techniques for evaluating learners’ facilities, programs, and staff utilizing theories for developing measurement instruments. Outcomes assessment is emphasized.

Tec 655 Academic Leadership in Technology (3-0) Cr. 3
Prereq. Permission of instructor

A definition of the faculty role in the development of technology as a discipline including strategies for dealing with programs personnel and constituencies are presented. Leadership skills involving team formation, team operation, and conflict resolution are addressed.

Tec 657 Curriculum Development in Industrial Technology (3-0) Cr. 3
Prereq. Permission of instructor

Basic concepts and factors influencing curriculum development techniques, organization and procedures. Emphasis will be given to program/course of study and training plan development.

Tec 699 Research (arr.)

Courses Primarily for Undergraduate Students

Infas 386 Information Assurance Summer Internship Cr. 3 SS Prereq. Permission of department. Summer program offered on a satisfactory-fail grading basis only.

Courses Primarily for Graduate Students

Infas 530 Advanced Protocols and Network Security (Same as Cpr E 530) See Computer Engineering.

Infas 531 Information System Security (Same as Cpr E 531) See Computer Engineering.

Infas 532 Information Warfare (Same as Cpr E 532) See Computer Engineering.

Infas 533 Cryptography (Same as Math 533) See Mathematics.

Infas 534 Legal and Ethical Issues in Information Assurance (Same as Cpr E 534) See Computer Engineering.

Infas 558 Leadership Team and Community (1-0) Cr. 3 Prereq. Permission of instructor. Building community within the Information Assurance program and making connections to the field of study and to the university. Structured support in networking with faculty peers, mentors, practicing professionals and the larger community at large. Springboard to leadership characteristics, characterized by high ethical concern, service, care. Offered on a satisfactory-fail grading basis only.

Infas 592 Seminar in Information Assurance Cr. 1 to 3 each term. Elective Prereq. Permission of instructor, projects or seminar in Information Assurance.

Infas 687 Information Assurance Summer Internship Cr. 3 Prereq. Permission of department. Graduate classification. One semester and one summer maximum per academic year professional work period. Offered on a satisfactory-fail grading basis only.

Interdisciplinary Graduate Studies

(Interdepartmental Graduate Program)

Supervisory Committee: G. Jackson Chair R. W. Bernard (Arts and Humanities), E. C. Fowles (Biological and Physical Sciences), G. A. Jackson (Geography, V. Lee (Interdisciplinary Development Studies), S. J. Crase (Social Sciences).

The degree of master of science or master of arts with major in interdisciplinary graduate studies is available to graduate students who wish to have a more diversified program of advanced study than that generally permitted students who specialize in a single subject. Areas of specialization in arts and humanities, biological and physical sciences, international development studies, physical sciences, social sciences, and a general area are designed to broaden and supplement a student’s program. Students must take courses in three different graduate subject matter areas; each subject contributing a minimum of nine credits toward the 35 graduate credits required for the degree. Courses which may be used for credit toward this degree program are selected from those listed in the Graduate College Catalog for graduate credit.

Both the thesis and nonthesis options are available; however, they are available in a manner that is consistent with the requirements of the appropriate program. The thesis option requires completion of a research project, with a written report, of not less than 120 pages. The nonthesis option requires completion of a comprehensive examination, with a written report, of not less than 40 pages. The comprehensive examination is administered at the end of the second semester of the second year of study.
599 (Creative Component) is required and a maximum of five credits of IGS 599 may be counted toward the total of 35 graduate credits. The student must consult with the program of study committee to decide on the basis of the academic advisor and student. The committee also aids the student in planning a program of study and in selecting appropriate courses.

Foreign language requirements if any will be decided by the student's committee.

Graduates will have experience in designing their own program centered around issues they have identified. Because of the interdisciplinary nature of IGS, students are expected to synthesize knowledge from three different areas of study.

Students who wish to apply for admission to interdisciplinary graduate studies should communicate with the chair of the program, the chair of the supervisory committee or one of its members (see above).

**Courses for Graduate Students**

IGS 599 Creative Component Cr var

IGS 899 Thesis Research Cr var

**Interdisciplinary Studies**

A major in interdisciplinary studies is offered in the College of Liberal Arts and Sciences for undergraduates who have unique interdisciplinary educational goals. The major is designed by a faculty review board, the academic advisor and the student. Leading to either the Bachelor of Arts or the Bachelor of Science degree the major includes 36 to 48 credits of coursework chosen to provide a coherent, carefully planned program in an area of interest that bridges two or more departments. This specialized area is identified on the diploma.

A student seeking admission to the program in interdisciplinary studies writes a letter of application that explains how the proposed major meets specific educational goals. Applications are screened by a faculty review board. Since students are expected to earn at least 30 credits after they are admitted into the program, the program is only submitted to the review board in the sophomore or junior year. The proposal will be considered if the area of interest properly falls within the College of Liberal Arts and Sciences and if the student's educational goals can be accommodated by a more traditional combination of existing majors and minors and electives.

Students who wish to prepare for professional schools in health related fields and students who wish to develop an area of interest based upon one of the College's cross-disciplinary programs may wish to propose a degree in Interdisciplinary Studies. Areas of interest in Interdisciplinary Studies have included Classical Studies, International Relations, Ecological Studies, African Studies, All Natural Studies, Asian Studies and U.S. Latin American Studies.

The interdisciplinary studies major must satisfy the requirements of the liberal arts and sciences curriculum in the College of Liberal Arts and Sciences. With the approval of the review board, the student will identify courses leading to either the B.A. or the B.S. degree. Emphasizing the humanities or a communicative arts normally leads to a B.A. A major emphasizing the natural or social sciences normally leads to a B.S. Different requirements for the B.A. and B.S. degrees are determined by the nature of the chosen field of study.

Courses listed in the major may come from any department of the university with the following restrictions:

1. The selection of courses needs to focus on a single theme and be consistent with the career and educational goals of the student.
2. At least one half of the courses in the major must come from degree-offering departments within the College of Liberal Arts and Sciences.
3. The courses must be chosen from at least two disciplines.

4. The courses chosen for the major must be at the 200 level or higher. Overall the degree program must include 45 credits at the 300 level or higher with at least 6 credits at the 400 level or higher.
5. An average grade of C or better must be earned in 15 credits at the 300 level or higher in the major.
6. An average grade of C or better must be earned in 15 credits at the 400 level or higher in the major.

An average grade of C or better must be earned in Eng 104 and 105. If this grade is not achieved, the student will be required to take an additional writing course as appropriate and earn a grade of C or higher.

A grade of C or better must be earned in either a beginning English composition course or a course in the major with a significant writing component.

Further information may be obtained from the college office.

**International Agriculture**

(Interdisciplinary Undergraduate Program)

Supervisory Committee: Robert A. Merwin Chair Ricardo Salvador Anthony Pompero III Robert Andrews

The international agriculture program provides opportunities to develop knowledge and skills related to the factors that interact to impact agricultural and environmental issues: production processes and distribution and utilization worldwide. The program puts emphasis on international experience through structured internships and study abroad. The international agriculture program is appropriate for students seeking positions that require knowledge and experience related to global agricultural issues and their impact on local, regional, national and international policies and practices.

Students preparing for careers in the following areas will benefit from the international agriculture program: government and non-governmental agencies, agribusinesses, educational institutions and non-profit assistance agencies. Outcomes from participation in this program focus on developing an awareness for the role of international agriculture in the career development process analyzing international agricultural issues and policies, acquiring skills for solving problems in international development and agribusiness and experiencing real situations and gaining perspectives about agriculture in a global setting.

**Secondary Major**

International agriculture is an undergraduate secondary major that may be taken only in conjunction with a primary major in business. Technical knowledge of international business will strengthen the expertise acquired with the primary major in Business. Students pursuing this program should strengthen their placement opportunities with multinational corporations.

A student in the College of Business may earn a secondary major in International Business. The requirements for this major include 12 credits in international business courses. One year of the same university level foreign language (minimum of 6 credits) and an appropriate experience (minimum 3 months). Students who pursue this secondary major will be required to complete the requirements for a primary major in Business. Fifteen of the 18 credits required for the International Business major must not be used for the primary major.

**International Studies**

(Interdepartmental Undergraduate Major and Minor)

Advised by the College of Liberal Arts and Sciences.

Supervisory Committee: Steven W. Schmidt Chair Robert Baum R. Douglas Hurt Hsian Ilyashieh Kathy Leonard Robert E. Mazur

The international studies program provides opportunities for students to develop skills and understand about international events and problems and global issues. The program is designed for students who wish to prepare for work or advanced study in the international arena such as in foreign service, journalism, advocacy organizations, scientific or research institutions, business, non-governmental development organizations (NGOs), humanitarian agencies, environmental organizations, human rights organizations, think tanks, international agriculture engineering and other fields.

A secondary major and a minor in International Studies are available for undergraduates. The program...
requirements are structured around a combination of designated Topical Module and a Geographic Regional Studies Component. Each student's program of study is designed to reflect programmatic opportunities at Iowa State University and the academic, intellectual, and professional interests of the student.

Secondary Major

A student seeking a secondary major in International Studies must successfully complete a minimum of 27 semester credits in courses approved for use in the International Studies program. This includes:

- **IntSt 235**
- **IntSt 430**
- **21 credits in courses approved for the International Studies program, with a minimum of 9 credits (at least 6 of which are numbered 300 or above) in a designated Topical Module and a minimum of 9 credits (at least 6 of which are numbered 300 or above) in a Geographic Regional Studies Component**
- **Fulfillment of Language Proficiency requirements (see below)**

The major must include a minimum of 9 credits not used to meet any other department college or university requirement.

Language Proficiency

Students with a major or minor in International Studies fulfill the Language Proficiency requirement through one of the following options:

- Completion of two years of university-level language instruction in a single appropriate foreign language as demonstrated by a foreign language course numbered 202 or higher. Students whose first language is other than English fulfill Language Proficiency with Engl 105 at a grade of C or better.
- Passing an examination given by the Dept. of Foreign Languages and Literatures. This is a certifying proficiency equivalent to two years of college instruction. Students proficient in languages not offered at ISU may petition for special consideration.
- Intensive study abroad experience that includes the use of a language other than English (individual prior approval of committee required for this option)

A Topical Modules

- **Global Environmental Issues**
- **Social Change and Economic Development**
- **Women and Development**
- **Cultural Change in an Era of Globalization**
- **International Business and Trade**
- Other topical clusters may be organized by teams of faculty and students around interests and strengths

B Geographic Regional Studies Component

- **Latin America**
- **Europe**
- **Russia and Central Europe**
- **Asia**
- **Middle East**
- **Africa**

International Studies students are strongly encouraged to participate in study and/or work abroad programs. Students may petition to use up to 9 credits in the major (5 credits in the minor) in study abroad and/or internships to substitute for courses within the Topical Module. Geographic Regional Studies Component and/or Language Proficiency requirements.

Courses Primarily for Undergraduate Students

- **IntSt 120 Study Abroad Credit (Same as LAS 120)**

  - Credit or credit/permission from the program coordinator
  - ISU offers numerous opportunities for study abroad.
    - Please contact the Study Abroad Resource Center or your academic advisor for current programs.

- **IntSt 220 Study Abroad Credit (Same as LAS 220)**

  - Credit or credit/permission from the program coordinator
  - ISU offers numerous opportunities for study abroad.
    - Please contact the Study Abroad center or your academic advisor for current programs.

- **IntSt 235 Introduction to International Studies (Same as LAS 235)**

  - Credit or credit/permission from the program coordinator
  - ISU offers numerous opportunities for study abroad.
    - Please contact the Study Abroad Resource Center or your academic advisor for current programs.

- **IntSt 430 Seminar in International Studies (Same as LAS 430)**

  - Credit or credit/permission from the program coordinator
  - ISU offers numerous opportunities for study abroad.
    - Please contact the Study Abroad Resource Center or your academic advisor for current programs.

Iowa Lakeside Laboratory

www.lakesidelab.org

(International Program)

Director Arnold van der Valk

Participating Faculty: Dennis E. Anderson (Biology Emeritus-Humboldt State University), Neil Beattie (Biology-Mount Mercy College), C. Lee Burris (Agronomy-Iowa State University), C. Arthur Coyle (Art and Design-Iowa State University), Paul J. Currier (Director-Plate River Whooping Crane Maintenance Trust), James G. Dinsmore (Animal Ecology-Iowa State University), John E. Doornbosch (Anthropology-Iowa State University), Charles Drewes (Zoology and Genetics-Iowa State University), Steven M. Herrnstein (Art and Design-Iowa State University), Laura L. Jackson (Biology-Iowa State University), Kenneth L. Lang (Biological Sciences-Humboldt State University), Michaeil J. Lannoo (Mineral Center for Medical Education-Iowa State University), David R. Mercer (Biology-Iowa State University and Northern Iowa), Clay L. Pierce (Animal Ecology-Iowa State University), Thomas R. Rosburg (Biology-Iowa State University), Michael J. Shott (Sociology-Iowa State University), Anthropology and Criminology-Iowa State University), David D. Smith (Biology-Iowa State University and Northern Iowa), Sarah A. Spaulding (Inst of Artic and Alpine Research University of Colorado), Eugene F. Stearns (Center for Great Lakes University of Michigan), Lors H. Tiffany (Botany-Iowa State University), and Sunday Tim (Agri/Biosystems Engineering-Iowa State University), James L. Weil (Biological Sciences-Iowa State University).

Iowa Lakeside Laboratory is a field station run cooperatively by Iowa State University, the University of Northern Iowa, and the University of Iowa through the State Board of Regents.

The Laboratory was established in 1909 for the conservation and study of the rich flora and fauna of northwest Iowa, especially those of the Great Lakes region with its numerous lakes, wetlands, and prairies. Its campus is located on approximately 140 acres of restored prairie wetland and gallery forest along the west shore of West Okoboji Lake.

Lakeside's mission is to provide graduate and undergraduate students opportunities to gain hands-on experience working with a variety of natural and human environments through its field-oriented summer courses and to provide research facilities and support for graduate students and faculty working on research projects in Northwestern Iowa.

Each summer Iowa Lakeside Laboratory offers students a unique educational experience - small full-immersion field-oriented courses in the natural sciences (archaeology, ecology, environmental science, hydrology, evolution, geology, soils, taxonomy). All courses meet all day from Monday through Friday. The majority of courses run for either 3 or 4 weeks. Enrollments in most courses are limited to 8 to 10 students. Courses are taught at the undergraduate (sophomore and junior) and the graduate level. Students obtain one credit for each week (40 hours) in class. One and two week courses are also available, including courses designed especially for teachers. Weather permitting, students normally spend at least part of each day doing field work either as part of their class work or working on individual or group projects. Because there are courses offered only alternate summers, the current Iowa Lakeside Laboratory Bulletin or Iowa State University Summer Session Bulletin (www.lakesidelab.org) should be consulted for the list of courses being offered in a given summer session.

The Iowa Lakeside Bulletin also contains additional information about the Laboratory and about each course being offered.

Research projects by undergraduates, graduate students, and faculty can be done either on the campus or at nearby natural areas. Under-graduate and graduate students are strongly encouraged to do independent projects at Lakeside and graduate students are welcome to use it as a base for their thesis and dissertation research. Laboratory space and other facilities are available for long term or short term research projects.

Teaching and research facilities include eight laboratory buildings, a library, and a lecture hall. Living accommodations include cottages, motel style units, and a large mess hall. All students are encouraged to stay at Lakeside while they are taking courses to take full advantage of its educational, professional, and social life.

Financial Aid

Iowa Lakeside Laboratory Scholarships are available to both undergraduates and graduate students. All scholarships cover room and board. Information about how to apply for Iowa Lakeside Laboratory Scholarships is included in the Iowa Lakeside Bulletin (www.lakesidelab.org). Students should also consult the Student Financial Aid Office for other scholarship opportunities, work study, and loan programs for which they are eligible.
Registration

Students can only enroll in Iowa Lakeside courses by submitting an Iowa Lakeside Registration and Scholarship Form and Housing Form to the Iowa Lakeside Laboratory Administrative Office. These forms are found on the Iowa Lakeside Laboratory Website (www.lakesideib.org) where they can be downloaded and in the Iowa State University Summer Session Bulletin and the Iowa Lakeside Laboratory Bulletin which can be obtained from Iowa Lakeside Laboratory 131 Bessey Hall Iowa State University Ames IA 50011 1020 Phone (515) 294 2488 FAX (515) 294 2323 E Mail lakeside@iastate.edu

Early registration is advisable. Because enrollment in Iowa Lakeside courses is limited, students should register before May 1 for the following summer session. Housing is also limited and students must apply for housing or indicate that they plan to live off campus at the time of registration.

Courses open for nonmajor graduate credit: 4021 4023 4151 4159 4221 4271 4611 4731 4851 4841 494 538

Courses Primarily for Undergraduate Students

Ia LL 115 Introduction to the Life Sciences 1 Cr 1 SS An overview of the various disciplines (developmental biology, ecology, evolution, molecular biology, etc.) that constitute the life sciences. Each section provides an opportunity to get hands-on experience with one or more of these disciplines. This course is for high school students who have completed a course in biology.
A Ecology and Evolutionary Biology
B Molecular Cellular and Developmental Biology

Ia LL 2051 Flora of the Iowa Lakes Region 2 Cr 2 SS

Ia LL 3001 Iowa Natural History (Same as A Ed 3001) Bot 3001 Zool 3001 Cr 4 Alt SS offered 2005 Prepara One course in the biological sciences Biological diversity and its causes examined through lectures and field trips to native lake marsh forest and prairie habitats. Topics include measuring the environment; sampling and identifying organisms; experimenting with the ecosystem; understanding species interactions and appreciating influences of past and present climates and geological events on natural ecosystems of the region.

Ia LL 3021 Plant Animal Interactions (Same as Bot 3021) Cr 4 Alt SS offered 2004 Prepara One course in the biological sciences. Introduction to ecology and co-evolution of plants and animals emphasis on dispersal pollination and plant herbivore interactions field and laboratory work. Reading Discussion

Ia LL 3023 Undergraduate Internships (Same as A Ed 3023) Cr 1 to 5 SS Prepara Permission of instructor and appropriate standing Placement with county conservation boards camps parks etc for experience as interpreters rangers and technicians.

Ia LL 3041 Physical Geology (Same as EnSc 3041) Geol 3041 Cr 4 Alt SS offered 2004 Landscape development as a product of geological materials and processes. Emphasis on field studies of composition of the earth glaciation weathering erosion and sedimentation.

Ia LL 3121 Ecology (Same as A Ecl 3121) Bot 3121 Zool 3121 Cr 4 SS An introduction to the principles of ecology at the population community and ecosystem level. Field studies of local lakes and prairies are used to examine factors controlling distributions interactions and roles of plants and animals in native ecosystems.

Ia LL 3261 Ornithology (Same as A Ecl 3261) Cr 4 SS The biology ecology and behavior of birds with emphasis on field studies of local avifauna. Group projects stress techniques of population analysis and methodology for population studies.

Ia LL 3641 Biology of Aquatic Plants Cr 4 Alt SS offered 2005 A field-oriented introduction to the taxonomy and ecology of aquatic plants in lakes wetlands and rivers. Individual or group projects.

Ia LL 3671 Plant Taxonomy (Same as Bot 3671) Cr 4 SS Principles of classification and evolution of vascular plants taxonomic tools and collection techniques. Use of keys. Field and laboratory studies emphasizing identification of local flowering plants and recognition of major plant families.

Ia LL 3711 Introduction to Insect Ecology (Same as Ent 3711) Cr 4 Alt SS offered 2006 Field and laboratory studies. Emphasis on life history emphasis on ecology and behavior.

Ia LL 4011 Statistical Methods for Field Biologists (Same as Stat 4011) Cr 4 Alt SS offered 2005 Introduction to the design and implementation of ecological and environmental field studies and statistical analyses. Interpretation and presentation of field data. Fundamentals of experimental design hypothesis testing with continuous and discrete data simple and multivariate regression and correlation. Introduction of analysis of variance and data presentation. Individual and/or group projects will be used to collect field data.

Ia LL 4021 Watershed Hydrology and Surgical Processes (Same as Agron 4021) EnSc 4021 Cr 4 SS Prepara Four courses in physical or biological sciences or engineering. Effects of geomorphology soils and land use on transport of water and materials (nutrients contaminants) in watersheds. Fieldwork will include assessment of the Great Lakes watershed. Nonmajor graduate credit.

Ia LL 4031 Evolution (Same as Biol 4031) Bot 4031 Cr 4 SS Mechanisms and patterns in microevolution and macroevolution. Field exercises will emphasize studies of natural selection adaptation genetic variation and population genetics of local plant and animal populations. Nonmajor graduate credit.


Ia LL 4191 Vertebrate Ecology and Evolution (Same as A Ecl 4191) Zool 4191 Cr 4 SS Field and laboratory study of representative vertebrates of northwestern Iowa. Observations and experiments emphasize ecologic and evolutionary histories by integrating concepts of functional morphology behavioral ecology and evolutionary biology. Nonmajor graduate credit.

Ia LL 4201 Amphibians and Reptiles (Same as A Ecl 4201) Zool 4201 Cr 4 Alt SS offered 2004 Prepara Two semesters of biology. Ecology behavior and conservation. Course in amphibians and reptiles with emphasis on their anatomy and morphology. Temperature and water regulation. Locomotion. Life history reproduction population and community ecology and conservation.

Ia LL 4221 Prairie Ecology (Same as Bot 4221) EnSc 4221 Cr 4 SS Prepara Familiarity with basic principles in biological sciences and ecology. Basic patterns and underlying physical and biotic processes. Plants and animals of North American prairies. Group projects stress techniques of population analysis and methodology for population studies. Nonmajor graduate credit.

Ia LL 4271 Archaeology (Same as Anth 4271) Cr 4 SS Nature of cultural and environmental evidence in archaeology and how they are used to model past human behavior and land use. Emphasis on Iowa prehistoric cultural resources and excavation techniques. Nonmajor graduate credit.

Ia LL 4351 Illustrating Nature 1 Sketching (Same as BMP 4351) Cr 2 SS Sketching plants animals and terrain. Visual communication development of a personal style and integration of typographic and visual elements on a page will be emphasized.

Ia LL 4381 Illustrating Nature II Photography (Same as BMP 4381) Cr 2 SS Study of photographic techniques. Intermediate technical and compositional aspects of color photography of natural areas and their plants and animals.

Ia LL 4611 Introduction to GIS (Same as Bot 4611) EnSc 4611 Env S 4611 IA LL 4611 Cr 4 SS Descriptive and predictive GIS modeling techniques spatial statistics and map algebra. Application of GIS modeling techniques to environmental planning and resource management. Nonmajor graduate credit.

Ia LL 4731 Soil Genesis and Landscape Relationships (Same as Agron 4731) EnSc 4731 Cr 4 Alt SS offered 2004 Prepara Agron 154 cr or 4201. Relationships between soil formation geomorphology and environment. Description classification and geography mapping and interpretation for land use. Nonmajor graduate credit.

Ia LL 4801 Introduction to Environmental Planning (Same as Env S 4801) LA LL 4801 Cr 4 Alt SS offered 2004 Introduction to environmental planning theories and methods emphasis on environmental planning using GIS modeling approaches and public participation in the planning process. Students should have basic familiarity with ArcView and database programs. Individual or group environmental planning projects. Nonmajor graduate credit.

Ia LL 4841 Plant Ecology (Same as Bot 4841) Cr 4 SS Populations of plant community and ecosystem ecology illustrated through studies of native vegetation in local prairies wetlands and forests. Group or individual projects. Nonmajor graduate credit.

Ia LL 4900 Undergraduate Independent Study (Same as A Ecl 4900) Bot 4901 Zool 4901 Cr 1 to 4 SS Independent study for senior classification and permission of instructor.

Ia LL 493 Natural History Workshop Cr 1 to 2 SS Offered as demand warrants. Five day long non technical introductions to a specific aspect of the natural history of the Upper Midwest or techniques for studying natural history.

A Amphibians and Reptiles
B Birds and Birder
C Nature Photography
D Mushrooms and Other Fungi
E Iowa’s Trees and Forests
F Fish Biology
G Prairies and Prairie Restoration
H Common Alleghenian Forests
I Insects
J Aquatic Plants
K Life in Rivers
L Life in Lakes
M Mosses and Liverworts
N Natural History of Great Lakes Region
O Field Archaeology
P Scuba Diving
Q Sketching Nature

Ia LL 494 Ecosystems of North America Cr 2 to 4 SS Prepara A general ecology course and permission of the instructor. An extended field trip to study a particular type of ecosystem (prairie coastal wetland forest alpine coral reefs etc) or the ecosystems of a specific region (Rocky Mountains Gulf Coast Appalachian Mountains Desert Southwest Central America etc.) Prior to the field trip there will be
be an orientation period and after each field trip a review and synthesis period. A field trip fee will be assessed to cover travel expenses. Nonmajor graduate credit.

lla LL 499 Undergraduate Research Cr 1 to 4
Preq: Junior or senior classification and permission of instructor

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
lla LL 5011 Freshwater Algae (Same as Bot 5011) Cr 4 SS: Structure and taxonomy of freshwater algae based on field collected material emphasis on genus level identifications habitats visited include lakes, lentic streams, and rivers. Algal ecology

lla LL 503 Graduate Internships Cr 1 to 5 SS
Preq. Permission of instructor and graduate standing. Placement with city conservation boards, campus parks, schools etc. for experience as interpreters, rangers, technicians, and teachers

lla LL 5051 Watershed Modeling and GIS (Same as A E 5051) EnSc 5051 Cr 4 Alt. SS: offered 2005 GIS techniques for watershed hydrology and water quality modeling and water resource management including various approaches to watershed analysis, modeling and management analytical tools for modeling watershed hydrology and water quality and case studies in modeling and managing rural and urban watersheds

lla LL 5061 Aquatic Ecology (Same as A Ecl 5061) EnSc 5061 Cr 4 SS Preq: Courses in ecology chemistry and physics. Analytical and aquatic ecosystem emphasis on basic ecological principles ecological theories tested in the field identification of common plants and animals

lla LL 5111 Field Parasitology (Same as Zool 5111) Cr 4 Alt. SS: offered 2005. Ecology and life history of parasites protozoans helminths arthropods field and laboratory investigations including preparation identification and morphology of representative types and stages. General and comparative concepts of parasitology

lla LL 5281 Fish Ecology (Same as A Ecl 5281) Cr 4 Alt. SS: offered 2004 Basic principles of fish interaction with the benthos and aquatic environment. Field methods: taxonomy and biology of fish with emphasis on the fish fauna of northwestern Iowa

lla LL 5281 Advanced Field Ornithology (Same as A Ecl 5281) Cr 2 SS: Preq: Concurrent registration in 3261 Field study of birds of the upper Midwest extended field trip to Minnesota and Wisconsin individual or group project

lla LL 5311 Conservation Biology (Same as Bot 5311) Cr 4 Alt. SS: offered 2004 Preq: 3121 Population and community-level examination of factors influencing the viability of plant and animal populations from both demographic and genetic perspectives. Assessment of biodiversity design and management of preserves

lla LL 5351 Restoration Ecology (Same as A Ecl 5351) Bot 5351 EnSc 5351 Cr 4 Alt. SS: offered 2004 Preq: A course in ecology Ecological principles for the restoration of native ecosystems establishment site preparation selection of seed mixes, planting techniques and management fire mowing, weed control of native vegetation evaluation of restorations. Emphasis on the restoration of prairie and wetland vegetation

lla LL 5351 Vegetation Restoration and Management Cr 4 Alt. SS: offered 2005 Preq: A general ecology course Theoretical and practical consideration for the development and implementation of vegetation management plans. Hands-on experience with a variety of techniques for restoring and managing natural vegetation including mowing, burning, grazing, thinning mechanical and chemical weed control and planting techniques. Nonmajor graduate credit.

lla LL 5641 Wetland Ecology (Same as Bot 5641) EnSc 5641 Cr 4 SS: Preq: 3121 Ecology

Mass Communications and was reaccredited in 1998 Accreditation which applies only to the majors in advertising and journalism and mass communication is based on the principle that students need a broad based liberal arts education as well as a solid core of courses within the discipline. In 1998 the communication studies program joined the Greenlee School Communication Studies is committed to providing students with a liberal arts education that emphasizes scholarly inquiry into the contemporary study of human communication

Undergraduate Study
The School encourages students to develop an attitude that ensures the depth necessary to succeed in the world of professional communication. Supporting work is designed to provide expertise and depth in related content areas. Graduates of the School will be able to generate ideas, gather and interpret data and disseminate written ideas. The School also prepares students throughout the university to be informed media participants and consumers and communicators.

There are no pre major classification requirements for communication studies. To become an advertising or journalism and mass communication major and to graduate the student must have either achieved a score of 26 or higher on the ACT English exam 550 or higher on the SAT verbal exam or passed the School's English usage test. Until these requirements are successfully completed advertising and journalism and mass communication students are designated as pre majors. For additional requirements see the major.

English Proficiency Requirement
To meet the University's English Proficiency requirement all majors in the School must earn a grade of C or better in English 104 and 106 or 105HS. These additional requirements apply to students majoring in Advertising and Mass communications. Graduates are qualified for positions in the creative and account sides of advertising within corporations, businesses and advertising agencies.

The Advertising Major
The advertising major prepares students for graduate education and careers in business and industry. Students majoring in Advertising will find their career opportunities enhanced in professions requiring applied communication expertise. Graduates are qualified for positions in the creative and account sides of advertising within corporations, businesses and advertising agencies.

To become an advertising major a student must successfully complete JMC 101, 110 and 201 and Advert 232. All these courses are successfully completed advertising students are designated as pre majors. To receive a bachelor's degree in advertising a student must earn at least 124 credits. Of these at least 45 credits must be at the 300 and 400 course levels. At least 65 credits must come from the liberal arts and sciences excluding advertising and journalism and mass communication. The degree requirements allow for a maximum of 33 and a maximum of 40 credits to be taken in Advert and JMC.

The Core for the Advertising Major

Foundation Requirements
Pre Major Requirements (9 credits)

3 Mass Media and Society Jl MC 101
1 Orientation to Journalism and Communication Jl MC 110
3 Reporting and Writing for the Media Jl MC 201
3 Principles of Advertising Advert 230

Major Requirements (15 credits)

3 Strategic Planning for Advertising and Public Relations Advert 301
3 Law of Mass Communication Jl MC 460
3 Select from Jl MC 401 406 453 454 461 462 464 474 476 477
3 Professional Media Internship—JiMC 499
Select 3 credits from:
3 Advertising Campaigns—Advert 434
3 Advanced Advertising Campaigns—Advert 435
3 Advanced Portfolio Practicum—Advert 436

Major Electives/Options (9-12 credits)
Choose a minimum of 9 credits from the following:
3 Electronic Media Production—JiMC 306
3 Fundamentals of Photojournalism—JiMC 310
3 Multimedia Production—JiMC 315
3 Public Relations Techniques—JiMC 321
3 Advertising Creativity—Advert 334
3 Media Buying—Advert 335
3 Media Sales—Advert 336
3 Visual Principles for Mass Communication—JiMC 342 & 342L
3 Lab in Basic Visual Principles—JiMC 342L
3 Lab in Intermediate Visual Principles—JiMC 343L
3 Science Communication—JiMC 347

Minimum 33 Maximum 40

Advt majors need a broad-based academic background that the School seeks to ensure by requiring a designated area of concentration (DAC) made up of 25 credits with at least 15 credits from the 300 or 400 level of the 25 credits. 10 credits are in prescribed courses and 15 credits are from a student-designed advisor approved group of courses excluding Advert and JiMC that will meet the student's professional or academic interests. A second major or minor outside of Advert or JiMC may substitute for the student-designed advisor approved part of the DAC.

The Communication Studies Major
The communication studies major prepares students for careers in business, industry, and graduate education. Students majoring in Communication will find their career opportunities enhanced in professions requiring applied communication expertise e.g., human resource management, personnel training, and development, sales management, organizational development, business communication, and international and intercultural relations.

ComSt majors need to master a focused course of inquiry into the contemporary study of human communication. The ComSt major provides this focus through emphasis in applied communication theory and research in interpersonal, small group, organizational and intercultural communication.

ComSt majors must earn at least 124.5 credits with 45 credits at the 300-400 level and a minimum of 36 credits in ComSt.

The Core for the Communication Studies Major

Foundation Requirements (12 credits)
3 Introduction to Communication Studies—ComSt 101
3 Introduction to Interpersonal Communication—ComSt 102
3 Introduction to Communication Research Methods—ComSt 203
3 Select one of the following:
3 Professional Communication—ComSt 214
3 Conflict Management—ComSt 218
3 Upper Division Requirements—ComSt 218

Examination for Communication Studies Major:

3 Interpersonal Communication—ComSt 404B
3 Small Group Communication—ComSt 404C
3 Organizational Communication—ComSt 404F
3 Intercultural Communication—ComSt 404E
3 Nonverbal Communication—ComSt 404F
3 Training and Development—ComSt 404G

3 Total Enhancement Requirement (4 credits)
3 Principles of Statistics—Stat 101

The Journalism and Mass Communication Major

The major in Journalism and mass communication prepares students for careers that involve all aspects of news and media. The emphasis is on generating ideas, organizing writing, editing, and presenting information for various audiences.

Graduates most likely will work in magazines, newspapers, electronic media, public relations, and public information as well as related disciplines that expect articulate and informed writing and presentation. Students select one of five emphases: electronic media studies, print media (magazine and newspaper), public relations, public information, and journalism.

A sixth option is also available that allows the student to pursue a general program of study.

To be a JiMC major a student must successfully complete JiMC 110, 115, and 201. To receive a bachelor's degree, a student must earn at least 124.5 credits. If these, at least 45 credits must be at the 300 and 400 course level. At least 62.5 credits must come from the liberal arts and sciences excluding Advert and JiMC. The degree requirements allow for a minimum of 33 and a maximum of 40 credits to be taken in Advert and JiMC.

The Core for the Journalism and Mass Communication Major

Foundation Requirements

Pre Major Requirements (6 credits)
3 Mass Media and Society—JiMC 101
3 Orientation to Journalism and Mass Communication—JiMC 110
3 Reporting and Writing for the Mass Media—JiMC 201

Requirements of all JiMC majors (9 credits)
3 Intermediate Reporting and Writing for the Mass Media—JiMC 202
3 Reporting and Writing for the Electronic Media—JiMC 206
3 Law of Mass Communication—JiMC 460
3 Professional Media Internship—JiMC 498

Requirements determined by emphasis (minimum of 12 credits). Emphasis based courses must be selected from courses numbered from JiMC 220 to JiMC 355.

Minimum of 6 credits must be selected at the 400 level. At least one of which must be JiMC 401, 406, 453, 461, 462, 464, 470, 474, 475 or 477. The remaining 3 credits to be determined by emphasis area.

Additional credits can be selected from any JiMC courses numbered 220 and above.

Total Minimum 33 Maximum 40

Enhancement Requirement (4 credits)
4 Principles of Statistics—Stat 101 or equivalent

JiMC majors need a broad-based academic background that the School seeks to ensure by requiring a Designated Area of Concentration (DAC) made up of 24 credits. All courses for the DAC must be taken outside of Advert and JiMC. At least 15 credits must be from the 300 and 400 level; this is a student-designed advisor approved group of related courses that will meet the student's professional or academic interests. A second major or two minors may substitute for the DAC.

Minors
Advertising
To become an advertising minor, the student must have achieved a score of 26 or higher on the ACT English examination, 590 or higher on the SAT verbal exam, or have passed the School's English usage test and have earned a grade of at least a C+ in JiMC 201.

JiMC majors may not minor in Advert. Advertising minors are required to complete at least 18 credits in Advert and JiMC courses. This includes 9 credits for the core (JiMC 201 with a C+ or better, Advert 230 and Advert 301) and either Advert 434 or 436 (3 credits) at the 300-400 level in Advert or related JiMC courses and 3 credits of Advert or JiMC electives.

Communication Studies
The requirements for a minor in Communication may be fulfilled by credit in ComSt 101 plus at least 15 additional hours of communication studies of which 9 credits are in courses numbered 300 or above. Students must earn a grade of C or better in all courses taken for the minor. No credits in 490, 499, or 590 may apply toward the minor.

Journalism and Mass Communication
JiMC minors are designed within each of the School's emphasis areas. See the School's literature or an advisor in JiMC for information. Advert majors may not minor in JiMC.

To become a JiMC minor, the student must have achieved a score of 26 or higher on the ACT English examination, 590 or higher on the SAT verbal exam, or have passed the School's English usage test and have earned a grade of at least a C+ in JiMC 201 and in either JiMC 202 or JiMC 206.

JiMC minors are required to complete at least 18 credits in JiMC or Advert courses. This includes 6 credits in the core (201 and either 202 or 206) 6 credits from courses numbered 220 to 355 and 3 credits from among 400-level courses and 3 credits of JiMC for Advert elective.

Graduate Study
The Greensleeve School of Journalism and Communication offers options for a master of science degree in journalism and mass communication. Two tracks are available, one for students who desire specialized study in communication theory and research, and another for students who wish to develop or strengthen professional skills. A minor in journalism and mass communication is available for students taking major work in other departments.

Majors plan programs of study in one of two concentrations:

I Communication as a Social Science
The School offers advanced academic preparation in communication theory and research leading to the master of science degree. Graduate work prepares students to use and contribute to research and scholarship in the field of communication. The degree requires a thesis based on original research. The maximum time limit is six years from admission.

Areas of research emphasis include social theory, communication and society, research methodology, interpersonal communication, and research methods. The degree requires a thesis or a comprehensive examination.

II Communication as a Profession
The School offers advanced professional training in journalism and mass communication leading to the master of science degree. Graduate work prepares students for professional careers in a variety of mass communication fields. Students with limited training or experience in journalism and mass communication may be required to complete professional skills courses in their program. The degree requires a comprehensive examination or a thesis.

Areas of professional emphasis include: journalism, writing and reporting for the traditional and new media.
media visual journalism and strategic communication

All students in the two degree emphases must complete four core courses: Introduction to Graduate Study in Journalism and Mass Communication (JI MC 592) Theories of Mass Communication (JI MC 501) Communication Research Methods (JI MC 520) and Seminars in Mass Communication (JI MC 598). Each student selects elective courses based on their major field and Program of Study Committee.

Courses open for nonmajor graduate credit: JI MC 460, 461, 464, and 477

Advertising (Advt)
Courses Primarily for Undergraduate Students

Advt 230 Advertising Principles (3-0) Cr 3 FSPREQ, SAHOMORPHIC Classification, social economic, and legal aspects of advertising. Evaluations of advertising research, strategy and appeals. Study of the creation of print and broadcast advertising.

Advt 301 Strategic Planning for Advertising and Public Relations (Same as JI 301) (3-0) Cr 3 FS. PREQ, Advt 230 or JI MC 220. Majors and minors must also have credit or concurrent enrollment in JI MC 201. Prospect analysis market segmentation post positioning planning public opinion formation communication strategy formation and development of critical thinking skills.

Advt 334 Advertising Creativity (2-2) Cr 3 FS PREQ, Advt 301 Development and execution of creative advertising materials. Copyrighting, art direction, and computer applications for print broadcast and digital media. Creative strategy development, execution, and evaluation.


Advt 336 Advertising Media Sales and Management (3-0) Cr 3 FSPREQ, Advt 301 and Advt 335 Fundamentals of advertising media sales with emphasis on sales techniques, presentation skills, and strengths of competing media. Includes development of sales and training materials for a variety of media sales situations.

Advt 434 Advertising Campaigns (3-0) Cr 3 FS PREQ, Advt 301 and 334 or 335 or 336 Development of advertising campaigns for business and social institutions. Projects involving budgeting, media selection, market analysis, campaign strategy, and creative execution.

Advt 435 Advanced Advertising/Public Relations Campaigns Cr 3 to a maximum of 3 credits. 5 PREQ, Permission of instructor Junior/senior standing strongly recommended. Preparation of materials for regional and national competitions.

Advt 436 Advertising Portfolio Practicum (0-0) Cr 3 PREQ, Advt 334 or portfolio review. Advanced advertising writing and design. Emphasis on creating advertising strategy problem solving and execution of creative materials in print broadcast and on line media for a variety of clients.

Advt 497 Seminar in Advertising Cr 1 to 3 Seminars or one-time classes on topics of relevance to students in advertising.

Communication Studies (ComSt)
Courses Primarily for Undergraduate Students

ComSt 101 Introduction to Communication Studies (3-0) Cr 3 FS. An introduction to communication theory, the development and functions of communication and a survey of interpersonal, small group, organizational, and intercultural communication.

ComSt 102 Introduction to Interpersonal Communication (3-0) Cr 3 FS. Application of communication principles and theory to research on the process of interpersonal communication improvement of communication skills most relevant to a broad range of interpersonal settings.

ComSt 203 Introduction to Communication Research Methods (3-0) Cr 3 FS. An introduction to analyzing and conducting communication research. Includes theory development, statistical methodologies.

ComSt 214 Professional Communication (3-0) Cr 3 FS. Communication theory and skill development in organizational settings. Emphasis on interpersonal skill development, team building, and meeting facilitation, informational interviewing, and team presentations and self-assessment.

ComSt 218 Conflict Management (3-0) Cr 3 S Exploration of communication theories, principles, and methods associated with effective conflict management in interpersonal and organizational contexts.

ComSt 301 Human Communication Theory (3-0) Cr 3 PREQ, 101. Examination of the major theories related to human communication with particular emphasis on theories underlying interpersonal small group organizational, and intercultural communication.

ComSt 310 Intercultural Communication (3-0) Cr 3 PREQ, 101 or 202. 301. Examines the theories, principles, and research in intercultural communication. Emphasis on the nature of intercultural sensitivity and the role of cultural values. Explores the role of cultural values in the development of cultural identity and the role of culture in shaping human behavior.

ComSt 311 Interpersonal Communication Theory and Research (3-0) Cr 3 PREQ, 102 or 203. 301. A study of contemporary interpersonal communication theories and research. Emphasis on relational development research including initiation maintenance conflict resolution and dissolution.

ComSt 314 Organizational Communication (3-0) Cr 3 PREQ, 101 or 202. 203. 301. Theory and research in organizational communication strategies for assessing and improving individual and organizational communication effectiveness. Understanding of organizational communication is created and sustained through human communication.

ComSt 317 Small Group Communication (3-0) Cr 3 PREQ, 101 or 202 or 203. 301. Theory and research in small group communication applications to group decision making and leadership. Includes communication analyses of groups and teams.

ComSt 326 Nonverbal Communication (Same as Ling 325, SP CM 325) (3-0) Cr 3 PREQ, 101 or 102 or 202 or 203. 301. Theory and research in nonverbal communication exploration of nonverbal codes and covert subcodes. Functions of nonverbal communication in various contexts. Student-designed investigations.

ComSt 404 Seminar in Communication Studies (Dual listed with 504) Cr 3 Cr 3 PREQ, a 3 credit 300-level ComSt course plus the appropriate 300-level course. As indicated in paragraph below. A Communication Theory or Research (any 300-level 3 credit course)

B Interpersonal Communication (ComSt 311)

C Small Group Communication (ComSt 317)

D Organizational Communication (ComSt 314)

E Intercultural Communication (ComSt 310)

F Nonverbal Communication (ComSt 326)

G Training and Development (ComSt 314)

ComSt 490 Independent Study Cr 1 to 3 each time taken, maximum of 6 FS SS. PREQ, 9 credits in communication studies and junior classification. Application must be submitted for approval the semester prior to the independent study.

ComSt 498 Professional Internship Cr 1 to 3 each time taken, maximum of 6 FS. Four hundred hours of on-site work is required for 3 hours credit.

Registration by application only. Application must be submitted to Communication Studies faculty adviser for approval the semester prior to the internship.

Courses Primarily for Graduate Students, Open to Qualified Undergraduates

ComSt 504 Seminar in Communication Studies (Dual listed with 504) Cr 3 FS. PREQ, Graduate standing.

A Communication Theory and Research

B Interpersonal Communication

C Small Group Communication

D Organizational Communication

E Intercultural Communication

F Nonverbal Communication

G Training and Development

ComSt 590 Special Topics Cr 1 to 4 each time taken. Application must be submitted for approval the semester prior to the independent study.

Journalism and Mass Communication (JMC)
Courses Primarily for Undergraduate Students

JMC 101 Mass Media and Society (3-0) Cr 3 FS. Communication models and their application to the mass media, the mass communication process, organization characteristics, and responsibilities of the mass media-related professional operations.

JMC 110 Orientation to Journalism and Communication (3-0) Cr 1 Orientation to career opportunities emphasis areas and requirements in the advertising and journalism and mass communication curricula.

JMC 201 Reporting and Writing for the Mass Media (1-4) Cr 3 FS. PREQ, Enlg 105 (or testout) and either a score of 26 or higher on the ACT English examination of 590 or higher on the SAT verbal exam or a passing score on the School’s English usage test. Generating story ideas, exercising news judgment, and gathering information via interviews, observation, and documentary sources to produce news and informational material for the mass media. Emphasis on analyzing and organizing information as well as accuracy and principles of good writing.

JMC 202 Intermediate Reporting and Writing for the Mass Media (1-4) Cr 3 FS. PREQ, JMC 201. 30 credits with a grade of C+ or better. Covering standard news assignments, beats for student print publication. Enhancing and refining skills in developing sources and generating story ideas; information-gathering techniques reporting and writing; Includes segments on local government and judiciary. Primarily designed for students interested in working for newspapers, magazines and online media.

JMC 205 Publicity Methods (3-0) Cr 3 FS. PREQ, Enlg 105. Communication and publicity fundamentals and the use of media for publicity purposes. Preparing releases for print and broadcast; basics of publication layout. Publicity campaigns Not available to JMC and JAdv majors.

JMC 206 Reporting and Writing for the Electronic Media (3-0) Cr 3 FS. PREQ, JMC 201. 30 credits with a grade of C+ or better. Researching organizing and writing for audio and visual media. Basic principles of news information, and entertainment programming content and structure.

JMC 220 Principles of Public Relations (3-0) Cr 3 FS. PREQ, Sophomore classification. Introduction to public relations in business, government, and non profit organizations. Functions processes and management of public opinion and information overview of theory.

JMC 301 Strategic Planning for Advertising and Public Relations (Same as Advrt 391) (3-0) Cr 3 FS. PREQ, Advrt 230 or JMC 220. Majors and minors must also have credit or concurrent enrollment in JMC 201. Prospect analysis market segmentation post-strategic planning public opinion formation communication strategy formation, and development of critical thinking skills.
Landscape Architecture 263

Graduates are able to begin to apply creative and
technical skills and scientific cultural and political
knowledge in the planned arrangement of natural and
constructed elements on the land with a concern for the
stewardship and conservation of natural and architectural
resources. The resulting environments shall serve useful aesthetic and
enjoyable purposes. Graduates are able to communicate
clearly and work effectively with others on
complex land design and planning problems. They understand the
cultural and environmental dimensions of issues involving changes in the
landscape.

The purchase or lease of a laptop Computer
and appropriate software is recommended for
students entering the professional program.

The curriculum is accredited by the American Society
of Landscape Architects and provides the education
which combined with experience is necessary for
professional registration.

The curriculum is composed of a one year
preprofessional program and a four year professional
program. Admission into the professional program
depends upon availability of resources and is subject to the
approval of a faculty committee at the completion of the
preprofessional program. Scholastic performance
aptitude and personal development are the
qualifications considered. The department also
cooperates in the undergraduate minor in design
studies.

For undergraduate curriculum in landscape
architecture leading to the degree of bachelor of
landscape architecture see College of Design Curricula

Graduate Study

The department offers opportunities for post-
professional study leading to the degree master of
landscape architecture. Minor work is offered to students seeking major work in other departments.

The M.L.A. degree is granted upon completion of 36
credits and the acceptance of a thesis or creative
component. Typically the program will require four semesters of study for students with a bachelor's
degree in landscape architecture. Students with a
bachelor's degree in landscape architecture may also enter as special program to earn both the M.L.A. and
the master of community and regional planning
(M.C.R.P) degrees in three years. Graduate students
do not possess a bachelor's degree in landscape
architecture may complete the additional coursework in the fundamental skills area of the profession. This
is accomplished by concurrent enrollment in the
undergraduate program to earn the B.L.A. degree
before fully engaging in graduate study. The time
necessary to earn the B.L.A. degree, in addition to the M.L.A.
will vary according to the student's background upon
admission. Students interested in the concurrent
programs should contact the department to receive a
detailed description of requirements.

Graduates have a broad understanding of landscape
architecture and related disciplines. They are able to
communicate effectively with colleagues in the
sciences and humanities as well as in the allied
professions. Graduates are prepared to work
individually and in multidisciplinary teams to

Landscape Architecture

www.public.istate.edu/~land_arch

J Timothy Keller, Chair of Department

Professors Anderson Hightshoe Keller

Distinguished Professors (Emeritus) Dyas

Professors (Emeritus) Soon Harvey Lane

Associate Professors Badenhop Chisdler Engler Grundmann Main

Associate Professors (Collaborators) Patchett

Assistant Professors Hoffmann Kyber Langhorst

Miller Wagner

Assistant Professors (Adjunct) Kane M Miller

Pritchard

Undergraduate Study

The profession of landscape architecture is concerned
with the quality of land use. It involves
analysis of environmental factors and human needs
which leads to recommendations for the planning
design management conservation and/or
development of landscapes. The profession involves
itself in a broad range of landscapes in urban
suburban rural and wilderness settings. The scale of
complex problems dealing with the physical environment. They are engaged in undertaking research and/or creative activities and communicating the results of these efforts in a concise and persuasive manner.

Courses open for nonmajor graduate credit: 302 481 480

Courses Primarily for Undergraduate Students

L A 101 Landscape Architectural Design and Visualization I (19) Cr F Prereq Concurrent enrollment in L A 141 recommended. Introduction to landscape architectural visualization and interpretation. Landscape composition and design explored through analytic and expressive drawings. Photo copes models and computers.

L A 102 Landscape Architectural Design and Visualization II (19) Cr S Prereq L A 101 Introduction to landscape architectural design. Projects with an emphasis on cultural expression, environmental ethics, and technical details of the design process.

L A 103 Introduction to Graphic Communication for Planners (2) Cr 3 F Prereq CRP major. Introduction to graphic communication techniques. Basic skills to review and evaluate site plans. Graphic formulation of land use plans and land development and zoning ordinances. Focus on both working and presentation graphics.

L A 141 Introduction to Landscape Architecture (3-9) Cr F Overview of the profession including noteworthy works, areas of practice, theories, philosophies, and approaches of various landscape architects. Lectures, discussions, readings.

L A 201 Studio I Landscape Interpretation and Representation (15) Cr F Prereq Enrollment in the professional program. Reading and representing the varied midwestern landscape. Development of aesthetic sensitivity to the geomorphology, vegetation, and cultural influences on this landscape. Small scale interventions and rendering of landscape phenomena and change. Emphasis is on a variety of documentation and drawing techniques.

L A 202 Studio II Site Planning and Design I (1-15) Cr S Prereq L A 201. Fundamental issues of landscape planning and design at a site scale. Projects introduce a variety of objective and subjective site inquiry methods of space and place making and sensitive integration of architecture and landscape for specific landuses. User needs, precedent study, programming, site engagement, planning design, and exterior space design are expressed through a variety of conceptual planning and written media.

L A 221 Native Plants of the Midwest (2) Cr 3 F Prereq Enrollment in the professional program. Observation and study of the wetland, prairie, and woodland vegetation native to the midwest region. Emphasis on plant communities, their distribution, structure, habitat, and visual appearance. Plant identification and use in landscape design. Precedent and case studies of vegetation preservation restoration and use in built works.

L A 241 Developing Identity as a Landscape Architect (1) Cr F Prereq Enrollment in the professional program. Designed to accompany L A 201. 221 272 281. Development of life skills such as conflict resolution skills, interpersonal communication, and personal development. Examination of personal and other values, background, abilities, attitudes, and hubs of information. Internal decision making and group interaction. Reading, discussion, class activities, keeping a journal, writing.

L A 272 Cultural Landscape Studies (3) Cr 3 F Prereq Enrollment in the professional program. Exploration of cultural landscapes from broad settlement patterns to individual sites with an emphasis on the origins and evolution of Midwestern landscapes. Investigation of the relationships between vernacular and designed landscapes. Landscapes will be considered as mode of cultural production that shape and are shaped by political and economic processes, history, and social, cultural memories. The course will cover the most persistent and ephemeral repositories of culture—lectures, readings, field studies, and writing.

L A 273 Landscape Architectural History Prehistory to 1800 (Same as Dan S 273) (3-0) Cr 3 F Landscape design concepts as observed over time. Outstanding works and significant personalities from prehistory through the 18th century. Development of design vocabulary and significant literature. Social, economic, political, and technical forces contributing to the development of landscape design styles. Lectures, readings, abstracts, reports.

L A 274 The Social and Behavioral Landscape (Same as Dan S 274) (3-0) Cr 3 S Exploration of social and behavioral landscape. Understanding the development of the domestic civic and commercial landscape. The course will focus on a working familiarity with design principles as they relate to the behavior and activities of people across a broad demographic and cultural spectrum. Equipped students to apply these principles to the design of exterior environments. Lectures, readings, discussions, group exercises, and field trips.

L A 281 Investigating Landscape Form, Process, and Detail (1-6) Cr 3 F Prereq Enrollment in the professional program. Exploration of the poetics and principles of landscape architecture. Investigation and interpretation of landform and natural processes such as hydrology, erosion, and sedimentation. Close observation and representation of detail design with an emphasis on material types, and in their connection and weathering. Readings, field studies, and drawings.

L A 301 Site Planning and Design II (1-15) Cr 6 F Prereq 202. Continuation of exploration of landscape planning and design at a site scale. Students explore greater levels of design and program complexity and sophistication. Focus on multiple uses and the refinement of detail elements integrated into site scale design proposals.

L A 302 Regional Landscape Design I (15) Cr 6 S Prereq 301 or permission of instructor. Cultural and natural influences on regional design. Regional patterns, theories, processes, forms, and materials as landscape design influences. Application of ecological concepts and regional design concepts, methods, tools, and data in mitigation design. Use of geographic information systems to model regional processes and reclaim regional patterns.

L A 303 Landscape Design Studio (0-12) Cr 4 each time taken maximum of 8 S S Prereq Enrollment in the professional program. Permission of advisor. Development of solutions for landscape architectural problems and advanced levels of design. A maximum of 8 credits may be applied towards graduation.

L A 308 Field Travel (Cr 1 to 2 each time taken) S S Prereq Enrollment in the professional program. Permission of advisor. Observation of professional practice and landscapes in rural and wilderness areas. Offered on a satisfactory-fail grading basis only.

L A 321 Introduction to Plants of the Midwest (2-3) Cr 3 S Prereq 221. Observation, study, and classification of various plants and horticultural varieties introduced into and cultivated in the midwest region. Emphasis on functional and aesthetic uses and cultural requirements of plants used in landscape design. Preparation of planting plans and plant lists for small scale yard design.

L A 332 Fundamentals of Planting Design (1-9) Cr S Prereq 221. Concurrent enrollment with L A 321 recommended. The art of creating plant compositions in the landscape. Emphasis on compositions using form, color, texture, and space, making qualities of plants. The science of creating plant assemblages that are adapted to the regional and site influences of climate, soils, aspect, drainage, and geomorphology of places. Technologies of preparing design projects, planting plans, use of plant selection software, plant lists, and cost estimates.

L A 341 Contemporary Landscape Architecture (1-0) Cr 1 S Exploration of contemporary landscape architecture practice through individualized research into creative practices. Preparation of paper and presentation outlining a broad framework and specific projects. Selection of a series of contemporary practices using specific projects as examples. Work may result in invitation of current practitioner(s) as a lecture or series event.

L A 371 Landscape Architectural History 1800 to Present (Same as Dan S 371) (3-0) Cr 3 F Landscape design concepts as observed over time. Outstanding works and significant personalities from 1800 to the present. Landscape design vocabulary and significant literature. Social, economic, political, and technical forces contributing to the development of landscape design styles. Lectures, readings, abstracts, reports.

L A 381 Shaping the Land (1-3) Cr 2 S Prereq 281. Introductory surface drainage grading and modeling of land forms and their impacts on the surrounding environment. Road alignment and control, parking, layout, rainfall, and preliminary development of construction documents.

L A 401 Community Landscape Design (1-5) Cr 6 F Prereq 402. Design concepts for larger and rural areas with emphasis on outreach, regional landscape analysis, resource management, impact assessment, public involvement, and land use feasibility. Design for multiple uses with a basis in human ecology and landscape ecology. Planning methods and concepts communicated through drawings, oral presentations, and written reports.

L A 402 Urban Landscape Design (1-5) Cr 6 F Prereq 302. Comprehensive planning and design for urban sites or for sites within urban contexts. Often engaging outreach projects in local communities. Typically involves a variety of integrated design issues, and a mix of methods and tools to cover the full range of design scales from master planning to proposals for site details. Emphasis on written and visual as well as graphic communication. Integrated seminar component will engage topical issues in community design. Previous studies in urban planning and urban design principles.

L A 403 Senior Thesis Preparation (Tutorial) Cr 2 F Prereq 402 and permission of instructor. Preparation for senior thesis.

L A 404 Advanced Landscape Architectural Design (1-5) Cr 6 S Prereq 401. Advanced forums for the demonstration of sophistication in landscape architectural design. Experimentation and innovation are encouraged.

L A 405 Senior Thesis (0-15) Cr S Prereq 401 402 and permission of advisor. Chair and thesis advisor. Individual advanced forum for the demonstration of sophistication in landscape architectural design. Experimentation and innovation are encouraged.

L A 441 Professional Practice (3-0) Cr 3 F Prereq 482. Professional practice in the private or public non-governmental organization and academic setting. Development of organizational and management techniques, proposal preparation, project budgeting and scheduling, project management and control, and construction observation.


L A 451 Landscape Architecture Professional Internship Study Abroad, or National Student Exchange Seminar (10) Cr 1 FS S S Prereq 450. Permission of advisor and chair. Exploration of landscape architectural design implementations and history and theory through professional work.
experience out-of-region national study experience or international study experience

A Professional Internship
B Study Abroad
C National Student Exchange

LA 461 Introduction to GIS (Same as LA 4611) See Iowa Lakeside Laboratory. Nonmajor graduation credit

LA 465 Landscape Change and Conservation (Dual listed with 565 same as NREM 465) (2 cr) 3 F Prereq LA 202 Review of issues in landscape ecology and conservation biology relevant to landscape change design and planning. Examination of foundational principles and their applications across a continuum of land uses from wilderness to urban areas

LA 477 Landscape Architectural Theory (3 cr) 3 F Prereq LA 371 Exploration of the major theories of landscape architectural theory and their relationships to broader cultural and theoretical practices. Examination of key texts and projects in landscape architecture: architecture, art and related fields. Emphasis will be placed on developing critical ways of analyzing ideas. Lectures, readings, discussion, and writing

LA 478 Topical Studies in Landscape Architecture (Dual listed with 568 same as DSN 578) (I2 or 3 cr) 3 Cr or 2 cr each time taken. (F or S) Preq LA 371 or senior classification or graduate standing

A Landscape Design
B Planting Design
C Construction
D History/Theory/Criticism
E Landscape Planning
F Urban Design
G Graphics
H Honors
I Interdisciplinary Studies
J International Studies
K Computer Applications
L Ecological Design

LA 480 Introduction to Environmental Planning (Same as LA 480) See Iowa Lakeside Laboratory. Nonmajor graduation credit

LA 481 Landscape Construction (1 cr) 2 F Preq LA 381 Solving complex site structure problems with an emphasis on the aesthetic and functional uses of building materials. Characteristics and uses of construction materials. Wood technology and structural theory of paving systems. Retaining walls, preliminary design of contract documents

LA 482 Advanced Landscape Construction (3 cr) 1-15 Cr 2 S Preq LA 481 Advanced landscape construction concepts and detailing. Water and irrigation systems. Mechanical and electrical systems. Site lighting. Project scheduling, cost and final contract document preparation with drawings and specifications

LA 490 Independent Study Cr 1 to 4 (F or S) Preq Written approval of instructor and department chair on required form. Investigation of a topic of special interest to the student

A Landscape Design
B Planting Design
C Construction
D History
E Landscape Planning
F Urban Design
G Graphics
H Honors
I Interdisciplinary Studies
J International Studies
K Computer Applications
L Ecological Design

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

LA 501 Advanced Landscape Architectural Theory (3 cr) 3 F Preq Basic background and permission of instructor. Discussion of landscape design theories. Evaluation of how the landscape is perceived or how that perception is formed. Filtered and focused

LA 509 Mining Reclamation and Mitigation (3 cr) 3 Alt S offered Fall 2005. Preq Admission to graduate program or permission of instructor. Historical and cultural attitudes toward mining and reclamation environmental impacts of mining and reclamation planning. Pre and post mining inventories and legal requirements for mining and reclamation

LA 541 Principles of Research for Landscape Architects (3 cr) 3 F Preq LA 371 Research of the major theories of landscape architecture and their relationships to broader cultural and theoretical practices. Examination of key texts and projects in landscape architecture: architecture, art and related fields. Emphasis will be placed on developing critical ways of analyzing ideas. Lectures, readings, discussion, and writing

LA 562 Studio in Resource Conservation and Management (1 cr to 15 cr) 2-6 cr each time taken. (F or S) Preq LA 202 Review of issues in landscape ecology and conservation biology relevant to landscape change design and planning. Examination of foundational principles and their applications across a continuum of land uses from wilderness to urban areas

LA 567 Advanced GIS Landscape Modeling (I cr) 4-8 cr Preq LA 302 or C R P 451/451 Application of Geographic Information Systems (GIS) modeling techniques to landscape planning and management issues. Selection and acquisition of digital landscape data. Modelling applications for studio projects, outreach projects and research projects

LA 572 Landscape Architectural History and Preservation (3 cr) 3 F Preq LA 371 or permission of instructor. Research methods applied to the preservation and restoration of the historic landscape. Outstanding landscape architectural works of the 18th, 19th and 20th centuries will be used to familiarize students with methods of architectural and documentary research. Technical problems of restoration and conservation and curatorial problems of interpretation and maintenance. Lectures and written reports

LA 578 Topical Studies in Landscape Architecture (Dual-listed with 487 same as DSN 578) (2 cr or 3 cr) 3 cr or 2 cr each time taken. F or S Preq LA Senior classification or graduate standing

A Landscape Design
B Planting Design
C Construction
D History/Theory/Criticism
E Landscape Planning
F Urban Design
G Graphics
H Honors
I Interdisciplinary Studies
J International Studies
K Computer Applications
L Ecological Design

LA 580 Thesis (3 cr) 3 F Preq Permission of major professor. Hands-on participation in a creative or research activity in the student’s area of specialization. Development of a detailed prospectus that defines the thesis or creative component

LA 582 Research Colloquium (1 or 2 cr) 1 F Preq Admission to graduate program or permission of instructor. Examination and discussion of professional practice research in landscape architecture and environmental planning through research and projects by faculty in landscape architecture and related fields

LA 590 Special Topics Cr 1 to 4 F Preq Written approval of instructor and department chair on required form

A Landscape Design
B Planting Design
C Construction
D History
E Landscape Planning
F Urban Design
G Graphics
H Honors
I Interdisciplinary Studies
J International Studies
K Computer Applications
L Ecological Design

LA 591 Environmental Law (Same as CRP 591) See Community and Regional Planning

LA 599 Creative Component Cr var F Preq Permission of major professor. Comprehensive study and original development of a project selected by the student and approved by the department. Project must be submitted at the end of the second year. Completed project is required. Approved by faculty committee. Evidence of mastery of the principles of landscape architecture

Course for Graduate Students, Major or Minor

LA 698 Thesis Research Cr var F Preq Permission of professor.

Liberal Arts and Sciences Cross-Disciplinary Studies

Zora D. Zimmerman Associate Dean for Academic Programs

Cross-disciplinary studies in the College of Liberal Arts and Sciences encompass programs of study and courses that cross established departmental lines

Cross-Disciplinary Programs

African American Studies Program (Minor only) See Index African American Studies

American Indian Studies Program (Minor only) See Index American Indian Studies

Biological/Premedical Illustration Program (Major or minor) See Index Biological/Pre Medical Illustration

Classical Studies (Minor only) See Index Classical Studies

Criminal Justice Studies (Minor only) See Index Criminal Justice Studies

Emerging Global Disease (Minor only) See Index Emerging Global Disease

Environmental Science (Major or minor) See Index Environmental Science

Environmental Studies (Secondary major or minor) See Index Environmental Studies

The Honors Program in Liberal Arts and Sciences See Index Honors Program

Interdisciplinary Studies Program (Major only) See Index Interdisciplinary Studies

International Studies Program (Second major or minor) See Index International Studies

U 5 Latina/o Studies Program

Program Director H. Avalos

U 5 Latina/o Studies Program is devoted to the study of Mexican Americans, Puerto Ricans, Cuban Americans, and other Latin American and Hispanic groups in the United States who trace their ancestry to the Spanish-speaking countries of Latin America, and who comprise the fastest growing ethnic groups in America.
a Studies is to be distinguished from Latin American studies, which focuses on people living in Latin America. The methodology of U.S. Latin American Studies is cross-disciplinary, drawing from the methods established in anthropology, sociology, political science, economics, history, literary studies, and other fields.

In addition to the general requirements of a major in interdisciplinary studies, see Index. Interdisciplinary Studies: a major in interdisciplinary studies focusing on U.S. Latin American Studies would require the completion of 24 credit hours. At least 15 of the 24 credits must be in courses numbered 300 and above. These 24 credits in the major focusing on U.S. Latin American Studies must include the following courses, each of which is worth three credits:

- LAS 211 (Introduction to U.S. Latin American Studies)
- LAS 321 (Peoples and Cultures of Latin America 1) (Course with a seminar requirement for seniors, or a course in U.S. Latin American history 1)
- LAS 331 (The Latin American Experience 1)
- LAS 332 (The Latin American Experience 2)

The student must have an average grade of C in the required courses of the major. Fulfillment of the foreign language requirement with Spanish is strongly recommended but not required. For a list of other eligible courses and more information on the U.S. Latin American Studies Program, contact the program committee chair.

Linguistics Program (Major or minor, graduate minor) See Index: Linguistics.

Premedical and Preprofessional Health Programs See Index: Preprofessional Study.

Speech Communication Program (Major or minor) See Index: Speech Communication.

Teacher Education Program See Index: Teacher Education Courses and Programs.

Technology and Social Change (Minor, graduate minor) See Index: Women's Studies.

Women's Studies Program (Major or minor) See Index: Women's Studies.

Courses Primarily for Undergraduate Students

LAS 101 Orientation for Open Option and Preprofessional Students (10 Cr 0 5 FS: First 10 weeks. Liberal Arts and Sciences staff. Self-responsibility examination to provide a self-evaluation of the student's readiness for college work. Required of all first-year students in the Open Option and Preprofessional Health Programs. Offered on a satisfactory-fail grading basis only.

LAS 104 Personal Career Development (2 Cr 0 2 FS: Prereq: 12 credits of ISU coursework. Comprehensive approach to personal career development. Intensive self-analysis and utilization of a computerized career exploration system contact with area professionals. Examination of work in modern society and the impact of technology on the future of work exposure to job search skills necessary for career choice implementation.

LAS 120 Study Abroad Credit (Same as IntS: 120) See International Studies.

LAS 129 Introduction to Creativity (3 Cr 3 S Creativity and humor in the problem-solving process. The use of lateral thinking for developing new ideas.

LAS 130 Cross Cultural Learning Community Seminar (1 Cr 0 1 Seminar for participants in the Cross Cultural Learning Community. The focus is on developing students' cross-cultural communication skills. Increasing their awareness of international concerns and introducing them to international sources of information available at the University. Offered on a satisfactory-fail grading basis only.

LAS 150 Society Culture and Change in a Diverse Nation Cr 3 Prereq: Approval of instructor. An analysis of contemporary patterns of diversity in the United States. The focus will be on patterns of gender, class, race, ethnicity, nationality, and regionalism. And the development of a multicultural society. There will also be analysis of multiculturalism and national character.

LAS 211 Introduction to U.S. Latin American Studies (3 Cr 3 S A survey of the people in the United States who trace their origin to the Spanish-speaking countries of Latin America, focusing primarily on Mexican Americans, Puerto Ricans, and Cuban Americans. History, religion, social structure, political participation, literature, and other aspects of each group within the framework of various sociological theories of ethnic identity and relationship.

LAS 220 Study Abroad Credit (Same as IntS: 220) See International Studies.

LAS 236 Introduction to International Studies (Same as IntS: 236) See International Studies.

LAS 250 Cultures in Transition Cr 3 An interdisciplinary introduction to a world in a state of rapid social and cultural transition. Discussion of the history, social and political institutions, arts, economy, agriculture and environment of the new nations.

LAS 290 Special Problems Cr 1 to 3 each time taken, 5 FS: Prereq: Freshman or sophomore classification. This course may be taken only with permission of the Dean of the College of Liberal Arts and Sciences. G Cart Center Project Cr 1 to 3.

LAS 298 Internship/Copr Cr 5 FS: Prereq: Permission of Business/ Liberal Arts and Sciences Career Services and the College of Liberal Arts and Sciences. Junior classification. Students participating in an internship or co-op on a full-time basis must register for this course prior to beginning their work experience. Students in full-time student status.

LAS 317 Student Teaching Cr 0 5 to 8 each time taken. FS: Prereq: 466 admission to teacher education program and approval of coordinator during semester of student teaching. Evaluation of instructional lesson planning and teaching in the liberal arts and sciences.

K Music – Secondary

L Music – Elementary

LAS 420 Study Abroad Credit (Same as IntS: 420) See International Studies.

LAS 430 Seminar in International Studies (Same as IntS: 430) See International Studies.

LAS 480 Field Experience for Secondary Teaching Certification Cr 0 5 to 2 each time taken. Maximum of 2. Observation and participation in a variety of school settings after admission to the teacher preparation program. Permission of area coordinator required prior to enrollment. (S/F grading may be used in some other programs sections).

A History/Social Sciences

B Physical Sciences

C Mathematics

D Biological Sciences

F Speech Communication

J Earth Sciences

K Music

LAS 490 Independent Study Cr 0 3 FS: Prereq: Permission of the dean of the College of Liberal Arts and Sciences. No more than 8 credits of LAS 490 may be applied toward graduation. This course may be taken only with the permission of the dean of the College of Liberal Arts and Sciences.

G Cart Center Project.

LAS 498 Internship/Copr Cr 0 3 FS: Prereq: Permission of Business/Liberal Arts and Sciences Career Services and the College of Liberal Arts and Sciences. Junior classification. Students participating in an internship or co-op on a full-time basis must register for this course prior to beginning their work experience. Students in full-time student status.

LAS 499 Internship Cr 1 to 4 FS: Prereq: Permission of the dean of the College of Liberal Arts and Sciences. Work experience in professional setting appropriate to the student's degree program. Academic work under faculty supervision may include written projects, reports, and guided reading.
486 487 524 525 To graduate with a major in linguistics a student must earn a C (not a C-) or better in each of the courses taken to fulfill the minimum requirements for the program of study in linguistics. Students who believe they have extenuating circumstances may appeal to the chair of the supervisory committee. Addition maps in linguistics must show proficiency in a foreign language equivalent to that achieved after two years of university-level study.

Minors in linguistics are usually individually tailored to the interests of the student who consults with the chair of the supervisory committee for Linguistics. All minors must have a minimum of 15 credits in linguistics of which 6 must be in courses numbered over 200. All programs must include Lng 219 or 309.

English proficiency requirement. The linguistics program requires grades of C or better in each of the following: English 104, 105 or 105H and one of English 305, 314, or a Foreign Language 370 course.

For information about using linguistics courses in an interdisciplinary studies major see the Interdisciplinary Studies Program.

Graduate Study

A graduate minor in linguistics is offered through a cooperative agreement with the departments and programs of Anthropology, Computer Science, English, Foreign Languages and Literatures, Psychology and Speech Communication. The minor permits students to investigate a variety of aspects of linguistics emphasizing the ability to think about language in a systematic and disciplined way and to apply the methods of the field to research problems in their own disciplines.

Courses for the Master's degree are selected with the approval of the Chair of the Supervisory Committee. A minimum of 12 credits in linguistics is required. Of these, at least 9 credits must be in linguistics, including two foundation courses (512 and 514), and at least one elective from the list of courses approved for graduate credit in Linguistics. The Ph.D. minor must include a thesis project and a dissertation.

Linguistics

www.engiu.edu/linguistics.html

Interdepartmental Program

Program Committee: Dr. Richard Prince, Dr. J. Dow, Dr. Douglas B. Schwartz and Dr. Christopher H. van der Veer.

Undergraduate Study

The linguistics program is a cross-disciplinary program in the College of Liberal Arts and Sciences designed to meet the needs of students interested in various aspects of language—its structure, history, varieties and meaning—and uses the program includes courses in anthropology, computer science, foreign languages and literatures, psychology and speech communication. This provides a multidisciplinary approach to the study of human language.

Courses in linguistics serve as background for students interested in any career that involves working with language, such as anthropology, computer science, foreign languages and literatures, psychology and speech communication. Teaching English as a second language to non-native speakers is also an area of interest for students enrolled in the linguistics program.

In the College of Liberal Arts and Sciences, courses in linguistics can be applied as electives or part of the general requirements. They may also be used in a minor or as a major.

Majors in linguistics complete a minimum of 33 hours in courses from the list below. Courses specifically required are Lng 219, 309, 371, 419 and one of the following: 420 or 498. Credit for only one course from the following set may be applied toward the major.
Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Mgmt 540 Strategy Formation: 1.Cr 1 1.F Preg Graduagte classification An introduction to the strategic planning processes. How to formulate strategy in context of environmental opportunities and threats to how analyze industry competition and build competitive advantages

Mgmt 541 Organizational Behavior: 2.Cr 2 F Preev Graduat Prerequisite Understanding human behavior in organizations and the nature of the organization from a managerial perspective. Special emphasis is placed on how individual differences such as perceptions, personality and motivation influence individual and group behavior in organizations and on how behavior can be influenced by job design, leadership groups and the structure of organizations

Mgmt 542 Ethics and Social Responsibility: 1.Cr 1 S Preg Graduat Prerequisite Classification The ethical issues moral dilemmas and stakeholder responsibilities. The morality of current management models and practices. Corporate governance and control moral reasoning in groups whistleblowing employee safety and health adversing environmental pollution plant closings insider trading employer rights

Mgmt 543 Strategic Management: 2.Cr 2 S Preg 501 507 POM 512 MIS 553 Mkt 504 Fin 505 Acct 508 Critical analysis of case studies in strategic management with an emphasis on integrative decision making. Strategy implementation in light of the legal regulatory and political contexts of business

Mgmt 544 Technology Transfer and Feasibility Analysis: 3.Cr 3 S Preg Graduate classification Commercialization of new technology. Topics covered include market analysis, intellectual property product development, feasibility analysis and new business evaluation

Mgmt 545 Entrepreneurship and New Business Creation: 3.Cr 3 Preg 512 The essentials of starting and operating a new business. Topics include current research on entrepreneurial perspectives and starting a new business. Financing the venture managing the growing firm and special issues

Mgmt 546 Managing Employee Attitudes and Behaviors: 3.Cr 3 S Preg 501 or 507 or 450 Advanced topics in the management of employee performance. Commitment and job satisfaction. Employee turnover stress leadership and career development (e.g. career ladders mentoring)

Mgmt 547 Seminar in Human Resources Management: 3.Cr 3 Preg 501 or 507 or 420 Topics and issues in personnel management with a focus on the management of human resources in organizations. Current personnel practices. Philosophies and behavioral science research

Mgmt 548 Employment Law for Managers: 3.Cr 3 Preg Graduate classification Survey of employment law for managers. Topics include hiring employees, employment ethics (e.g. special books, harassment, drug testing discipline) union relations and termination of employment (e.g. COBRA)

Mgmt 549 Compensation Management: 3.Cr 3 S Preg 571 Concepts techniques and issues dealing with remuneration of the workforce. The impact of government legislation as well as organizational and societal issues

Mgmt 550 Strategic Planning and Environmental Analysis: 3.Cr 11.Cr 101 Prerequisite Discussion of concepts and techniques used in long range strategic planning. Examination of planning practices in business and not for profit organizations. Topics include environmental scanning, industry analysis, forecasting competitive and comparative strategies and tactics

Ling 590 Special Topics (Same as Anthr 590) See Anthropology Acceptable only when taught as a course in linguistics.

Ling 590B. Special Topics Teaching English as a Second Language (TESL) Linguistics (Same as Eng 590B) See English.


Management

Russell L. Czuczak Chair of Department

Distinguished Professors Wortman

University Professors Morrow

Professors Chacko Hunger McEneny Shadder Van Auken Weber

Associate Professors Blackburn DeMane Johnson

Associate Professors (Emeritus) Anichson

Assistant Professors Hermann Kaufman

Lecturers Smith

Undergraduate Study

For undergraduate curriculum in business major in management see College of Business Curriculum

The Department of Management offers a major in management. Students will complete the general education requirements (including business foundation courses), and business core requirements for the bachelor of science degree (B.S.) Management is a broad discipline and activity which is neither industry nor function specific. Management concepts theories, techniques and skills are applicable to all business functional areas and are essential components for successful organizational management. The department requires sound conceptual technical and human skills for the effective utilization of organizational resources. For the management major students are required to take Mgmt 371, 374, 471, and 472. In addition students select two courses from an approved list to complete the bachelor of science degree.

The department also offers a minor in management majors in the College of Business. The minor requires 15 credits from an approved list of courses of which 9 credits must be taken within the department. Students with declared majors have priority over students with declared minors in courses with space constraints.

Graduate Study

The Department of Management participates in three graduate programs: the M.B.A. in Business, the M.B.A. full time and part time programs and the interdisciplinary M.S. degree in Industrial Relations. The M.B.A. in Business is a 30-credit curriculum culminating in a thesis. The M.B.A. program is a 48-credit hour curriculum. Twenty four of the 48 credit hours are core courses and the remaining 24 are graduate electives. A student can obtain a specialization in Human Resource Management by taking 12 credit hours of courses from a selected list of courses. Finally the department is one of several participating departments offering coursework leading to an interdisciplinary M.S. in industrial relations.

Courses open for nonmajor graduate credit: Mgmt 414, 415, 472, 479

Courses Primarily for Undergraduate Students

Mgmt 310 Entrepreneurship and Innovation: 3.Cr 3 S Preg Junior classification. Review of the entrepreneurial process with emphasis on starting a new business. How to analyze opportunities develop an innovative product organize financing, launch and manage a new venture. Deals with the role of the entrepreneur and the importance of a business plan. Speakers and field project.

Mgmt 313 Feasibility Analysis and Business Planning: 3.Cr 3 S Preg 370 Developing an idea for a new business venture conducting a feasibility study researching the potential market analyzing the competition and writing a business plan. Basic business functions are discussed in terms of their application to conducting feasibility analyses and writing a business plan for an entrepreneurial venture.

Mgmt 370 Management of Organizations: 3.Cr 3 S S S Preg Econ 101 A management functions approach needed to explain what managers do in organizations how they deal with external constituents how they structure their companies and how they deal with employees. A contingency approach is used as a framework for understanding how to increase the effectiveness and efficiency of organizations in today's dynamic highly competitive business environment.

Mgmt 371 Organizational Behavior: 3.Cr 3 S S S Preg 370 The study of individual attributes interpersonal relations and employee attitudes in organizations. Instructional emphasis is placed on how management concepts such as reward systems job design leadership teams etc. can be used to manage employee attitudes and behavior.

Mgmt 377 Competitive Strategy: 3.Cr 3 S S S Preg Econ 101 and junior classification. Developing competitive strategy and achieving competitive advantage in business. Industry analyses generic strategies: hyper competition competing against time and building distinctive capabilities.

Mgmt 414 International Management: 3.Cr 3 S S S The nature and economic role of the multinational firm and entrepreneurial ventures including the impact of legal political and cultural variables upon firm performance and management activity. Case studies illustrate interdependent nature of functional areas of business projected across national boundaries. Nonmajor graduate credit.

Mgmt 415 Managing NovVentures: 3.Cr 3 S S S Preg 370 Mkt 340 Fin 301 Acct 380 POM 320 Examination of business problems and issues in new and growing firms. Emphasis is on analyzing existing businesses. Includes a field project. Nonmajor graduate credit.


Mgmt 471 Personal and Human Resource Management: 3.Cr 3 S S S Preg Junior standing. Recruitment and selection utilization and development of people in organizations. Examination of each personnel function interpersonal relationships among the functions.

Mgmt 472 Management of Diversity: 3.Cr 3 S S S Preg Junior classification. One of the most crucial problems in organizations today is the management of diversity. Attempts to define the difference between equal employment opportunity/nafiraffive action which has a legal basis and diversity which has an educational basis. Organized around the concepts of (1) cultural diversity and cultural identity (2) development of skills and tools to manage diversity and (3) structure of diversity development programs in organizations. Nonmajor graduate credit.

Mgmt 478 Strategic Management: 3.Cr 3 S S S Preg 370 POM 320 Fin 301 Mkt 340 Acct 380 285. Developing graduate strategy formulation implementation and evaluation and control in today's organizations. Emphasis is on strategic planning and decision making using the case method and other projects.

Mgmt 479 Management Seminar: 3.Cr 3 S S S Preg Senior classification in management and permission of the instructor. Discussion of new or controversial issues in management. Course utilizes advanced material and research drawn from topic areas within management. Nonmajor graduate credit.

Mgmt 490 Independent Study: 1 to 3 cr each term taken. Preg 370 senior classification permission of instructor.
Management Information Systems

(Administered by the Department of Logistics Operations and Management Information Systems)

Richard F Poist Jr Interim Chair of Department
Distinguished Professors: Allen Baume
Professors: Crum Poist
Professors (Emeritus): Thompson Vorhees
Associate Professors: Hendrickson Lerso
Lumnus Mennecke Nialkate Premkumar Ruben Townsend Walter
Asst Professors: Hackathorn Johnson Montabon Strader Suzuki Zhu
Instructors (Adjunct): Blanshan Chang Chobenn Chayon Tandradinata

Undergraduate Study

For undergraduate curriculum in business major in management information systems (MIS) see College of Business Curricula.

The MIS Program is designed to provide students with a strong education foundation that prepares them as information system (IS) professionals. The academic program consists of a specially designed curriculum that emphasizes conceptual, analytical, technical and interpersonal skills. The major offers students comprehensive training for the application and management of information systems to prepare them to provide effective information services and support to organizations. The coursework is designed to provide the technical and conceptual skills associated with the use of information technology in business organizations. The program will impart knowledge on existing and emerging information technologies and their impact on the IS function. To critically analyze business processes identify inefficiencies and problems assess information requirements create solutions and technical specifications for the supporting systems provide expertise to design and develop database applications using the latest database technologies provide expertise in the latest telecommunication technologies train in interpersonel and communication skills to effectively interact with various information systems clients and provide managerial skills to manage IS projects.

To enter the MIS major students must achieve a cumulative ISU grade point average of 2.75 or a grade point average of 2.75 in the foundation (see College of Business Curricula). The MIS major requires students to take six courses. The required courses are:

- Crm S 201
- Mss 311
- Mss 432
- Mss 433
- Mss 435

In addition they will take one additional elective course from an approved list. These courses are designed to provide the conceptual technical and managerial skills necessary to design and develop systems in organizations.

Graduate Study

The MIS area participates in three graduate programs in the College of Business—M.S. in Business MIS and full-time and part-time M.B.A. programs. The M.S. program is a 30 credit hour curriculum with a thesis.

The M.B.A. program is a 48 credit hour curriculum. Twenty-four of the 48 credit hours are core business courses and the remaining 24 credit hours are graduate electives. Students can obtain a MIS specialization in the M.B.A. program by taking 12 credit hours of graduate MIS courses from a selected list of courses.

The masters of science in information systems (MSIS) is a 32 credit (minimum) curriculum designed around three interrelated areas: Foundation, IS and electives. All students are expected to be familiar with basic computing skills before they enter the program. The MSIS will educate students on applying IS theory and concepts to modern IS development through classes that enable them to learn and use the latest software in application projects. Students graduating from the program will have advanced technical and managerial skills to develop and manage information systems projects.

The MIS area also participates in an interdisciplinary MS program in Information Assurance.

Courses open for nonmajor graduate credit:

- Cr 432
- Cr 433
- Cr 435
- Cr 436

Courses Primarily for Undergraduate Students:

MIS 330 - Management Information Systems

For Cr 3 Prereq: Com S 103

The role of information technology in organizations. Overview of methodology for design and development of systems including decision support systems, expert systems, data bases and user computing. Emphasis on computer applications relate concepts to practice. Lecture and laboratory work emphasizes the enabling role of IT in contemporary organizations.

MIS 331 - File Structures and Programming

For Cr 3 Prereq: Com S 207

Introduction to the concepts and uses of data structures: file access and object oriented programming methodologies in contemporary business environments. Object oriented programming languages such as C++ used. Application development environments will be covered.

MIS 342 - Information System Analysis

For Cr 3 Prereq: Com S 207

Critical analysis of business processes, data and process modeling feasibility studies. CASE tools and developing system design specifications. Nonmajor graduate credit.

MIS 343 - Database Management Systems

For Cr 3 Prereq: Com S 207

Database design and implementation on data models for both classical and object oriented. Use relational and object oriented database management systems. Nonmajor graduate credit.

MIS 434 - Electronic Commerce Strategy

For Cr 3 Prereq: Com S 342

Overview of electronic commerce. Emphasis is on the strategic, operational, and technical issues associated with global electronic commerce using class lectures, discussion and case studies.

MIS 435 - Business Telecommunications

For Cr 3 Prereq: Com S 207

Overview of telecommunications technology used in various business applications—local area network, wide area network, broadcast network, wireless and voice network. Understand the role of protocols specifically internet protocols in communications. Train to analyze network requirements and implement area networks. Nonmajor graduate credit.

MIS 438 - Information Systems Development

For Cr 3 Prereq: Com S 207

Design of business systems using contemporary tools and methods such as SQL CASE tools, OOD tools, etc. Emphasis is on synthesizing concepts from earlier MIS courses. Nonmajor graduate credit.

MIS 439 - Topics in Management of Information Systems

For Cr 3 Prereq: Com S 207

Permission of instructor. A variety of topics will be covered and topics may vary between semesters. Some of the topics are information resource management, electronic commerce, decision support systems and expert systems.

MIS 449 - Independent Study

For Cr 1 to 3 credit taken under Prereq 330 senior classification permission of instructor.

Courses Primarily for Graduate Students

MIS 503 - Management Information Systems

For Cr 2 Prereq: Graduate classification. Current theories and practices of information processing and decision making. Focus on information technology and its uses in improving work practices and tools for decision support. Use of artificial intelligence and other advancements in technology to cope with pressures and risks of information technology. Overview of IT strategy, information systems planning and development of enterprise architecture. Focus on systems development and implementation.

MIS 531 - Business Software Development

For Cr 3 Prereq: MIS 503

A survey of business oriented software programming languages with emphasis on design writing, debugging and testing of computer programs for business transaction processing and managerial decision support. Topics include structured programming and file processing.

MIS 532 - Advanced Business Software Development

For Cr 3 Prereq: MIS 531

A survey of business oriented programming languages with emphasis on state of the art development techniques for business software. Topics include object oriented, and Internet programming issues and methods.

MIS 533 - Data Management for Decision Makers

For Cr 3 Prereq: MIS 503

The course will address the data needs of functions such as marketing, finance production etc. The course will focus on teaching advanced data base management skills needed to design, develop and use database data warehousing and data mining systems for effective decision support. Importance of contemporary technologies will be stressed.

MIS 534 - Electronic Commerce

For Cr 3 Prereq: MIS 502

Overview of how modern communication technologies including the Internet and world wide web have revolutionized the way we do business. It will provide an understanding of Internet technologies and how companies are using the Internet for commercial purposes. The course will also explore future scenarios on the use of these technologies and their impact on various industries and society.

MIS 555 - Telecommunications Management

For Cr 3 Prereq: MIS 531

Issues involved in the management of telecommunications systems. Overview of telecommunications technology used in various business applications. This course will involve the design of networks for Internet protocols in communications. Train to analyze network requirements and implement area networks. Nonmajor graduate credit.

MIS 557 - Information Resource Management

For Cr 3 Prereq: MIS 503

Information Resource Management (IRM) is a popular concept describing information systems resources from a strategic resource perspective. This course will present and discuss the IRM concept as well as provide practical tools for implementing this approach within the organization. Topics will include IS outsourcing, total cost of ownership IS planning and strategic analysis. Justification for IT investment, management of IT human resources, traditional project management theory and project management techniques derived from the Theory of Constraints (TOC).

MIS 569 - Business Processes and Systems Development

For Cr 3 Prereq: MIS 503

Discusses the theory and techniques used to analyze information systems to support various business processes. The course also discusses the theory and concepts related to business systems design such as data and process modeling. Emphasis is on development of theory database management systems design and developing technical specifications for a business system. A working prototype for a business application will be developed using popular software development packages.

MIS 579 - Topics in Management of Information Systems

For Cr 3 Prereq: MIS 503

A variety of topics may be offered in different semesters. Topics may include electronic commerce, information resources management, decision support systems and expert systems.

Management Information Systems
Management Information Systems

MIS 590 Special Topics Cr 1 to 3 each time taken
Preq: Permission of instructor For students wishing to do individual research in a particular area of MIS

MIS 599 Creative Component Cr 3 Prequ: Graduate classification permission of supervisory committee chair Preparation and writing of creative component

Courses for Graduate Students

MIS 649 Research Cr 3 to 6 arranged FS SS
Preq: Graduate classification permission of major professor Research

Marketing

Russell N Laczniak Chair of Department
Distinguished Professors Teas
Professors Laczniak Ramaswami
Professors (Emeritus) Zober
Associate Professors Agarwal Barone DeCarlo Polan Wong
Assistant Professors Mallatou Norman
Lecturers Aklil

Undergraduate Study

For undergraduate curriculum in business major in marketing see College of Business Curricula

In addition to the business core, marketing majors are required to complete 18 credits of marketing or department approved courses included in the 18 credits are three required courses Mkt 443, 444, and 447.

Marketing is concerned with management decisions that deal with the satisfaction of customer needs and wants in the purchase and use of goods and services. The primary decision areas in marketing involve the identification of market segments and decisions dealing with product design, pricing, promotion including personal selling and marketing communications. A major in marketing prepares the student for careers in sales and marketing research, marketing management, retailing marketing communications, promotion management and international marketing. Each field of study may be applied to consumer, industrial and service marketing in business and nonprofit organizations.

The instructional objectives of the Marketing department is to provide knowledge of the marketing process and an understanding of the marketing function. The students are expected to develop decision making skills, computational skills and communication skills with appreciation for global marketplace and ethical concerns.

The department also offers a minor for non-marketing majors in the College of Business. The minor required 15 credits from an approved list of courses: of which 9 credits must stand alone. Students with declared majors have priority over students with declared minors in courses with space constraints.

Graduate Study

The Department of Marketing participates in two graduate programs: the M.S. in Business and the M.B.A. full-time and part-time programs. The M.S. in business is a 30-credit curriculum culminating in a thesis or creative component. The M.B.A. program is a 48-credit nonthesys noncreative-component curriculum. Twenty-four of the 48 credit hours are core courses and the remaining 24 are graduate electives. Within the M.B.A program students may develop an area of specialization in marketing. This specialization requires that 12 of the 24 credit hours of graduate electives be from marketing.

Courses open for nonmajor graduate credit: 410, 424, 444, 447, 448, 449 and 492

Courses Primarily for Undergraduate Students

Mkt 340 Principles of Marketing (3-0) Cr 3 FS SS
Preq: Econ 101 The role of marketing in society Markets, marketing institutions, and marketing functions with emphasis on product, price, marketing communication and marketing channel decisions.

Mkt 343 Personal Selling (3-0) Cr 3 Preq 340
Analysis of the theory and practice of personal selling with the context of relatio marketing and salesforce automation. Topics include goal setting, prospecting, territory management, questionning, presentation, adjustments, commitment, and customer service simulation of selling situations.

Mkt 410 Promotional Strategy (3-0) Cr 3 FS Preq 345 Principles and concepts involved in the development and implementation of promotional strategies. Coordination of a variety of promotional elements, advertising, promotion, direct response, public relations and publicity of web communications and personal selling. Nonmajor graduate credit.

Mkt 442 Sales Management (3-0) Cr 3 FS Preq 340 Functional aspects of sales force management, personal selling methods, procedures for recruiting selecting and training new salespeople, compensations and expense control systems, problems of sales force motivation and supervision, methods of territorial and quota assignment, sales department budgets, distributor dealer relations. Other selected topics. Nonmajor graduate credit.

Mkt 443 Strategic Marketing Management (3-0) Cr 3 FS Preq 444 Analysis of major elements of strategic marketing management. May include case studies, business simulations involving decision making using marketing tools from previous courses. (For marketing majors only)

Mkt 444 Fundamentals of Marketing Research (3-0) Cr 3 FS Preq 340 Stat 226 Marketing research techniques, problem formulation, research design, questionnaire construction, sampling data collection, procedures and analysis and interpretation of data related to marketing decisions. Nonmajor graduate credit.

Mkt 446 Retailing (2-0) Cr 3 FS Preq 340 Basic areas of retail management, buying, merchandising, retail promotion, store location, store layout, credit management and inventory control. Emphasis on practical application of retail management principles.

Mkt 447 Fundamentals of Consumer Behavior (3-0) Cr 3 FS Preq 340 Study of how consumers select purchase use and dispose of goods and services. Includes analysis of how markets and other influences the buying decision. Application of concepts and methods of the behavioral sciences to marketing management decision making. Nonmajor graduate credit.

Mkt 448 Fundamentals of International Marketing (3-0) Cr 3 FS Preq 340 Introduction to terms used in international marketing and sources of information on international markets. Development of sensitivity toward foreign business environment and familiarity with operations of multinational corporations. Nonmajor graduate credit.

Mkt 449 Marketing Seminar (0-0) Cr 3 Preq 340 Analysis of current issues and problems in marketing with emphasis on new theoretical and methodological developments. Additional seminars may be offered. Nonmajor graduate credit.

C Marketing for the Internet

Mkt 450 Independent Study (1-0) to 3 each time taken Preq: 340 senior classification permission of the instructor

Mkt 452 Comparative Marketing (3-0) Cr 3 SS Preq 340 The course provides exposure to students in culture social economic and political environment of marketing in foreign countries. Students complete a term project (e.g. a marketing plan) based on information collected in the foreign country. Students attend briefings by experts, officials of private and public organizations. Nonmajor graduate credit.
Materials Engineering

(Administered by the Department of Materials Science and Engineering)

Mufti Akinc Chair of Department

Distinguished Professors: Grzegorz Theil
Thompson Trivedi

Professors: Akinc Chumbley Genal Jiles
D Martin S Martin McGee Pecharsky Tsukruk

Professors (Adjunct): Anderson McCullum

Distinguished Professors (Emeriti) Verhoeven

Professors (Emeriti): Larsen Patterson Smith

Wechsler Wieder

Associate Professors: K Constant Conzemius

Gleeson Matileprega Russell

Assistant Professors: Biner Lograsso

Assistant Professors: Cann A Constant

Nakovitsa Tan Zoubakay

Assistant Professors (Adjunct): Kerner Selby Snyder Sordelet

Undergraduate Study

For the undergraduate curriculum in materials engineering leading to the degree of bachelor of science in Materials Engineering, the student is advised to consult the appropriate departmental curriculum guide. The curriculum is intended to provide education in the fundamental principles of materials science and to prepare students for careers in materials science and engineering.

The objective of the materials engineering program is to produce graduates who

- have a strong foundation in materials science and engineering
- are capable of working independently and in teams
- are proficient in oral and written communication
- engage in lifelong learning in response to the rapidly expanding knowledge base and changing environment of our world
- are engaged in study in materials and related or complementary fields

Graduates in materials engineering are able to apply scientific and engineering principles to select or design the best materials to solve engineering problems. They are also able to control the microstructure of materials through processing to optimize properties and performance. They are also able to control the microstructure of materials through processing to optimize properties and performance. They are also able to control the microstructure of materials through processing to optimize properties and performance. They are also able to control the microstructure of materials through processing to optimize properties and performance. They are also able to control the microstructure of materials through processing to optimize properties and performance.

The core materials courses include fundamentals of materials science, engineering, and technology.

Met E 211 Introduction to Materials Science and Engineering (3-3) 6 F P Brace Chem 177 or 167

Course description: A study of the properties and processing of metallic materials. An introduction to the fundamentals of materials science and engineering.

Met E 212 Thermodynamics in Materials Engineer-

ing (3-3) 3 S Preme Chem 178 and credit or enrollment in Math 101

Course description: An introduction to the principles of thermodynamics and the behavior of materials under various conditions.

Met E 213 Integrated Materials Design (3-3) 2 C Preme Credit or enrollment in Phys 221

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 214 Structural Characterization of Materials (3-3) 3 S Preme Credit or enrollment in Phys 221

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 272 Principles of Materials Science and Engineering (3-3) 6 S Preme Chem 167 or 177

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 298 Cooperative Education (3-3) 6 S Preme Credit or enrollment in Phys 221

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 313 Integrated Materials Design (3-3) 2 C Preme 212 Design of devices and processes for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 315 Kinetics and Phase Equilibria in Materials (3-3) 3 F Preme 211 Kinetic phenomena and phase equilibria relevant to the understanding of the properties of materials.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 316 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 317 Mechanical Behavior of Materials (3-3) 3 S Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 318 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 319 Mechanical Behavior of Materials (3-3) 3 S Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 320 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 321 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 322 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 323 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 324 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 325 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Met E 326 Ceramic Processing and Fabrication (3-3) 3 F Preme 211 An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.

Course description: An introduction to the principles of materials science and engineering, focusing on the design and optimization of materials for specific applications.
Mat E 351 Introduction to Polymeric Materials (3-0) Cr 3 F Prereq 211 Introduction to polymeric materials: synthesis, structure, and properties. Relationships between polymer composition, processing, and properties. Oral presentation. Nonmajor grade credit.

Mat E 362 Principles of Nondestructive Testing (Same as E M 362) (3-0) Cr 3 S Prereq Phys 112 or 222 Radiography ultrasonic testing magnetic particle inspection eddy current testing dye penetrant inspection and other techniques. Physical bases of tests to materials to which applicable types of defects detectable calibration standards and reliability safety precautions. Nonmajor grade credit.

Mat E 362L Nondestructive Testing Laboratory (Same as E M 362L) (1-0) Cr 1 S Prereq Credit or enrollment in 362. Hands-on nondestructive testing techniques to the detection and sizing of flaws in materials and the characterization of material's microstructure. Includes experiments in hardness, dye penetrant, radiography, and eddy current testing. Field trips to industrial laboratories. Nonmajor grade credit.

Mat E 370 Toying with Technology (Same as Cpr E 370) (3-2) Cr 3 FS Prereq C 120junior standing in non-engineering major A project-based hands-on learning course. Technology literacy appreciation for technological innovation principles behind major technological innovations. Hands-on laboratory experiences based upon simple systems. Construction of LEGO's and controlled by small microcomputers. Future K-12 teachers will leave course with complete lesson plans for use in their upcoming careers.

Mat E 386 Summer Internship Credit 1 S Prereq Permission of department Summer professional work period.

Mat E 387 Engineering Internship Credit 6 S Prereq Permission of department junior classification. Professional work period one semester maximum per academic year.

Mat E 389 Cooperative Education Credit 6 S Prereq 298 permission of department senior standing. Professional work period in the cooperative education program. Students must register for this course before commencing work

Mat E 413 Integrated Materials Design (0-0) Cr 2 F Prereq 313 Design of devices parts processes or systems including experimentation taking into account physical chemical mechanical economic and ethical principles. Project planning including scheduling and cost estimation. Application of design tools such as CAD CAM and FEM. Analysis of problems design and development of solutions. Safety concept of shared responsibility teamwork communication. Testing and data collection. Interpretation of results and reporting. Oral presentation skills.

Mat E 414 Materials Engineering Design (0-0) Cr 2 S Prereq Senior classification. Practical applications of physical chemical mechanical and/or electrical principles to solving material science engineering design problems. Consideration of economic and time constraints in design of materials and processes involved in real world design problems specified by external sponsors such as industry or government. Oral and written final project report.

Mat E 423 Glass Science and Engineering Credit 3 S Prereq 212 Composition structure manufacturing and uses of inorganic glasses especially silicate glasses. Nonmajor grade credit.

Mat E 424 Ceramic Industries (3-0) Cr 3 S Prereq 322 Property control of products for various ceramic industries. Utilization of ceramic products in contemporary applications with a global perspective for raw materials engineering science and industrial activity. Ethical economic and lifelong learning aspects for professional engineering practice. Nonmajor grade credit.

Mat E 432 Microelectronics Fabrication Techniques (Same as E E 432) (2-4) Cr 4 S Prereq 420junior standing in non-engineering major A project-based hands-on learning course. Microelectronic fabrication techniques. Techniques used in modern integration including silicon and integrated circuits and laser etching. Process integration. Process evaluation and device testing. Extensive laboratory exercises utilizing computer tools to build electronic devices. Use of computer simulation tools for predicting processing outcomes. Recent advances in processing CMOS IC's and micro- and mechanical systems (MEMS). Nonmajor grade credit.


Mat E 453 Physical and Mechanical Properties of Polymers (Dual-listed with MSE 553) (2-3) Cr 3 S Prereq 391 Overview of polymer chemical and physical properties. Some examples of materials. Materials selection. Intensive laboratory experiments include chemical composition studies. Microstructural characterization and testing. Nonmajor grade credit.


Mat E 466 Multidisciplinary Engineering Design (Same as Cpr E 466) I 4 E 466 I E 466 M E 466 (1-4) Cr 3 S Prereq Student must be within two semesters of graduation and receive permission of the instructor. Application of team design concepts to projects of a multidisciplinary nature. Concurrent treatment of design manufacturing and life cycle considerations. Application of design tools such as CAD CAM and FEM Design methodologies project scheduling cost estimating. Quality control in manufacturing processes. Development of a prototype and appropriate documentation in the form of written reports oral presentations computer models and engineering drawings.

Mat E 490 Independent Study Credit 1-4 S Prereq Permission of department. Individual research special topics.

Mat E 498 Cooperative Education Credit 1-4 S Prereq 398 permission of department. Third and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.

Materials Science and Engineering

Muft Akinc, Chair of Department

Distinguished Professors: Guochen Theu Thompson, Thrv

Professors: Akinc Chumbley Galen Jiles D Martin S Martin McGee Pecharsky Tasukru

Professors (Adjunct) Anderson McCallum

Distinguished Professors (Emeritus) Vernooven

Professors (Emeritus) Larson Patterson Smith Weslejer Wilder

Associate Professors (Adjunct) Constantzen Konzemus Gleenon Malapragada Russell

Associate Professors (Adjunct) Nonacr Lograsso

Assistant Professors: Cann A Constant Napolitano Tan Zouberek

Assistant Professors (Adjunct) Kramar Selby Snyder Sordeler

Graduate Study

The Department offers programs toward the degrees of master of science (thesis) and doctor of philosophy with a major in materials science and engineering. Research in the department is administered through the College of Engineering and Institute for Physical Research and Technology (IPRT). Centers such as the Ames Laboratory the Center for Advanced Materials Processing, the Microelectronics Research Center and the Center for Advanced Technology Development which provide excellent facilities and graduate student research assistantships.

Graduate students have broad understanding of materials science and engineering and related disciplines. They are able to communicate effectively with scientific colleagues in formal and informal settings. Graduates are able to address complex problems in materials science and process design while considering the various constraints relevant to both industrial and research environments. They are skilled in carrying out independent and collaborative research, communicating research results and writing concise and persuasive grant proposals.

Prerequisite to major graduate work is completion of an undergraduate curriculum in physical science or related engineering. However, well qualified juniors in materials engineering interested in graduate study can apply for concurrent enrollment in the Graduate College to simultaneously pursue M S and B S degrees. Graduate assistantships can be awarded to students who are admitted to both M S and B S degrees can be obtained in five years of study under the concurrent enrollment plan.

The requirements for the MS and PhD degrees are established by the student's program of study committee within the established guidelines of the Graduate College. These requirements include coursework research dissertation and a final oral examination. The PhD degree also includes a qualifying examination.

There are no foreign language requirements for either of the graduate degrees administered by the Department of materials science and engineering.

Graduate students wishing to declare a minor in materials science and engineering will have at least one M S E faculty member serving on their advisory committee. For the M S and Ph D degrees they will take a minimum of 8 and 12 M S E course credits respectively.
The program in mathematics offers training suitable for students planning to enter secondary school teaching, to work in mathematics and computer science for industry, or to continue their studies in this field. The requirements for an undergraduate major in mathematics are designed so that the student may have opportunity for appropriate specialization to meet one or more of the foregoing objectives and at the same time obtain a thorough introduction to the mathematics underlying all of them.

Graduates understand a broad range of mathematical topics and are familiar with a broad range of mathematical models. They have skills for solving problems in diverse situations. They can construct rigorous arguments to demonstrate mathematical facts. They can communicate their mathematical methods to others and can justify their assumptions.

The requirements for an undergraduate major include:

(a) The sequence 175, 176 or the sequence 155, 166, 201, 202, 265, 301, 317, 414, and either 266 or 267.
(b) 15 additional credits chosen from mathematics courses at the 300 level or above of which 6 must be included in (341 365 471 481)
(c) The courses used to satisfy (a) and (b) above must include one of the sequences 301 302 414 415 435 436
(d) In addition to the credits in (b), either Math 492 or 2 credits of C I LAS 480C I (I LAS 480C is available only for students seeking secondary school certification).
(e) English proficiency requirement: The department requires a grade of C- or better in each of English 104 and 105 (or 105H) and an upper level writing requirement that may be met by writing an acceptable undergraduate thesis (Math 491) or by taking at least one of Engl 302, 306, 314 or JMC 201. A grade of C- or better is required.

The department strongly recommends that each student majoring in mathematics include in the program substantial supporting work beyond the minimum general education requirement of the college in one or more areas of application of mathematics, such as other mathematical sciences, engineering natural science, or social science. In particular, it recommends that each student take Com S 207, 208, Phys 221, 222 and Stat 341, 342 or Math 304.

The department strongly recommends you have proficiency in a foreign language.

Math 10 High School Geometry (4.0 Cr 0 FFS) For students who do not meet the geometry admission requirement. Elements of Euclidean geometry including congruence, parallel lines, circles, similar polygons, perimeter, area, and volume. Offered on a satisfactory-fail grading basis.

Math 20 High School Geometry (4.0 Cr 0 FFS) For students who do not meet the geometry admission requirement. Elements of Euclidean geometry including congruence, parallel lines, circles, similar polygons, perimeter, area, and volume. Offered on a satisfactory-fail grading basis.

Math 25 High School Algebra (4.0 Cr 0 FFS) For students who do not have adequate facility with topics from high school algebra or do not meet the algebra admission requirement. All students should initially enroll in Math 10. The course is divided into tracks of one and two semester lengths. For most students a diagnostic exam will determine which track must be taken. Students will receive a grade in Math 25 or 30 respectively depending on the level of material covered. Satisfactory completion of Math 30 is recommended for students planning to take Math 150 or 151. Math 25 for SFS is sufficient for Math 104, 150, 151. Students must complete Math 30 to remove a deficiency in the algebra admission requirement. Topics include signed numbers, polynomials, rational and radical expressions, exponential and logarithmic expressions and equations. Offered on a satisfactory-fail grading basis.

Math 30 High School Algebra (4.0 Cr 0 FFS) For students who do not have adequate facility with topics from high school algebra, or who do not meet the algebra admission requirement. All students should initially enroll in Math 10. The course is divided into tracks of one and two semester lengths. For most students a diagnostic exam will determine which track must be taken. Students will receive a grade in Math 25 or 30 respectively depending on the level of material covered. Satisfactory completion of Math 30 is recommended for students planning to take Math 150 or 151. Math 25 for SFS is sufficient for Math 104, 150, 151. Students must complete Math 30 to remove a deficiency in the algebra admission requirement. Topics include signed numbers, polynomials, rational and radical expressions, exponential and logarithmic expressions and equations. Offered on a satisfactory-fail grading basis.

Math 101 Orientation in Mathematics (1.0 Cr 0 FFS) For those wishing to familiarize themselves with the program of study. Sources of general information and perspectives concerning mathematics. Discussion of possible areas of study or careers. Offered on a satisfactory-fail grading basis.

Math 104 Introduction to Probability and Matrices (3.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry Permutations, combinations, probability, binomial and multinomial theorems. Matrices expected value. Either 104 or 150 may be counted toward graduation but not both.

Math 105 Introduction to Mathematical Ideas (3.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Topics from mathematics and mathematical applications with emphasis on their nontechnical content.

Math 140 College Algebra (3.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Coordinate geometry, integer exponents, quadratic and polynomial equations, functions, graphing polynomial and rational functions, exponential and logarithmic functions, systems of equations. Students in Liberal Arts and Social Sciences may not count Math 140, 141, 142, 149 or 195 toward Group III of the General Education Requirements.

Math 141 Trigonometry (2.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Coordinate geometry, integer exponents, quadratic and polynomial equations, functions, graphing polynomial and rational functions, exponential and logarithmic functions, systems of equations. Students in Liberal Arts and Social Sciences may not count Math 140, 141, 142, 149 or 195 toward Group III of the General Education Requirements.

Math 142 Trigonometry and Analytic Geometry (2.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Coordinate geometry, integer exponents, quadratic and polynomial equations, functions, graphing polynomial and rational functions, exponential and logarithmic functions, systems of equations. Students in Liberal Arts and Social Sciences may not count Math 140, 141, 142, 149 or 195 toward Group III of the General Education Requirements.

Math 149 Precalculus Mathematics (5.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. 1 semester of trigonometry A fast paced review of topics from algebra, trigonometry and analytic geometry required for the sequence Math 165, 166, 265, 267. Students in Liberal Arts and Social Sciences may not count Math 140, 141, 142, 149 or 195 toward Group III of the General Education Requirements. Only one of 140, 149 may count toward graduation.

Math 150 Discrete Mathematics for Business and Social Sciences (3.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Linear equations and inequalities, linear programming, matrix algebra, discrete probability, logic. Either 150 or 155 may be counted toward graduation but not both.

Math 151 Calculus for Business and Social Sciences (3.0 Cr 0 FFS) Prerequisite satisfaction on placement exam. 2 years of high school algebra 1 year of high school geometry. Linear equations and inequalities, linear programming, matrix algebra, discrete probability, logic. Either 150 or 155 may be counted toward graduation but not both.
school algebra 1 year of high school geometry
Differential calculus integral calculus introduction to max min theory for functions of two variables Will not serve as a prequisite for 265 or 266 Only one of 151 160 the sequence 165 166 the sequence 175 176 or the sequence 181 182 may be counted towards graduation

Math 160 Survey of Calculus (4) Cr 4 FS Prereq Satisfactory performance on placement exam 2 years of high school algebra 1 year of geometry Analyzing geometry differentiation and integration of elementary functions is prerequisite for 265 or 266 Only one of 151 160 the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 165 Calculus I (4-4) Cr 4 FS SS Prereq Satisfactory performance on placement exam 2 years of high school algebra 1 year of geometry 1 semester of trigonometry or enrollment in 141 or 142 Functions limits continuity differentiation derivatives of vector valued functions applications of derivatives Only one of 151 or 160 or the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 165H Honors Calculus I (4-4) Cr 4 F Prereq Satisfactory performance on placement exam 2 years of high school algebra 1 year of geometry 1 semester of trigonometry High math placement scores recommended but not required Functions limits continuity differentiation derivatives of vector valued functions applications of derivatives Additional material of a theoretical conceptual computational or modeling nature Some of the work may require more ingenuity than is required in Math 165 Preference will be given to students in the University Honors Program Only one of 151 or 160 or the sequence 165-166 or the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 166 Calculus II (4) Cr 4 FS SS Prereq Grade of C- or better in 165 166 or 175 or high math placement scores Integration applications of the integral matrices differentiation of functions of several variables Only one of 151 or 160 the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 166H Honors Calculus II (4) Cr 4 FS Prereq Permission of instructor and 165 165H or 175 or high math placement scores Integration applications of the integral matrices differentiation of functions of several variables Additional material of a theoretical conceptual computational or modeling nature Some of the work may require more ingenuity than is required for Math 166 Preference will be given to students in the University Honors Program Only one of 151 or 160 the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 181 Calculus and Differential Equations for the Life Sciences (3) Cr 4 FS Prereq Satisfactory performance on placement exam 2 years of high school algebra 1 year of high school geometry 1 semester of trigonometry or enrollment in 141 or 142 Exponential and logarithm functions derivatives first order linear difference equations and differential equations Examples taken from laboratory experiments Only one of 151 160 the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 182 Calculus and Differential Equations for the Life Sciences (3) Cr 4 FS Prereq 181 Integral nonlinear and second order difference equations and differential equations Examples taken from laboratory experiments Only one of 151 160 the sequence 165-166 the sequence 175-176 or the sequence 181-182 may be counted towards graduation

Math 195 Mathematics for Elementary Education (2-2) Cr 3 FS Prereq Satisfactory performance on placement exam 2 years high school algebra 1 year of high school geometry enrollment in elementary education Language of sets systems of whole numbers numberation and algorithms for computation topics from number theory geometric shapes and measurement congruence similarity and transformation principles and statistics

Math 196 Mathematics for Elementary Education II (2-2) Cr 3 FS Prereq Grade of C- or better in 195 Language of sets systems of whole numbers numberation and algorithms for computation topics from number theory geometric shapes and measurement congruence similarity and transformation principles and statistics

Math 201 Introduction to Proofs (2) Cr 2 FS Prereq 165 or 166H Reading and writing simple proofs Proofs involving sequences and the definitions of limit derivative and the definite integral Proofs by mathematical induction Only one of the sequence 175-176 or 201 may be counted towards graduation

Math 206 Computer Programming in FORTRAN (Same as CS 206) See Computer Science

Math 265 Calculus III (4) Cr 4 FS SS Prereq Grade of C- or better in 166H or 176 Multiple integrals vector fields and vector integrals sequences and series

Math 265H Honors Calculus III (4) Cr 4 FS Prereq Permission of the instructor and 166H or 176 Multiple integrals vector fields and vector integrals sequences and series Additional material of a theoretical conceptual computational or modeling nature Some of the work may require more ingenuity than is required in Math 265 Preference will be given to students in the University Honors Program

Math 266 Elementary Differential Equations (3) Cr 3 FS SS Prereq Grade of C- or better in 166H or 176 Solution methods for ordinary differential equations First order equations linear equations constant coefficient equations Eigenvalue methods for systems of first order linear equations introduction to stability and phase plane analysis

Math 267 Elementary Differential Equations and Laplace Transforms (4) Cr 4 FS SS Prereq Grade of C- or better in 166 166H or 176 Same as 266 but also including Laplace transforms and series solutions to ordinary differential equations

Math 268 Laplace Transforms (1) Cr 1 F Prereq Laplace transforms and series solutions to ordinary differential equations Together 266 and 268 are the same as 267

Math 273 Introduction to Scientific Computation (3) Cr 3 FS SS Prereq Math 265 or enrollment in Math 265 Math 266 or Math 267 knowledge of Fortran or C Vector matrix and graphics programming for scientific applications Algorithms for interpolation solution of systems of linear equations least squares nonlinear equations and optimization in one and several variables and ordinary differential equations Emphasis on high quality mathematical software its strengths and limitations

Math 290 Special Problems Cr 1 to 3 each time taken H HOURS

Math 297 Intermediate Topics in Elementary Mathematics (2-2) Cr 3 FS Prereq Grade of C- or better in 196 Additional topics in geometry including coordinate congruence similarity and transformations Pre-algebra topics in mathematics of current importance to prospective elementary teachers

Math 298 Cooperative Education Cr FS SS Prereq Permission of the department cooperate education coordinator Sophomore classification Required of all cooperative education students Students must register for this course prior to commencing each work period

Math 301 Introduction to Abstract Algebra (3) Cr 3 FS Prereq 166 or 166H or 175 and 267 or 317 Introduction to the theory of groups and rings Emphasis on writing proofs Nonmajor graduate credit

Math 302 Introduction to Abstract Algebra (3) Cr 3 S Prereq 301 Theory of fields abstract vector spaces and linear algebra Emphasis on writing proofs Nonmajor graduate credit

Math 304 Introductory Combinatorics (3) Cr 3 FS Prereq 166 166H or 176 Permutations combinations topics from probability combinatorial theory principle discrete probability classical probability Additional topics selected from recurrence relations generating functions random walks and Markov chains Nonmajor graduate credit

Math 307 Theory of Matrices (3) Cr 3 FS SS Prereq 2 semesters of calculus Systems of linear equation determinants vector spaces inner products linear transformations eigenvalues and eigenvectors Emphasis on methods and techniques Only one of 307 or 317 may be counted toward graduation Nonmajor graduate credit

Math 308 Application of Linear Algebra to Discrete Optimization (3) Cr 3 FS SS Prereq 301 or 317 Linear programming and topics chosen from game theory transportation and assignment problems discrete dynamic processes and multiple objective linear programming Nonmajor graduate credit

Math 314 Graphs and Networks (3) Cr 3 FS SS Prereq 166 166H or 176 Graphs directed graphs trees connectivity graph algorithms Eulerian and Hamiltonian chains Matching and covering Optimization for networks Applications Nonmajor graduate credit

Math 317 Theory of Linear Algebra (4) Cr 4 FS Prereq 166 Systems of linear equations determinants vector spaces inner product spaces linear transformations eigenvalues and eigenvectors Emphasis on writing proofs and results Nonmajor graduate credit Only one of 307 or 317 may be counted toward graduation

Math 331 Topology (3) Cr 3 Alt S offered 2005 Prereq 307 or 317 Topological properties of metric spaces including metric properties of Rn sequences continuous functions completeness compactness Nonmajor graduate credit

Math 341 Introduction to Theory of Probability and Statistics (Same as Stat 341) See Statistics

Math 342 Introduction to Theory of Probability and Statistics (Same as Stat 342) See Statistics

Math 350 Number Theory (3) Cr 3 Alt S offered 2005 Prereq 307 or 317 Properties of the integers Diophantine equations prime number distribution and representation problems Applications to cryptography Nonmajor graduate credit

Math 365 Complex Variables with Applications (3) Cr 3 FS Prereq 265 Functions of a complex variable including differentiation integration and series expansions residues evaluation of integrals conformal mapping Only two of 365 395 396 may be counted toward graduation Nonmajor graduate credit

Math 378 Optimization and Modeling with Artificial Life (3-3) Cr 3 S Prereq One of 301 304 Com S 330 or other discrete math Familiarity with programming Introduction to the modeling and optimization techniques that together are called artificial life or life Biology from evolution and ecology are used to solve problems in biology engineering and areas such as combinatorial or functional optimization Evolutionary programming genetic algorithms genetic programming evolutionary neural nets and their uses in optimization and modeling Nonmajor graduate credit

Math 385 Introduction to Partial Differential Equations (3) Cr 3 FS Prereq 265 and one of 266 267 Separation of variables methods for elliptic parabolic and hyperbolic partial differential equations FOURIER SERIES STURM- LIOUVILLE EIGENFUNCTIONS BOUNDARY LAYER SOLU TIONS AND SHAPES OF HARMONIC FUNCTIONS AND SPHERICAL HARMONICS Only two of 385 395 396 may be counted toward graduation Nonmajor graduate credit

Math 398 Cooperative Education Cr R FS SS Prereq Permission of the department cooperative education coordinator and junior classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Math 414 Advanced Calculus (3-0) Cr. 3 FS SS Prereq 201 or 176, 265, and 307 or 317 A careful development of calculus of functions of a real variable limits, continuity, differentiation, integration. Series. Nonmajor graduate credit.

Math 415 Advanced Calculus (3-0) Cr. 3 S Prereq 414 Sequences and series of functions of a real variable uniform convergence, power series and Taylor series. Stone-Weierstrass Theorem. Elementary functions. Fourier series introduction to measure theory and Lebesgue integration. Other topics at the discretion of the instructor. Nonmajor graduate credit.

Math 421 Logic for Mathematics and Computer Science (Same as Com S 421) (3-0) Cr. 3 S Preq 301 or 307 or 317 or Com S 330 Propositional and predicate logic. Horn logic, equational logic. Resolution and unification. Foundations of logic, programming reasoning about programs, program specification and verification. Nonmajor graduate credit.


Math 435 Geometry (3-0) Cr 3 S Preq 307 or 317 Euclidean geometry through properties invariant under similarity transformations. Use of both synthetic and analytic methods. Nonmajor graduate credit.

Math 436 Geometry (3-0) Cr 3 S Preq 425 Non-Euclidean geometry through properties invariant under isometric transformations. Analytic methods applied to at least two of elliptic, projective and hyperbolic geometries. Nonmajor graduate credit.


Math 465 Advanced Calculus for Applied Mathematics (3-0) Cr 3 FS Preq 265 Frequently applied concepts from multivariable calculus presented with enough theory to promote understanding of applications. Topics may include derivative matrices, Taylor polynomials, curvilinear coordinates, Green's divergence theorem, Stokes' theorem, uniform convergence, operations on series and integrals, improper integrals. Nonmajor graduate credit.

Math 471 Computational Linear Algebra and Fixed Point Iteration (Same as Com S 471) (3-0) Cr. 3 FS Preq. 265 and either 265 or 267 Computational Linear Algebra or FORTRAN or C. Computational exact solutions of linear systems, least square methods. Similarity methods for eigenvalues, non-linear equations, fixed point iteration in one and several variables. Newton's method in several variables. Nonmajor graduate credit.


Math 484 Computational Mathematics for Biologists (Same as BiC 484) (3-0) Cr. 3 F A survey of graph theory, linear algebra, discrete math and algorithms used in computational biology with examples taken from genomics, phylogenetics, and structural problems. Course provides a mathematics background for BiC/Gen/Com S/Math 594. Nonmajor graduate credit.

Math 489 History of Mathematics (3-0) Cr 3 S Preq 6 credits in mathematics at the 300 level or above History of mathematical ideas found in the undergraduate curriculum. It includes a discussion of the historical and cultural settings in which these ideas arose and the influence of the culture on the type of mathematical ideas that developed. Some of the particular cultures and their mathematics that are studied include Babylonian and Ancient Egyptian Ancient Greek and Indian, European, and Chinese. Nonmajor graduate credit.

Math 490 Independent Study Cr 1 to 3 each time 30 credits in mathematics. No more than 3 credits of Math 490 may be counted toward graduation. Honors.

Math 491 Undergraduate Thesis Cr 2 or 3 Writing a formal mathematics paper. Open approval by the department, the paper will satisfy the departmental advanced English requirement.

Math 492 Undergraduate Seminar Cr 2 S Preq Consent of instructor. Introduction to mathematics research. Mathematical presentation mathematical literature search. Participating in seminars on advanced topics in mathematics. Seminar content varies.

Math 497 Teaching Secondary School Mathematics (Same as C 497) See Curriculum and Instruction.

Math 498 Cooperative Education Cr R FS SS Preq Permission of the department cooperative education coordinator and junior classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Courses Primarily for Graduate Students: Open to Qualified Undergraduate Students Math 501 Introduction to Real Analysis (3-0) Cr. 3 S Preq 265 and 307 A careful development of the real numbers. Study of metric spaces, completeness, continuity and sequences with particular attention to R^3 and real valued functions of one and several variables. Differentiation and integration of real valued functions, sequences of functions, limits and convergence, equicontinuity.

Math 502 Numerical Analysis I (3-0) Cr 3 S Preq 414 Numerical linear algebra including eigenvalue problems, numerical solution of nonlinear equations and systems.

Math 503 Numerical Analysis II (3-0) Cr 3 S Preq 414 Approximation theory including polynomial interpolation and best approximation, numerical integration, numerical methods for ordinary differential equations.

Math 504 Abstract Algebra (3-0) Cr 3 S Preq 302 First semester of full-year course. Algebraic systems and their structures including groups, rings, modules, and fields.

Math 505 Abstract Algebra (3-0) Cr 3 S Preq 504 Continuation of 504.

Math 507 Numerical Solution of Ordinary Differential Equations (Same as Com S 507) (3-0) Cr 3 S SS Preq 481 or 465 or 415 knowledge of FORTRAN or C. One step methods for initial value problems. One step methods for systems of multi-step methods. Boundary value problems. Examples using Fortran and C.

Math 510 Linear Algebra (3-0) Cr 3 S SS Preq 302 or 307 or 317 Advanced topics in linear algebra including canonical forms, inner product spaces, bilinear forms, tensor products and applications to other branches of mathematics.

Math 511 Functions of a Single Complex Variable (3-0) Cr 3 S SS Preq 465 or 414 Theory of analytic functions, integration topology of the extended complex plane, singularities and residue theory.


Math 519 Methods of Applied Mathematics (3-0) Cr 3 S Preq 365 or 365 or 426 or 465 Techniques of classical and functional analysis with applications to partial differential equations. Integration, equations and boundary value problems for ordinary differential equations.

Math 520 Methods of Applied Mathematics II (3-0) Cr 3 S Preq 519 Continuation of Math 519.

Math 525 Numerical Analysis of High Performance Computing (Same as Com S 526 Cr 526) (3-0) Cr 3 S Preq 414 CRTP 411 CRTP 481 Experience in scientific programming. Knowledge of FORTRAN or C. Development of efficient numerical methods for use on current state-of-the-art high performance computers. Applications of the methods to the students' areas of research.


Math 532 Introduction to Functional Analysis (3-0) Cr 3 S offered 2004 Prereq 531 Continuation of 531.

Math 533 Cryptography (Same as Cpr E 533 InfA’s) (3-0) Cr 3 S Preq Math 301 or Cr E 310 or Com S 330. Basic concepts of secure communication. DES and IDEA public key cryptosystems. Elliptic curves, hash algorithms, digital signatures. 

2003-2005
applications Relevant material on number theory and finite fields
Math 534 Topology (3) Cr 3 F Prereq Permission of instructor Introduction to general topology Emphasizes topics useful in analysis
Math 537 Algebraic Topology (3) Cr 3 Alt S offered 2005 Prereq 321 or 334 301 Foundations of algebraic topology Simplicial complexes Simplicial and singular homology
Math 540 Seminar in Mathematics Education (3) Cr 3 Offered on a 2 year cycle offered SS 2005 Prereq Enrollment in the master of school mathematicians program or professional studies in education Research studies in mathematics learning and teaching exemplary practices in mathematics education and teaching the latest trends in the mathematics curriculum in grades K 12
Math 542 Investigating the Teaching and Learning of Secondary Mathematics (1) Cr 1 Alt F offered 2004 Prereq Enrollment in master of school mathematics program professional studies in education or permission for secondary mathematics education majors Research discussion and evaluation of efforts to improve instruction in the mathematics classroom Math 542 may be taken for credit multiple times
Math 543 Seminar in Mathematics Education (1) Cr 1 F Prereq Teaching a mathematics course Selected topics in collegiate mathematics education including cooperative learning instructional use of technology writing in mathematics and cognitive learning theories Research studies exemplar practices and trends in mathematics education
Math 545 Intermediate Calculus (4) Cr 4 Offered on a 3 year cycle offered SS 2004 Prereq 3 semesters of calculus and enrollment in the master of school mathematics program Further development of the fundamental concepts of calculus and their applications with emphasis on a constructivist approach to learning cooperative groups problem solving the use of technology
Math 546 Algorithms in Analysis and Their Computer Implementation (2) Cr 3 Offered on a 3 year cycle offered SS 2004 Prereq 3 semesters in calculus or concurrent enrollment in 545 and enrollment in the master of school mathematics program The use of technology in secondary mathematics with an emphasis on the exploration and implementation of algorithms
Math 547 Discrete Mathematics and Applications (4) Cr 4 Offered on a 3 year cycle offered SS 2006 Prereq Enrollment in the master of school mathematics program A study of discrete mathematics topics in graph theory game theory linear programming recursion combinatorics and algebraic structures Issues in integrating discrete topics into the secondary curriculum Use of the computer to explore discrete mathematics
Math 549 Intermediate Geometry (3) Cr 3 Offered on a 3 year cycle offered SS 2006 Prereq 425 or equivalent and enrollment in the master of school mathematics program A study of geometry with emphasis on metrics the group of isometries the group of similarities and the affine group Specific spaces studied include the Euclidean plane the 2 sphere and projective 2 space Emphasis on analytical methods
Math 551 Design Theory and Association Schemes (3) Cr 3 F Prereq 301 or 304 or 317 Combinatorial designs and Latin squares Construction methods including finite fields Error correcting codes Adjacency matrices and algebraic combinatorics
Math 552 Enumerative Combinatorics and Ordered Sets (3) Cr 3 S Prereq 301 or 304 or 317 Ordered sets and lattices Generating functions Mobius inversion and other enumeration methods
Math 554 Introduction to Stochastic Processes (Same as Stat 551) (3) Cr 3 S Prereq 542 Markov chains on discrete spaces in discrete and continuous time random walks Poisson processes birth and death processes and their long term behavior Optional topics may include branching processes renewal theory introduction to Brownian motion
Math 555 Theory of Stochastic Processes (Same as Stat 555) (3) Cr 3 F Prereq 514 or 515 Stat 542 Martingales Markov processes on continuous spaces and their qualitative behavior Wiener processes Optional topics may include elementary theory of Ito calculus and diffusions linear stochastic systems and stochastic differential equations
Math 557 Ordinary Differential Equations (3) Cr 3 F Prereq 266 or 267 307 or 317 415 or 465 First semester of full year course The initial value problem existence and uniqueness theorems continuous dependence on parameters linear systems stability and asymptotic behavior of solutions to dynamical systems and two point boundary value problems
Math 558 Ordinary Differential Equations (3) Cr 3 Alt S offered 2005 Prereq 557 Continuation of 557
Math 561 Dynamical Systems (3) Cr 3 Alt S offered 2005 Prereq 414 Smooth mappings and flows on manifolds Fixed points stable unstable and center manifolds normal forms Structural stability bifurcations Horseshoe maps Introduction to chaotic behavior
Math 562 Manifolds Tensors and Differential Geometry (3) Cr 3 Alt S offered 2004 Prereq 414 Geometry of curves and surfaces Manifolds coordinate systems Tensors differential forms Riemannian metrics Connections covariant differentiation curvature tensors
Math 567 Boolean Algebras (3) Cr 3 Alt S offered 2005 Prereq 302 or 421 Structure of Boolean algebras and their representations Stone spaces and duality Atomicity completeness distributivity operations extensions of homomorphisms Examples and applications from mathematical logic and topology
Math 571 Mathematical Logic (3) Cr 3 Alt F offered 2004 Prereq 421 First semester of full year course Algebraic structures in logical systems recursive functions consistency undecidability and incompleteness theorems of arithmetic results of Gentzen and Godel theory of models ultraproduits and ultralimits nonstandard analysis
Math 572 Mathematical Logic (3) Cr 3 Alt S offered 2005 Prereq 571 Continuation of 571
Math 573 Random Signal Analysis and Kalman Filtering (Same as Aae E 573 E E 573 M E 573) (3) Cr 3 F Prereq E E 512 or Aae E 331 or M E 370 or M E 411 or Math 341 or 395 Elementary notions of probability Random processes Autocorrelation and spectral functions Estimation of spectrum from finite data Response of linear systems to random inputs Discrete and continuous Kalman filter theory and applications Smoothing prediction Linearization of nonlinear dynamics
Math 574 Optimal Control (Same as Aae E 574 E E 574 M E 574) (3) Cr 3 S Prereq 577 The optimal control problem Variational approach Pontryagin s principle Hamilton Jacobi equation Dynamic programming Tima-optimal minimum fuel minimum energy control systems The regulator problem Structures and properties of optimal controls
Math 576 Introduction to Robust Control (Same as E E 575 See Electrical Engineering
Math 576 Digital Feedback Control Systems (Same as Aae E 576 E E 576 M E 576) (3) Cr 3 F Prereq 415 or Aae E 432 or E E 475 or M E 411 or M E 414 and Math 267 Sampled-data discrete data and Many a z transform Design of digital control systems using transform methods root locus frequency response and direct design methods Design using state space methods Controllability observability pole placement state estimators Digital filters in control systems Microcomputer implementation of digital filters Finite wordlength effects Linear quadratic optimal control in digital control systems Simulation of digital control systems
Math 577 Modern Control Systems I (Same as Aae E 577 E E 577 M E 577) (3) Cr 3 F Prereq 415 or Aae E 331 or M E 414 and Math 307 or 317 State variable and output input descriptions of linear continuous time and discrete-time systems Solution of linear dynamical equations Controllability and observability of linear dynamical systems Canonical description of linear systems Realizations of transfer function matrices Canonical form dynamical equations State feedback State estimators Decoupling by state feedback Design of feedback systems Stability of linear dynamical systems
Math 578 Modern Control Systems II (Same as Aae E 578 E E 578 M E 578) (3) Cr 3 S Prereq 577 Well posedness of nonlinear control systems Approximate analysis methods Control perturbation method and describing function method Lyapunov stability theory Absolute stability of feedback systems Input-output stability Large-scale systems
Math 579 Adaptive Control (Same as E E 579) See Electrical Engineering
Math 584 Category Theory (3) Cr 3 Alt F offered 2004 Prereq 302 Categories and functors and their applications
Math 585 Partial Differential Equations (3) Cr 3 Alt F offered 2003 Prereq 515 or 519 First semester of full year course First order equations and systems General theory of linear partial differential equations including wave heat and potential equations in several variables maximum principles theory of distributions and fundamental solutions Von Neumann and Hilbert space methods Rayleigh quotients and applications of semigroup theory introduction to the theory of nonlinear equations and systems One or more of ill posed problems singularity formation regularity theory equations of mixed type bifurcation theory
Math 586 Partial Differential Equations (3) Cr 3 Alt S offered 2004 Prereq 585 Continuation of 586
Math 588 General Theory of Algebraic Structures (3) Cr 3 Alt F offered 2003 Prereq 504 First semester of full year course Subalgebras homomorphisms congruence relations and direct products Lattices and closure operators Varieties and quasivarieties of algebras Free algebras Birkhoff s theorem clones Malcev conditions Advanced topics
Math 589 General Theory of Algebraic Structures (3) Cr 3 Alt S offered 2004 Prereq 588 Continuation of 588
Math 590 Special Topics Cr var
Math 594 Computational Molecular Biology (Same as Gen 594) See Zoology and Genetics
Math 597 Introductory Computational Structural Biology (Same as BCB 597) (3) Cr 3 S Prereq Meth 265 and some knowledge of programming Mathematical and computational approaches to protein structure prediction and determination Topics include molecular distance geometry potential energy minimization and molecular dynamics simulation
Math 599 Creative Component Cr var
Courses for Graduate Students
Math 610 Seminar Cr var
Math 642 Advanced Probability Theory (Same as Stat 642) See Statistics
Math 690 Advanced Topics Cr var Prereq Permission of instructor A Algebra B Functional Analysis C Measure Theory D Approximation Theory E Linear Algebra
Mechanical Engineering

Jon VanGerpen, Interim Chair of Department

Distinguished Professors: Bernard

University Professors: Bahadur

Professors: Brown Chandra Colver DeVries Molan Nelson Okishi Pete Fletcher Sanner Shapiro VanGerpen Wilson

Professors (Collaborators): Vanderploeg

Distinguished Professors (Emeritus): Serov

Professors (Emeritus): Bathe Baumgarten Cook Danovsky De Jonge Ede Hall Hendrickson Henkin Junkhan Kavanagh Mischke Peters Roberts Spinrad Wechsler

Associate Professors: Bullen Flugrad Ganmella Hendel Keidar Luecke Mann Maxwell Oliver Vance

Associate Professors (Adjunct): Edelson Gray McClelland

Associate Professors (Collaborators): Prusa

Associate Professors (Emeritus): Joensen Van Miter

Assistant Professors: Bastawros Battagha Bryden Cao Olsen Qamshay Subramaniam Sundararajan

Lecturers: Comer Gassman Starns

Undergraduate Study

For undergraduate study in mechanical engineering leading to the degree of bachelor of science see College of Engineering. Curriculum This curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Mechanical engineers are typically involved with such activities as

- design of various products for consumer and commercial markets

About one-fourth of all engineers practicing today have been educated as mechanical engineers. Their activities include research, development, design, testing, production, technical sales, and technical management.

Mechanical engineers are characterized by personal creativity, breadth of knowledge, and versatility. For these reasons they are found to function and thrive as valuable members and leaders of multidisciplinary teams. Through clever use of analysis, modeling, design synthesis and interpersonal skills, they solve important problems to improve our world.

The overall objective of the curriculum in mechanical engineering is to prepare students for lifelong learning and growth in careers as mechanical engineers in the rapidly-changing industrial world.

Upon successfully completing the mechanical engineering curriculum, students will be prepared for immediate entry into the field or for further study at the graduate level.

The mechanical engineering curriculum is organized to provide students with a broad foundation in mathematics and the sciences of physics and chemistry.

- Through courses in these subjects, students will attain the basic knowledge required to understand and analyze mechanical engineering systems.

This background is extended and organized through studies in solid mechanics, fluid mechanics, thermodynamics, heat transfer, materials, and electrical applications.

- Upon completion of courses in these areas of the curriculum, students will be able to apply engineering principles to create, analyze or improve processes, devices or systems to accomplish desired objectives.

A major focus throughout the mechanical engineering curriculum is a series of experiences that emphasize engineering design:

- Students will develop engineering judgment through open-ended problems that require establishment of reasonable engineering assumptions and realistic constraints.

In addition, a sequence of courses emphasizing engineering design begins in the first year and culminates with a capstone design experience.

- Students will not only be able to apply their engineering knowledge to real-life design problems but also critically evaluate the solutions.

Development of skills needed to be independent creative thinkers, effective communicators, and contributing team members is emphasized throughout the curriculum.

- Students will learn to effectively work in multidisciplinary teams to solve engineering problems subject to technical and business constraints through critical thinking that crosses content boundaries.

- Students will develop an understanding of the societal context in which they will practice engineering. They will include ethical legal and aesthetic considerations in design of engineering components and systems.

The curriculum provides flexibility to allow students to broaden their perspectives or to focus in more depth in areas of particular interest. Organized sequences of technical electives can be chosen from areas which represent major concentrations in the field of mechanical engineering. Optional areas of specialization include energy conversion and utilization, thermal systems design, mechanical system design, materials and manufacturing, nuclear engineering, thermal and environmental engineering, and vehicle propulsion.

- Elective courses provide additional emphasis in terms of the student's unique educational goals.

In addition, students elect courses in the humanities, social sciences, U.S. diversity and international perspectives.

- Through these courses, students develop an understanding of the societal context in which they will practice engineering, including environmental, legal, aesthetic and human aspects.

Students in mechanical engineering are encouraged to participate in the cooperative education program or to obtain engineering internships both in the United States and abroad. Study abroad is also encouraged and the department has exchange programs with several universities around the world. These experiences help students to round out their education and to better prepare for careers in the increasingly global practice of engineering.

Graduate Study

The department offers work for the degrees of master of science and doctor of philosophy with major in mechanical engineering. The master of science degree may be earned with or without thesis. Although major and minor program requirements differ, the major program may be used for minor work by students taking major work in other departments.

The graduate program offers advanced study in fluid mechanics, fluid power controls, heat transfer, computer-aided design machines and systems materials and manufacturing processes, thermodynamics, energy utilization, virtual reality applications, micro-electro mechanical systems, computational fluid dynamics, combustion, HVAC, IC engines and radioactive waste management.

The department offers students the opportunity to broaden their education by participating in minor programs in established departments, interdepartmental programs, or other programs as approved by the program of study committees.

The requirements for advanced degrees are established by the student's program of study committee within established guidelines of the Graduate College. Graduate students who have not completed an undergraduate program of study substantially equivalent to that required of undergraduate students in the department can expect that additional supporting coursework will be required. A foreign language requirement exists for the degree of doctor of philosophy only if the student's program of study committee deems it appropriate to a specific program of study.

Courses open for nonmajor graduate credit: 400 and 400-level courses except 330, 398, 399, 388, 486, 490 and 498.

Courses Primarily for Undergraduate Students

M.E. 102 Mechanical Engineering Orientation I

M.E. 202 Mechanical Engineering Seminar I

M.E. 231 Engineering Thermodynamics I

M.E. 232 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 234 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 238 Metrology I (3) C 24 3 Cr.

M.E. 240 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 241 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 242 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 243 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 244 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 245 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 246 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 247 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 248 Manufacturing Engineering (3) C 24 3 Cr.

M.E. 249 Manufacturing Engineering (3) C 24 3 Cr.
M E 330 Thermodynamics (3 Cr) Gr 3 FS Prereq E 222 For students electing one course in engineering thermodynamics. First and second laws of thermodynamics and properties and processes for pure substances. Selected applications including cycles for power and refrigeration. Psychrometric charts for either 213 or 330, but not both may be applied toward graduation. Majors in mechanical engineering may not apply. M E 330 toward a degree in mechanical engineering.

M E 332 Engineering Thermodynamics II (3-0) Cr 3 FS Prereq 231 fundamentals of gas mixtures psychrometry and thermochromy. Applications to one-dimensional, compressible flow, refrigeration, air conditioning, and combustion processes. Nonmajor graduate credit.

M E 335 Fluid Flow (3-2) Cr 4 FS Prereq Credit or enrollment in 332 EM E 345 Math 266 or 267 credit or enrollment in 570. Incompressible and compressible fluid flow fundamentals. Dimensional analysis and similarity. Internal and external flow applications. Lab demonstrations and experiments. Emphasizing concepts in thermodynamics and fluid flow. Written reports are required. Nonmajor graduate credit.


M E 396 Summer Internship Cr RS Prereq Permission of Department Chair. Summer professional work period.

M E 397 Engineering Internship Cr RS Prereq Permission of department chair. Professional work period one semester, one academic year.

M E 398 Cooperative Education Cr RS SS Prereq 298 permission of department. Second professional work period in the cooperative education program. Students must register for this course before commencing work.

M E 410 Mechanical Engineering Applications of Mechatronics (2-2) Cr 3 S Prereq E E 442 448 credit or enrollment in 570. Mechatronics is the integration of mechanical and electronic systems. Measurement processes data acquisition, systems analysis of data, and propagation of measurement uncertainty. Nonmajor graduate credit.

M E 411 Automatic Controls (2-2) Cr 3 FS Prereq 421 Methods and principles of automatic control. Pneumatic hydraulic and electrical systems. Representative applications of automatic control systems. Mathematical analysis of control systems. Nonmajor graduate credit.

M E 412 Legal and Environmental Considerations in Design (3) Cr 3 F Prereq Credit or enrollment in 325 senior classification in engineering. Analysis of product design and manufacturing. Failure modes associated with product environment. Interaction between the legal profession, legislative bodies standards and the design engineer using a case study approach in design applications. Litigation involving design standards and laws applicable to specific designs surveyed. The influence of laws and standards upon design. Nonmajor graduate credit.

M E 413 Practical Fluid Power Circuits (Same as A E 413) (3) Cr 1 FS Prereq Credit or enrollment in 414 or AE 447 Properties of fluids. Pump and motor efficiencies. Power transmission systems. Fluid power systems and experimentation investigation of appropriate control systems. Application to hydrotomatic transmissions. Nonmajor graduate credit.

M E 414 Hydraulic Systems and Control (3) Cr 3 FS Prereq 421 335 Characteristics of hydraulic motors and pumps system components system analysis feedback control and stability control principles. Computer simulation. Nonmajor graduate credit.


M E 418 Mechanical Considerations in Robotics (2-2) Cr 3 S Prereq 421 Three-dimensional kinematics. Dynamics and control of robot manipulators. Hardware elements and sensors. Laboratory experiments using industrial robots. Nonmajor graduate credit.


M E 421 Mechanical Systems and Control (3) Cr 4 FS Prereq E M E 345 Math 267 E E 442 448 Modeling and simulation of mechanical systems. Development of simple models of motion and development of response characteristics. Fundamentals of control applications including mathematical analysis and design for closed-loop control systems. Introduction to computer interfacing for data acquisition and control. Laboratory exercises for hands on motion and control implementation. Nonmajor graduate credit.

M E 425 Mechanical System Optimization (3) Cr 3 S Prereq 415. 160. Mechanical system optimization techniques including unconstrained and constrained minimization. Analytical optimization techniques. Both the theory of the methods and the application to mechanical system design will be presented. Nonmajor graduate credit.


M E 433 Alternative Energy Conversion (3) Cr 3 FS Prereq 322. Basic principles thermodynamics and performance of alternative energy conversion technologies. Society's energy consumption (fuel cells, photovoltaics, thermoelectric devices, wind energy, biomass, non-renewable and nuclear fusion) non-conventional energy sources (ocean tides and currents). Nonmajor graduate credit.


M E 442 Heating and Air Conditioning Design (1-4) Cr 3 S Prereq 441. Design criteria and assessment of heating and air conditioning. Design of heating, ventilating, and air conditioning systems. Nonmajor graduate credit.

M E 443 Compressed Air Systems (3) Cr 3 S Prereq 322. Basic principles thermodynamics and performance of components involved in compressed air. Performance of various components including various components such as compressors (reciprocating, rotary centrifugal and axial). Prime movers: compressors, compressors, and acclerators. Dryers, heat recovery, receivers, filters, regulators, fault detectors, controllers etc. Performance analysis and operating principles for both systems and components. Energy consumption and economic analysis for system design and operation. Nonmajor graduate credit.

M E 444 Elements and Performance of Power Plants (3-0) Cr 3 S Prereq Enrollment in 325 Basic principles thermodynamics engineering analysis of power plant systems. Topics include existing power plant technologies, the advanced energy systems of the future societal impacts of power production and operation, and regulatory concerns. Nonmajor graduate credit.


M E 446 Power Plant Design (2-3) Cr 3 F Prereq 332 credit or enrollment in 335. Design of a power plant to meet regulatory cost control and output needs. Selection and synthesis of principal components. Oral and written reports required. Nonmajor graduate credit.


M E 448 Fluid Dynamics of Turbomachinery (3-6) Cr 3 S Prereq 335 Applications of principles of fluid mechanics and thermodynamics in performance analysis and design of turbomachines and related fluid systems. Nonmajor graduate credit.

M E 449 Internal Combustion Engine Design (3-0) Cr 3 FS Prereq 324 325. Design and mechanical design of a spark ignition or compression ignition internal combustion engine to meet specified performance, fuel economy, and air pollution requirements. Oral and written reports required. Nonmajor graduate credit.

M E 451 Engineering Acoustics (Same as E M 451) See Engineering Mechanics Nonmajor graduate credit.

M E 466 Multidisciplinary Engineering Design (Same as Cor E 466 E 466 E 466 Mat 466) (1-4) Cr 3 FS Prereq. Student must be within two quarters of graduation and permission of instructor. Application of team design concepts to projects of a multidisciplinary nature. Concurrent treatment of design manufacturing and life cycle considerations. Application of design tools such as CAD, CAM, and FEM. Design methodology project scheduling, cost estimating, quality control manufacturing processes. Development of a prototype and appropriate.
growth physiology genetics biochemistry and ecology the program emphasizes the impact that the microbial world has on human animal and plant health as well as on industry and biotechnology. Graduates are able to develop and implement experimental approaches to address specific questions. In addition graduates are able to communicate scientifically using a variety of media.

Graduate microbiologists find career opportunities in a wide variety of areas in hospital and clinical laboratories or federal, state, and local government agencies, in research and development in dairy and food processing in the pharmaceutical and fermentation industries.

Undergraduate programs for the major in microbiology usually include the following basic courses: 302 310 402 404 430 440 450 and labs. Aspects of these courses emphasize communication skills, environmental issues, problem solving, and laboratory techniques. Courses in the following areas are required as supporting work biology chemistry biochemistry genetics mathematics and physics.

Preventive preparation may be accomplished through the curriculum major in the department (see College of Veterinary Medicine). Admission Requirements

Students majoring in microbiology are eligible to apply for the Cooperative Education Program with the Agricultural Research Service. If selected, the student will complete four paid work experiences at the National Animal Disease Center, the National Veterinary Services Laboratories, or the Soil Science Laboratory in Ames. Other internship opportunities also are available.

The department offers a minor in microbiology which may be earned by accumulating a minimum of 15 credits from the department offerings.

Majors in microbiology must take courses in written communication (Eng 104, 105, and one of 209, 309 or 314); one course in oral communication (6 cr. in Comm 212) and must meet the College of Agriculture English proficiency requirement of C or better in these courses. Students must also meet the College of Agriculture requirements for credit in courses in ethics and the university diversity and multicultural requirements.

Graduate Study

The department offers the degrees of master of science and doctor of philosophy and a doctoral minor to students majoring in other departments.

Graduates in the Microbiology program have a strong broad basic general knowledge of as well as advanced knowledge in a specific aspect of microbiology. Those students completing a thesis have the technical research critical thinking problem solving and computer skills to design implement and conduct research using a variety of modern molecular tools and equipment. They are able to communicate research results effectively with scientific peer groups in both oral and written formats.

Prerequisite to graduate study is completion of coursework in general microbiology, biology biochemistry, mathematical sciences and physics.

The faculty also participates in the interdepartmental majors and programs in genetics immunology MCB (molecular cellular and developmental biology) neuroscience and physiology and social change toxicology and water resources (see Index).

Each graduate student must demonstrate proficiency in English composition within two semesters in residence.

Courses open for nonmajor graduate credit: 310 330 374 406 419 420 421 and 485.

Courses Primarily for Undergraduate Students

Micro 110 Orientation in Microbiology (1-1 cr. F 05 F Orientation to the discipline of microbiology the curriculum in microbiology and educational research opportunities within the department. Offered on a satisfactory fail basis only.

Micro 201 General Microbiology (2 cr. F 2 FS Prereq: One semester of college-level biology. Selected topics in microbiology with emphasis on the relationship of microorganisms to human animal and plant health. Credit or permission.)

Micro 201L Introductory Microbiology Laboratory (1 cr. F 5 FS Prereq: Credit or enrollment in 201 or 202. Basic microbiology laboratory techniques for non-microbiology majors.

Micro 302 Biology of Microorganisms (3 cr. F 3 FS Prereq: Biol 201 credit or enrollment in Biol 202. 1 semester of chemistry. Basic cell biology physiology metabolism genetics and ecology of microorganisms. With an emphasis on prokaryotes and viruses as well as the role of microorganisms in the environment disease agriculture and industry.

Micro 302L Microbiology Laboratory (3 cr. F 5 FS Prereq: Credit or enrollment in 302. Basic microbiology laboratory techniques for majors in microbiology. All research in the laboratory.

Micro 310 Fundamentals of Microbial Infection and Immunity (3 cr. F 3 FS Prereq: 302. Study of pathogenic microbes mechanisms of disease and host resistance. Nonmajor graduate credit.

Micro 310L Medical Microbiology Laboratory (3 cr. F 5 FS Prereq: 201 or 202, 291L or 292L credit or enrollment in 310. Isolation and identification of human bacterial pathogens. Study of fungal and viral human pathogens using polymerase chain reaction antibody labeling and electron microscopy.

Micro 311 Introduction to Parasitology (Same as Zool 311) See Zoology.

Micro 330 Environmental Systems (Same as EnvS 330) See Environmental Science. Nonmajor graduate credit.

Micro 374 Insects and Our Health (Same as Ent 374) See Entomology. Nonmajor graduate credit.

Micro 402 Microbial Genetics (3 cr. F 3 FS Prereq: 302. 1 semester fundamental concepts of bacterial and bacteriophage genetics including mutation mechanisms of both vertical and horizontal genetic information transfer. Gene regulation and genetic approaches to study of bacterial cellular processes. Review and discussion of research literature to examine experimental design methodology and interpretation of both historical and contemporary relevance to microbial genetics.

Micro 402 Microbial Physiology (Dual listed with 504) (3 cr. F 3 FS Prereq: 302 and Chem 332 Topics in bacterial physiology biochemistry of bacteria in natural systems metabolic diversity life in extreme environments adaptative and developmental changes.

Micro 406 Principles of Mycology (Same as Bot 406) See Botany. Nonmajor graduate credit.

Micro 407 Microbiological Safety of Foods of Animal Origins (Dual listed with 507) (3 cr. F 3 FS Prereq: 420. Examination of the factors in the production of foods of animal origin from animal husbandry to processing distribution and final consumption which contribute to the overall microbiological safety of the food. The two modules of this course will be 1) the procedures and processes which can affect the overall microbiological safety of the food and 2) the Hazard Analysis Critical Control Points (HACCP) system.

Micro 408 Virology (Dual listed with 508) (3 cr. F 3 FS Prereq: 310. The biology of animal, plant and insect viruses.

Micro 419 Foodborne Hazards (Same as FS HN 419). See Food Science and Human Nutrition. Nonmajor graduate credit.


Micro 421 Food Microbiology Laboratory (Same as FS HN 421) (1-1 cr. F 3 FS Prereq: 201 or 302). Credit or enrollment in 420. FS HN 420. Standard microbiological techniques employed in the food industry including microscopic examination of foods plate counts other enumeration methods indicator organisms of food quality safety foodborne pathogens and molds. Nonmajor graduate credit.

Micro 425 Food Biotechnology (Dual listed with 525 same as FS HN 442) See Food Science and Human Nutrition.

Micro 430 Procaroytic Diversity and Ecology (Dual listed with 530) (3 cr. F 3 FS Prereq: Chem 332. 302. Study of the fundamental techniques and theory of studying the diversity of microbial life. Experimental techniques will include isolation and physiological characterization of bacterial groups that inhabit different environments. In addition techniques for the phylogenetic characterization phylogenetic properties and genetic manipulation of diverse species of bacteria.

Micro 450 Undergraduate Seminar (1 cr. F 3 FS Prereq: SP CM 212. Required of all undergraduate majors. Discussion of current papers in microbiology and immunology issues in scientific conduct bioethics and career opportunities in microbiology. Students present current papers in a journal club format.

Micro 475 Immunology (Dual listed with 575) (3 cr. F 3 FS Prereq: 310. An examination of humoral and cell-mediated immune function as well as the interaction of the cells and factors of the immune system that result in health and disease. Micro 575L. Optional credit for either 475 or 520. But not both may be applied to graduation.

Micro 477 Bacterial Plant Interactions (Dual listed with 577 same as Pl CM 320 F 3 FS Prereq: 310. Offered 2004. Prereq: 3 credits in microbiology or plant pathology. Focuses on plant-associated bacteria in terms of their role in the ecosystem diversity and the phylogenetic and molecular mechanisms involved in their interactions with plants. Covers symbiotic nitrogen fixation plant pathogenesis plant growth promotion and biological control.

Micro 485 Soil Microbial Ecology (Same as Agronomy 485) See Agronomy. Nonmajor graduate credit.

Micro 487 Aquatic and Wetland Microbial Ecology (Dual listed with 587 same as Bot 487). See Botany.

Micro 490 Independent Study (1-5 cr. F 3 FS Prereq: A minimum of 6 credits of 300-level or above coursework in microbiology permission of instructor. A maximum of 6 credits of 400 may be used toward the total of 12 credits required for graduation.

H Honors.

Micro 495 Internship (1-2 cr. F 3 FS Prereq: At least 3 credits of 300 level or above coursework in microbiology. Approval of academic adviser. Participation in the College Intern Program or an equivalent work experience. Written report of activities required. Offered on a satisfactory fail grading basis only.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Micro 501 Advanced Microbiology (3 cr. F 3 FS Prereq: 201 or 302. Credit or enrollment in 420 or 422. FS HN 420. Standard microbiological techniques employed in the food industry including microscopic examination of foods plate counts and other enumeration methods indicator organisms of food quality safety foodborne pathogens and molds. Nonmajor graduate credit.

Micro 525 Food Biotechnology (Dual listed with 425) (5 cr. F 3 FS Prereq: 201 or 302). Credit or enrollment in 420 or 422. FS HN 420. Standard microbiological techniques employed in the food industry including microscopic examination of foods plate counts and other enumeration methods indicator organisms of food quality safety foodborne pathogens and molds. Nonmajor graduate credit.
Micro 509. Microbial Physiology. (Dual listed with 404 same as V MPM 504) (3) Cr 3 S Prereq 302 and Chem 332. Topics in microbial physiology including bioenergetics in bacterial systems, metabolic diversity life in extreme environments, adaptive and developmental changes.

Micro 507. Microbiological Safety of Foods of Animal Origins. (Dual listed with 407 same as FS HN 507) (3) Cr 3 S Prereq 420. Examination of the various factors in the production of foods of animal origin from animal production through processing, distribution and final consumption which contribute to overall microbiological safety of the food. The two modules of this course will be 1) the procedures and processes which can affect the overall microbiological safety of the food and 2) the Hazard Analysis Critical Control Point (HACCP) system.


Micro 525. Food Biotechnology. (Dual listed with 425 same as FS HN 525) See Food Science and Human Nutrition.

Micro 530. Procarotary Diversity and Ecology. (Dual listed with 430) (3) Cr 3 S Prereq 310. Surveys the diversity of procarotary organisms emphasizing important and distinguishing phylogenetic, morphological, ecological and metabolic features of members of those groups.

Micro 540. Livestock Immunogenetics. (Same as An S 540) See Animal Science.

Micro 575. Immunology. (Dual listed with 475 same as V MPM 575) (3) Cr 3 S Prereq 310. Humoral and cellular immune functions. Interactions between cells and factors of the immune system that result in health and disease. Credit for either 575 or 520 but not both may be applied toward graduation.


Micro 585. Soil Microbiology and Biochemistry. (Same as Agron 585) See Agronomy.

Micro 586. Medical Bacteriology. (Same as V MPM 586) (4-0) Cr 4. S Prereq 310. Bacteria associated with diseases of vertebrates including virulence factors and interaction of host responses.

Micro 587. Aquatic and Wetland Microbial Ecology. (Dual listed with 487 same as Bot 587) See Botany.

Micro 590. Special Topics. Cr 1 to 5 each time elected. S Prereq Permission of instructor.

Micro 599. Creative Component Cr Air Prereq Northen M C Option only. A written report based on laboratory research. Library reading of topics related to the student's area of specialization and approved by the student's advisory committee.

Courses for Graduate Students

Micro 604. Seminar. (1.0) Cr 1 each time taken. S Offered on a satisfactory/unsatisfactory basis only.

Micro 615. Molecular Immunology. (Same as BBMB 615) See Biochemistry, Biophysics and Molecular Biology.

Micro 625. Mechanisms of Bacterial Pathogenesis. (Same as V MPM 625) See Veterinary Microbiology and Preventive Medicine.

Micro 626. Advanced Food Microbiology. (Same as FS HN 626) See Food Science and Human Nutrition.

Micro 641. General Mycology. (Same as Bot 641) See Botany.

Micro 642. General Mycology. (Same as Bot 642) See Botany.

Micro 679. Light Microscopy. (Same as Bot 679) See Botany.


Micro 685. Advanced Soil Biochemistry. (Same as Agron 685) See Agronomy.

Micro 690. Current Topics. Cr 1 to 3 each time elected. S Prereq Permission of instructor. Colloquium or advanced study of specific topics in a specialized field.

A Microbiology

B Immunology

C Infectious Diseases

Micro 698. Seminar in Molecular Cellular and Developmental Biology. (Same as MCB 698) See Molecular Cellular and Developmental Biology.

Micro 699. Research.

Military Science

www.public.iastate.edu/~armytoult
Lt Col Marvin Meek Chair of Department

Professors Meek

Assistant Professors (Adjunct) Meyer

Instructors (Adjunct) Kohrn Mayner Runyon Shovess Taylor Vance

The mission of the Reserve Officer Training Corps (ROTC) is to commission the future leaders of the United States Army. Since ROTC produces 65 percent of the Army's Officer Corps, it is the mission of the ROTC program to instill in its students the leadership qualities and skills necessary for success in the U. S. Army. The mission of the ROTC program is to prepare cadets for leadership roles in the Army. The program provides students with the knowledge and skills necessary to become effective leaders in the Army. The program also provides students with the opportunity to gain valuable experience in leadership positions within the Army.

The College of Liberal Arts and Science offers a minor in Military Studies. The minor consists of 15 hours of ROTC instruction, which may be taken from one or a number of the ROTC programs. The 15 hours must be in courses numbered 300 or above.

Courses Primarily for Undergraduate Students

Basic Program

M S 101. Introduction to Military Science. (1-0) Cr 1 S 1F. This course offers an overview of the role of the United States Army in national defense and the Army Reserve. The course also introduces the student to the basic training and physical fitness requirements of the Army. The course also introduces the student to the basic training and physical fitness requirements of the Army. The course also introduces the student to the basic training and physical fitness requirements of the Army.

M S 101L. Basic Leadership Laboratory. (0-2) S Cr 3 F. This lab is designed to teach basic military training skills and tasks and to develop confidence and leadership. Students will learn various military tasks such as marching, drill, footwork, and small unit tactics. The lab also provides an opportunity for students to develop confidence and leadership skills.

M S 104. Seminar. (2-0) Cr 2 S. This course is designed to teach basic military training skills and tasks and to develop confidence and leadership. Students will learn various military tasks such as marching, drill, footwork, and small unit tactics. The course also introduces the student to the basic training and physical fitness requirements of the Army.

M S 105. Basic Leadership Laboratory. (0-2) S Cr 3 F. This lab is designed to teach basic military training skills and tasks and to develop confidence and leadership. Students will learn various military tasks such as marching, drill, footwork, and small unit tactics. The lab also provides an opportunity for students to develop confidence and leadership skills.
M 402L Advanced Leadership Laboratory (0-4) Cr 1 F S Preq: Completion of the basic program On the job training and evaluation provided by the ROTC cadre. Developing training programs, structuring laboratories, presenting classes, planning various events and accepting responsibility for the leadership labs

M 410 Field Training Exercise (3-0) Cr 1 S Preq: Completion of the basic program An annual military exercise that requires approximately 72 hours of planning participation and follow up plus ROTC cadre evaluation. Designed primarily for the advanced ROTC cadre in preparation for being commissioned as officers in the U.S. Army. Actual military conditions are simulated. Detailed instruction in weapons training and execution of a simulated operation order in accomplishing a specific mission Conducted as a weekend exercise at Camp Dodge (National Guard Facility). Offered on a satisfactory fail grading basis only.

Military Studies

Advisory Committee: K Schneider Coordinator P Ladd M Merk

Military Studies is a program designed for students interested in learning about military skills and careers. The mission of the Reserve Officer Training Corps (ROTC) programs is threefold: First, students are developed mentally, morally, and physically in order to make them strong leaders. Second, a desire for development in mind and character is instilled in students so they may assume the highest responsibilities of command citizenship and government. Finally, students are imbued with the highest ideals of duty, honor, and loyalty in order to graduate with a basic professional background and motivation toward their careers.

The Air Force Aerospace Studies Military Science and Naval Science departments accomplish this mission through detailed courses of instruction occurring throughout a typical student's college career. All cadets are offered a course by these departments that focus on the development of professions in military science and their application. Each department offers courses unique to its branch of the military. The Air Force Aerospace Studies curriculum prepares students with Air Force structure and doctrine. Students in Army ROTC classes gain an appreciation for ground warfare and doctrine. While the Naval Science program develops basic seamanship skills such as navigation and marine propulsion. On a broader scale, all three departments offer courses promoting leadership and sound management practices that investigate the military's role in American domestic and foreign policy and can be employed in any career path.

Air Force Aerospace Studies Military Science and Naval Science courses are offered in the following participating departments: Air Force Aerospace Studies Military Science and Naval Science.

Undergraduate Study

Undergraduate study in this program provides the student with an opportunity to develop a minor in Military Studies. The three Iowa State University ROTC programs offer a minimum of 35 credit hours of specialized coursework. The minor in Military Studies is open to any Iowa State University student.

Undergraduate students may minor in Military Studies by taking 15 credit hours of coursework from a combination of any of the three ROTC programs - regardless of whether or not a commission in the Armed Forces is desired. At least 6 of the 15 credit hours must be in courses numbered 300 or above.
Courses Primarily for Undergraduate Students
Air Force Aerospace Studies - See Air Force Aerospace Studies

AFAS 141 The United States Air Force Today I
AFAS 142 The United States Air Force Today II
AFAS 241 The Development of Air Power I
AFAS 242 The Development of Air Power II
AFAS 341 Air Force Management and Leadership I
AFAS 342 Air Force Management and Leadership II
AFAS 441 National Security Forces in Contemporary American Society
AFAS 442 National Security Forces in Contemporary American Society II

Military Science

M S 101 Introduction to Military Science
M S 102 The United States Cadet Establishment
M S 201 Principles of Leadership
M S 202 Map Reading and Land Navigation
M S 301 Methods of Instructing Military Skills
M S 302 Small Unit Tactics
M S 403 The Military Team
M S 402 The Professional Officer

Naval Science

N S 111 Introduction to Naval Science
N S 210 Naval Ship Systems I
N S 211 Naval Ship Systems II
N S 212 Seapower and Maritime Affairs
N S 311 Navigation and Naval Operations I
N S 312 Navigation and Naval Operations II
N S 321 Evolution of Warfare
N S 411 Leadership and Management I
N S 412 Leadership and Management II
N S 421 Evolution of Amphibious Warfare

Molecular, Cellular, and Developmental Biology

(Interdepartmental Graduate Major)

Program Executive Committee Janice Buss Chair L Ambrosio R Robson
Participating Faculty Jan Buss Chair L Ambrosio I L Anderson A Andreotti R E Andrews
D Basbaum G Beattie P Bercott J Beetham D C Beitz M Bhattacharyya D Bert A Bogdanove
B Bonning J Buss S Carpenter P Chine C Coffman D Dobbs C F Ford R Hamilton
D Hannapel E R Henderson T Huatt T S Ingrischens J Johansen K M Johansen
R Jurekia C Komar M Lee C Link J E Mayfield M A McClay R A Miller F C Minson
J Reecy R M Robson R R Rodermeier R F Rosenbusch D S Sakaguchi P S Snhable
S S Shen M H Spalding M H Strover R W Thurber C K Tuggle D F Voytas
B W Wurtele

Undergraduate Study

A special program in molecular cellular and developmental biology is not offered for the baccalaureate. Undergraduates wishing to prepare for graduate study in molecular cellular and developmental biology should elect courses in biochemistry, botany, genetics microbiology and zoology mathematics through calculus, chemistry through organic and one year of physics. Biol 301 301L 302 and 302L are recommended to undergraduates desiring an introduction to this area.

Graduate Study

Work is offered for the master of science and doctor of philosophy degrees with a major in molecular cellular and developmental biology in several cooperating departments: Agronomy, Animal Science, Biochemistry, Biophysics Molecular Biology, Biomedical Sciences, Botany, Entomology, Food Science and Human Nutrition, Horticulture, Plant Pathology, Veterinary Microbiology and Preventive Medicine, Veterinary Pathology, Zoology and Genetics.

Facilities and qualified faculty are available in these departments for conducting fundamental research in the various aspects of molecular cellular and developmental biology. Ongoing research projects include molecular and cellular studies of viral, prokaryotic plant and animal systems.

Students may enter the MCB major in one of two ways: they may apply to and be accepted into the major directly or they may formally apply to the major after being accepted by a participating department. Students admitted into MCB will take MCB 697 in their first two semesters and choose a major professor from the participating faculty by the end of their second semester. Students admitted by a department will choose a major professor from the participating faculty in that department. All PhD students take a core curriculum consisting of the following courses: one year of biochemistry (BBMB 404 405 or BBMB 501 502) molecular genetics (MCDB 502 511 545 or 676) cell biology (MCDB 529 or 529 or 540) developmental biology (MCDB 512 533) and seminar in MCDB (MCDB 688). In seminar students will make journal and research presentations and attend MCDB seminars. M S students take the above core but may delete either the molecular genetics cell biology or developmental biology component. Additional coursework is selected to meet departmental requirements and to satisfy individual student research interests. The foreign language requirement is determined by the student's major department. All graduate students are required to teach as part of their training for an advanced degree.

Students majoring in molecular cellular and developmental biology at the PhD level must meet the following requirements: one year of biochemistry (BBMB 404 405 or BBMB 501 502) one course in each of two of the following three areas: molecular genetics (MCDB 502 511 545 or 676) cell biology (MCDB 529 or 529 or 540) developmental biology (MCDB 512 533) and a seminar of MCDB 688 (seminar in MCDB) each year.

Courses for Graduate Students

MCDB 502 Microbial Genetics (Same as Micro 502) See Microbiology

MCDB 511 Molecular Genetics (Same as Gen 511) See Zoology and Genetics

MCDB 512 Plant Growth Development and Development (Same as Bot 512) See Botany

MCDB 520 Genetic Engineering (Same as Gen 520) See Zoology and Genetics

MCDB 525 Cellular Growth and Regulation (Same as Zool 525) See Zoology and Genetics

MCDB 529 Plant Cell Biology (Same as Bot 529) See Botany

MCDB 533 Principles of Developmental Biology (Same as Zool 533) See Zoology and Genetics

MCDB 540 Signal Transduction (Same as Zool 540) See Zoology and Genetics

MCDB 545 Plant Molecular Biology (Same as Bot 545) See Botany

MCDB 590 Special Topics Ctr arr

MCDB 645 Molecular Endocrinology Hormones and Growth Factors (Same as BBMB 645) See Biochemistry, Biophysics and Molecular Biology

MCDB 676 Biochemistry of Gene Expression in Eukaryotes (Same as BBMB 676) See Biochemistry, Biophysics and Molecular Biology

MCDB 697 Graduate Research Rotation (0 3 0 0) 3 6 each time taken FS Graduate research projects performed under the supervision of selected faculty members in the molecular cellular and developmental biology program

MCDB 898 Seminar in Molecular Cellular and Developmental Biology (Same as An S 898) BBMB 698 Bot 698 Gen 698 Micro 698 VMPM 698 Zool 698 (2 0) Cr 1 to 2 each time taken FS Student and faculty presentations

MCDB 699 Research

Music

www.music.iastate.edu

Sue Haug, Chair of Department

Professors: Darlington David Haug Messenger Prater J Rodda Work Zeigler

Professors (Adjunct) Esp	

Distinguished Professors Emeritus White

Professors (Emeritus) Beley Brandt Burkhalter Dreixel Molson Swift Vongrabo

Associate Professors Binnette Cox Gouran Larkin Munson Sadleik Schilling Sisson Monroe Stuart Sturm

Associate Professors Emeritus Albom Bjerstrom

Assistant Professors Baker Creswell Deane Golemo Goodman Laycock Stone Sundermann Tam

Assistant Professors (Adjunct) Byden Kipkatch K Rodde Seebock Trentham

Assistant Professors (Emeritus) Waggoner

Instructors (Adjunct) Thomas

Instructors (Collaborators) Foss Kazier Patton Tener

Lecturers: Smith Tsao Lim

Undergraduate Study

The Department of Music offers a strong undergraduate major program where students study with full time faculty professionals in a supportive environment that encourages students to become their best.

The curriculum of the music department provides:

1 A comprehensive program of professional studies for students who wish to prepare for careers in music, including teaching performance, and composition and for students who plan to pursue graduate studies in music.

2 Courses in music literature, theory and areas of performance for all students regardless of major.

The department embodies the land grant philosophy of service to the people of the state with a faculty of active scholars and teachers who are committed to excellence in teaching creative scholarly work and arts outreach. The department is an accredited institutional member of the National Association of Schools of Music (NASM).

The Theatre Program is administered by the Department of Music (see Index Theatre Courses)

Bachelor of Music

For the undergraduate curriculum in music leading to the degree bachelor of music see Liberal Arts and Sciences Curriculum. In order to receive teacher certification in music students must earn the Bachelor of Music degree.

Candidates for the bachelor of music will complete the following requirements:

Cr 36-46

General education 0 5

Library 47

Music core 31-47

Area of Specialization (Students must select one of the following options music education organ piano string instruments composition voice or wind or percussion instruments)

Bachelor of Arts Music Major

For the undergraduate curriculum in Liberal Arts and Sciences major in music leading to the degree bachelor of arts see Liberal Arts Sciences Curriculum.

Candidates for the degree bachelor of arts with a music major will normally complete 46 credits of music including the following required courses 119
General Requirements
Prior to being accepted as a music major, students are required to audition for applied faculty in their performance area (piano, organ, woodwinds, strings, percussion, brass, or voice) and must successfully demonstrate performance skills appropriate for college level instruction. Once accepted, a student must complete a major examination in keyboard skills. This examination will be given by members of the departmental faculty during summer orientation on the week preceding the opening of classes for fall semester or by appointment.

Seminars and Recitals: All music majors enrolled for applied music courses will attend a weekly 1-hour seminar in their areas and departmental recitals each semester.

Ensemble Requirement: All bachelor of music students must register for an ensemble course each semester of full-time enrollment (except during student teaching). Students in a music education option must register for six semesters of large ensemble (111 110 145 141 161 161 161) and one semester of chamber music ensemble (111 161 301 321). Instrumental music education students may count one semester of 114 as a large ensemble. All full-time Bachelor of Music students in options other than music education must include among their ensembles at least two semesters of large ensemble (111 110 145 141 161 161 161) and one semester of chamber ensemble (113 161 301 321).

Continuation Examination: To be approved for continuation as a music major on the junior level, a student must pass a continuation examination taken normally at the end of the fourth semester. Before taking this examination, the student must fulfill the requisite forms as well as prepare a statement of (1) his/her personal goals, (2) a self-assessment of his/her progress thus far and (3) an assessment of what he/she expects to accomplish before graduation.

The student taking the Continuation Examination performs for a Continuation Examination Committee. Requirements include the performance of three works representing different periods or styles selected by and studied with the applied teacher of a self-prepared piece and sight-reading. The student must display acceptable solo ability and performance techniques in at least one of the applied areas. Written evaluation will be given each student following his/her performance. This evaluation will include a candid assessment of the student's potential to achieve his/her goals. In addition, the student may arrange to meet with members of the Continuation Examination Committee at a later date to discuss the results of his/her Continuation Examination.

All music majors must demonstrate proficiency in piano as a part of the continuation examination. Proficiency will normally be demonstrated by completing Music 226 or for keyboard majors by completing Music 327. The student must pass all parts of the continuation examination in order to enroll in Music 319 or 419. Applied Music

Graduation Proficiency: To be recommended for graduation, a music student must demonstrate to the faculty a mature acquaintance with performance practices and repertoire. All music majors will participate in departmental recitals to the satisfaction of the department. Candidates for the bachelor of music degree will present a graduation recital.

English proficiency requirement: The department requires a grade of C- or better in each of English 104 and 105 (or 106H). In addition, the English proficiency must be certified through one of the following means:

1. Certification of writing skills by the instructor after completion of Music 120 383 384 472 473 475 490 490D or 490E (Passing one of these courses does not automatically satisfy the requirements for English proficiency).

2. Satisfactory completion of an advanced writing course (e.g. English 302 305 or 314).

Graduate Study
Courses open for nonmajor graduate credit: 440 440 472 473 475 476

Courses Primarily for Undergraduate Students
Music 101 Fundamentals of Music (1.2) Cr. 2 FS Pre Req. Ability to read elementary musical notation Not to be repeated for credit and analysis of scales, intervals, chords and rhythm. Key signatures time signatures transpositions intended for non-majors.

Music 102 Introduction to Music Listening (1.3) Cr. 3 FS Pre Req. Expansion of the music listening experiences of the general student through greater awareness of differences in techniques of listening, performance media and materials of the arts. The course focuses on the elements of music rhythm, melody, harmony, form and style and how these elements are used in music of different cultures and time periods. Students need not be able to perform or read music. Open to non-majors only.

Music 105 Basic Musicianship (1.4) Cr. 3 S Pre Req. Performing arts major classification. Beginning keyboard techniques, sight-reading and sight-singing skills. Basic materials of music notation scales, intervals, key signatures, time signatures, rhythm and harmony.

Music 111 Wind Ensemble (0.3) Cr. 1 each time taken FS Pre Req. Open to all students; by audition Emphasis on significant works with woodwind and percussion instruments. Performances include formal concerts on campus and the annual tour.

Music 112 Concert Band (0.2) Cr. 1 each time taken FS Pre Req. Open to all students who have performed on a wind or percussion instrument in high school band or orchestra. Repertoire includes the broad spectrum of band music. Two concerts are presented each semester.

Music 113 Jazz Ensemble (0.2) Cr. 1 each time taken FS Pre Req. Open to all students by audition. Designed to explore various styles and trends in contemporary jazz.

Music 114 Marching and Pep Bands (0.5) Cr. 1 each time taken A Marching Band. FS Pre Req. Open to all students who have performed on a wind or percussion instrument in high school band or orchestra. Membership determined by date of band application, audition required for percussionists. Flakiers, and tailgaters. Presentation of pre-game and half-time shows at each home and at least one away football game. B Pep Band. FS Pre Req. Students selected by auditions from current members of 114A. Performances at basketball games.

Music 115 Symphonic Band (0.3) Cr. 1 each time taken FS Pre Req. Open to all students by audition. Stresses high quality wind literature. Performances include formal concerts on campus.

Music 118 Applied Music Non-majors (1.0 or 1.0) Cr. 1 or 2 each time taken FS, SS Pre Req. Audition permission of instructor. Applied music for the general student. Will not satisfy applied music requirements for music majors.

A Voice
B Piano
C Organ
D Strings
E Clarinet
F Woodwinds
G Brass
H Percussion
I Harp
J Harpsichord
K Harpsichord

Music 119 Applied Music Majors (1.2 or 1.2) Cr. 1 or 2 each time taken FS, SS Pre Req. Audition permission of instructor. Restricted to music majors. Minimum weekly practice of 5 hours per credit is expected. Weekly seminar required.

A Voice
B Piano
C Organ
D Strings
E Clarinet
F Woodwinds
G Brass
H Percussion
I Harpsichord
J Harpsichord

Music 120 Introduction to Music Literature and Styles (3.0) Cr. 3 FS Pre Req. 221 Directed studies via aural analysis for music majors with emphasis on the materials of music, form and aesthetic issues. Introduction to style and literature of the major performance media in context of historical chronology. Fundamentals of score reading and performance terminology.

Music 127 Class Study in Piano I (1 or 2) Cr. 1 FS Pre Req. 101 or audition and permission of instructor. Beginning keyboard technique repertory and sight-reading skills.

Music 128 Class Study in Piano II (1 or 2) Cr. 1 FS Pre Req. 102 or audition and permission of instructor. Continuation of beginning keyboard technique repertory and sight-reading skills.

Music 131 Vocal Jazz Ensemble "Off the Record" (0.2) Cr. 1 Each time taken FS Pre Req. Open by audition and permission of instructor. Concurrent enrollment in one of the following: 151 161 171 Smaller music chorus specializing in advanced vocal jazz techniques. Performances on and off campus.

Music 133 Basic Voice Techniques (0.2) Cr. 1 Each time taken FS. Pre Req. Permission of instructor. Study of voice techniques of vocal production. Respiratory phonation articulation and performance.

Music 141 Lynnea Women's Choir (0.3) Cr. 1 Each time taken FS Pre Req. Open to all female students by audition. Large chorus emphasis on fundamental vocal and choral skills; wide variety of repertoire. Campus concerts each semester.

Music 146 Summer Band (0.2) Cr. 5 Each time taken SS Pre Req. Open to all students who have performed on a woodwind or percussion instrument in high school band or orchestra. One concert presented in SS.

Music 151 Oratorio Chorus (0.3) Cr. 1 Each time taken FS Pre Req. Open to all students by audition. Advanced skills required. High quality literature. Campus concerts each semester; some concerts in conjunction with orchestras. Mens and womens choirs separately and in combination A Cantus et Mensa Choir B State Mens' Choir

Music 156 Summer Chorus (0.2) Cr. 5 Each time taken SS Open to students staff and community

Music 161 Iowa State Singers (0.5) Cr. 1 Each time taken FS Pre Req. Open to all students by audition. Concert choir specializing in performance of advanced music literature. Renaissance through contemporary. Campus concerts annual spring tour.
Music 171 Chamber Singers (0.3) Cr 1 each time taken Prereq: Open to all students by audition
Several appearances annually by a select group capable of advanced study performing music literature appropriate for small vocal ensemble Renaissance through contemporary

Music 181 Symphony Orchestra (0-4) Cr 1 each time taken FS Prereq: Open to all students by audition Reading preparation and performance of standard repertoire Five or six concerts annually plus occasional off-campus appearances

Music 219 Applied Music Majors (5.2 or 12) Cr 1 to 3 each time taken FS SS Prereq: Audition permission of instructor restricted to music majors Minimum weekly practice of 5 hours per credit is expected Weekly seminar required
A Voice
B Piano
C Organ
D Strings
E Canzon
F Woodwinds
G Brass
I Percussion
K Harpsichord

Music 221 Introduction to Music Theory (3-0) Cr 3 F Fluent identification and application of the elements of music and music notation The study of two voice species counterpoint as an introduction to voice-leading principles in common practice period music

Music 222 Introduction to Aural Theory and Music Technology (0-4) Cr 2 F Aural discrimination of musical elements and patterns as demonstrated by proficiency in ear training sight singing and related musicianship skills Introduction to technological equipment and software used in the study of music

Music 227 Class Study in Piano II (0-2) Cr 1 FS Prereq: 128 or audition and permission of instructor Intermediate keyboard technique repertoire and sight reading skills Introduction to score reading hymn playing and accompanying at the piano

Music 228 Class Study in Piano III (0-2) Cr 1 FS Prereq: 227 or audition and permission of instructor Continuation of intermediate keyboard technique repertoire and sight reading skills Introduction to score reading hymn playing and accompanying at the piano

Music 231 Materials of Music I (3-0) Cr 3 S Prereq: 221 Harmonic melodic and rhythmic materials of the common practice period Application of these materials in analysis and writing Techniques of melodic construction formal design and harmonization

Music 232 Aural Theory I (0-3) Cr 1 S Prereq: 222 Development of sight singing ear training and related musical skills with emphasis on melodic harmonic and rhythmic materials from the common practice period

Music 248 Introduction to Music Technology (2) Cr 2 S Preq 101 or 221 and 222 and permission of instructor Introduction to the history and current use of technology in music education and the music industry Hands-on work with MIDI/computer music software recording studio equipment

Music 265 Music in Elementary Education (3-0) Cr 3 FS Preq: HD FS 226 or Paych 230 Experiencing and understanding the fundamentals of music through singing playing classroom instruments body movement reading notation listening and creative activities Developing lesson plan strategies and sequence exploring multicultural musics integrating music with other subjects in the elementary classroom and evaluating aspects of musical learning

Music 266 Introduction to Music Education (1-2) Cr 2 F Preq: Concurrent enrollment (5 Cr) in LAS 480K Required for second year majors in music education Historical philosophical and social foundations of music education music curriculum overview including goals of the music program and contemporary and international curriculum development psychology of teaching music including discipline techniques Preparation for required observations in area schools

Music 290 Special Problems Cr var F SS Preq: Permission of instructor A through F 12 credits in music approval of department head H approval of department head
A Education
B Theory
C Composition
D History
E Literature
F Applied Music
H Honors
G Conducting

Music 301 Opera Studio Cr 1 to 3 each time taken FS Preq: Permission of instructor Study of selected opera scenes and chamber operas Basic stagecraft role interpretation production

Music 302 Advanced Music Listening (3-0) Cr 3 S Preq: Music 102 junior classification Study of the evolution of music styles through history with emphasis on listening Primarily European music with some non-Western music providing a global perspective Individual composer's unique approach to timbre texture rhythm and melody General trends in the progress of style and form Concert reports and papers in addition to examinations Ability to read music recommended but not required Open to non-majors only

Music 304 History of Rock n Roll (3-0) Cr 3 S Preq: 101 102 221 or 222 Rock n Roll from the mid 1950s through the 1980s focusing on the development of rock styles from its roots in blues folk country and pop Expansion of listening experience through study of song forms musical instruments of rock and the socio-political significance of song lyrics Examinations research paper or in class presentation required Students must not be able to perform or read music

Music 318 Applied Music Non majors (5 or 10) Cr 1 or 2 each time taken FS SS Preq: Audition permission of instructor Applied music for the general student Will not satisfy applied music requirements for music majors
A Voice
B Piano
C Organ
D Strings
E Canzon
F Woodwinds
G Brass
I Percussion
K Harpsichord

Music 319 Applied Music Majors (5 2 or 12) Cr 1 to 3 each time taken FS SS Preq: Audition permission of instructor restricted to music majors Minimum weekly practice of 5 hours per credit is expected Weekly seminar required
A Voice
B Piano
C Organ
D Strings
E Canzon
F Woodwinds
G Brass
I Percussion
K Harpsichord

Music 321 Advanced Ensemble (0-3) Cr 1 each time taken FS Preq: Advanced proficiency and performing ability permission of director and department head Performance in ensembles that demand high proficiency Open to a limited number of undergraduate and graduate students
A Voice
B Piano
C Organ
D Strings
E Canzon
F Woodwinds
G Brass

Music 324 English and Italian Diction for Singing (2-0) Cr 2 Alt F offered 2004 Preq: Credit or enrollment in 118A or 119A The international phonetic alphabet and its application to correct pronunciation of English and Italian in singing

Music 325 French and German Diction for Singing (2-0) Cr 2 Alt S offered 2005 Preq: Credit or enrollment in 118A or 119A The international phonetic alphabet and its application to correct pronunciation of French and German in singing

Music 327 Functional Piano (3-0) Cr 2 S Preq: 226 or audition and permission of instructor Emphasis on sight reading three and four part score reading improvisation accompanying and advanced harmonization
A Keyboard majors
B Vocal/choral majors

Music 331 Materials of Music II (3-0) Cr 3 S Preq: 231 Harmonic melodic and rhythmic materials of the common practice period Application of these materials in analysis and writing Techniques of melodic construction formal design and harmonization

Music 332 Aural Theory II (0-2) Cr 1 F Preq: 232 Development of sight singing ear training and related musical skills with emphasis on melodic harmonic and rhythmic materials from the eighteenth and nineteenth centuries

Music 337 Materials of Music III (3-0) Cr 3 S Preq: 231 Writing and analysis based on musical styles since 1900

Music 338 Aural Theory III (2-0) Cr 1 S Preq: 332 Development of sight singing ear training and related musical skills with emphasis on melodic harmonic and rhythmic materials from the nineteenth and twentieth centuries

Music 350 Instrumental Techniques Strings (10-2) Cr 1 Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 351 Instrumental Techniques Clarinet Flute Saxophone (1-2) Cr 2 S Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 352 Instrumental Techniques Oboe Bassoon (0-2) Cr 1 F Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 353 Instrumental Techniques Trumpet, Horn (0-2) Cr 1 S Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 354 Instrumental Techniques Trombone Baritone Tubas (0-2) Cr 1 F Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 355 Instrumental Techniques Percussion (0-2) Cr 1 S Preq: Concurrent enrollment in 350B Techniques and skills required for teaching of instruments Examination of materials for school use For the instrumental music specialist

Music 356 Instrument Maintenance and Repair (1-0) Cr 1 F Preq: Permission of instructor Techniques and skills required for basic maintenance and repair of wind and percussion instruments Examination of commercial repair methods and facilities For the instrumental music specialist

Music 358 Lab Ensemble (0-1) Cr Review and selection of appropriate literature for ensembles of differing levels and abilities Conducting and rehearsal experience
A Choral F 2003 S 2005 Sight singing conducting and accompanying experience in conjunction with 362A Required of all vocal music education majors in every semester offered B Instrumental Performance on secondary instruments. Includes experiences with singing and vocal techniques. Required of all instrumental music education majors in those semesters when enrolled in 350 351 352 353 354 or 365

Music 360 Vocal Pedagogy (2-0) Cr 2 Alt S offered 2005 Prereq 319A or vocal proficiency examination. Physical, acoustical and musical properties of the vocal instrument. Includes survey of important texts and articles on singing and voice production.

Music 361 Conducting I (1-2) Cr 2 F Prereq 231 232 Introduction to conducting. Score reading and analysis. Conveying musical ideas through appropriate gestures. Leadership role of the conductor.


B Instrumental techniques S Advanced baton technique. Score preparation. Specific problems of large instrumental ensembles. Concurrent enrollment in 356B.


Music 367 Choral Literature (2-0) Cr 2 Alt S offered 2004. Prereq 361. Recommended Overview of choral repertoire from the sixteenth century to the present including accessible works for the young conductor.

Music 368 Marching Band and Jazz Ensemble Techniques (2-0) Cr 2 Alt S offered 2005 Prereq Credit or enrollment in 362B. Recommended Techniques and materials for teaching marching band in the high school. Philosophy. Computer assisted drill design techniques. Band set up and other related skills. Jazz style articulation. Phrasing materials and teaching techniques for secondary school jazz ensembles.

Music 369 String Pedagogy (0-2) Cr 1 Prereq 319D or 350. Practical examination of current teaching methods and materials. Intended for string instrumental music education majors.

Music 383 History of Music (3-0) Cr 3 F Prereq 120 History of the stylistic and cultural development of music from the Baroque through the 19th century. Major composers. Historical periods. Major stylistic movements.

Music 384 History of Music (3-0) Cr 3 S Prereq 383 History of the stylistic and cultural development of music. Classical through contemporary music.

Music 417 Literature and Pedagogy in Applied Music Cr 1 to 4. Prereq 231 232. FS SS Prereq Permission of instructor. Includes experience in technology relative to the particular discipline A Voice B Piano.

C Organ A Strings E Carillon F Woodwinds G Brass I Percussion J Jazz Pedagogy and Performance

Music 419 Applied Music Majors (5-0 12-1 12) Cr 1 to 3 each time taken. FS SS Prereq Audition permission of instructor. Restricted to music majors. Minimum weekly practice of 5 hours per credit is expected. Weekly seminar required. A Voice B Piano C Organ D Strings E Carillon F Woodwinds G Brass I Percussion K Harpsichord

Music 430 Seminar in Analysis for Performance (3-0) 3 each time taken. Prereq 337 383. Analysis and performance of selected works appropriate to student's performance medium. Examination of structural, rhythmic, harmonic and textural aspects of the music selected. Literature will vary according to the needs of the class. Nonmajor graduate credit.

Music 440 Seminar in Music Theory (3-0) Cr 3 each time taken. Prereq 337 383. Various topics in music theory including counterpoint, arranging, pedagogy and psychology of music. Content will vary. Contact the Department of Music for the current year offering. Nonmajor graduate credit.


Music 464 Instrumental Administration, Materials, and Methods (2-0) Cr 2 Alt S offered 2004. Prereq Credit or enrollment in 362B. Recommended Instructional materials and methods appropriate for teaching instrumental music in elementary, middle school and high school music programs. Required observations in area schools.

Music 465 Choral Materials and Methods (2-0) Cr 2 Alt F offered 2003 Prereq Concurrent enrollment in 356A. Instructional materials and methods appropriate for teaching choral music in the secondary school. Emphasis on pedagogy and rehearsal techniques. Required observations in area schools. For the vocal music education specialist.


Music 471 The Tones of Florence A Study of Humanism (Same as U St 471) Cr 3 SS Prereq Application through the Study Abroad Program. Interview with instructor Sophomore classification. A survey of the masterpieces of music literature painting sculpture architecture mathematics and theology that made Florence the major European center of humanism in the Renaissance.

Music 472 History of American Music (3-0) Cr 3 Prereq Ability to read music. 9 credits from music major. American literature American history art history. Serious and popular currents that have influenced development in American music and its relation to transcendent modernism mass culture and other intellectual social and cultural trends in the history of America. Nonmajor graduate credit.


Music 475 Music of the Romantic Era (3-0) Cr 3 Prereq 383 384. Detailed survey of instrumental vocal choral and keyboard music from 1825 to 1900. Nonmajor graduate credit.

Music 476 Music of the Twentieth Century (3-0) Cr 3 Prereq 383 384. Detailed survey of instrumental vocal and keyboard music from 1900 to the present. Nonmajor graduate credit.

Music 490 Independent Study Cr var SS Prereq Permission of instructor. A thorough F 2 credits in music approval of department head. No more than 4 credits of Music 490 may be counted toward graduation.

A Education B Theory C Composition D History E Literature F Applied Music G Honors H Conducting

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students Music 590 Special Topics Cr var SS Prereq Permission of instructor. Approval of department head.

A Education B Theory C Composition D History E Literature F Applied Music G Conducting


Natural Resource Ecology and Management

J Michael Kelly, Chair of Department University Professors Atkinson. Professors Best Clark Downing Hall Harrington Jungt Kelly Menzel Schultz Summerfield Way Professors (Collaborators) Brandle Isabrandre Otis Niemenschnieder University Professors (Emertus) Hinz McNabb Professors (Emertus) M Bachmann R Bachmann Bensend Clark Countryman Dansemore Downing Hart Mawiller Moorman Prestemon Professors (Collaborator Emertus) Klaas Associate Professors Collett Daniel Debinski Kuo Mize Morris Rumble Associate Professors (Collaborators) Tomer Assistant Professors Alsborn Miller Pease Stokke Thompson Assistant Professors (Adjunct) Isenhart Negrole Castile Pritchard Stafford Assistant Professors (Collaborators) Hofman Koford Pierce

The department addresses a broad spectrum of natural resource and environmental issues in a holistic approach to learning discovery and engagement. Our vision of natural resources is that
Ecology curriculum in addition they must apply formally for admission to the teacher education program (see Index Teacher Education Program). Students with an interest in careers in outdoor writing are encouraged to obtain a minor or a second major in journalism (see Index Journalism and Communication Courses and Program). Students who wish to pursue a job as a conservation officer may wish to minor in criminal justice (see Index Criminal Justice Studies).

The department offers a minor in animal ecology that may be earned by taking 15 credits in the department including 310, 312, NREM 120 plus five additional credits of Animal Ecology courses at the 300 level or above.

Forestry (For)

The forestry curriculum offers courses that are concerned with the management of forest ecosystems for multiple benefits including wood and fiber production, water, water conservation, recreation, and wildlife. Conservation and preservation of natural resources are emphasized. The department offers work for the bachelor of science degree with a major in forestry and options in forest ecosystem management, urban and community forestry, natural resource conservation, and wood products. All options lead to a professional degree in forestry (Bachelor of Science) and have been accredited by the Society of American Foresters (SAF) since 1935. The SAF is a specialized accrediting body recognized by the Council on Post Secondary Accreditation and the U.S. Department of Education as the accrediting body for forestry education in the United States. The primary goal of the undergraduate curriculum in forestry is to educate foresters to be responsible stewards of the nation's forests.

The purpose of the undergraduate curriculum in forestry is to prepare students for professional employment in management and conservation of natural resources. They are prepared to function effectively in a complex society.

Graduates understand and can apply scientific principles associated with forests, forest ecosystem management, and wood and non-wood products. Graduates are able to communicate effectively and work well in teams. They are capable of preparing and delivering effective oral and written communication of scientific and technical decisions to professional and lay audiences. They are proficient in technical skills such as measurements, computers, inventory economic analysis, data and situation analysis, and ecosystem assessment. They are sensitive to the importance of ethics in forestry and are sensitive to cultural diversity and broad environmental concerns.

Graduates of the forest ecosystem management option are skilled at understanding how forests function and how forests can be managed to produce desired goods (wood, fiber, recreation, wildlife habitats) and services (climate regulation, wildlife) in the long run. They are skilled at interpretation of interactions and effects of metabolic and biotic factors in forests and quantification of biophysical and economic outputs from forest ecosystems. They are proficient at making complex decisions involving public and private forest resources where ethical, legal, social, economic, and ecological dimensions are explicitly considered.

Graduates of the urban and community forestry option are able to combine biological, social, and economic expertise effectively to manage trees or forests in an urban setting. They are skilled at decision making related to site assessment and long term management of urban trees and forests to achieve multiple goals.

Graduates of the natural resource conservation option are skilled at assessing the natural functions of the environment and human impacts, they are skilled at interpretation of forest and other natural environments and making decisions related to their conservation and preservation.

Graduates of the wood products option understand the anatomical, physical, and chemical properties of wood and know wood processing operations involved in drying, machining, gluing, and chemical treatment of wood. They are skilled at applying knowledge in the development of products and processes. They are able to provide scientific and technical solutions to forested landscapes. They are skilled at making decisions for customers of wood products.
ment and relevant aspects of basic mathematics and natural sciences computing applications and personal and professional development. They are able to execute non-research independent research have developed problem solving and critical thinking skills and can communicate effectively with scientific colleagues and the general public in both formal and informal settings.

Personnel of the Biological Resources Division of the U S Geological Survey through the Iowa Cooperative Fish and Wildlife Research Unit and the Iowa Department of Natural Resources contribute to the graduate programs of the department.

No more than two dual listed animal ecology courses may be applied for major graduate credit. Additional work is expected of students taking a dual listed course for credit at the 500 level.

Forestry
The department offers programs leading to the degrees of master of science and doctor of philosophy with a major in forestry and minor work to students taking major work in other departments. Areas of specialization for the M S degree are forest administration and management, forest biology, forest entomology, wood science, and forest economics. Areas of specialization for the Ph D are forest biology, wood science, forest entomology and forest economics.

Graduates are skilled at defining a research problem in forestry, applying scientific principles and appropriate methods and analyzing the results. They have an understanding of the many facets of forest and wood science and are very knowledgeable in specific areas in forestry. They are able to deal with complex forestry problems and where appropriate they are capable of blending ecological, social, ethical, legal, and economic factors in the research process. They are very skilled at communicating both in written and oral form research results to professional and lay audiences. They are sensitive to the cultural diversity and work effectively with peers, natural resource professionals, and the public.

The graduate program is open to and suitable for students who have majored in forestry or related natural resource fields. A non thesis master's option is available. All students are required to teach and conduct research as part of their training for the Ph D degree.

The department participates in the Masters in Business Administration (M B A) with specialization in the agriculture program administered by the College of Business. Providing an opportunity to obtain an M B A degree while taking advanced courses in forestry and marketing and with the cooperation of forestry, the department also participates in interdisciplinary majors in ecology and evolutionary biology, plant physiology, and water resources (see index).


Animal Ecology
Courses Primarily for Undergraduate Students
A Ed 130 Wildlife and Agriculture (2) Cr 2 S Survey of the ecology and management of fish and wildlife resources in areas of intensive agriculture with emphasis on wildlife conservation and management practices for private agricultural lands. Designed for nonmajors.

A Ed 211 Careers in Animal Ecology (2) Cr 1 FS Second half semester Prereq Sophomore classification. Career planning and opportunities in animal ecology. Offered on a satisfactory-fail grading basis only.

A Ed 301 Iowa Natural History (Same as la LL 301) See Iowa Lakeside Laboratory.

A Ed 303I Undergraduate Internship (Same as la LL 303I) See Iowa Lakeside Laboratory.


A Ed 312 Ecology (Same as Biol 312) See Biology.

A Ed 312I Ecology (Same as la LL 312I) See Iowa Lakeside Laboratory.

A Ed 321 Fish Biology (Dual listed with 521I) (2-3) Cr 3 S Prereq 310 Anatomy physiology behavior and ecology of fishes.

A Ed 326I Ornithology (Same as la LL 326I) See Iowa Lakeside Laboratory.

A Ed 330 Interpretation of Natural Resources (3) Cr 3 S Prereq 6 credits in biological sciences. History objectives forms and techniques of natural resources interpretation in the settings of county state and national parks.

A Ed 350 Ecological Methods and Analyses (2) Cr 3 S Prereq 312 NREM 120 Stat 1 or 104. Quantitative techniques used in management of natural resources with emphasis on inventory and manipulation of habitat and animal populations. Nonmajor graduate credit.

A Ed 361 Natural History of Fishes (0-3) Cr 1 F Prereq 310 312 Natural history and ecology of Midwest fishes including identification survey methods habitat requirements foods and feeding reproduction communities and other ecological factors which affect species well being.

A Ed 362 Natural History of Reptiles and Amphibians (0-3) Cr 1 S Prereq 310 312 Natural history and ecology of Midwest reptiles and amphibians including identification survey methods habitat requirements foods and feeding reproduction communities and other ecological factors which affect species well being.

A Ed 363 Natural History of Birds (0-3) Cr 1 S Prereq 310 312 Natural history and ecology of Midwest birds including identification habitat requirements distribution foods and foraging and reproduction.

A Ed 364 Natural History of Mammals (0-3) Cr 1 FS Prereq 310 312 Natural history and ecology of Midwest mammals including identification survey methods habitat requirements foods feeding reproduction communities and other ecological factors which affect species well being.

A Ed 401 Introductory Aquatic Animal Health and Medicine (Same as VDPAM 401) See Veterinary Diagnostic and Production Animal Medicine.

A Ed 403 Environmental Ecology (Same as la LL 403I) See Iowa Lakeside Laboratory.

A Ed 410 Aquatic Ecology (Same as Bot 410) EnSci 410 (3) Cr 3 F Prereq Biol 312 EnSci 330 or NPEM 301 Stranding aquatic ecosystems with application to fisheries and pollution problems. Emphasis on lacustrine riverine and wetland ecology. Nonmajor graduate credit.

A Ed 410L Aquatic Ecology Laboratory (Same as Bot 401L EnSci 401L) (0-3) Cr 1 F Prereq Concurrent enrollment in 410L Field trips and laboratory exercises to accompany 410 Hands-on experience with aquatic research and monitoring techniques and concepts. Nonmajor graduate credit.

A Ed 411 Identification of Aquatic Organisms (Same as Bot 411) (0-3) Cr 1 FS Prereq Credit or enrollment in 410L. On line taxonomic and identification exercises to accompany 410 Instruction with aquatic research and monitoring techniques and concepts. Nonmajor graduate credit.

A Ed 413 Community Ecology and Management (2) Cr 3 S Prereq Biol 312 The effect of interspecific interactions on the structure and dynamics of natural and managed communities including concepts of guild structure and trophic web dynamics and their importance to the productivity diversity stability and sustainability of communities. The implications of interspecific interactions in the management of wild species will be emphasized with illustrative case histories of interactions between plants invertebrates and vertebrates. Nonmajor graduate credit.

A Ed 419I Vertebrate Ecology and Evolution (Same as la LL 419I) See Iowa Lakeside Laboratory. Nonmajor graduate credit.

A Ed 420I Amphibians and Reptiles (Same as la LL 420I) See Iowa Lakeside Laboratory.

A Ed 425 Aquatic Insects (Dual listed with 525) same as Ent 425) See Entomology.

A Ed 430 Media Techniques in Natural Resources Interpretation (3) Cr 3 Alt F offered 2003 Prereq 330 Media techniques used by interpreters for teaching the public about natural resources. Nonmajor graduate credit.

A Ed 440 Fishery Management (Dual listed with 540) (2) Cr 3 F Prereq 312 NREM 120 credit or enrollment in 410 Stat 101 or 104. Biological basis of fishery management fishery problems and management practices for freshwater anadromous and marine fishes.

A Ed 442 Aquaculture (Dual listed with 542) (2) Cr 3 S Prereq 410 enrollment in 312 Concepts related to the culture of aquatic organisms including culture systems water quality nutrition genetics diseases.

A Ed 451 Wildlife Management (2) Cr 3 F Prereq 350 Problems of managing wildlife habitat and populations. Case studies and group projects. Nonmajor graduate credit.

A Ed 455 International Wildlife Issues (3) Cr 3 S Prereq 310 312 Biology of World wildlife. NREM 120 Biological political social and economic factors affecting the management of international wildlife resources. Nonmajor graduate credit.

A Ed 490I Undergraduate Independent Study (Same as la LL 490I) See Iowa Lakeside Laboratory.

Courses Primarily for Graduate Students, open to qualified undergraduate students

A Ed 508I Aquatic Ecology (Same as la LL 508I) See Iowa Lakeside Laboratory.


A Ed 514 Evolutionary Ecology (3-0) Cr 3 Alt F offered 2003 Prereq 588 Biol 303 graduate standing. Relationships between animals and their environment with major emphasis on adaptive strategies and evolutionary mechanisms.

A Ed 515 Ecology of Freshwater Invertebrates (Same as Zool 515) (1) Cr 3 S Alt S offered 2004 Prereq 410 Biol 312 Stat 101 or 104. Identification natural history and ecological relationships of free-living freshwater invertebrates. Emphasis on community structure and sampling techniques.

A Ed 516 Avian Ecology (3-0) Cr 3 Alt S offered 2004 Prereq 310 312 or graduate standing. Current topics and theories including avian breeding and foraging ecology community structure habitat selection field methodologies and data interpretation. Strong avian emphasis.

A Ed 518 Stream Ecology (Same as EnSci 518) (3) Cr 3 Alt S offered 2004 Prereq 410 Biological chemical physical and geological processes that determine the structure and function of flowing water ecosystems. Current ecological theories as well as applications to stream management for water quality and fisheries.
environmental courses. Exercises will be built around common organisms and ecosystems in Iowa Field trips.

A. Animal Biology (Same as Ia LL 573A)
B. Animal Behavior (Same as Ia LL 573G)
C. Project WET (Same as Ia LL 573W)


A. 588 Population Ecology (Same as Bot 588)
B. 12 credits in mathematics (at least 3 in calculus) Concepts and theories of population dynamics with emphasis on models of growth, predation, competition, and regulation.

A. 590 Graduate Independent Study (Same as Ia LL 590) See Iowa Lakeside Laboratory.

A. 599 Creative Component (Cr 1-3 F Prereq Northeith M 5 option only)

Courses for Graduate Students

A. 600 Seminar (2.0) Cr 1 Each time taken: May be taken more than once for graduate credit. FS Current topics in ecological research and wildlife management and environmental problems related to fish or wildlife resources.

A. 611 Analysis of Populations (2.0) Cr 3 F Prereq 312 Stat 401 A course in calculus Quantitative techniques for analyzing vertebrate population data to estimate parameters such as density and survival. Emphasis on statistical inference and computing.

A. 698 Animal Ecology Teaching Practicum Cr 1 to 3 Each time taken FS SS Prereq Graduate classification in animal ecology and permission of instructor. Graduate student experience in the animal ecology teaching program. Offered on a satisfactory graded basis only.

A. 699 Research (Same as Ia LL 699) See Iowa Lakeside Laboratory.

Courses Offered at the Gulf Coast Research Laboratory (GCRL), Ocean Springs, Mississippi

The Gulf Coast Research Laboratory is affiliated with the University of Southern Mississippi. Iowa State students may register for the following University of Southern Mississippi/GCRL courses and transfer them to the ISU degree programs. Written permission of the ISU coordinator for the GCRL 201 Bessey is required for this arrangement. Inquire at 201 Bessey for further information.

MAR 405 Marine Ecology Cr 3.5 SS Prereq 16 hours of biological sciences including general zoology, general botany, and vertebrate zoology. A consideration of the role of marine organisms to their environment including the effects of temperature, salinity, light, nutrient concentration currents, and food on their abundance and distribution.

MAR 406 Marine Ecology Lab Cr 2 SS Lab to accompany MAR 405.

MAR 407 Marine Aquaculture Cr 3 SS Prereq General zoology or invertebrate zoology. A lecture laboratory and field course designed to introduce aquatic and marine biology students to the history principles, problems, and procedures relating to the culture of commercially important crustaceans fish, and mollusks along the Gulf Coast.

MAR 407L Marine Aquaculture Lab Cr 3 SS Lab to accompany MAR 407.

Forestry

Courses Primarily for Undergraduate Students

For 201 Forest Biology (2.0) Cr 2 F Prereq Concurrent enrollment in 202, 203, 204, 205, and 206. Discussion of ecological concepts individual tree structure and growth variation and diversity in tree populations. Physical environment of trees and forests, ecological processes in forest communities, and introduction to different regional forest communities.

For 202 Wood Utilization (2.0) Cr 2 F Prereq Concurrent enrollment in 201, 202, 204, 205, and 206. Basic management practices (BMPs) for controlling soil erosion associated with harvesting. Environ-mental aspects of materials usage by society. Processing of wood and fiber into products.

For 203 Resource Measurements/Evaluation (2.0) Cr 2 F Prereq Concurrent enrollment in 201, 202, 204, 205, and 206. Methods of decision making related to forest ecosystems including communications and conflict resolution. Current issues related to public private and urban forests, quantification of forest resources, and goods produced by the forest and expected by the public such as wildlife, water, recreation, and wilderness.

For 205 Integrated Forestry Laboratory (3.0) Cr 3 F Prereq Concurrent enrollment in 201, 202, 203, 204, and 206. Field and laboratory exercises integrating the evaluation and management of forest goods and services and the processing of wood products.

For 206 Field Forestry Camp Cr 4 F Prereq Concurrent enrollment in 201, 202, 203, 204, and 205. Three week field camp to address topics and issues covered in 201, 202, 203, 204, and 205.

For 280 Wood Anatomy and Properties (3.0) Cr 4 S Prereq Consideration of the anatomy and properties of wood and how they relate to its successful use. Comparative anatomical characteristics and identification of commercially important North American woods.

For 283 Pesticide Application Certification (Same as Ent 283) See Entomology.

For 290 Special Problems Cr 1 to 3 Prereq Freshman or Sophomore classification permission of instructor. A maximum of 4 credits may be used toward the total credits needed for graduation. A Leadership in Forestry Teams (LIFT) Learning Community.

B. Forest Ecosystem Management
C. Natural Resource Conservation
D. Urban and Community Forestry
E. Wood Science and Technology.

For 302 Silviculture (3.0) Cr 3 S Prereq 201 Manipulation of forest vegetation based on ecological principles for the production of goods and services Non-major graduate credit.

For 342 Dynamics of Forest Stands (3.0) Cr 3 F Prereq 202, 203, 204, 205, 206, and 207. Examination of factors affecting individual tree and forest growth. Estimation of growth and yield of even aged and aged stands. Examination of ways to assess site quality and competition. Review of simple random sampling and introduction to stratified random sampling ortho and other sampling techniques. Non-major graduate credit.

For 356 Dendrology (Same as Bot 356) See Botany for 402 Watershed Hydrology and Surface Processes (Same as Agron 402, EnSci 402, Geo 402) (2.0) Cr 2 F Prereq Credit or enrollment in EnSci 330 or Geol 100 or 201, Math 165 or 161. Buss, Simplex. Examination of watersheds in systems environments of environmental, biological and physical factors. Control, stability, soil formation, and nutrient transport. Laboratory emphasizes field identification of watersheds and scale processes. Non-major graduate credit.
For 416 Forest Pest Management (Same as Pl P 416 | See Plant Pathology Nonmajor graduate credit)

For 451 Forest Resource Economics and Quantitative Methods (3 Cr 3 Cr 4 S Prereq 203 Econ 101 Math 150 Application of economic principles to forest resources includes methods of identifying and specifying problems in the management and use of forest resources. Application of mathematical and statistical models to the solution of managerial problems Nonmajor graduate credit

For 452 Forest Ecosystem Management (3 Cr 3 Cr 3 F Prereq 451 Principles of planning regulating and decision-making associated with public and private forests Optimization of multiple-goal forestry with resource and policy constraints Integrated forest resources management and evaluation of ecosystem management models Nonmajor graduate credit

For 453 Forest Resource Policy and Administration (3 Cr 3 Cr 3 S Prereq 451 Forest policy processes participants programs and conflict resolution Contemporary forest resource policies and issues Forest resources for administration Functions of administration personnel management and use of PERT/CPM in project administration Ethics in forestry Nonmajor graduate credit

For 454 Forestry Practicum (14 Cr 3 S Prereq 20 credits in student's major at 300 level or above Integrated decision making related to the conservation management and preservation of private and public forests wildlands/rural communities forests and/or the production and utilization of wood products Student work with a client and development management plans that incorporate ecological economic social economic and institutional/ political factors Effective teamwork written/oral visual communication and problem solving stressed Multiple trips to project site and client Nonmajor graduate credit

For 460 Agroforestry Systems (Dual-listed with 560 same as Agron 460 | I 2 Cr 3 Alt F offered 2004 Prereq 6 credits in biological science at 300 level or above Concepts of sustainable land use agroecological dynamics and component interactions of agroforestry systems Agroforestry systems in temperate and tropical regions Design and evaluation techniques for agroforestry systems Ecological socioeconomic and polical aspects of agroforestry

For 475 Community Tree Management (Same as Hort 475 PI HP 475 | I 2 Cr 3 F Prereq Junior or senior classification Basics in biology of establishment and management of woody perennials in community-owned urban greenspaces Consideration of urban site and soil characteristics Plant physiology plant culture urban forest values inventory methods species selection urban forest maintenance (health care and pest management) urban forest administration legal and political issues and landscape ecology (including wildlife) of the urban forest Nonmajor graduate credit

For 476 Urban Forest Resource Planning and Policy (2 Cr 2 Alt S offered 2005 Prereq Senior classification For 475 Analysis of natural resource administration policy and planning in an urban context Legal and political issues and policies influencing natural resource use decisions in densely populated areas Nonmajor graduate credit

For 481 Chemical Conversion of Wood (2-3 Cr 3 Alt F, offered 2004 Prereq 280 Chemical properties of wood Pulp and paper technology Other fiber products Cellulose derivatives Nonmajor graduate credit

For 483 Wood Deterioration and Preservation (Same as Ent 483 PI P 483 I 2-3 Cr 3 Alt F offered 2003 Prereq Tissue deterioration by biological and physical agents of wood in use Wood preservation and fire retardant treatments Nonmajor graduate credit

For 465 Adhesive Bonded Wood Products (2-3 Cr 3 Alt F, offered 2004 Prereq 290 Production of laminated wood plywood wafer boards particleboard and medium density fiberboard includes wood variables adhesives processes use of wood residues and combining wood with other materials Nonmajor graduate credit

For 486 Wood Moisture Relations (2-3 Cr 3 Alt S offered 2004 Prereq 280 Movement of liquids and gases in wood Seasoning techniques shrinkage and swelling of wood Nonmajor graduate credit

For 487 Mechanical Properties of Wood (3 Cr 3 Alt S offered 2004 Prereq 280 Mechanical thermal electrical and acoustical properties of wood lumber grading and stress rating Nonmajor graduate credit

Courses Primaarily for Graduate Students, Open to Qualified Undergraduate Students For 551 Geology (3 Cr 3 Alt F offered 2004 Prereq 500 Principles of geology in the context of forest resources Kumarian systems as they apply to natural and improved populations of plants and animals Genetic systems as they interact with long term natural selection to produce clonal or ecotypic variation The impact of current environments and genetic modifications of domesticated organism on short-term selection pressures Special coverage of species of interest to students enrolled in the course

For 484 Advanced Forest Ecology and Silviculture (3 Cr 3 Alt F offered 2004 Prereq 301 Detailed analysis of factors underlying forest growth and stand growth and development Applications of this knowledge to forest culture to support a diversity of use and protection objectives Discussions of regional silviculture tropical forests and experimentation in forest biology

For 550 Advanced Quantitative Methods in Forests (2-3 Cr 3 Alt S offered 2004 Prereq Stat 401 and one course in quantitative analysis or systems analysis or forest biometrics Applied problems in forest biometrics and mathematical programming and other modeling techniques as applied to modern forestry

For 580 Agroforestry Systems (Dual-listed with 560 same as Agron 580 | I 2 Cr 3 Alt F offered 2004 Prereq 6 credits in biological science at 300 level or above Concepts of sustainable land use agroecological dynamics and component interactions of agroforestry systems Agroforestry systems in temperate and tropical regions Design and evaluation techniques for agroforestry systems Ecological socioeconomic and polical aspects of agroforestry

For 570 Resource Allocation in Forestry (2 Cr 2 Alt S offered 2005 Prereq 451 or two courses in economics Analytically approach to economic aspects of forest resources Problems Theory and application of economic decision making criteria to traditional and modern forest resource management issues Current problems in the allocation of forest resources

For 580 Sustainable Agriculture Seminar (Same as An S 580 | I See Animal Science

For 487 Advanced Topics in Wood Science (2 Cr 2 Alt F offered 2003 Prereq 280 Recent contributions of research and technology to product development Topics in focus basic and applied research

For 599 Creative Component 110 F A Forest Biology B Forest Biometry C Forest and Recreation Economics D Forest Management and Administration E Wood Science

Courses for Graduate Students For 603 Tree Growth and Development (4-0 Cr 4 Alt S, offered 2004 Prereq 301 or a course in plant physiology Structure and function of individual trees and forests Emphasis is on factors that make up plants different from herbaceous plants Response of individuals to such environmental factors as radiation temperature water stress flooding and compaction air pollution fire and wind

For 654 Advanced Topics in Forest Economics (1 Cr 1 May be taken twice for credit Alt S offered 2005 Prereq Permission of instructor Discussion and presentation of advanced forest economic problems with particular attention to recent theories and applications Emphasis on applications of micro and macroeconomic principles to forest resource allocation and long range planning

For 499 Seminar in Plant Physiology and Molecular Biology (Same as Bot 499 | I See Botany

For 699 Research Cr 1 to 9 A Forest Biology—Wood Science B Forest Biometry C Forest Economics D Forest Management and Administration E Wood Science F Plant Physiology

Natural Resource Ecology and Management Courses Primarily for Undergraduate Students

NREM 104 Practical Work Experience Cr R Three months of relevant work experience in natural resources animal ecology or forestry. Study at a summer biological station may be available. See advisor for specific requirements and approval process

NREM 110 Orientation in Natural Resource Ecology and Management (1 Cr 1 F Orientation to the University and to the Department of Natural Resource Ecology and Management Discussion of the importance of work experience and development of desired resume Career opportunities

NREM 120 Introduction to Renewable Resources (Same as Agron 120 AST 120 Env S 120 I 3 Cr 3 F Overview of soil water plants and animals as renewable natural resources in an ecosystem context History and organization of resource management Concepts of integrated resource management

NREM 301 Forest Ecology and Soils (Same as EnSci 301 PI HP 301 I 3 Cr 3 F Prereq Bot 201 201 or a second course in biology Effects of environmental factors on ecosystem structure and function Special emphasis is given to soil forming processes and the role of soil in nutrient and water cycling and ecosystem dynamics. Additional emphasis is given on human influences on natural ecosystems Nonmajor graduate credit

NREM 303 Internship Cr 1 to 3 FS SS Prereq Permission of instructor and sponsoring standing Placement with county conservation boards camps zoos parks forests and interpreters rangers and technicians. A total of 6 credits may be used toward degree requirements

NREM 305 Seminar (2 Cr 2 Cr each time taken may be taken more than once for graduation credit FS Prereq Permission of instructor. Current topics in natural resources or related issues

NREM 310 Natural Resource Management on Small Properties (3-0 Cr 2 Alt S Techniques of resource management with emphasis on small private holdings. Non forestry majors only Course terminates at the end of 11 weeks

NREM 345 Natural Resource Photography and Geographic Information Systems (Same as EnSci 345 I 2 Cr 3 F Prereq Junior classification Use of aerial photos and remotely sensed imagery in resource management. Training in techniques of photo measurement interpretation and use of Geographic Information Systems (GIS) Principles of remote sensing Nonmajor graduate credit

NREM 390 Fire Ecology and Management (3-0 Cr 3 F Characteristics and role of fire in forest ecosystems Major topics include fuels fire weather fire behavior fire danger rating systems fire control and prescribed burning Nonmajor graduate credit
NREM 407 Watershed Management (Same as Env S 407) 3 Cr 3 1 4 Prereq. A course in general biology. Managing human impacts on the hydrologic cycle. Field and watershed landscape best management practices for modifying the impacts on water quality and quantity and timing are discussed. Field project includes developing a management plan using landscape buffers. Nonmajor graduate credit.

NREM 446 Integrating GIS and GIS for Natural Resource Management (Dual listed with 546 same as EnSo 446) 2 [2-3] 3 Cr 3 5 Prereq. 12 credits in student's major at 300 level or above. Emphasis on the use of GIS as a data collection tool for GIS. Basic theory of GIS. Use of Global Positioning System technology for spatial data collection and navigation. Post processing and real-time correction of GPS data. GIS data transfer to GIS for mapping applications. Use of GIS to construct way points for use in GPS navigation.

NREM 460 Controversies in Renewable Resource Management (Dual listed with 565 same as EnEnv 460) 3 Cr 3 F Prereq. 120 and A Ecol 312 or For 301 Junior classification. Analysis of controversial renewable resource issues using a case approach that correlates recent thoughts and trends in the development of information and scientific understanding. Ecological, social, political, and economic implications of each issue will be analyzed. Nonmajor graduate credit.

NREM 465 Landscape Change and Conservation (Dual listed with 465 same as LA 465) 3 [2-2] 3 Cr 3 5 Prereq. A Ecol 312. Landscape change and landscape conservation. Concepts and management practices for landowners and teachers and others. Not for students majoring in animal ecology or forestry. May be taken more than once for graduation credit.

NREM 490 Independent Study 1 0 to 4 each time elected. Prereq. Junior or senior classification. Permission of instructor. A maximum of 6 credits of 490 may be used toward degree requirements. A Animal Ecology B Forestry H Honors Program.

NREM 493 Workshop 1 3 Cr 3 Prereq. Permission of instructor. Ecological concepts and management practices for landowners and teachers and others. May be taken more than once for graduation credit.

NREM 496 Travel Course (Dual listed with 596) 1 3 Cr 3 May be repeated. Prereq. Permission of instructor. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students. A International B Domestic.

NREM 498 Cooperative Education 1 3 Cr 3 Prereq. Permission of departmental chair. Required of all cooperative education students. Students must register prior to commencing each work period.

Courses Primarily for Graduate Students, open to qualified undergraduate students

NREM 505 Seminar 2 0 to 3 Cr 1 each time taken may be taken more than once for graduation credit. FS Prereq. Permission of instructor or graduate classification. Current topics in natural resources research and management.

NREM 510 Methods for Presenting Scientific Results (Dual listed with 720) 2 Cr 2 2 Prereq. Permission of instructor. Techniques of proper platform presentation. Discussion of effective audiovisual techniques for presentation of research findings. Practice in development of overheads and slides. Use of computer generated and projected visuals. Practice in oral presentation with critical review.

NREM 532 Human Dimensions of Natural Resource Management (Dual listed with 732) 3 Cr 3 A Ecol 312 or equivalent plus 6 credits of biological sciences. permission of instructor. Exploration of institutions that help shape fish and wildlife management and policies. Current research on interaction of humans with wildlife resources. Roles of social forces, politics and economics in wildlife management.

NREM 542 Introduction to Molecular Biology Techniques (Same as Zool 542) 2 3 Cr 3 Se Zoology and Genetics.

NREM 546 Integrating GPS and GIS for Natural Resource Management (Dual listed with 446) 2 [2-3] 3 Cr 3 5 Prereq. 12 credits in student's major at 300 level or above. Emphasis on the use of GPS as a data collection tool for GIS. Basic theory of GIS. Use of Global Positioning System technology for spatial data collection and navigation. Post processing and real-time correction of GPS data. GIS data transfer to GIS for mapping applications. Use of GIS to construct waypoints for use in GPS navigation.

NREM 565 Landscape Change and Conservation (Dual listed with 465 same as LA 465) 3 Se Landscape Architecture.

NREM 590 Spatial Topics 1 0 to 4 each time elected. Prereq. Permission of instructor. A Animal Ecology B Forestry.

NREM 593 Workshop 1 3 Cr 3 Prereq. Graduate classification. May be taken more than once for graduation credit.

NREM 595 Travel Course (Dual listed with 496) 1 3 May be repeated. Prereq. Permission of instructor. Limited enrollment. Extended field trips to study ecological topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students. A International B Domestic.

NREM 599 Creative Component Cr arr.

NREM 600 Seminar 2 0 to 3 Cr 1 each time taken may be taken more than once for graduation credit. FS Current topics in natural resources research and management.

NREM 689 Research Cr 1-9

**Naval Science**

www.imstate.edu/Naval

Col Paul Ladd, Chair of Department

Professors Ladd

Assistant Professors (Adjunct) Hoffer

Instructors (Adjunct) Freeborn Ukeley, Woodard

The function of the Navy and Marine Corps officer education program is to provide a permanent system of education in essential naval science and other academic subjects at civilian education institutions. A source of well-trained officers may be available for the Navy and the Marine Corps and their reserve components.

Students who enter the Navy and Marine Corps officer education program may apply for either of two programs: the NROTC scholarship program (full scholarship) which includes books, tuition, housing, and a monthly stipend; or the college program (non-scholarship limited financial assistance). Applicants for the scholarship program are selected through comprehensive nationwide competitive procedures. Applicants for the college program are selected by the Professor of Naval Science from among students already in attendance or for admission by the university. This program involves financial assistance for each of the last two academic years. NROTC students pursue these studies like other students except that they meet certain requirements that will prepare them to serve as naval officers after graduation. A scholarship program student incurs a minimum 4 year active duty military obligation as a commissioned officer after graduation; a college program student incurs a 3 year active duty obligation. If a scholarship student fails to earn a degree or if a commission is not tendered (for other than physical reasons), the student may incur a 2 year obligations in an enlisted grade or may be required to reimburse the government for scholarship costs. This obligation is not incurred during the freshman year. Information is available from the Professor of Naval Science Iowa State University.

While in the program, students will participate in summer at-sea training cruises with pay. Students are also exposed to regular and extracurricular activities that teach leadership principles and help them decide which field of the Navy or Marine Corps they wish to enter. These activities include a weekly leadership laboratory three cruises for scholarship and one for nonscholarship students and several student societies.

**Undergraduate Study**

Naval science courses are primarily for those students in the NROTC program. However, other university students may also enroll in naval science courses.

All students enrolled in the NROTC program must fulfill the following requirements:

1. N S 111 210 211 212 311 312 411 421 Marine option students will substitute N S 321 and 421 for the 300 and 400 series listed above. Hst 389 or Hst 390 may be substituted for N S 212. Mgmt 370 may be substituted for N S 411.

2. All NROTC students must complete one course in American military history or national security policy. A computer science course is required of all Navy option students.

3. All Navy option scholarship students must successfully complete Math 165 and 166, Math 176 and 178 or Math 181 and 182 by the end of the sophomore year. Phys 211 and 222 or Phys 111 and 112 by the end of the junior year.

4. In addition to the normal naval science courses all NROTC students are required to participate in laboratory periods that supplement the various academic courses emphasize human relations principles teach basic military formations movements commands courtesies and honors and provide practice in unit leadership.

5. Navy option scholarship students are encouraged to major in engineering and physical sciences to meet the technological requirements of the modern Navy. However, Navy option students and Marine Corps option students may pursue any major leading to a bachelor’s degree.

6. The College of Liberal Arts and Sciences offers a minor in Nautical Studies. Requirements for the minor include taking a minimum of 15 credit hours of ROTC instruction which may be taken from one or a number of the ROTC programs. At least 6 credit hours must be in courses numbered 300 or above.

For basic undergraduate curriculum requirements see: Liberal Arts and Sciences Curricula or Engineering Curricula.

**Courses Primarily for Undergraduate Students**

N S 111 Introduction to Naval Science 2 [3-0] Cr 3 F Introduction to the organization, regulations and capabilities of the Navy with emphasis on mission and principal warfare components.

N S 210 Naval Ship Systems I (Engineering) 3 [3-0] Cr 3 S An introduction to naval engineering with emphasis on the equipment and machinery involved in the conversion of energy for propulsion and other purposes aboard the major ship types of the U.S. fleet. Basic concepts of the theory and design of steam, gas turbine, diesel and nuclear propulsion introduction to ship design: stability, hydrodynamic forces, compartmentation electrical and auxiliary systems, damage control.

N S 211 Naval Ship Systems II (Weapons) 3 [3-0] Cr 3 F Introduction to the theory and principles of operation of naval weapon systems. Includes coverage of types of weapons and fire control systems capabilities and limitations. Theory of target acquisition, identification and tracking.
NREM 407 Watershed Management (Same as Env S 407) 3 Cr S, Prereq A course in general biology. Managing human impacts on the hydrologic cycle. Field and watershed landscape best management practices for preventing the impacts on water quantity and timing are discussed. Field project includes developing a management plan using landscape buffers. Nonmajor graduate credit.

NREM 446 Integrating GPS and GIS for Natural Resource Management (Dual listed with 546 same as EnSo Sc 446) (2-3) Cr 3 S, Preq 12 credits in student's major at 300 level or above. Emphasis on the use of GPS as a data collection tool for GIS. Basic theory of GPS. Use of Global Positioning System technology for spatial data collection and navigation. Post processing and real time correction of GPS data. GIS data transfer to GIS for mapping applications. Use of GIS to construct waypoints for use in GPS navigation. Nonmajor graduate credit.

NREM 460 Controversies in Renewable Resource Management (3) Cr 3 F, Prerequisites A preq 120 and a Ecol 312 or For 301 Junior classification. Analysis of controversial renewable resource issues using a case approach that concentrates on the collection and dissemination of information and scientific understanding. Ecological, social, political, economic, and ethical implications of each issue will be analyzed. Nonmajor graduate credit.

NREM 485 Landscape Change and Conservation (Dual listed with 485 same as LA 485) See Landscape Architecture.

NREM 490 Independent Study (1-4) Cr 1 to 4 each time. Elect preq. Junior or senior classification. Permission of instructor. A maximum of 6 credits of 490 may be used toward degree requirements. A, Animal Ecology. B, Forestry. Honors Program.

NREM 493 Workshop (1-3) Cr 13 Prereq: Permission of instructor. Ecological concepts and management practices for landowners, teachers, and others. Not for students majoring in animal ecology or forestry. May be taken more than once for graduation credit.

NREM 496 Travel Course (Dual listed with 596) Cr 13 May be repeated with permission of instructor. Limited to expanded field trips. Location and duration of travel vary. Pre-trip sessions arranged. Trip expenses paid by students. A, International. B, Domestic.

NREM 498 Cooperative Education (1-3) Cr 13 Prereq Permission of departmental chair. Required of all cooperative education students. Students must register prior to enrolling in any work period.

**Courses Primarily for Graduate Students, open to qualified undergraduate students**

NREM 505 Seminar (2-0) Cr 1 each time taken. May be taken more than once for graduation credit. F, Prereq. Permission of instructor or graduate classification. Current topics in natural resources, research and management.

NREM 510 Methods for Presenting Scientific Results (2-0) Cr 2 S, Prereq: Permission of instructor. Techniques of proper platform presentation. Discussion of effective audiovisual techniques for presentation of research findings. Practice in development of overheads and slides. Use of computer generated and projected visuals. Practice in oral presentation with critical review.

NREM 532 Human Dimensions of Natural Resource Management (3-0) Cr 3 All F offered 2004. Preq A Ecol 312 or equivalent plus 6 credits of biological sciences permission of instructor. Exploration of institutions that help shape fish and wildlife management and policies. Current research on interaction of humans with wildlife resources. Roles of social forces, politics, and economics in wildlife management.

**NREM 542 Introduction to Molecular Biology Techniques** (Same as Zool 542) See Zoology and Genetics.

NREM 546 Integrating GPS and GIS for Natural Resource Management (Dual listed with 446) (2-3) Cr 3 S, Preq 12 credits in students major at 300 level or above. Emphasis on the use of GPS as a data collection tool for GIS. Basic theory of GPS. Use of Global Positioning System technology for spatial data collection and navigation. Post processing and real time correction of GPS data. GIS data transfer to GIS for mapping applications. Use of GIS to construct waypoints for use in GPS navigation.

NREM 565 Landscape Change and Conservation (Dual listed with 465 same as LA 565) See Landscape Architecture.


NREM 593 Workshop (1-3) Cr 13 Prereq: Graduate classification. May be taken more than once for graduation credit.

NREM 595 Travel Course (Dual listed with 596) Cr 13 May be repeated with permission of instructor. Limited enrollment. Extended field trips to study ecological topics in varied environments. Location and duration of travel vary. Pre-trip sessions arranged. Trip expenses paid by students. A, International. B, Domestic.

NREM 599 Creative Component Cr at an.

NREM 600 Seminar (2-0) Cr 1 each time taken. May be taken more than once for graduation credit. FS. Current topics in natural resources research and management.

NREM 689 Research Cr 1-9

**Naval Science**

[Link to website: www.iastate.edu/Naval]

Col Paul Ladd, Chair of Department

Professors Ladd

Assistant Professors (Adjunct) Hoffer

Instructors (Adjunct) Freeborn, Ukeiley, Woodward

The function of the Navy and Marine Corps officer education program is to provide a permanent system of education in essential naval science and other academic subjects in civil education institutions. The source from which the officers are available for the Navy and the Marine Corps and their reserve components.

Students who enter the Navy and Marine Corps officer education program may apply for either of the programs: the NROTC scholarship program (full scholarship) which includes books, tuition, board, and a monthly stipend and the college program (non-scholarship limited financial assistance). Applicants for the scholarship program are selected through comprehensive nationwide competitive procedures. Applicants for the college program are selected by the Professor of Naval Science from among students already in attendance at or selected for admission by the university. This program involves financial assistance for each of the first two academic years. NROTC students pursue their studies like other students except that they meet certain requirements that will prepare them to serve as naval officers after graduation. A scholar shop program student incurs a minimum 4 year active duty military obligation as a commissioned officer after graduation. A college program student incurs a 3 year active duty obligation. If a scholarship student fails to earn a degree or if a commission is not offered, the student may incur a 2 year obligation in an enlisted grade or may be required to reimburse the government.

**Naval Science courses are primarily for those students in the NROTC program. However, other university students may also enroll in naval science courses.**

All students enrolled in the NROTC program must fulfill the following requirements:

1. N 111 210 211 212 311 312 411 412 Marine option students will substitute N 321 and 421 for the 300 and 400 series listed above. Hst 389 or Hst 390 may be substituted for N 212. Mgmt 370 may be substituted for N 411.

2. All NROTC students must complete one course in American military history or national security policy. A computer science course is required of all Navy option students.

3. All Navy option students must successfully complete Math 185 and 186, Math 171 or Math 182 and 181 or 182 by the end of the sophomore year. Phys 221 and 222 or Phys 111 and 112 by the end of the junior year.

4. In addition to the normal naval science courses all NROTC students are required to participate in laboratory periods that supplement the various academic courses. Emphasis on human relations principles, teaching basic military formations, understanding military commands, courtesies, and honors, and provide practice in unit leadership.

5. Navy option scholarship students are encouraged to major in engineering and physical sciences to meet the technological requirements of the modern Navy. However, Navy option students and Marine Corps option students may pursue any major leading to a bachelor’s degree.

6. The College of Liberal Arts and Sciences offers a minor in Liberal Studies. Requirements for the minor include taking a minimum of 15 credit hours of ROTC instruction, which may be taken from one or a number of the ROTC programs. At least 6 credit hours must be in courses numbered 300 or above.

For basic undergraduate curriculum requirements, see Liberal Arts and Sciences Curriculum or Engineering Curricula.

**Courses Primarily for Undergraduate Students**

N 111 Introduction to Naval Science (3-0) Cr 3 F Introduction to the organization, regulations, and capabilities of the Navy with emphasis on mission and principal warfare components.

N 210 Naval Ship Systems I (Engineering) (3-0) Cr 3 S An introduction to naval engineering with emphasis on the equipment and machinery involved in the conversion of energy for propulsion and other purposes aboard the major ship types of the U.S. fleet. Basic concepts of the theory and design of steam, gas turbine, diesel, and nuclear propulsion systems and an introduction to ship stability, hydrodynamic forces, propulsion systems, electrical systems, and control.

N 211 Naval Ship Systems II (Weapons) (3-0) Cr 3 F Introduction to the theory and principles of operation of naval weapon systems. Includes coverage of types of weapons and fire control systems, capabilities and limitations. Theory of target acquisition, identification, and tracking basics of...
Graduate Study

Work is offered for the master of science and doctor of philosophy degrees with a major in neuroscience. Coordinating departments include Animal Science, Biochemistry, Biophysics and Molecular Biology, Biomedical Sciences, Chemical Engineering, Chemistry, Computer Science, Entomology, Health and Human Resources, Microbiology, Psychology, Zoology, and Genetics.

Facilities and faculty are committed to research in the following areas: neuronal membrane functions; signal transduction; sensory neurogenetic diseases; neurodegenerative diseases; neuroendocrinology; neurotoxicology; neuropathological development; neurobiology; neurogenetics, computational neuroscience, neural networks, and behavioral neuroscience.

An undergraduate or advanced degree in the sciences is ordinarily a prerequisite for admission to the program. A student may select a major professor from the faculty participating in the program.

All students take a core curriculum consisting of Neuro 556, 557, 660, 669, 666, BBMB 404 and STAT 401. All students are also expected to take elective neuroscience courses from the following: Comp C 474, E 454, Psych 511, 517, 518, BMS 507, 511, 565, V Phys 565, Zoology 540.

Courses for Graduate Students

Neuro 556 Neurobiology (Same as Zool 556) 3.0 Cr. 3 to 4. Prereq: Zool 355 or Psych 310; physics recommended. Integration coding plasticity and development in nervous systems.

Neuro 557 Advanced Neuroscience Techniques (Same as Zool 557) 3.0 Cr. 2 to 3. Prereq: Neuro 556. Research methods and techniques. Experience and demonstrations representing individual faculty specialties.

Neuro 660 Current Topics in Neurobiology and Behavior (Same as Zool 660) 1.0 Cr. 2 to 3 each time. Prereq: Permission of instructor. Topics may include communication, computational neuroscience, hormones and behavior, neural integration, developmental neurobiology, neuroanatomy, and ultrastructure, sensory biology, social behavior techniques in neurobiology and behavior.

Neuro 690 Journal Club in Neuroscience (1-0) Cr. 1 each time taken. Prereq: Neuro 556. Students are required to attend at least one presentation at a weekly journal club focusing on current topics.

Neuro 696 Neuroscience Seminar (1-0) Cr. 1 each time taken. Prereq: Neuro 556. Presentations and discussion of research by students, faculty, and visiting scholars.

Neuro 699 Research

Office Education Programs

Iowa State University offers Reserve Officers Training Corps (ROTC) programs for the professional training of officers for the Army, Air Force, Navy, and Marines.

The purpose of these programs is to provide an avenue for interested students to become reserve or regular officers in one of the United States military services and the university regards this training as an important opportunity for officer development. All students enrolled in advanced ROTC programs receive financial support which includes student financial aid. Scholarships are also available for all services as outlined in the section on financial aid.

For specific courses and programs see also Air Force, Aerospace Studies, Military Science, and Naval Science.

Pest Management

(Interdepartmental Undergraduate Program)

Advisory Committee 
John Tollefson Chair Hall 
Gibson Minner Pease

The pest management program is designed for students with a career interest in the science and technology of pest management. Students in the program conduct introductory and exploratory studies with plant diseases, insects, weeds and other pests emphasizing the development of management systems that are ecologically and economically sound as well as sustainable. The interdisciplinary nature of the program is reflected in the departmental sponsors: Agronomy Animal Ecology Plant Pathology Entomology Forestry and Horticulture.

Pest management is an undergraduate secondary major that may be taken only in conjunction with a primary major. For example, the student may wish to take a primary major in agronomy, forestry, entomology, or some other life science and use elective credits to satisfy the requirements of the pest management major. Graduates have a broad knowledge of agricultural and/or forest pests as well as those of man and animals. Graduates can diagnose pest problems and recommend ecologically and economically sound systems to alleviate these problems. They are well versed on the pest concept and able to identify pests and symptoms of pest injury and understand the economics of decision making. Moreover, graduates are aware of technologically advanced pest management tactics and are skilled in applying these. Students educated in pest management may find employment opportunities with government organizations (state and federal), agricultural chemical companies, food processing firms, consulting agencies, urban pest control companies, timber companies and other concerns that produce insects and the market the nation's food and fiber.

Students wishing to enroll in the pest management curriculum must register with the chair of the advisory committee. After consultation with the chair a pest management adviser will be assigned depending on the interests of the student. The student should indicate interest in pest management as early as possible in order that requirements of the program be effectively integrated with those of the primary major.

A pest management minor may be earned by completion of at least 15 credits of pest management or related courses taken at ISU. The courses that must be taken for a minor are: Agron 317 Ent 376 PL 407. The remainder of the credits are to be selected from the following: Ent 374 PL 416 M 491 PL 498. Courses required in a student's major may not be applied toward the pest management minor. Contact the pest management chair for more details.

Courses open for nonmajor graduate credit: Ent 376 PL 407.

Courses Primarily for Undergraduate Students

P M 283 Pesticide Applicator Certification (Same as Ent 283) See Entomology

P M 317 Principles of Weed Science (Same as Agron 317) See Agronomy

P M 376 Fundamentals of Entomology and Pest Management (Same as Ent 376) See Entomology, Nonmajors, or graduate credit

P M 407 Principles of Plant Pathology (Same as PL 407) See Plant Pathology Nonmajor graduate credit

P M 416 Forest Pest Management (Same as PL 416) See Plant Pathology Nonmajor graduate credit

P M 490 Independent Study Cr. 1 to 3 each time taken. Prereq: Junior or senior classification. 3 credits in pest management permission of instructor and written plan of study approved by pest management curriculum chair. A maximum of 6 credits of 490 may...
be used toward the total of 12 credits required for graduation.

Philosophy and Religious Studies

Michael A. Bishop, Chair of Department
University Professors: Kupfer
Professors: Helinger, Hunter, Kressel, Robinson, Smith, Wilson
Associate Professors: Baum, Ganger, German, Sanford, Sawyer
Assistant Professors: Butler, Davidson, de Llantana, Fehr, Gerisson, Gross, Vivas, Werdich
Lecturers: Torroja

Philosophy

Undergraduate Study

Philosophy seeks to make sense of human experience and reality through critical reflection and argument. It deals with the kinds of questions that engage all reflective people but which do not obviously belong to any of the empirical sciences. It asks questions such as the following: Are there objective standards for deciding what is right and wrong? Is it morally right to do X or not? Can machines think? Do we have a moral obligation to obey the law? How can goods be justly distributed? Is I free if my actions are consequences of my past and the laws of nature? How does language relate to the world? Does God exist? Can machines think? Do I have a mind and if so how does it relate to my body?

Philosophy engages in constructive give and take with other fields of study including the various sciences. Philosophers for example probe the assumptions and implications of social sciences, natural sciences, psychology and law. The study of philosophy provides several benefits. It emphasizes rigorous understanding of problems together with careful analysis of the strengths and weaknesses of the available solutions. It encourages clarity in the presentation of one's own ideas as well as sensitivity in the consideration of the ideas of others. The study of philosophy therefore encourages one to develop skills and habits that are useful not only in philosophy but in non-philosophical areas as well. Philosophy students historically do well for example in law and medical schools.

However, one should not think of the study of philosophy only in terms of career benefits. Philosophical questions arise in many areas of family business and civic life and so the philosophy major prepares one for appreciating and responding to a lifetime of intellectual challenges. The degree program in philosophy requires a minimum of 33 credits. The following courses compose the core program of the major from which 15 credits shall be chosen. Additionally, two courses at the 400 level or above are required:

- Ethical Theory: One course required. Choose from 330 (Ethical Theory) or 335 (Social and Political Philosophy).
- History of Philosophy: One course required. Choose from 310 (Ancient Philosophy) or 315 (17th Century Philosophy) or 316 (18th Century Philosophy) or 317 (19th Century Philosophy) or 318 (20th Century Philosophy) or 319 (20th Century Philosophy).

Metaphysics and Epistemology. One course required. Choose from 364 (Metaphysics: God, Minds, and Matter) or 380 (Philosophy of Science) or 381 (Philosophy of Science) or 400 (Introduction to Symbolic Logic).

Logic 207 (Introduction to Symbolic Logic) is required.

The department offers a minor in philosophy which may be earned by completing a total of 15 credits in philosophy. At least 3 credits must be in courses numbered 300 or above. Students may want to emphasize specific areas by taking 15 hours of courses chosen from the following:

- Philosophy of Science: 201, 206, or 207, 314, 315, 316, 317, 318, 460

English proficiency requirement. The department requires a grade of C- or better in each of ENG 104 and 105 (or 105H) and approval of writing by an instructor of one of the following courses (310, 318) to be designated by the student.

Graduate Study

The department offers a graduate minor in philosophy. For those taking the M.A. or M.S. the minor requirement is two courses above 300 (but not 400) taken in conjunction with 590. For those taking the Ph.D., the requirement is four courses above 300 at least one of which is above 400 (but not 400) all taken in conjunction with 590. Interested students should ask the chair to assign a minor advisor.

The department participates in the interdisciplinary program in general graduate studies (See Index). Courses open for nonmajor graduate credit: All 300 and 400 level courses except 490.

Courses Primarily for Undergraduate Students

Phil 201 Introduction to Philosophy (3) Cr 3 FS SS. It has been rumored that the unexamined life is not worth living. Philosophy is an attempt to begin examining life by considering such questions as: What makes us human? What is the world ultimately like? How should we relate to other people? Is there a god? How can we know anything about these questions? Understanding questions of this kind and providing answers to them is what this course is all about.

Phil 206 Introduction to Logic and Scientific Reasoning (3) Cr 3 FS SS. Basic principles of critical reasoning and argument evaluation. A consideration of basic forms of argumentation in science and everyday life. Application to contemporary issues and controversies.

Phil 207 Introduction to Symbolic Logic (Same as Lng 207) (3) Cr 3 FS SS. Introduction to fundamental logical concepts and logical symbolism. Development of natural deduction through first order predicate logic with identity. Applications to arguments in ordinary English and to philosophical issues. Majors should take 207 as early as possible.

Phil 230 Moral Theory and Practice (3) Cr 3 FS SS. Investigation of moral issues in the context of major ethical theories of value and obligation: e.g. punishment, abortion, economic justice, job discrimination, world hunger, and sexual morality. Emphasis on critical reasoning and argument analysis.

Phil 235 Ethical Issues in A Diverse Society (3) Cr 3 FS SS. This course will examine a range of ethical issues focusing on social justice, human rights, reproductive rights, and sexual morality. Emphasis on critical reasoning and argument analysis.

Phil 236 Ethical Issues in A Diverse Society (3) Cr 3 FS SS. This course will examine a range of ethical issues focusing on social justice, human rights, reproductive rights, and sexual morality. Emphasis on critical reasoning and argument analysis.

Phil 310 Ancient Philosophy (Same as ClSt 310) (3) Cr 3 Fr Prereq: 201 Survey of the principal philosophers of the ancient world: the pre-Socratics, Plato, Aristotle, and the Stoics and Epicureans. Questions concerning being, knowledge, language, and the good life are treated in depth. Nonmajor graduate credit.

Phil 314 17th Century Philosophy (3) Cr 3 Alt SS offered 2004 Prereq: 201 Readings from philosophers such as Hobbes, Descartes, Spinoza, Leibniz and Locke. Changing conceptions of knowledge self and duty in response to challenges of new science and post-reformation challenges to ecclesiastical authority. Nonmajor graduate credit.

Phil 315 18th Century Philosophy (3) Cr 3 Alt SS offered 2005 Prereq: 201 Readings from philosophers such as Berkeley, Hume, and Kant. Development of Enlightenment thought. Issues include idealism, causation, freedom and knowledge regarding science, ethics and duties. Nonmajor graduate credit.


Phil 317 20th Century Continental Philosophy (3) Cr 3 Alt F offered 2004 Prereq: 201 An examination of 20th century continental philosophy against the background of the 19th century continental tradition. Movements covered include Phenomenology, Marxism, Postmodernism, Post-structuralism, Feminism. Focus on attempts to develop history, society and politics. Debates about the crisis of reason and culture. Political issues surrounding such debates. Nonmajor graduate credit.

Phil 318 20th Century Anglo-American Philosophy (3) Cr 3 SS Prereq: 201 Major movements in recent philosophy such as realism, logical positivism, ordinary language philosophy, and naturalism. Russell, Wittgenstein, Quine and other leading figures. Topics include knowledge of the material world, mind language values and philosophical method. Nonmajor graduate credit.


Phil 330 Ethical Theory (3) Cr 3 FS Prereq: 201 or 230. Major themes in normative ethics and metaethics. Includes such views as relativism, emotivism, and absolutism. Comparison of ethics with science and how moral judgments are justified. Nonmajor graduate credit.

Phil 331 Moral Problems in Medicine (3) Cr 3 Alt SS, Prereq: 2004 or junior classification. In-depth study of some of the central moral problems arising in medicine. e.g., abortion, euthanasia, patient rights and health care professions, and honesty, and the tension between medical ethics and social expectations. Nonmajor graduate credit.

Phil 332 Philosophy of Law (Same as ClSt 332) (3) Cr 3 FS Prereq: 201 or 230. Extent of our obligation to obey the law. What constitutes just punishment? How much of the immoral should be made illegal? Relation of the state to major themes of law and the state. Discussion of such concepts as coercion, equality and responsibility. Nonmajor graduate credit.

Phil 333 Family Ethics (3) Cr 3 Alt SS offered 2004 Prereq: 3 credits in philosophy. Moral dimensions of marriage and love, parenthood relations, domestic work, and moral education. Can parents be friends? What do children...
Owe their parents? Is there a feminist mode of moral thinking? Nonmajor graduate credit

Phil 334 Environmental Ethics (Same as Env S 334) (3) Cr 3 F Previous credits in philosophy or junior class year. Thorough study of some of the central moral issues arising in connection with human impact on the environment: e.g., human overpopulation, species extinction, forest and wilderness management, pollution. Several world views of the proper relationship between human beings and nature will be explored. Nonmajor graduate credit

Phil 335 Social and Political Philosophy (3) Cr 3 At S, offered 2001 or 2002 Foundations of social and political life. Metaphysical and epistemological grounds in classical and recent thinkers. The basis of political organization: the nature of social and political institutions, rights, and authority, and the justifiability of political action. Original texts. Nonmajor graduate credit

Phil 336 Bioethics and Biotechnology (3) Cr 3 At S, offered 2005. Previous 2001 or 22034. In-depth study of some central moral issues in the life sciences, e.g., genetic screening and testing, genetically engineered plants and animals, and related regulatory issues. Bioethicists research ethics, bioethics, the impact of biotechnology on society and the environment. Major moral theories will be discussed and applied. (Phil 336 contains almost no similarities to Phil 331.) Nonmajor graduate credit

Phil 338 Feminist Philosophy (3) Cr 3 S Previous 3 credits in philosophy recommended. This course critically examines the work that oppositional such as sex/gender self/other subjectivity/objectivity and nature/nature does in philosophy and in our culture more generally. In particular, we will consider historical and contemporary feminist engagements and human issues of sexual orientation, political equality, race, biology, violence and pornography. It works toward the personal and political emancipation of women. Nonmajor graduate credit

Phil 340 Aesthetics (3) Cr 3 F Previous 2001 or 2002 is looking at there is appreciating arts of natural beauty. We will examine our aesthetic experiences talk about such experiences (e.g., art criticism) and what makes them valuable. Do the different arts have common values? How are their different arts compared? Nonmajor graduate credit

Phil 343 Philosophy of Technology (Same as TSC 343) (3) Cr 3 S Previous 6 credits of social science or TSC 341 and 3 credits of social science Conditions under which technological innovations contribute to human emancipation relationship of technology and democracy, duty and limits of technical rationality and problems of ensuring that benefits of technological advancement are communally shared. Issues discussed with reference to contemporary developments in microelectronics, technology transfer to the Third World, etc. Nonmajor graduate credit

Phil 350 Philosophy of Religion (Same as Relg 350) (3) Cr 3 F Previous 2001 The value and truth of religious life and belief: Mystical experience, religious faith, language, arguments for God's existence, the problem of evil, and religion and morality. Historical and contemporary readings from both the western and eastern traditions. Nonmajor graduate credit

Phil 364 Metaphysics God, Minds, and Matter (3) Cr 3 S Previous 3 credits in philosophy. A survey of classical and contemporary views on some basic metaphysical issues. Issues discussed include: Does God exist? Do you have a mind and if so how does it relate to your body? What is the nature of cause and effect? Do objects have any essential properties? How can we account for property of objects have in common? Nonmajor graduate credit

Phil 380 Philosophy of Science (3) Cr 3 F Previous 2001 or 6 credits in a science. Introduction to the philosophy of science. A variety of basic problems common to the natural and social sciences, the nature of explanation, the structure of theories

the unity of science and the distinction between science and non-science. Nonmajor graduate credit

Phil 381 Philosophy of the Social and Behavioral Sciences (3) Cr 3 S Previous 2001 or 6 credits in the social sciences. Methodological and doctrinal issues about the social and behavioral sciences against the background of an influence of the natural sciences. Focus is on the historical and cultural background of 19th and 20th century western thought. Nonmajor graduate credit

Phil 398 Cooperative Education Cr R FS SS Prereq: Permission of the departmental education coordinator. Junior or senior classification. Readings of all cooperative education students. Students must register for this course prior to beginning each work period. Nonmajor graduate credit

Phil 420 Analytical Geometry (3) Cr 3 Each time taken maximum of 6 credits. S Previous 2001 Theoretical and normative issues in ethics, aesthetics, religious thought, or political philosophy. Topics vary each time offered. Nonmajor graduate credit

Phil 450 Free Will, Fate, and Moral Responsibility (3) Cr 3 F Previous 3 credits in philosophy. Strongly encouraged. Are we free if all our actions are inevitable consequences of our past and the laws of nature or if God exists and is omniscient? Examine what sorts of facts constitute threats to human freedom, issues of time, causation, and agency are treated in depth. Nonmajor graduate credit

Phil 460 Epistemology and Metaphysics (3) Cr 3 Each time taken maximum of 6 credits. At S, offered 2004. Previous 2001 and at least one course in the history of philosophy. Issues in epistemology and metaphysics. Topics vary each time offered. Nonmajor graduate credit

Phil 465 Brains, Minds and Computers (3) Cr 3 F Previous 2001 An examination of concepts such as computability, programming, and free will and of arguments about whether any human capacity is forever beyond realization in a machine. Nonmajor graduate credit

Phil 480 Controversies in Science (3) Cr 3 Each time taken S Previous 3 credits in philosophy or 6 credits in a natural or social science. Philosophical treatment of a branch of science that has had significant social political and/or moral implications. Possible topics include: the IQ debate implications of Darwinism; the Galileo affair the role of value in science; current science policy (e.g., the Human Genome Project). Topics will be arranged to meet the needs of interested students. Often taught by a philosopher and a scientist from the relevant disciplines. Nonmajor graduate credit

Phil 483 Philosophy of Biology (3) Cr 3 Previous 3 credits in philosophy or 3 credits in biology. Biology is powerful both as a science and in its effects on our culture. Philosophy of biology evaluates this power. Possible topics include: What makes sciences such as evolutionary theory, ecology, molecular biology, and so good? What is life? Can evolution account for design? What role does chance play in evolution? Has there been progress in the evolution of life on earth? What can sociology tell us about human behavior and culture? Nonmajor graduate credit

Phil 485 Philosophy of Physics (3) Cr 3 Previous 3 credits in philosophy or 3 credits in Physics. Concepts and philosophical issues relating to the interpretation of theories in classical and modern physics. May include one or more of the following topics: The relationship between mathematicians and the physical world. Newtonian physics (determinism and predictability), thermodynamics and statistical physics (the nature of probability, entropy and the direction of time), relativistic physics (determinism realism and non-classical consciousness and the role of the observer). Nonmajor graduate credit

Phil 490 Independent Study Cr 1 to 4 each time taken. Previous 6 credits in philosophy. Permission of instructor and approval of chairman. No more than 9 credits of Phil 490 may be counted toward graduation. Guidance and research on special topics selected to meet needs of advanced students. Honors

Courses Primarily for Graduate Students for minor credit, open to qualified undergraduates

Phil 555 Contemporary Political Philosophy (Same as Pol S 555) (3) Cr 3 At S, offered 2005. Previous 6 credits of philosophy or political science. Examination of theories of justice proposed by contemporary political philosophers. Analysis of the philosophical foundations of perspectives such as liberalism, libertarianism, communitarianism, socialism. Feminism. Normative assessments of socio-political institutions. Nonmajor graduate credit

Phil 590 Special Topics in Philosophy Cr 2 to 4 each time taken. Previous 3 credits in philosophy. A. History of Philosophy B. Epistemology and Metaphysics C. Value Theory D. Logic and Philosophy of Science

Religious Studies (Relg) Undergraduate Study

Religious studies gives students the opportunity to investigate and reflect on the world’s religions in an objective and informed manner. Though there is emphasis in religious studies on the wide variety of religious phenomena as well as on the various methods in the study of religion, the aim is to help students develop their own integrated understanding of the nature of religion and its role in individual and social life.

Graduates of the religious studies program have knowledge of the religious diversity in the United States and the world. They have the ability to interpret religion empathetically and critically and to compare and contrast historical and contemporary differences and similarities of religious systems. They understand ways in which religion influences and is influenced by the historical, social and cultural contexts in which religious systems function. Graduates often pursue careers in non-profit community organizations, apply to professional schools or graduate programs or enter seminaries to prepare for ministry.

The program provides students with the following opportunities to major or minor in religious studies to fulfill group requirements to take religious studies courses that are integrative in another major to take religious studies courses as electives and to develop an interdisciplinary major. (See the professor in charge of the religious studies program for advice.)

The major in religious studies seeks to provide breadth and depth. Breadth is provided through the exploration of the world’s various religious traditions and traditions and exposure to a variety of theoretical approaches and methodologies in the academic study of religion. Depth is achieved through specialized courses in particular religious traditions and particular issues in the study of religions, culminating in research seminars. The objective is to expose the student to various components of the discipline of Religious Studies and by doing so develop skills that are valuable in a number of careers and that provide the necessary foundation for pursuing graduate studies.

Students are required to take courses in three clusters of religious traditions: 1 Western religions (religions originating in Southwest Asia, the Mediterranean Basin, or in Europe); 2 Asian religions (religions originating in South Asia, Southeast Asia, or East Asia); and 3 General religions (religions among the indigenous peoples of Africa, the Americas, Australia, and Siberia). An additional course should focus on religion within North America.
Students pursuing a major in religious studies must
calculate a minimum of 33 credits including the
following requirements:
1 Three credit hours in each of the three clusters of
religious traditions for a total of nine hours
2 Three credit hours in a course that primarily
focuses on religion in North America. (The course
used to meet the North American religions require-
ment may not be used simultaneously to meet the
cluster requirements, described in number 1 above)
3 Theories and Methods in the Study of Religion -
Religious Studies 385
4 Six hours of Seminar (475)
The following courses may be used to fulfill the
requirements in the areas of Western Asian
Indigenous and North American Religions. Note that
some courses are also used to meet these
requirements but are general electives for the
Religious Studies Major

**I Western Religious Traditions**

Relig 210 Religion in America
Relig 220 Introduction to the Bible
Relig 233 Introduction to Judaism
Relig 255 Introductions to Judaism
Relig 257 Introduction to Catholicism
Relig 321 Old Testament
Relig 322 New Testament
Relig 323 Sacred Scripture
Relig 334 African American Religious Experience
Relig 338 Latin American Religious Experience
Relig 354 Islamic Civilization
Relig 367 Christianity in the Roman Empire
Relig 376 Classical Archaeology

**II Asian Religions**

Relig 352 Religious Traditions of India
Relig 353 Buddhism

**III Indigenous Religions**

Relig 326 American Indian Religions
Relig 328 African American Religious Experience
Relig 338 Latin American Religious Experience

**IV Religion in North America (while courses may be
listed in more than one category the same course
cannot be used to meet both requirements)**

Relig 210 Religion in America
Relig 326 American Indian Religions
Relig 334 African American Religious Experience
Relig 338 Latin American Religious Experience

The program offers a minor which may be earned by
completing a total of 15 credits in religious studies including
such courses are in the three areas that have been described. Nine hours must be
in courses at the 300 level or above (no more than 3
hours of seminar and no more than 3 hours of
special study)

English proficiency requirement: The department
requires a grade of C or better in each of English 104
and 105 (or 105H) and requires one 300 level course
in religious studies in which writing is evaluated as
acceptable

Students may choose to do a senior thesis under the
supervision of a religious studies faculty advisor. This
option may earn 12 credits toward the completion of the
major

**Graduate Study**

The program offers courses for graduate minor work
in religious studies as supporting work for other
fields. Religious studies may also be one of the three
areas required for the general graduate studies
master's degree

Courses open for nonmajor graduate credit: 321 322
323 324 336 353 352 353 354 350 356
367 377 395 476

**Courses Primarily for Undergraduate Students**

Relig 105 Introduction to World Religions (3.0)
Cr 3 FS SS. An introduction to the academic study of
religions including myths, beliefs, rituals, values
social forms. Examples chosen from oral cultures and
major religions of the world

Relig 210 Religion in America (3.0) Cr 3 FS SS
Introduction study of the major beliefs, practices, and
institutions of American Judaism, Catholicism,
Protestantism, and Islam with emphasis on the
diversity of religion in America and attention to
issues of gender, race, and class

Relig 220 Introduction to the Bible (3.0) Cr 3 FS
Basic overview of the contents of the Old and New
Testament in light of their ancient socio-historical
background and in light of the modern interpretations
and relevance to modern American society

Relig 233 Introduction to Judaism (3.0) Cr 3 An
introduction to basic Judaism. Special attention is
given to Jewish sacred texts, rituals, social practices,
and modern forms

Relig 242 History of Christianity (3.0) Cr 3 FS SS
An introduction to Christian thought and practice from
an historical point of view. Stressing the development
of belief and spirituality and the continuity and
changes involved in these developments

Relig 260 Religious Ethics (3.0) Cr 3 An
survey of religious ethics and an emphasis of
reasoning about practical moral issues (e.g., abortion,
sex; the distribution of wealth; environmental ethics).
Explores in detail the relationship between religious
beliefs and moral practice

Relig 280 Introduction to Catholicism (3.0) Cr 3 F
An introduction to Catholic belief and practice. The
Catholic ethos will be located in the context of other
world religions, and special stress will be placed on
the central beliefs of the Church as understood by
Catholics and on sacramentality as the distinguishing
mark of the Catholic worldview

Relig 321 Old Testament (3.0) Cr 3 F An in-depth
study of the literature and religion of ancient Israel
in light of recent archaeological discoveries. Research
about the ancient Near East and a variety of
interpretations. Nonmajor graduate credit

Relig 322 New Testament (3.0) Cr 3 A detailed
survey of the sacred scriptures of Christianity in light
of recent archaeological discoveries and historical
research about their Greco-Roman and Jewish
background. Nonmajor graduate credit

Relig 323 Science and Religion (Same as Hist 323)
See History

Relig 328 American Indian Religions (Same as
Am 332) (3.0) Cr 3 An introduction to the beliefs
and rituals of Native American religions with attention
to cultural and historical contexts and
implications. Nonmajor graduate credit

Relig 334 African American Religious Experience
(Same as Am 334) (3.0) Cr 3 Alt. F offered
2004. Examination of the African American
experience from the perspectives of black religion and
the black church, with attention to political
economic, and social as well as spiritual concerns
Nonmajor graduate credit

Relig 336 Women and Religion (Same as W S 336)
(3.0) Cr 3 F Prereq. 105, 210 or W S 201
rendered. Examines the status of women in various
religions, feminist critiques of religious structures and
belief systems, and contemporary feminisms
Nonmajor graduate credit

Relig 338 Latin American Religious Experience
(3.0) Cr 3 S A survey of Latin American religions,
including indigenous traditions as they are reflected in
the literature of Mexican Americans, Puerto Ricans,
Cubans, and other groups of Latinos living in the
United States. Nonmajor graduate credit

Relig 340 Magic, Witchcraft, and Religion (Same as
Anth 340) See Anthropology

Relig 350 Philosophy of Religion (Same as Phil
350) See Philosophy Nonmajor graduate credit

Relig 352 Religious Traditions of India (3.0) Cr 3 F
Examination of the religious traditions of India including
Hinduism, Jainism, and Sikhism through text, ritual,
and contemporary practice. Nonmajor graduate credit

Relig 353 Buddhism (3.0) Cr 3 S The various
Branches of Buddhism that seek to realize enlightenment and
freedom. Special attention to meditation and yoga and their
relationship to altered states of consciousness and to
social contexts. Nonmajor graduate credit

Relig 354 Islamic Civilization (3.0) Cr 3 An
introduction to Islamic religion, culture, and society
from 700 to the present. Nonmajor graduate credit

Relig 356 African Religions (3.0) Cr 3 An
introduction to the teachings, practices, and history of
the religions that originated in Africa and other
regions which have gained substantial followings
among African peoples. Nonmajor graduate credit

Relig 367 Christianity in the Roman Empire (Same
as Cl St 376) (3.0) Cr 3 An historical introduction to
the rise of Christianity in the Roman empire with
special attention to the impact of Greco-Roman
culture on the thought and practice of Christians and
the interaction of early Christians with their
contemporaries. Nonmajor graduate credit

Relig 370 Religion and Politics (Same as Pol S
370) (3.0) Cr 3 Alt offered 2004 Prereq 105 or
210 recommended. The interaction of religion and
politics in the US from both an historical and
contemporary perspective as well as the role of
religion in politics internationally. Nonmajor graduate
credit

Relig 376 Classical Archaeology (Same as Cl St
376) See Classical Studies

Relig 377 Social Dimensions of Religions (Same as
Soc 377) (3.0) Cr 3 Alt offered 2005 Prereq
210 or Soc 130 or 134 recommended. The
influence of religion in society both as a conservator of values
and as a force for social change. Nonmajor graduate
credit

Relig 395 Theory and Method in Religious Studies
(3.0) Cr 3 Prereq 105 Examines the variety of
theories and methods employed in the study of
religion. Application of these methods to various
religions of the world. Nonmajor graduate credit

Relig 475 Seminar Issues in the Study of Religion
(3.0) each time taken maximum of 6 credits
Prereq 6 credits in religious studies. Topic changes
each time offered. Closed to freshmen Sophomores
must have approval of instructor Nonmajor graduate
credit

Relig 490 Independent Study Cr 1 to 3 each time
taken Prereq 6 credits in religious studies and
permission of instructor. Approval of professor in
charge of program. No more than 9 credits of Relig
490 may be counted toward graduation. Guided
reading and research on special topics selected to
meet the needs of advanced students. Honors

Relig 491 Senior Thesis Cr 3 Written under the
supervision of a Religious Studies faculty advisor

Relig 494 Special Studies in Religious Research
Languages (3.0) Cr 2 to 3 each time taken Prereq
6 credits in Religious Studies and permission of
instructor

Relig 499 Peace and Justice Internship Cr var
maximum of 6 Prereq 3 credits in religious studies
permission of faculty internship coordinator
Supervised placement with a peace and justice
agency. Structured reflection on the relation of religion
and practical social issues. Offered on a
satisfactory-fail grading basis only

Relig 590 Special Topics in Religious Studies Cr
1 to 3 each time taken Prereq Permission of instructor
9 credits in religious studies
Undergraduate Study

For the undergraduate curriculum in liberal arts and sciences major in physics leading to the degree of bachelor of science see Liberal Arts and Sciences Curriculum.

Physics and astronomy are basic natural sciences which attempt to describe and provide an understanding of both our world and our universe. Physics serves as the underpinning of many different disciplines including the other natural sciences and technological areas. Graduates are proficient in the methods of rigorous scientific analysis, relevant mathematical techniques, and modern computational and laboratory methods. They have a broad knowledge of physics including mechanics, electricity, magnetism, thermodynamics, and modern physics. Students are able to communicate clearly and effectively at general and technical levels. They are prepared to pursue a wide range of careers as a professional physicist or other science educators. They are also prepared to pursue advanced studies and careers in areas as diverse as engineering, medicine, law and business administration.

Many opportunities exist for students who terminate their studies with a bachelor's degree especially when combined with technology studies in other areas. Students who meet the necessary scholastic standards often continue their studies in a graduate college and contributing to new developments in the field.

The department normally expects each student majoring in physics to complete at least the following courses: Phys 221, 222, 321, 321L, 322L, 322L, 361, 364, and three credits of laboratory work chosen from 310, 311, 311L, 470L, or Astro 344L. All students are required to earn at least 5 credits in a laboratory work in physics in addition to the laboratory components of Phys 221 and 222. These 5 credits must be in courses numbered 300 or higher or in approved substitutions. All students must earn at least 20 credits in physics and astronomy courses numbered 300 or higher. The basic list of expected courses is not a rigid requirement, and changes in this basic list will be approved by the department curriculum committee on recommendation of the student's advisor when such changes will better serve the student's needs. In particular, students planning a physics major and also seeking certification for high school teaching may with the approval of the department use a significantly different program designed to meet their particular needs. These students should consult the department for further information. Additional information concerning programs of study including special degree programs is available from the department.

The department also offers a major in applied physics in cooperation with several other departments. This major consists of a physics core plus more specialized studies in a physics related technology area and is designed to prepare students to work in high technology industry or continue their studies in a graduate program in applied science or engineering. Normally students in this major will be expected to complete a physics core consisting of the following courses: Phys 221, 222, 321, 321L, 361, 364 and six credits of liberal studies from Phys 310, 311, and 470L. At least 3 credits of the laboratory must be in Phys 470L. In addition a minimum of 12 credits in a specialized topic area must be obtained in a cooperating department. A minimum of 6 credits of additional physics courses are required at the 300 level or above. Specific requirements and recommendations for course selection depend on the area of specialization and guidelines may be obtained from the Department of Physics and Astronomy in summary the major requires a minimum of 32 credits of physics and 12 credits in a specialized topic area.

Students majoring in physics who wish an emphasis in astronomy or astrophysics should consider a minor in astronomy (see below). Those planning graduate work in physics, astronomy or astrophysics should add to the basic list the courses Phys 362 365, 490, 491 and 496. One or more of Astro 405, Phys 511, 524, or 537 may also be added according to interest.

The department offers a minor in physics which may be earned by completing 20 credits in physics courses chosen as follows: Phys 221, 222, 321 at least 3 credits in a laboratory work chosen from 321L, 322L, 310, 311, and 111T. Other acceptable courses include 304 306, 326, 361, 362, 364, 365, 480, 481, and 496.

The department offers a minor in astronomy which may be earned by completing 15 credits chosen as follows: a total of 12 or more credits in Astro courses (must include Astro 344L and may include one of the courses Astro 120, Astro 150, or Astro 150L) with the remaining 3 credits (if applicable) chosen from among the courses Phys 304, 321, 361, 362, 364, 365, 480, 481, or 496. 12 or more credits must be at the 300 level or higher. Note that many students are not necessarily required to satisfy both the requirements of a physics major and an astronomy minor.

English proficiency requirement: The department requires a grade of C or better in each of Engl 104 and 105 or 105H, and a C- or better in Engl 202, 305, 309 or 314. Students are also encouraged to study at least one foreign language.

Graduate Study

The department offers studies for the degrees major of science and doctor of philosophy with majors at both levels in applied physics, astrophysics, condensed matter physics, high energy physics, nuclear physics and physics and minor credit courses for students majoring in other departments.

Facilities of various research groups of the department, Ames Laboratory and the Applied Science Center including the Microelectronics Research Center are available for research.

Students with bachelor's degrees in physics or astronomy from other institutions ordinarily will qualify for graduate study at Iowa State provided they have satisfactorily completed course work similar to that suggested for undergraduate majors here intending to go on to graduate school. In some cases additional instruction at the intermediate level may be required.

Graduates have a broad understanding of physical science as well as mastery of state-of-the-art methods in their area of specialization. They are able to communicate effectively to a wide range of audiences from the general public to research colleagues. Their skills in rigorous scientific thinking prepare them for leadership in the broader community. They are skilled in communicating research results and soliciting research support. They have considerable teaching experience. They have developed problem solving skills that prepare them for careers in either industry or academia.

All candidates for an advanced degree in physics are expected to complete Phys 571, 572, 591 and either 531 or 584. Candidates for an advanced degree in applied physics and are expected to complete Phys 571, 591, 470L (6 cr), 591 (3 cr) and either 572 or 531.

Except for the applied physics major where a thesis is always required, the degree master of science is offered both with and without thesis.

For all areas of study except applied physics the basic requirements for the M.S. are the same. At least 30 credits of acceptable graduate work must be completed, not less than 21 of which must be in physics or astronomy. Students must complete not less than 6 credits from outside their major area. 3 credits being required from outside the department and 3 credits from 400 level course in another area of specialization.

Students choosing a degree with thesis may apply up to 8 credits of 699 but no credits of 599 toward the minimum 30 credits. Students choosing a degree without thesis should apply 2 credits of 699 but may not apply any credits of 699 toward the minimum 30 credits.

Students whose major area is applied physics must complete at least 30 credits of acceptable graduate work and not less than 19 credits of these must be in the required courses listed above the remaining 11 credits of the 30 credit minimum may be chosen freely either from within the student's major area or from without and either from the department or outside but it should be noted that not more than 3 credits of Phys 699 may be applied toward the 30 credit minimum.

In addition to the list of basic courses above all candidates for the doctor of philosophy degree must complete the Astrophysics must also complete Phys 592. Individual areas may impose additional requirements. In addition to course work in the major area of study a candidate must complete 12 credits from outside the area of study. 6 of these credits must be taken from other departments and 6 must be taken from the Department with the additional constraint that this latter 6 must include at least one 500 or 600 level introductory course in another area of specialization. Each candidate for the doctor of philosophy degree is required to teach one year of elementary physics or astronomy.

Graduate students interested in a physics minor should contact the department for requirements.

Courses open for nonmajor graduate credit: Phys 304, 310, 311, 361, 362, 364, 365, 480, 481, 483, and Astro 344L, 346.

Astronomy and Astrophysics (Astro)

Courses Primarily for Undergraduate Students

Astronomy and the Sky and the Solar System (3-0) Cr. 3

FSS for the nonscientist: The sky constellations, motions of the sun, moon and planets, seasons and the calendar, eclipses. The solar system: origin and evolution, characteristics of the sun, planets, satellites, comets, meteorites and asteroids. Extensive use of the planetarium is included.
Astro 125L. The Sky and the Solar System Laboratory (2) Cr 1 FS Prqrr, Concurrent or previous enrollment in Astro 120 Laboratory course to accompany Astro 125L. Students carry out practical exercises involving naked eye and telescopic observing to explore and reinforce ideas covered in Astro 120. Activities based on a sky simulation computer program and other computer-based exercises are also included.

Astro 150. Stars and Galaxies and Cosmology (3) Cr 3 FS For the nonscientist. Observational aspects of stellar astronomy motions, distances, sizes, spectra, types of stars, variability, binary systems. Stellar evolution. The birth and death of stars, including supernovae, neutron stars, and black holes. The Milky Way Galaxy, clouds of matter in space, the structure and evolution of our galaxy. Other galaxies. Clusters of galaxies. Quasars. Theories of the origin of the universe.

Astro 260. Astronomy and Cosmology (3-0) Cr 3 S Prqrr, 120 or 150 For the nonscientist. Exploration of our universe and the processes that govern it. Stellar systems and evolution. The young solar system. Supernovae and black holes. The Big Bang and the future of the universe. Prospects and searches for extraterrestrial life.

Astro 380. Independent Study Cr 1 to 4 each time taken. Prqrr, Permission of instructor.

Astro 390. Introduction to Cosmic Ray Astronomy (3) Cr 3 F Prqrr, Phys 222, Analytical and computational aspects of cosmic-ray objects: planets, stars, galaxies, etc. Observational techniques ranging from solar phenomena to astrophotography. Available instruments include Meade 14 Celestron and Schmidt cameras. Course meets at Fass Observatory south of Boone. Nonmajor, graduate credit.

Astro 344L. Astronomy Laboratory (1) Cr 3 F Prqrr, Phys 222, Experiments in optical astronomy. Observational techniques ranging from stellar photometry to astrophotography. Available instruments include Meade 14 Celestron and Schmidt cameras. Course meets at Fass Observatory south of Boone. Nonmajor, graduate credit.


Astro 450. Undergraduate Research Cr 1 to 6 each time taken. FS Prqrr, Permission of instructor. Research under supervision of astronomy faculty.

Astro 450L. Undergraduate Research Cr 1 to 6 each time taken. FS Prqrr, 344L, and permission of instructor. Laboratory or observational project under supervision of faculty.

Astro 490. Independent Study Cr 1 to 4. Prqrr, 6 credits in astronomy. Permission of instructor. No more than 9 credits of Astro 490 may be counted toward graduation. H, Honors.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students


Astro 510. Observational Astrophysics (3) Cr 3 Alt F offered 2004. Prqrr, 405 or 505. Techniques in optical and near-infrared astronomy including spectroscopy and photometry with both single channel and 2-dimensional array detectors. Emphasis on projects involving participation in the use of research telescopes and modern instrumentation. Project topics range from spectroscopic and photometric studies of pulsating and binary star systems to deep photo graphic and CCD imaging of faint nebulae and galaxies.


Astro 590. Special Topics Cr var. Prqrr, Permission of instructor. Individually directed study of research level problems for students electing the nonthesis M.S. option in astronomy.

Courses for Graduate Students


Astro 650. Advanced Seminar (1) Cr 1 each time taken. FS Topics of current interest in astronomy and astrophysics. Offered on a satisfactory-fail grading basis only.

Astro 660. Advanced Topics in Astronomy and Astrophysics (3-0) Cr 1 to 3 each time taken. Prqrr, 405 or 505. Stellar evolution, solar physics, variable stars, compact objects, the interstellar medium, active galaxies, and quasars. Formation and evolution of galaxies. Cosmology. High energy astrophysics. Advanced observational techniques and astrophysical applications of hydrodynamics.


Physics (Phys)

Phys 101. Physics for the Nonscientist (3) Cr 3 FS Survey of the principal areas of both classical and modern physics. Emphasis on the nature of the physical universe and the application of physical principles to life in the modern world.


Phys 111. General Physics (4) Cr 4 FS SS Prqrr, 11/2 years of high school algebra, 1 year of geometry. 1 semester of trigonometry. General background in physical concepts and principles and methods for those who do not plan advanced study in physics or engineering. Mechanics, fluids, heat and thermodynamics, vibrations, waves, sound.


Phys 199. Introductory Seminar (1-1) Cr F R. Survey of recent scientific breakthroughs and current research in physics and astronomy. Faculty. Discussion of careers based on a major in physics. Offered on a satisfactory-fail grading basis only.

Phys 221. Introduction to Classical Physics I (4) Cr 5 FS SS Prqrr, Credit or enrollment in Math 166. For engineering and science majors. 3 hours of lecture each week plus 1 recitation and 1 laboratory every 2 weeks. Elementary mechanics, including kinematics and dynamics of particles, work and energy, linear and angular momentum conservation laws, rotational motion, oscillations, gravitation, electric forces and fields, electrical currents, DC circuits.

H, Honors.


H, Honors.

Phys 232. Computational Skills of Physics (3) Cr 1 S Prqrr, 222. Development of skills in the use of software and computational equipment essential to physicists and other scientists. Students work at their own pace. Programming experience is helpful but not necessary.

Phys 290. Independent Study Cr 1 to 4 each time taken. Prqrr, Permission of instructor.

Phys 298. Cooperative Education (Cr R FS SS Prqrr. Permission of the department's cooperative education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period.

Phys 302. The Challenges of Contemporary Physics (3) Cr 3 S Prqrr, Sophomore classification. A largely nonmathematical but intellectually challenging exploration of physics which assumes no previous work in the field. Selected material from classical and modern physics establishes the conceptual framework for the study of a major area of contemporary physics, culminating in the discussion of topics at the frontier of present knowledge. Research topics may vary from year to year and may include new particle physics, quarks, superconductivity, lasers, nuclear fusion, liquid crystals, solid state devices, gravitation, waves.


Phys 306. Waves of Motion (3) Cr 3 S Prqrr, 222. Credit or enrollment in Math 267. Oscillating systems including damped and forced.
Physics

300

2003-2005

oscillations fluids geometric optics water waves the wave equation Fourier and Laplace transforms transform non uniform media spherical waves polarization interference and diffraction transmission lines non linear waves

Phys 310 Electronic Instrumentation for Experimental Physics (4 Cr) F Prereq 222 Math 166 Common electronic instruments power supplies transducers passive and active devices analog integrated circuits including filters and amplifiers digital integrated circuits signal transmission and enhancement Nonmajor: graduate credit

Phys 311 Intermediate Laboratory (0 Cr) 1 or (0 Cr) 1 or (0 Cr) 2 each time taken S Preq 322 or 324 Experiments in classical and modern physics performed independently by each student Nonmajor: graduate credit

Phys 311T Intermediate Laboratory (0 Cr) 3 each time taken S Preq 112 or 222 Experiments in classical and modern physics performed independently by each student. For students preparing for a career in high school teaching.

Phys 321 Introduction to Modern Physics I (3 Cr) Cr 3 S Preq 222 credit or enrollment in Math 266 Quantum nature of matter, photons, Bohr model of hydrogen diBeagle wavelength of matter Schrodinger wave equation in one dimension energy quantization. Solution for poten

tial states barrier and ion. One-electron atom, spin, and angular momentum. X-ray and optical excitations of electron atom.

Phys 321L Introductory Laboratory in Modern Physics (0 Cr) 1 Cr 1 S Preq Credit or enrollment in 321 and credit or enrollment in 232 or equivalent experience. Experiments related to the foundations of modern physics. The dual wave and particle character of electrons and photons. Statistics. Interference and diffraction. X-ray and optical excitations of electron atom.


Phys 365 Electricity and Magnetism II (2 Cr) 2 Cr 2 F Preq 364. Relativistic electromagnetism. Radiation and propagation of electromagnetic waves interaction with matter. Nonmajor: graduate credit.

Phys 389 Seminar (1 Cr) 1 Cr S Required of all junior physics majors. Career opportunities in academic and professional fields. Exploration of alternative careers. Basic skills needed for the job market. Offered on a satisfactory-fail grading basis only.

Phys 390 Cooperative Education Cr 3 F SS Preq Permission of department. Cooperative education coordinator. Junior class members required. Required of all cooperative education students. Students must register for this course prior to beginning each work period.

Phys 390 Seminar on Secondary School Physics Cr 1 or 2 maximum of 2 Cr Preq Permission of instructor. Review of materials and curricula for secondary school physics presented and discussed by members of the class. Required for approval to teach physics in secondary schools.

Phys 450 Undergraduate Research Cr 1 to 6 each time taken F SS Preq Permission of instructor. Theoretical research under supervision of physics faculty.

Phys 450L Undergraduate Research Cr 1 to 6 each time taken F SS Preq Permission of instructor. Laboratory project under supervision of physics faculty.

Phys 470L Applied Physics Laboratory Cr 2 each time taken F SS Preq 322 or 324 and permission of instructor. Studies in modern experimental techniques: experimental and simulation in various areas of applied physics, e.g., superconductivity, optical spectroscopy, nuclear magnetic resonance, electron spin resonance, x-ray diffraction, and computer-aided techniques in physics.

Phys 470L Applied Physics Laboratory Cr 2 each time taken F SS Preq 322 or 324 and permission of instructor. Studies in modern experimental techniques: experimental and simulation in various areas of applied physics, e.g., superconductivity, optical spectroscopy, nuclear magnetic resonance, electron spin resonance, x-ray diffraction, and computer-aided techniques in physics.

Phys 480 Quantum Mechanics I (3-0 Cr) 3 F Preq 322 Math 266. First semester of a full year course. A systematic development of the formalism and applications of quantum mechanics. Solutions to the time-independent Schrodinger equation for various one-dimensional potentials including the harmonic oscillator, operator methods, Harmonic picture, angular momentum, the hydrogen atom, and symmetry properties. Nonmajor: graduate credit.

Phys 481 Quantum Mechanics II (3-0 Cr) 3 F Preq 322 Math 266. First semester of a full year course. A systematic development of the formalism and applications of quantum mechanics. Solutions to the time-independent Schrodinger equation for various one-dimensional potentials including the harmonic oscillator, operator methods, Harmonic picture, angular momentum, the hydrogen atom, and symmetry properties. Nonmajor: graduate credit.

Phys 489 Tutorial Seminar (1-0 Cr) 1 Cr each time taken F SS Preq Permission of instructor. For junior and senior physics majors. Topics of interest in physics discussed in small groups. Offered on a satisfactory-fail grading basis only.

Phys 490 Independent Study Cr 1 to 4 Preq 6 credits in physics permission of instructor. 1 Cr no more than 9 credits of Phys 490 may be counted toward graduation.

Phys 496 Modern Optics (3-0 Cr) 3 Alt S offered 2004 Fall Credit or enrollment in 321 and 365 Review of wave and electromagnetic theory topics selected from reflection refraction interference geometrical optics Fourier analysis dispersion coherent optics Fraunhofer diffraction holography quantum optics nonlinear optics. Nonmajor: graduate credit.

Phys 498 Cooperative Education Cr R SS Preq Permission of the department cooperative education coordinator. Senior classification. Required of all cooperative education students. Students must register for this course prior to beginning each work period.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Phys 500 Introductory Research Seminar (1 Cr) F CRF Discussion by research staff of their research areas. Expected thesis research work. Opportunities in the field for majors only. Offered on a satisfactory-fail grading basis only.

Phys 501 Oral Communication of Physics Seminar (2 Cr) 1 each time taken F Preq Graduate classification. Practice in communication of physics and astronomy in typical college classroom settings and professional meetings. Skills emphasized include selection of physical examples and analogies, presentation styles, and dialogue organization of physics topics and classroom techniques. The teaching proficiency of each student is evaluated in detail. For graduate physics majors only. Offered on a satisfactory-fail grading basis only.

Phys 511 Condensed Matter Physics I (3 Cr) 3 SS Preq 504. Condensed matter physics. Introduction to the solid state properties of metals, semiconductors, and superconductors.


Phys 524 Nuclear Physics (3 Cr) 3 S Preq 480 Basic properties and structure of atomic nuclei. Interaction of nuclear models, nuclear reactions, and nuclear decay and stability accelerators. Nuclear astrophysics and relativistic heavy ion collision.


Phys 535 Physics of Semiconductors (Same as E E 535) See Electrical Engineering.

Phys 536 Physics of Semiconductor Devices (Same as E E 536) See Electrical Engineering.

Phys 537 High Energy Physics (3 Cr) 3 S Preq 480 Survey of particle physics, current understandings, and Lagrangians. The Standard Model and the Higgs mechanism. Quarks and hadron production and decay. Hadron spectroscopy structure functions. Running coupling constants. The CKM matrix selected topics beyond the Standard Model such as supersymmetry and grand unification.

Phys 541 General Relativity (3 Cr) 3 Alt S offered 2004 Fall Credit or Math 465. Tensor analysis and differential geometry developed and used to formulate Einstein field equations. Schwarzchild and Kerr solutions. Other advanced topics may include gravitational radiation, black hole formation, and gravitational fields. Alternate gravitational theories at unified field theories: cosmology.

Phys 551 Computational Physics (4-0 Cr) 4 S Preq 365. 480. Use of modern computational techniques to analyze topics in classical and modern physics. Offered on a satisfactory-fail grading basis only.


Phys 580 Special Topics Cr var Preq Permission of instructor. Topics of current interest:

A Nuclear Physics
B Condensed Matter Physics
Phys 591 Quantum Physics I (4.0) Cr 4 F Prereq 481 First semester of a full year course. Postulates of quantum mechanics, time dependent and time independent Schrödinger equations for one- and three-dimensional systems, theory of angular momentum; Rayleigh-Schrödinger time independent perturbation theory

Phys 592 Quantum Physics II (4.0) Cr 4 S Prereq 591 Continuation of 591: Variational theorem and WKB method, time-dependent perturbation theory, method of partial waves and Born approximation for scattering by central potentials; identical particles and symmetry; Dirac and Klein Gordon equation for free particles, path integral formalism

Phys 599 Creative Component Cr var. Prereq Permission of instructor. Individually directed study of research level problems for students electing the nonthesis M.S. degree option

Courses for Graduate Students

Phys 611 Quantum Theory of Condensed Matter (3.0) Cr 3 S Prereq 512 681 Quasiparticles in condensed matter phonons magnons photons electrons Quantum theory of interacting many body systems Greens functions and diagrammatic techniques

Phys 624 Advanced Nuclear Physics (3.0) Cr 3 Alt F offered 2004 Prereq 524 and 592 Microscopic few-body and many body theory; theory of effective Hamiltionians; relativistic nuclear physics; nuclear effects in hadron-nucleus, lepton-nucleus, and nucleus-nucleus reactions

Phys 625 Physics of Strong Interactions (3.0) Cr 3 Alt S offered 2005 Prereq 681 Quark model Quantum Chromodynamics (QCD) perturbation methods for QCD effective field theories for quarks and gluons. Finite temperature field theories quark-gluon plasma phase transitions in QCD

Phys 632 Semiconductor Physics (3.0) Cr 3 Alt S offered 2004 Prereq 480 481 Detailed structure statistical mechanics of electrons and holes; galvanomagnetic effects; magnetoresistance; cyclotron resonance; transport properties; principles of junctions and heterostructures; optical properties; amorphous semiconductors; quantum well structures

Phys 637 Elementary Particle Physics (3.0) Cr 3 Alt F offered 2003 Prereq 537 First semester of a full year course. Properties of leptons, bosons and quarks and their interactions; quantum chromodynamics; Glashow-Weinberg-Salam model; grand unification theories; supersymmetry; modern theoretical techniques and tests of the Standard Model

Phys 638 Elementary Particle Physics (3.0) Cr 3 Alt S offered 2004 Prereq 637 Continuation of 637 Properties of leptons, bosons and quarks and their interactions; quantum chromodynamics; Glashow-Weinberg-Salam model; grand unification theories; supersymmetry; modern theoretical techniques

Phys 650 Advanced Seminar (1.0) Cr 1 each time taken. FS Topics of current interest. Offered on a satisfactory fail grading basis only

A Nuclear Physics

B Condensed Matter Physics

C High Energy Physics

D Physics

E Applied Physics

Phys 660 Advanced Topics in Physics Cr 1 to 3 each time taken. FS Courses on advanced topics and recent developments

A Nuclear Physics

B Condensed Matter Physics

C High Energy Physics

D Physics

E Applied Physics

Phys 674 Applications of Group Theory to Physics Condensed Matter Physics (3.0) Cr 3 Alt F offered 2003 Prereq 592 Theory of groups and group representations, point spaces and rotation groups applications to molecular and crystal structures; crystal field and spin-orbit interactions; energy bands and phonon dispersion relations. Applications to modern materials

Phys 675 Applications of Group Theory to Physics Nuclear and High Energy Physics (3.0) Cr 3 Alt S offered 2004 Prereq 682 Theory of Lie groups, Lie algebras and their representations. Survey of the Lorentz group Poincaré group SU(3) and other Lie groups of physical importance. Applications to nuclear and elementary particle physics

Phys 681 Quantum Field Theory I (3.0) Cr 3 F Prereq 592 Quantization of fields (canonical and path integral): Feynman rules; introduction to gauge theories Quantum Electrodynamics; radiative corrections renormalization and renormalization group

Phys 882 Quantum Field Theory II (3.0) Cr 3 Alt S offered 2004 Prereq 681 Continuation of 681: Systematics of renormalization renormalization-group methods; symmetries of spontaneous symmetry breaking; nonabelian gauge theories; the Standard Model and beyond; special topics

Phys 699 Research

Plant Health and Protection

www.pathplantiestate.edu

Interdepartmental Undergraduate Program

Advisory Committee Ed Braun Chair Burns Flynn Jurenka Martinon Taber Way

Undergraduate Study

For undergraduate major in plant health and protection leading to the degree bachelor of science see Agriculture Curricula

Plant Health and Protection is an interdisciplinary major administered by the departments of Plant Pathology Entomology Agronomy Horticulture and Forestry. The program emphasizes a holistic approach to plant health management encompassing soil fertility and plant nutrition health and plant breeding cultural practices and protection against pests such as insects weeds and diseases. Graduates understand the principles of plant structure and function and the ways in which plants are affected by biotic and abiotic stress factors. They are skilled in diagnosing plant health problems and developing and implementing plant health management strategies to reduce plant stress with minimal environmental impact. Graduates are able to communicate clearly and work effectively with others on complex plant health problems. They understand the ethical and environmental dimensions of problems and issues facing agricultural and natural resource professionals

Plant Health and Protection is a broad-based curriculum in biological and agricultural sciences. Students take courses in the basic biological and physical sciences; plant fertility management, entomology, weed science, plant pathology and plant production systems (agronomy, horticulture and forestry). Cooperative practical work experience/ internships with industry and governmental agencies are available to qualified students. Students also have a large number of free elective credits for courses that they can use to individualize their degree program.

Plant health professionals are employed by agribusiness firms such as seed companies; agricultural chemical companies; farm management and crop consulting businesses; producer cooperatives; food processing companies; nurseries and landscape businesses. Graduates are also employed by governmental agencies like the EPA, USDA Extension Service and state departments of agriculture. The curriculum in plant health and protection provides an excellent preparation for graduate study in the crop protection disciplines and related fields such as agronomy, horticulture, plant breeding, genetics, microbiology, molecular biology, botany and environmental science.

A minor in plant health and protection may be earned with 15 or more credits in 200-391 and additional courses selected from an approved list available from the chair of the Plant Health and Protection advisory committee. At least 9 of the 15 credits may not be used to satisfy other departmental or university requirements. Courses open for nonmajor graduate credit 301 320 324 379 437 416

Courses Primarily for Undergraduate Students

PH 110 Orientation in Plant Health and Protection (1.0) Cr F Prereq Required of students in the plant health and protection curriculum. Requirements and career opportunities in the fields of plant health and protection

PH 208 Plant Health Biology (3.0) Cr 3 S Prereq BIOL 109 or 201 Introduction to issues in plant health biology; plant productivity and food supply safety and plant health; plant biotechnology; integrated pest management; plant health and sustainable agriculture

PH 283 Pesticide Application Certification (Same as ENT 283) See Entomology

PH 301 Forest Ecology and Soils (Same as NREM 301) See Natural Resource Ecology and Management Nonmajor graduate credit

PH 317 Principles of Weed Science (Same as Agron 317) See Agronomy

PH 320 Plant Nutrition (Same as Hort 320) See Horticulture Nonmajor graduate credit

PH 354 Soils and Plant Growth (Same as Agron 354) See Agronomy Nonmajor graduate credit

PH 354L Soils and Plant Growth Laboratory (Same as Agron 354L) See Agronomy

PH 378 Fundamentals of Entomology and Pest Management (Same as Ent 378) See Entomology Nonmajor graduate credit

PH 391 Practical Plant Health (Same as PI P391) (4.0) Cr 2 F Prereq 6 credits in biological sciences. Diagnosis of all types of plant health problems caused by diseases, insects, weeds, nutrient deficiencies and toxoplasmosis. Techniques of experimental, stress and environmental stress. Emphasis is on acquiring practical skills. Students will gain experience in written and oral communications. Field trips

PH 392 Plant Health and Protection Work Experience Cr R FS SS Prereq 6 credits in plant health and protection permission of advisor. Practical work experience in a plant health discipline. For majors and advanced students

PH 407 Principles of Plant Pathology (Same as PI P407) See Plant Pathology Nonmajor graduate credit

PH 416 Forest Pest Management (Same as PI P416) See Plant Pathology Nonmajor graduate credit

PH 475 Community Tree Management (Same as For 475) See Forestry

PH 490 Independent Study Cr 1 to 3 FS SS Prereq Junior or senior classification 6 credits in plant health and protection permission of instructor. A maximum of 6 credits of 490 may be used toward the total of 125 credits required for graduation.

A Plant Health and Protection H Honors

PH 498 Plant Health Management (2.0) Cr 3 S Prereq 391 Exploration of issues in plant health management from multiple perspectives. Technical and socioeconomic dimensions of problems will be analyzed through case studies. Guest speakers field trips and other resources. Problem solving and communications skills will be emphasized
Plant Pathology
www.plantpath.iastate.edu

Charlotte R. Bronson Chair of Department
Professors Bronson Bronson Gleason Harrington
Hill McGee Miller Nutter Tyka

Graduate Students (Emeritus) Tiffany
McNeel

Graduate Students (Emeritus) Duran Epstein Hoag
Norton Stewart

Associate Professors Baum Munivaad Yang
Assistant Professors Beatie Bogdanov

Assistant Professors (Collaborators) Block

Undergraduate Study
The department participates in the undergraduate major and minor in plant health and protection see Agriculture Curricula

For a second major in pest management see Agriculture Curricula

Graduate Study
The department offers studies for the degrees master of science and doctor of philosophy in these areas of plant pathology and minor for students majoring in other departments or programs. A master of science nonthesis option is available. The department also participates in the interdepartmental majors in toxicology, microbiology molecular cellular and developmental biology ecology and evolution biology and sustainable agriculture.

Students entering graduate programs in the department need a baccalaureate in the biological and mathematical sciences as well as adequate preparation in English.

Graduates have a broad understanding of the biology and management of plant pathogenic microorganisms and the interactions of pathogens with their host plants. They understand the relationship between plant pathology and allied disciplines and are able to communicate effectively with scientific colleagues and the general public in both oral and written forms. Graduates are able to address complex plant disease problems facing agricultural and bioscience professionals taking into account the related ethical, social, legal and environmental issues. They are skilled in research procedures communicating research results and writing concise and persuasive grant proposals.

Courses open for nonmajor graduate credit: 407 416 483

Courses Primarily for Undergraduate Students

PI P 391 Practical Plant Health (Same as PI HP 391) See Plant Health and Protection

PI P 407 Principles of Plant Pathology (Same as PI HP 407) (2) Cr. 3 F S Preq: 8 credits in biological sciences including Bot 202. Bacteria Principles underlying the nature diagnosis and management of plant diseases. Laboratory complements lecture topics and provides experience in plant disease diagnosis Nonmajor graduate credit

PI P 416 Forest Pest Management (Same as For 416) (P) 4 1/2 Cr. 3 S Preq: 8 credits in biological sciences including Bot 201 Harrington Nature of insects and pathogens of forest and shade trees their role in the dynamics of natural and managed forest ecosystems and the management of indigenous and exotic pests Nonmajor graduate credit

PI P 452 Integrated Management of Diseases and Insect Pests of Turfgrasses (Dual listed with 452 same as Ent 452 Hort 452) (3) Cr. 3 Alt S offered 2004 Preq Hort 357 Gleason Lewis D Identification and biology of important diseases and insect pests of turfgrasses Development of integrated pest management programs in various turfgrass environments

PI P 477 Bacterial-Plant Interactions (Dual listed with 577 same as Micro 477) (10) Cr. 3 Alt S offered 2004 Preq: 9 credits in microbiology or plant pathology Beattie Focuses on plant associated bacteria in terms of their ecology diversity and the physiological and molecular mechanisms involved in their interactions with plants

PI P 483 Wood Deterioration and Preservation (Same as for 483) See Forestry Nonmajor graduate credit

PI P 490 Independent Study Cr 1 to 3 F S Preq Junior or senior classification 7 credits in biological sciences permission of instructor A maximum of 6 credits of 490 may be used toward the total of 125 credits required for graduation A Plant Pathology H Honors

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

PI P 503 Biology of Plant Pathogens (3) Cr. 4 F Preq: Bot 202 Bot 301 Botaniklve Brigham Fungi Bacterial succession of organisms that cause plant disease experiences emphasizes techniques in working with fungi bacteria nematodes and viruses Field trips

PI P 506 Plant Pathogen Interactions (2) Cr. 2 S Preq 407 or 416 or 503 Bot 301 Baum Winkham Introduction to mechanisms of plant parasite interaction Genetics and molecular genetics of plant disease resistance and pathogenicity

PI P 507 Epidemiology and Disease Management (2) Cr. 2 S Preq: 407 or 416 or 503 Nutter Principles of pathogen population dynamics as affected by environment and host/pathogen genetics modeling biotic plant stress on crop productivity Principles and practices employed for disease control and their utilization for management applications of disease management and epidemiological principles to specific diseases through case studies

PI P 509 Plant Virology (Same as Micro 509) (2 6) Cr. 1 S offered 2005 Preq: 407 or 503 Bot 404 BBMB 405 Chem 211 Hall Plant viruses and the diseases they cause Emphasis on epidemiology and control Structure function and biochemical biophysical properties of plant viruses

PI P 511 Integrated Management of Tropical Crops (Same as Ent 511 Hort 511) (3) Cr. 3 Alt S offered 2005 Preq: 407 or 416 or 503 or Ent 370 or 376 or Hort 221 Gleason Lewis Applications of Integrated Crop Management including plant pathology entomology and horticulture to tropical cropping systems Familiarization with a variety of tropical agroecosystems and Costa Rican agriculture is followed by 10-day tour of Costa Rican agriculture during spring break then week of individual projects Tour expenses paid by students

PI P 530 Ecologically Based Pest Management (Same as Agron 530) Ent 530 SusAg 530) (3) Cr. 3 Alt F offered 2004 Preq: 407 or 416 or 503 Nutter Durable least toxic strategies for managing weeds pests and insect pests with emphasis on underlying ecological processes

PI P 543 Plant Disease Epidemiology (2-4) Cr. 4 Alt F offered 2004 Preq: 407 or 416 or 503 Nutter Theory and practice relating to the quantification of biotic plant stress as affected by the temporal and spatial interaction of hosts and pathogen populations Analysis of environmental and host and pathogen genetic factors that alter the course of plant disease epidemics Risk assessment theory and modeling the impact of biotic plant stresses on yield and quality

PI P 562 Integrated Management of Diseases and Insect Pests of Turfgrasses (Dual listed with 462 same as Ent 562 Hort 562) (3) Cr. 3 Alt S offered 2004 Preq: Hort 357 Gleason Lewis D Identification and biology of important diseases and insect pests of turfgrasses Development of integrated pest management programs in various turfgrass environments

PI P 565 Professional Practice in the Life Sciences (Same as Agron 565 An S 565 BCB 565 Gen 565 Hort 565 V MPM 565) (Cr 0 to 5 per module) S Preq: Graduate classification Professional discourse on the ethical and legal issues facing life scientists Researchers offered in modular format each module is four weeks A Professional Practices in Research Good scientific practices and professional ethics in the life sciences B Intellectual Property and Industry Interactions Ethical and legal issues facing life scientists involved in research interactions with industry C Life Science Ethics Basic principles of moral theory and ethical issues about the environment biotechnology and the appropriate role of scientific expertise in public moral debate D Ethics in Plant Breeding and Plant Genetic Resource Conservation Ethical issues facing scientists involved in crop improvement plant conservation and plant biotechnology

PI P 574 Plant Pathology (3) Cr. 3 Alt F offered 2004 Preq: 407 or 416 or 503 Baum Winkham Introduction to mechanisms of plant parasite interaction Genetics and molecular genetics of plant disease resistance and pathogenicity

PI P 577 Bacterial Plant Interactions (Dual listed with 477 same as Micro 577) (3) Cr. 3 Alt S offered 2004 Preq: 3 credits in microbiology or plant pathology Focuses on bacterial plant interactions in terms of their ecology diversity and the physiological and molecular mechanisms involved in their interactions with plants

PI P 590 Special Topics Cr 1 to 3 each time taken FS SS Preq 10 credits in biological sciences permission of instructor

PI P 591 Plant Disease Control (3) Cr. 3 Alt F offered 2003 Preq: 407 or Micro 503 Gleason Lewis Principles and practices of disease control Use of biological control cultural practices resistance and chemical control in disease management

PI P 594 Seed Pathology (2) Cr. 3 Alt S offered 2005 Preq: 407 or 503 McGee Significance of diseases on the major phases of seed production growing harvesting conditioning and planting seed Pathologists considered include fungi bacteria viruses nematodes and abiotic agents Emphasis on control: epidemiology host parasite relationships and seed health testing

Courses for Graduate Students

PI P 606 Molecular Virology (Same as V MPM 606) See Veterinary Microbiology and Preventive Medicine

PI P 643 Natural Toxins (Same as Tox 643) See Toxicology

PI P 691 Field Plant Pathology (10-0) Cr. 2 each time taken Alt SS offered 2004 Preq: 407 or 416 or 503 Diagnosis of plant diseases plant disease assessment methods and the integration of disease management into commercial crop production practices Objectives to develop students with common diseases of Midwest crops and landscape plants and to provide experience in disease diagnosis Field trips include commercial operations agricultural research facilities and ornamental plantings

PI P 692 Molecular Biology of Plant Pathogen Interactions (3-0) Cr. 3 Alt S offered 2005 Preq: 407 or 408 or Biological 416 or 422 or course in molecular biology Miller Molecular and physiological mechanisms of plant disease and resistance Host pathogen recognition and response resistance gene function signal transduction Agrobacterium virus host interactions

PI P 694 Colloquium in Plant Pathology (2.0) Cr. 2 each time taken FS Preq: 407 or 416 or 503 permission of instructor Advanced topics in plant pathology including biological control cultural control risk assessment of resistance gene deployment
Assistant Professors (Adjunct) Byström Waggoner

Undergraduate Study

For the undergraduate curriculum in Liberal Arts and Sciences with major in political science leading to the degree of Bachelor of Arts see Liberal Arts and Sciences Curriculum.

The study of political science is designed to enable students to become familiar with theories of public values and patterns of national and international political systems. A political science major should complete a broad liberal arts program which would maximize opportunities for study in related social science disciplines as well as in various areas of the humanities. Students will understand the interrelationships of the subfields of political science, develop skills in analysis and critical thinking, and be able to apply research methods relevant to the discipline.

The political science major is often chosen by students preparing for a career in law. Students with this goal should consult with the department in selecting courses. See also Preprofessional Study.

Several internship options are available to the political science major offering students the opportunity to experience practical application of the knowledge learned in academic courses.

Requirements for the Major

For the purpose of defining undergraduate requirements in the Department of Political Science the Department employs four subfields within the discipline with the following courses in each:


III. Comparative Politics (Pol S 241, 314, 340, 341, 342, 343, 346, 348, 349, 350, 440, 490)

IV. International Relations (Pol S 251, 315, 355, 356, 357, 358, 359, 381, 422, 451, 452, 453, 454, 490)

To complete the major in Political Science a student must earn 33 semester credits of courses in Political Science subject to the following conditions:

a. Students must satisfactorily complete Pol S 101

b. Students must complete at least two courses in each of the four subfields listed above. Students may apply only one half semester mini-course (Pol S 312, 313, 314, 315) in each group.

c. Political Science courses in which a student has a grade of D+ or lower may count for the major but can be counted as electives.

d. At least 18 credits of Political Science courses must be numbered 300 or above.

e. Students must pass one statistics course from among Pol S 101, 104, 226, 231.

f. Students must develop a research tool by following one of the following options (1) two years (four semesters) of a single college level foreign language as demonstrated by successful completion of a four-year foreign language class numbered 202 (2) successful completion of Pol S 301 or (3) passing a national level examination demonstrating an intermediate level of proficiency in a language other than English. Students whose first language is not English may fulfill the research tool requirement by using the options described above or by providing documentation of at least 3 years full time course work in a secondary school or one year of course work in a college or university in which the language of instruction is other than English.

g. No more than six credits of Pol S 490 or 499 (alone or in combination) can be used to fulfill any of these requirements. A maximum of three credits of Pol S 403 can be applied to meet any of the four subfield requirements.

h. A maximum of six credits from half semester mini-courses (Pol S 312, 313, 314, 315) can be applied to satisfy the above requirements.

i. At least 15 credits of Political Science coursework must be earned at Iowa State University.

English Proficiency. Majors must earn at least a C+ in each of Eng 104 and 105. Those who do not complete Eng 309 or 314 with a grade of C or higher must also complete Pol S 395.

The department offers a minor in political science that may be earned by completing 15 credits beyond the 100 level of coursework in political science nine of which must be at the 300 level or above. A student majoring in Political Science normally is expected to take at least 8 credits in Political Science coursework at Iowa State University. Only 3 credits of Pol S 490 or Pol S 499 alone or in combination and only 2 credits of Pol S 312-315 may be included in the total of 15 credits required for the minor. All minors in the College of Liberal Arts and Science required a minimum of 6 credits in courses numbered 300 and above taken at ISU with a grade of C or higher. Credits earned in Pol S 490 offered on a satisfactory/fail basis only will not fulfill this requirement.

Graduate Study

The department offers work for a Master of Arts degree (M.A.), a M.A. with a major in political science and minor for students in other departments. The department also offers work for a Master of Public Administration (MPA) degree or a Certificate of Public Management (CPM) for those interested in an educational certificate program that requires less work than a full masters program. In addition the Political Science Department offers work for the Masters of Science in Information Assurance. Brochures with details and requirements for all graduate programs may be obtained from the department office or at the department's webpage at www.ilstu.edu/polisci/graduate.html.

The M.A. program is designed to enable its graduates to engage in governmental research areas in public service or private industry. A student wishing to pursue the graduate study program may also wish to work for certification in high or junior college teaching. A thesis is required for this degree. The department also has a Joint Master of Arts/Junior Doctor of Law (M.A./J.D) program with the Law School of Drake University. Detailed information for the M.A./J.D can be found at the ISU Political Science webpage as well as the Drake Law School website (under Joint Degree). www.law.drake.edu/dms/jointprograms.html. Students wishing to pursue this joint degree must submit separate applications to both Drake University and Iowa State University and be accepted by both institutions.

M.A. graduates have a broad substantive understanding of the political process and the academic study of politics. They also have in-depth knowledge of one or more subfields in political science. Graduates are skilled at conducting research and preparing thorough research summaries. They are able to identify and address complex political questions taking into account related ethical, legal, economic, and social issues.

The usual prerequisites for major graduate work in the M.A. program normally are completion of at least 15 credits in political science, the GRE (Graduate Record Examination) one year of a foreign language (equivalent to 8 semester hours) and a course in basic statistics (equivalent to Stat 101). If the basic statistics requirement has not been met the student may remedy the deficiency by passing equivalent courses for which no graduate credit will be received. During their program of study, all students are expected to complete Stat 401. Pol S 501 and a thesis. Students normally do not concentrated course work in at least one of the following three areas international relations, comparative politics, or American politics. The student's program of study committee may require additional courses.

Students in other graduate programs may obtain a minor in political science by completing at least 8 credits of political science courses including one of the seminars. Interested students should consult the Graduate College Handbook for additional information on graduate minors.
The Master of Science in Information Assurance (MSIA) is a multi-disciplinary program designed to provide students with diverse backgrounds and interests with the opportunity to pursue professional training in the emerging field of information assurance. The core of the MSIA program is built around a series of courses taught in Electrical and Computer Engineering, Mathematics, and Computer Science that integrate elements of software and hardware aspects of cryptography and computer security. The program also recognizes that information assurance, defined in terms of security, privacy, access, and reliability, is not simply a technical problem but also involves a range of policy and legal dimensions, including policy education, ethics, and management. Recognizing that political science offers many potential intersections with information assurance topics such as public sector management of information technology and computer crime, it incorporates courses in information technology policy and law, information technology and international relations, information warfare, etc. Students with interests in these areas are encouraged to select the Department of Political Science as their home department.

Students opting to pursue a MSIA degree through the Department of Political Science can expect to acquire skills and background knowledge relevant to a career in public policy or public sector management of information assurance technologies. The INFAS degree program also provides opportunities for students who wish to pursue a PhD in information politics and policy.

Students interested in the INFAS degree program should consider Political Science as a home department if their future career and/or educational interests lie in such areas as institutional questions related to the Internet and information technologies, international political economy, national security, and information warfare. Information technology policy and law and public administration and public sector management of information technology are admission requirements generally follow the same guidelines as the M.A. or MPA in Political Science. Additional requirements are specified by the INFAS program in cooperation with Political Science. More in-depth information on the program can be found at http://www.isst.uaste.edu/finals.html

Public Policy and Administration

The Public Policy and Administration offers work for the professional Masters of Public Administration degree (MPA). The program is designed to educate and train students for careers in management and policy analysis at the federal and state levels of government, non-profit management, and those who are seeking careers in international management.

The program serves a diverse student body including both pre-service students and in-service employees in government and nonprofit organizations. The curriculum covers a broad area of public administration and policy, including organizational and administrative processes, leadership, management in a turbulent environment, organizational change, human resources, management, budgeting, cost-benefit analysis, finance, management policy, analysis, ethics, and international management. The program offers three tracks: Public Management Policy Analysis, and International Management.

The MPA degree requires 37 credit hours which includes (a) 12 credit hours in Core Competency, (b) 12 credit hours in one of the Concentration areas (c) 3-7 credit hours in Research Method (d) Electives up to 7 credit hours (e) 3 credit hours of Internship and (f) 3 credit hours of Creative Component (a Capstone Project).

The program also offers a Certificate of Public Management program (CPM) which requires a completion of 12 credit hours in the Core 3 credit hours in Quantitative Methods and one additional course in the area of student interest.

Courses are offered both in Ames and Des Moines. Some courses are also available via ISN and Web.

The Program also offers joint master's degrees with the Department of Community and Regional Planning and the Department of Human Development and Family Sciences. The plan of study consists of 37 credit hours. Under the rules of the Graduate College, all students may pursue a joint degree between any two of the three disciplines. Interested students are encouraged to consult the ISU's Graduate Handbook.

Requirements for admission are a graduate school application, an essay stating purposes for study, 4 college transcripts the GRE (waived for those with five or more years of public sector experience) three letters of recommendation, and the TOEFL for international students.

The department cooperates in the interdepartmental program in international relations, interdepartmental majors in transportation and water resources, and an interdisciplinary minor in gerontology (see Index).

Courses open for nonmajors or graduate credit: 405 406 410 413 417 420 421 422 420 431 433 440 451 452 470 475 476 480 482 486 487

Refer to the Schedule of Classes (www.uaste.edu/ -catalog) or consult the department (www.uaste.edu/grad-studies.html) for up-to-date scheduling information.

Courses Primarily for Undergraduate Students

Pol S 101 Orientation to Political Science (2,0) Cr. 1 weeks F/S Preq: Political Science and Open Option majors only or permission of the instructor. Introduction to the discipline and sub-fields of Political Science including an introduction to analytical thinking and research skills relevant to political science. Orientations to university college and departmental structure policies and procedures, student roles and responsibilities, degree planning and career awareness. Offered on a satisfactory-fail grading basis only

Pol S 215 American Government Institutions and Policies (3,0) Cr. 3 FS Fundamentals of American democracy, constitutionalism, nature of federalism and duality of citizens institutions and processes of the executive, legislative and judicial branches of government. The role of public opinion, interest groups, and political parties. Policies and problems of national government

Pol S 235 Introduction to Ethics and Politics (3-0) Cr. 3 F/S Preq: Sophomore standing. Introduction to moral and political issues such as violence, deception, corruption, civil disobedience, democracy, justice, equality, and freedom. Students will read classic and contemporary texts and consider political applications. This course serves as an introduction to advanced courses in political theory

Pol S 241 Introduction to Comparative Government and Politics (3-0) Cr. 3 FS Basic concepts and major theories applied to selected political systems, including non-western political systems

Pol S 261 Introduction to International Politics (3-0) Cr. 3 FS Dynamics of interstate relationships pertaining to nationalism, the nation state, and world foreign policy making, the national interest, military capability, and strategy. Case studies of transnational issues such as population, food, energy, and terrorism

Pol S 298 Cooperative Education Cr. F SS Preq: Permission of department cooperating education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to commencing each work period

Pol S 301 Introduction to Empirical Political Research (3-2) Cr. 4 FS Preq: 3 credits in political science. One statistics course required. Techniques of empirical political research and analysis. Surveys, methods of data collection, applications of statistics and computer techniques

Pol S 305 Political Behavior (3-0) Cr. 3 F Preq: Sophomore classification. Empirical theories and descriptions of political behavior including decision-making concepts and theories with emphasis on groups and political elites

Pol S 306 Political Decision-Making and Conflict Resolution (3-0) Cr. 3 Preq: 3 credits in political science. Study of domestic and international political conflict. Simulation and games will be used to illustrate the process through which conflict is resolved

Pol S 310 State and Local Government (3,0) Cr. 3 Preq: 3 credits in political science. Role of state and local governments in the American federal system. Structure of budgeting: political parties, elections, interest groups. Major governmental institutions, legislative executive and judicial structures, and functions of local governments.

Pol S 311 Municipal Government and Politics (3-0) Cr. 3 Alt. F offered 2003 Preq: 3 credits in political science. Municipal formation of organization administration of municipal services, problem solving in municipal government. Urban and metropolitan political processes. Implications of federal urban policies.

Pol S 312 Minicourse in American Government and Politics (3-0) Cr. 2 W weeks FS Preq: Sophomore classification. Half semester course on selected topical issues in American government and politics. Designated repeat not permitted. Use of credit in Pol S major and minor is limited. See Undergraduate Study for information.

Pol S 313 Minicourse in Theory and Methods (3-0) Cr. 2 B weeks FS Preq: Sophomore classification. Half semester course on selected topical issues in theory and methods in political science. Designated repeat not permitted. Use of credit in Pol S major and minor is limited. See Undergraduate Study for information.

Pol S 314 Minicourse in Comparative Politics (3-0) Cr. 2 B weeks FS Preq: Sophomore classification. Half semester course on selected topical issues in comparative politics. Designated repeat not permitted. Use of credit in Pol S major and minor is limited. See Undergraduate Study for information.

Pol S 315 Minicourse in International Relations (3-0) Cr. 2 B weeks FS Preq: Sophomore classification. Half semester course on selected topical issues in international relations. Designated repeat not permitted. Use of credit in Pol S major and minor is limited. See Undergraduate Study for information.

Pol S 319 Law and Politics (3-0) Cr. 3 FS Preq: Sophomore standing. An examination of the American judicial system and the interplay between law and politics analyzed and evaluation of the role of legal and political actors and prominent issues addressed by the legal system.

Pol S 320 American Judicial Process (Same as CJST 320) (3-0) Cr. 3 S Preq: 215 The genesis of political systems and personnel of American courts: basic juridical concepts, restraints on exercise of the judicial power, major eras of American constitutional history, an overview of civil liberties, impact of court decisions on public policy.

Pol S 334 Politics and Society (Same as Soc Sci 334) See Sociology

Pol S 340 Politics of Developing Areas (3-0) Cr. 3 At S offered 2008. Examination of economic and political development as they relate to the political process of developing states. Impact of social and technological changes on political systems of developing areas. Some case studies

Pol S 341 Politics of Japan (3-0) Cr. 3 At S offered 2004. Political traditions and cultures. Contemporary governmental and institutional structures. Examination of public policy issues in Japan as a post-industrial society.

Pol S 342 Politics of China (3-0) Cr. 3 At S offered 2003. The Chinese Revolution origins, political theory
and practice party and government China as a modernizing nation including the problems of leadership succession and economic transformation

Pol S 343 Latin American Government and Politics (3.0) C 3 0 Political institutions processes and contemporary issues Selected countries examined intensively to illustrate generalizations. Role of parties, military church human rights women environmental issues interest groups ideology and globalization

Pol S 344 Public Policy (3.0) C 3 S How agendas come to be set in public policy: theories describing the policy making process forces molding policy choices and the impact of such choices

Pol S 345 European Politics (3.0) C 3 S Comparative study of polical institutions of Europe and the European Union: emphasis on parties, elections and governmental structures. Substance and process of public policies in selected problem areas.

Pol S 348 Israeli Government and Politics (3.0) C 3 Alt S offered 2006 Prereq 243 01 comparable background in Middle East Chinese history. Major factors that have shaped and continue to influence the distinctive nature of Israeli society and politics. Patterns and determinants of Middle East relations as reflected in Arab-Israeli conflict. Foreign policymaking in Israeli and American involvement since 1945.


Pol S 350 Introduction to the Middle East (3.0) C 3 S 0 Introduction to the Middle East as a region and issues of political importance to the Middle East and its neighbors. Covered include: Islam, regional conflicts and alliances, local leaders, economic issues and gender and social relations. Nonmajor graduate credit.


Pol S 356 Theories of International Politics (3.0) C 3 S 0 Introduction to major theoretical concepts and approaches. Both classical and contemporary: world politics including realism, empiricism, liberalism, and postpositivism. For example: War and conflict, peace and cooperation: political economy crises, decision making, systemic theory, dependence and interdependence.


Pol S 358 United States Foreign Policy (3.0) C 3 F Prereq 215 or 251 or Hist 467 or 470 or 471. U.S. foreign policy since World War II with emphasis on changing American values in foreign policy: the role of the President’s Cabinet and the bureaucracy in policy making: and a survey of current foreign policy issues and problems.

Pol S 359 Current Issues in American Foreign Policy (3.0) C 3 S Prereq 215 251 or 358 Examination of contemporary U.S. foreign policy issues (e.g., U.S. policy in the Middle East, defense budgeting in the post Cold War era, conventional and nuclear arms control policies). The course will explore alternate methods to analyze policy: survey the evolution of each issue and discuss different policy alternatives.


Pol S 370 Religion and Politics (Same as RelG 370). See Religious Studies. Nonmajor graduate credit.


Pol S 381 Introduction to Political Economy (3.0) C 3 S 0 Introduction to the theoretical perspectives on international political economy. Analysis of specific issues such as the changing international trade regime, international finance and Third World development under conditions of globalization.

Pol S 385 Women in Politics (Same as W 385). (3.0) C 3 S 0 Examination of the entry and participation of women in politics in the United States and other countries including traditional family action: conflicts and strategies for change through the political process.

Pol S 395 Advanced Writing in Political Science (1.0). Prereq 2SS Prereq Major in political science. Taken in conjunction with 303 or 400 level Political Science courses. Required of majors. Offered on a satisfacory/fail grading basis only.

Pol S 398 Cooperative Education Cr. R. FSS Prereq Permission of department. Cooperative education coordinator. Junor classification. Required of all cooperative education students. Students must register for this course prior to beginning work period.

Pol S 406 Public Opinion and Voting Behavior (3.0) C 3 S Prereq 6 credits in political science or junior classification. The formation of political opinions and attitudes: political participation and voting behavior of the general public: and their influences on American political policies and the political process. Nonmajor graduate credit.


Pol S 413 Intergovernmental Relations (Dual listed with S13). (3.0) C 3 S 5. Prereq 6 credits in American government. Theories and practices of governmental relations between federal state and local governments. Nonmajor graduate credit.

Pol S 417 Campaign Rhetoric (Same as Sp Cm 417). See Speech Communication. Nonmajor graduate credit.


Pol S 421 Constitutional Freedoms (3.0) C 3 S Prereq 320 or 420. Leading Supreme Court cases interpreting the Bill of Rights and the Fourteenth Amendment. Emphasis on religion, speech, privacy, due process, and equal protection. Nonmajor graduate credit.


Development of the principles of international law and war analysis of theories concerning its nature and fundamental conceptions: its relation to national law: problems of international legislation and codification. Nonmajor graduate credit.


Pol S 432 Comparative Politics of the Middle East (3.0) C 3 Cr. Prereq. 241 and coursework on the Middle East. Applies comparative methodology to the analysis of problems and processes in the Middle East as a region. Focus on democratization and economic liberalization. Nonmajor graduate credit.


Pol S 442 Comparative Foreign Policy (Dual listed with S42). (3.0) C 3 S 5 Prereq 251. Various theoretical approaches to explain foreign policy making and behavior through the use of case studies of selected nations. Nonmajor graduate credit.

Pol S 453 International Organizations (3.0) C 3 S Prereq 251. Private and public organizations such as the United Nations other specialized agencies and multinational organizations and their influence on our daily lives. Nonmajor graduate credit.

Pol S 464 Political Parties and Interest Groups (3.0) C 3 F Prereq 215. Nonmajor graduate credit.

Pol S 470 Public Choice (Same as Econ 470). See Economics. Nonmajor graduate credit.

Pol S 475 Management in the Public Sector (Dual listed with 575). (3.0) C 3 F 3 Prereq 371. Literature and research on organizational behavior and management theory with emphasis on applied aspects of managing contemporary public sector organizations. Topics include distinctions between public and private organizations, leadership, productivity, employee motivation, organizational structure, and organizational change. Nonmajor graduate credit.


Pol S 477 Government, Business and Society (Dual listed with S77). (3.0) C 3 Alt F offered 2003. Prereq Junior classification. Perspectives on the changing roles and relationships of business government and society so as to open the way for more effective policy decisions on corporate government affairs. Topics may include the changing economy: transformation of workplace and commu
nity conditions consumers' social responsibilities of businesses economic policies and regulations and politics in the business government relationship
Nonmajor graduate credit

Pol S 480 Ethics and Public Policy (Dual listed with 588 I 3 0) Cr 3 Preq 6 credits in political science Major ethical concepts in U.S. political philosophy The controversy over public versus private morality in political policy making. Analysis of public decision making case studies with emphasis on ethical considerations Major proposals and legislation related to improving the quality of ethical criteria and decisions in public policy making Nonmajor graduate credit

Pol S 482 Environmental Politics and Policies (Dual listed with 582 same as Env S 482 I 3 0) Cr 3 Preq 3 credits in political science or 3 credits in Environmental Science Minor classification Major ideologies relating to conservation and ecology Processes participants and institutions involved in state national and global environmental policymaking Case studies of environmental controversies and proposals for policy reform Nonmajor graduate credit

Pol S 486 Science Technology and Public Policy (Dual listed with 569 I 3 0) Cr 3 Alt S offered 2005 Preq 6 credits in Political Science junior or senior classification Examines the development of science and technology policy in the United States including the historical origins of the government's role in science and technology the dynamics of government universitvindustry relations on technological advancement and the impact of science and technology on global politics Nonmajor graduate credit

Pol S 487 Electronic Democracy Schmidt (2-1) Cr 3 Preq Sophomore standing or instructor approval The impact of computers the internet and the World Wide Web on politics and policy The positive and negative effects on information technology ITT on selected topics such as freedom power and control privacy civic participation the sense of community virtual cities interest group behavior the new media campaigns elections and voting will be examined Nonmajor graduate credit

Pol S 490 Independent Study Var FS Preq 6 credits in political science No more than 9 credits of Pol S 490 may be counted toward graduation Special studies in the political institutions processes and policies of American foreign and international governments Also studies in traditional and behavioral political theory Use of credit in Pol S major and minor is limited See Undergraduate Study for information A American Government and Politics B Theory and Method C Comparative Politics D International Relations E Extended credit The student may earn an additional 1 or 2 credits for extra study done for any 300 or 400 level course with instructor's approval G Capstone Project H Honors

Pol S 495 Capstone Project in Political Science (3 0) Cr 3 3 Preq 21 credits in political science and permission of instructor Capstone project for political science majors integrating research analysis and participation

Pol S 498 Cooperative Education (2-2) Cr R FS Preq Requirement of department coordinator education coordinator senior classification Required of all cooperative education students Students must register for this course prior to commencing each work period

Pol S 499 Internship in Political Science Var FS SS Preq 6 credits in political science junior or senior classification Permission of internship coordinator Work experience with a specific nongovernmental or governmental agency at the local state national or international level combined with academic work under faculty supervision Offered on
the end of World War II. Special emphasis on national (primarily U.S.) development assistance and agricultural/food policies and policies of the international food organizations the World Bank and the regional development banks.

Pol S 562 Environmental Politics and Policies (Dual listed with 489 I-30 Cr 3 F Pre req: 3 credits in political science or 3 credits in Environmental Studies: graduate classification. Major: ideologies relating to conservation and ecology. Processes: participants and institutions involved in state national and global environmental policymaking. Case studies of environmental controversies and proposals for policy reform.

Pol S 586 Science Technology and Public Policy (Dual listed with 486 I-30 Cr 3 Alt: S offered 2005 Pre req: 6 credits in political science. Investigates the dynamics of interaction between science and politics at the national and international levels and how this interaction shapes policy for science, human welfare and global concerns. The topics include the evolution of the relationship between science and government, the old and new social contract for science, national innovation policy and global economic and environmental concerns.

Pol S 590 Special Topics (Cr 2 to 5 each time taken. F Pre req: 15 credits in political science written permission of instructor.

A American Political Institutions
B Public Law
C Political Theory and Methodology
D Comparative Government
E International Relations
F Political Parties and Policy Formulation
G Public Administration and Public Policy
I Internship
T Teaching Preparation

Pol S 598 Public Administration Internship (Cr 3-6 F Pre req: 15 credits in political science permission of the instructor. Supervisor's internship with administrative and legislative organizations, judicial branch offices and nonprofit groups.

Pol S 599 Creative Component

Courses for Graduate Students

Pol S 610 Graduate Seminars (3 I-3 Cr. 3 for each seminar F Pre req: 15 credits in political science

A American Political Institutions
B Public Law
C Political Theory and Methodology
D Comparative Government
E International Relations
F Policy Process
G Public Administration and Public Policy
H Research

Preprofessional Study

Requirements for admission to most professional academic programs can be met by study at Iowa State University. These programs may be met in the course of obtaining a bachelor's degree from Iowa State or at a level below that of a degree, depending on the intended field of study. The specific courses taken in a professional program will depend primarily upon the admission requirements of the professional school to which a student wants to apply. In some programs requiring three years of professional work, a student may by careful planning complete requirements for the bachelor's degree upon transfer to Iowa State up to 32 semester credits of professional coursework. Generally these credits will be counted as electives but a maximum of 24 may be used as major credits in interdisciplinary studies and a smaller number of major credits in appropriate departments.

Students who have not declared a major upon entry should enter as preprofessional students in the premedical, prelaw, pre-engineering, pre-health professions, or pre-veterinary programs at Iowa State University. If a preprofessional student changes his major or enters a professional program such as a dental hygiene or veterinary medicine, he or she must complete major requirements for the professional program in the college of veterinary medicine. If an aspirant for admission in a professional program is not recommended, he or she must complete major requirements for the professional program in the college of veterinary medicine before entering a professional program.

Clinical Laboratory Science/Medical Technology

Clinical laboratory scientists are often referred to as medical technologists. These professionals are the backbone of human health care systems. They work in laboratories, test diagnostic specimens, and ensure the accuracy of results. Some professionals may also be employed by pharmaceutical companies. Medical technologists are the backbone of human health care systems. They work in laboratories, test diagnostic specimens, and ensure the accuracy of results. Some professionals may also be employed by pharmaceutical companies. Medical technologists are skilled in using advanced laboratory equipment and techniques.

Admissions requirements for programs vary by university. Typically, admission requires a degree from a college of veterinary medicine and completion of a veterinary medicine program. Medical technologists are also required to complete coursework in areas such as biology, chemistry, and mathematics. They often work in hospitals or clinics, performing tests on patients to diagnose and monitor disease.

Dentistry

Dentists diagnose and treat a wide range of conditions involving the teeth, jaws, and mouth. They also perform surgical procedures such as the extraction of teeth. Dentists may work in private practice or in hospitals, clinics, or dental offices. They may also work for government agencies or in research institutions.

Health Information Management

Health information managers are responsible for the accurate and efficient management of patient health information. They ensure that patient information is recorded, stored, and retrieved accurately and efficiently. Health information managers also ensure that patient information is protected and that it is used in compliance with legal and ethical standards.

Hospital and Health Administration

Hospital and health administration professionals oversee the management of hospitals and other healthcare facilities. They ensure that hospitals meet federal and state regulations and that they operate efficiently and effectively. Hospital and health administration professionals also develop policies and procedures to improve patient care and to ensure that hospitals are financially sound.

Human Medicine

Human medicine is the study of the diagnosis and treatment of disease in humans. It involves the study of the structure and function of the human body and the development of treatments to cure or prevent disease. Human medicine professionals work in a variety of settings, including hospitals, clinics, and research institutions.

Veterinary Medicine

Veterinary medicine is the study of the diagnosis and treatment of disease in animals. It involves the study of the structure and function of the animal body and the development of treatments to cure or prevent disease. Veterinary medicine professionals work in a variety of settings, including veterinary clinics, research institutions, and government agencies.

Dental Hygiene

Dental hygiene is the study of the prevention and treatment of oral health problems. Dental hygienists perform procedures such as cleaning teeth and may participate in oral health education programs. They work in a variety of settings, including dental offices, clinics, and hospitals. Dental hygienists are trained in the use of dental instruments and techniques and are responsible for maintaining oral health in patients.
Law
A lawyer assists the legal peaceful resolution of conflicts in many different ways. Most lawyers are employed in private practice, but many are employed by government agencies and private business. At least 3 years are needed to complete a law school program leading to a doctor of jurisprudence (J.D.) or a bachelor of laws (LL.B) degree and a bachelor's degree is required for admission to all law schools. A student planning to enter law school may major in any field. The courses taken should develop skill in critical thinking, comprehension and expression of ideas and understanding of human institutions and values. Perhaps most important, courses in English, foreign language and literature, government, economics, history, mathematics, Latin, logic and scientific method and philosophy.

Library and Information Science
Librarians are essential in educational institutions, medical facilities, government agencies, industries and public information centers. The professional preparation for library administration is provided by a master's degree program. Admission requirements for the University of Iowa's program, for example, include a bachelor's degree with at least 84 semester credits in the arts and humanities and the natural and social sciences. Iowa State students may choose majors that reflect their own interests and that may provide a foundation for work in medical law or other specialized libraries.

Nuclear Medicine Technology
The use of radioactive materials in the diagnosis and treatment of disease is the distinguishing feature of nuclear medicine. Under the supervision of a physician in a hospital or clinic, the technologist prepares and administers these radioactive materials. The technologist also supervises the use of these materials in diagnostic and treatment procedures. Students may choose majors that reflect their own interests and that may provide a foundation for work in medical physics, radiology, or other related fields.

Pharmacy
The profession of pharmacy is devoted to the health and well-being of people worldwide. Pharmacy professionals, known as pharmacists, are part of an interdisciplinary health care team. They have the responsibility of ensuring the safe and effective use of medications. Pharmacy professionals are also responsible for the development, production, and distribution of medications. They are trained in the science of pharmacology, the study of drugs and their effects on the body. They are also trained in the science of pharmacy, which encompasses the study of the chemistry, physics, and biology of drugs and their interactions with the body. They are also trained in the science of pharmacokinetics, the study of how drugs are absorbed, distributed, metabolized, and excreted by the body. They are also trained in the science of medicinal chemistry, which encompasses the study of the chemistry of drugs and their interactions with the body. They are also trained in the science of pharmaceutical sciences, which encompasses the study of the production, formulation, and distribution of medications. They are also trained in the science of pharmacy administration, which encompasses the management of pharmacy operations.

Podiatry
Podiatrists diagnose and treat diseases and disorders of the human foot and ankle. They treat patients in private practice and in institutions such as hospitals and nursing homes. Podiatrists are trained in the science of podiatry, which encompasses the study of the foot and ankle and their interactions with the body. They are also trained in the science of podiatric medicine and surgery, which encompasses the study of the diagnosis and treatment of diseases and disorders of the foot and ankle.

Theology or Religious Studies
The professional education of a student of religion can follow one of two paths. The path to a profession as a pastor, priest, rabbi or other religious position in a religious tradition usually requires 3 years in a program leading to the master of divinity (M.Div.) offered at a school of divinity or of theology. The path to a profession as a teacher of religious studies at the college level requires 4 years in a program leading to the Ph.D. at a graduate school of Religious Studies. Both seminaries and graduate schools require a bachelor's degree for admission. The American Association of Theological Colleges recommends the following guidelines as a basis for preparation for theological studies. English language and literature history including non-Western culture, philosophy, natural sciences, social sciences, espacially psychology, sociology and anthropology, the fine arts and modern languages and religion both Western and Eastern. Although students in a variety of majors may qualify for admission to a theological school, interested persons are advised to review their proposed programs with a representative of the Theological Studies Program in the Department of Philosophy and Religious Studies.

Veterinary Medicine
Veterinarians are licensed professionals who provide medical care for animals. They are responsible for diagnosing and treating diseases and disorders of animals, and for performing surgical procedures. They are also responsible for ensuring the health and welfare of animals, and for providing guidance to animal owners on issues such as nutrition, exercise, and housing.

Physical Therapy
Physical therapy is a health care profession that uses physical therapy techniques to help people with a variety of conditions. Physical therapists use a variety of techniques, including exercise, massage, and heat, to help people improve their physical functioning and overall quality of life.

Physician Assistant
A physician assistant provides medical services under the supervision of a licensed physician. They conduct physical examinations, order and interpret laboratory tests, make diagnostic and treatment decisions, and are allowed to prescribe medication in most states. Certification as a physician assistant requires completion of a master's degree program at an accredited institution. Students may choose majors that reflect their own interests and that may provide a foundation for work in medical sciences, psychology, or other related fields.

Occupational Therapy
Occupational therapists are trained to help people with physical disabilities to improve their independence and participation in everyday activities. They are trained in the science of occupational therapy, which encompasses the study of the human body, the interaction of individuals with the environment, and the use of therapeutic techniques to help people improve their physical functioning and overall quality of life.

Podiatry
Podiatrists diagnose and treat diseases and disorders of the human foot and ankle. They treat patients in private practice and in institutions such as hospitals and nursing homes. Podiatrists are trained in the science of podiatry, which encompasses the study of the foot and ankle and their interactions with the body. They are also trained in the science of podiatric medicine and surgery, which encompasses the study of the diagnosis and treatment of diseases and disorders of the foot and ankle.
To assist students who have indicated interest in the premedical program for the College of Veterinary Medicine and are undecided about a major, an advising category is available known as GENPV (General Undeclared Students Pre-Vet). Orientation and advising services for these students are designed to help students fulfill premedical course requirements to introduce available majors and careers allied to veterinary medicine and to introduce career options in veterinary medicine. GENPV students must select a major by the end of their second semester. Some Iowa State University majors allow by careful planning the opportunity for a student to earn the bachelor’s degree by combining credits from three years of preprofessional study and one year of professional study in the College of Veterinary Medicine.

Production/Operations Management
(Administered by the Department of Logistics Operations and Management Information Systems)

Richard F Post Jr Interim Chair of Department
Distinguished Professors Allen Baumel
Professors Cumm Post
Professors (Emeritus) Thompson Voorhees
Associate Professors Hendrickson Larson
Lumme Menecke Niakanta Premkumar Rubin
Townsend Walter
Assistant Professors Hackbart Johnson
Montebon Strader Suzuki Zhu
Instructors (Adjunct) Bhanosh Chang
Chooibeh Clayton Tandonadina

Undergraduate Study
For undergraduate curriculum in business major in production and operations management see College of Business Curricula.

Production/operations management is the planning and implementation of the processes used to transform inputs into finished goods and services. A majority of the firm’s investment personnel and purchases of materials and equipment are often controlled by the production function. The efficient management of these resources is critical to the success of the firm. Although operations management principles apply to all types of organizations, the production/operations management major focuses on the application of these principles in manufacturing systems. Students learn how to efficiently organize and manage the labor equipment, material and information systems resources required to deliver products that satisfy customer needs. The major provides business students with the understanding of manufacturing planning and control systems, continuous process improvement; techniques for manufacturing methods, strategic quality management systems and other manufacturing practices needed to become gainfully employed in manufacturing industries.

Students are required to take three courses: POM 420, 422 and 424 plus three additional courses from an approved list. Stat 326 is recommended though not a prerequisite for any required courses.

The department also offers a minor for non Production/Operations Management majors in the College of Business. The minor requires 15 credits from an approved list of courses of which 9 credits must stand alone. Students with declared majors have priority over students with declared minors in courses with space constraints.

Graduate Study
The production/operations management major participates in two graduate programs, the M.S. in Business and the full-time and part-time M.B.A. programs. The M.S. program is a 30-credit curriculum culminating in a thesis.

POM 521 Strategic Quality Management (3 Cr. 3 Preq: Stat 328: graduate classification. Management and technical issues related to quality problem solving including the strategic importance and economic impacts of quality, managerial issues in planning and designing quality assurance systems, control of quality systems, employee involvement, statistical concepts relevant for designing for quality, inspection and measurement. Process control and acceptance sampling. Use of statistical techniques in the diagnosis and solving of real world problems.

POM 522 Manufacturing Information Systems (3-0 Cr. 3 Preq: 522: An integrated analysis of advanced manufacturing planning and control procedures for business. A variety of topics are covered, including forecast management, aggregate planning, master production scheduling, material requirements planning, enterprise resource planning, capacity planning, shop floor control and just-in-time and competitive analyses of modern manufacturing systems. The design, selection, and implementation of information systems to support these concepts is emphasized.

POM 525 Manufacturing Strategy (3-0 Cr. 3 Preq: 522: Formulation and implementation of manufacturing strategies for achieving competitive advantage. Topics include strategic issues related to global competition, productivity, delivery performance, manufacturing flexibility, inventory information technology, and performance measurement.

POM 590 Special Topics (1 to 3 credit hours. Preq: Permission of instructor. For students wishing to do individual research in a particular area of POM.

Professional Agriculture
(Interdepartment Program administered by the Department of Agricultural Education and Studies)

Supervisory Committee: Eric Hoberg Kenneth Holshcer Steve Jungst Paul Lasley Sergey Lence Dan Loy Kenneth Moore Gary Munvold James Pease

Graduate Study
The graduate major in professional agriculture is an off-campus program leading to the degree of master of agriculture. The program is considered to be a professional master's degree and not preparation for further graduate study. Graduate students have a broad base of knowledge in one or more agriculture disciplines. They have the ability to communicate effectively and make decisions based on knowledge. To earn the 32 credits necessary for graduation, the student must complete 28 semester credits of formal coursework and 4 credits of creative component. Courses are delivered via video-tape, interactive video, world wide web, and off campus classes and workshops. Specific courses offered in the program and the location of the off-campus classes may be obtained from the departmental course listings off-campus course catalog, or by contacting the Professional Agriculture Coordinator 201 Curtiss Hall.

Psychology
psych server iastate.edu
Craig A. Anderson Chair of Department
Distinguished Professors Wells
Professors Anderson Andre Bonten Bushman Calvino Esperson Gerard Gobons Larson Peter Phye Russell
Distinguished Professors (Emeritus) Atman
University Professors (Emeritus) Brown
Professors (Emeritus) Aultman Charles Gommam Hughes Karis Layton Thomas Schuster Strahan Wyten Wiatrowski
Associate Professors Cooper Cress Cunnick Dark Hansisch Scott Venkatarag
Undergraduate Study

For college level requirements in undergraduate curricula leading to the degrees of bachelor of arts and bachelor of science see Liberal Arts and Sciences Curriculum

An undergraduate major in psychology may be taken as liberal arts education as preparation for graduate study in psychology or as background for professional education in law and the health professions. A student with a bachelor's degree in psychology may qualify for a variety of positions including those in social services, mental health, corrections, rehabilitation, developmental disability centers, business management, and public opinion surveying. Depending on professional goals, a minor in another discipline may be desirable. Students should consult with their academic advisors early in their undergraduate curriculum.

The requirements of the program enable graduates to understand and apply the scientific principles, facts, and basic methods of psychology in their personal and professional activities. Graduates learn to think scientifically about human behaviors and mental processes. They can communicate effectively in speech and writing, respecting individual and cultural differences in behaviors and appreciate ethical issues in both the science and practice of psychology.

Professional work with a job title of psychologist in academic, business, clinical government, and school settings requires graduate degrees.

The major must include the following psychology courses: 101 102 111 211 301 and 440 each with a minimum grade of C. The major also must include five courses distributed across at least four of the following five areas: Area A: 230 Area B: 260 Area C: 310 315 Area D: 316 Area E: 360 450.

Two additional 3-credit courses in psychology must be taken. Area courses may be used to meet this requirement, but variable credit courses (470, 490, 491, and 492) may not. In accordance with college requirements, a C or better average is required in the courses used to satisfy the major.

Departmental requirements for the BA and BS include the following supporting courses: six credits in philosophy including 201 or 202, one of the following: Biol 109 or 201, Zool 155, Chem 163, Gen 260, one of the following: Stat 117 and 118 or their equivalent, and two courses in mathematics acceptable in LAS Gen Ed group 111.

Students electing a B.S. degree also must complete Phys 302 with a minimum grade of C and a minimum of 10 additional supporting credits as follows: three credits from LAS Gen Ed group 111a or approved departmental list, six credits from LAS Gen Ed group 111b, and one credit in a laboratory course from LAS Gen Ed group 111b.

Students electing a B.A. degree also must complete an ISU approved minor.

See also the B.S./M.S. program under Graduate Study.

The department offers a minor in psychology. The minor requires completing 18 credits in psychology including 101 and 301, each with a minimum grade of C. At least 9 of the 18 credits must be 300 level courses (or above), but no more than three credits total may be from Psych 490, 491, and 492. A C average or better is required in the courses used to satisfy the minor. Contact the psychology advising office for more information.

English proficiency requirement. The department requires a grade of C or better in Eng 104 and in Eng 105 (or 106), and a C or better in Psych 302 or Psych 490 (2 credits minimum) or Eng 302, 303, or 314.

Graduate Study

The department offers the degrees master of science and doctor of philosophy in psychology and a minor to students with a major in other departments.

Within the major of psychology the department offers a doctoral specialization in counseling psychology (APA accredited) and doctoral areas of concentration in cognitive psychology and social psychology. The department also offers a non thesis master's degree program in general psychology.

Students seeking a graduate major in psychology must have graduated from an accredited college in a curriculum substantially equivalent to the undergraduate curriculum in liberal arts and sciences at Iowa State University. An acceptable curriculum must include at least 15 credits of basic psychology, which should include a laboratory course, a measurement course, and a statistics course.

Graduates function as academic psychologists in higher education or as professional psychologists in applied settings. They have an extensive background of psychological principles and the quantitative skills to conduct psychological research, communicating the results to the scientific community, students in the classroom, and the general public.

Graduates in applied programs have specialized knowledge in counseling and program development. They are skilled in delivering such programs and services to diverse clientele in a variety of settings.

The department also participates in the interdepartmental programs in instructional relations and neuro-science and in the interdepartmental minor in gerontology (see index). An academic and supervised practicum in the teaching of psychology is recommended for all doctoral students whose future plans may include teaching at the college level. A 12 month internship in a training site or agency approved by the faculty is required of all doctoral students in counseling psychology.

The department also offers a B.S./M.S. program in psychology that allows the student to obtain both the B.S. and M.S. degrees in five years. Students interested in this program should contact the chair of the department's Graduate Program Committee for admission to the Graduate College. The department should be made near the end of the junior year of undergraduate study.

Courses open for nonmajor graduate credit.

Psych 401 413 422 436 440 450 460 484 485 488

CmDs 471

Courses Primarily for Undergraduate Students

Psych 101 Introduction to Psychology. (3) Cr. 3

FS 3 SS PreReq 101. Students will learn concepts derived from the application of the scientific method to the study of behavior and mental processes. Applications of psychology. 101H (2) F Honors section. (For students in the University Honors Program only.)

Psych 102 Laboratory in Introductory Psychology. (2) Cr. 1

FS PreReq Credit or enrollment in 101 Laboratory to accompany 101.

Psych 111 Orientation to Psychology. (1) Cr. F

Program requirements and degree/career options. Required of psychology majors. Offered on a satisfactory-fail grading basis only.

Psych 131 Academic Learning Skills. (2) Cr. 1

FS Efficient methods of study and reading. Offered on a satisfactory-fail grading basis only.

Psych 200 Exploring Psychology at ISU. (2) Cr. 1

FS Survey of psychological research and practice. Psychology majors only. Offered on a satisfactory-fail grading basis only.

Psych 230 Developmental Psychology. (3) Cr. 3

FS SS Life span development of physical traits, cognition, intelligence, social and emotional behavior, personality, and adjustment.

Psych 280 Social Psychology. (3) Cr. 3

FS SS Individual human behavior in social contexts. Emphasis on social desirability, attitudes, perceptions of others, social influence, attraction, aggression and group pressure.

Psych 301 Research Design and Methodology. (3) Cr. 3

FS SS PreReq 101. 1 course in psychology survey of the principal research techniques used in psychology with an emphasis on the statistical analysis of psychological data.

Psych 302 Research Methods in Psychology. (2) Cr. 3

FS PreReq 301. Discussion of and experience in designing research studies, collecting and analyzing data, and preparing research reports in psychology.

Psych 310 Brain and Behavior. (Same as Zool 310) (3) Cr. 3

FS PreReq 101. 1 course in science of the human system with emphasis on brain mechanisms mediating sensory processes across motivational learning and abnormal behavior.

Psych 312 Sensation and Perception. (3) Cr. 3

FS PreReq 101. Survey of the physiology and psychology of human sensory systems including vision, audition, smell, taste, the skin senses, and the vestibular senses.

Psych 313 Learning and Memory. (3) Cr. 3

FS PreReq 101. Fundamental concepts and theories of learning and memory derived from human and animal research.

Psych 314 Motivation. (3) Cr. 3

FS PreReq 101. Concepts and topics of motivation including curiosity, pain emotion, social aggression, love, play, addiction, sleep, tongue and work.

Psych 315 Drugs and Behavior. (3) Cr. 3

FS PreReq 101. 1 course in science of the use and effects of psychoactive drugs and their use in experimental therapeutic and social settings.

Psych 318 Cognitive Processes. (3) Cr. 3

FS PreReq 101. 1 course in science of human information processing during thinking, problem solving, reading, language, memory, and attention.

Psych 333 Educational Psychology. (Same as C1 333.) See Curriculum and Instruction.

Psych 346 Psychology of Women. (Same as W S 346) (3) Cr. 3

FS PreReq 2 courses in psychology including 101. Survey of psychological literature relating to biological, developmental, interpersonal, and sociocultural determinants of the behavior of women.

Psych 360 Psychology of Normal Personality. (3) Cr. 3

FS SS PreReq 101. Theories and research in the study of development and functioning of normal personality.

Psych 381 Social Psychology of Small Group Behavior. (Same as Soc 361) (3) Cr. 3

FS PreReq 280 or Soc 305. A survey of small group research and theory from a social psychological perspective. Major theories of interpersonal behavior such as exchange theory, equity theory, and status consistency theory, and major areas of research such as leadership, power, conformity, bargaining, status norms and roles.

Psych 401 History of Psychology. (3) Cr. 3

FS PreReq 4 courses in psychology. Philosophy and science backgrounds of psychology. Development of theories and causes of events in academic and applied psychology. Nonmajor graduate credit.

Psych 413 Psychology of Language. (Same as Ling 413) (3) Cr. 3

FS PreReq 101. Psychological and linguistic processes involved in language related activities like speaking, listening, reading and writing. Nonmajor graduate credit.

Psych 422 Counseling Theories and Techniques. (2) Cr. 3

FS PreReq 2 courses in psychology. Survey of major theoretical approaches in counseling and related assessment and treatment techniques. Supervised practice in basic counseling skills. Nonmajor graduate credit.

Psych 434 Applied Behavior Analysis. (Dual listed with 534) (3) Cr. 3

FS PreReq 9 credits in human


Psych 450: Industrial Psychology. (3:0 Cr) 3: FS SS Pr: Prenau 2 courses in psychology including 101. Stat 101 Content and methods of industrial psychology including the design of experiments used to select employees, how to conduct performance appraisals and how to train employees in organizations. Work attitudes and behaviors of employees, work schedules, safety and human factors, and relevant legal issues. Discussion of regression and correlation are used in the course. Nonmajor graduate credit.

Psych 460: Abnormal Psychology. (3:0 Cr) 3: FS SS Pr: Prenau 3 courses in psychology including 101. Description of major forms of maladjustment including anxiety, mood disorders, personality disorders, substance dependence, and schizophrenia. Factors in the development of behavior deviations. Research pertinent to the description development and maintenance of abnormal behavior. Nonmajor graduate credit.

Psych 470: Seminar in Psychology. (1 to 3 Cr) C: 1 to 3 each time taken. Pr: Prenau 12 credits in psychology. Current topics in psychological research and practice. A: Counseling, B: Experimental, C: Individual Differences, D: Social.

Psych 484: Psychology of Close Relationships. (3:0 Cr) 3: Prenau 9 credits in psychology including 280. Theories and research concerning the functions and development and deterioration of close relationships. Influence of psychological processes on romantic, marital, and family relationships. Topics include mate selection, interdependence, trust and commitment, power and dominance in relationships, sexuality, divorce, gender roles, and family interaction. Nonmajor graduate credit.

Psych 486: Health Psychology. (3:0 Cr) 3: Prenau 2 courses in psychology. Application of psychological theory and research methods to issues in physical health. Psychological factors in illness prevention, health maintenance, treatment of illness recovery from illness and adjustment to chronic illness. Nonmajor graduate credit.

Psych 488: Cultural Psychology. (3:0 Cr) 3: Prenau 280 and 301 junior classification. Examination of psychological differences among people living in different parts of the world with a focus on cross-cultural research related to social development and personality psychology. Nonmajor graduate credit.

Psych 490: Independent Study. Cr: maximum 3 per semester. FS SS. Prenau 3 credits in psychology and permission of instructor. No more than 9 credits of 450 may be counted toward a degree in psychology. Supervised reading in an area of psychology. Writing requirement.

Psych 491: Research Practicum. Cr: FS SS. Prenau Junior classification, permission of instructor and 9 credits in psychology. No more than 9 credits of 491 may be counted toward a degree in psychology. Supervised research in an area of psychology. Primarily for students intending to pursue graduate education.

Psych 492: Fieldwork. Practicum. Cr: FS SS. Prenau Junior classification, permission of instructor and 9 credits in psychology. Supervised fieldwork in a human service agency or other appropriate setting. Offered on a satisfactory/unsatisfactory basis only.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students. Psych 507: Applications of Multivariate Methods in Psychology. (3:0 Cr) 3: Prenau Stat 401, Stat 402. Training in the application of multivariate methods in the analysis of psychological data using standard statistical packages. Techniques that are covered include exploratory and confirmatory factor analysis, MANOVA, multiple regression models, logistic regression survival analysis, path analysis, and structural equation analysis with latent variables.


Psych 512: Advanced Perception. (3:0 Cr) 3: Prenau. 312 Survey of current theory and research in perception with an emphasis on vision.

Psych 514: Advanced Human Learning and Memory. (3:0 Cr) 3: Prenau. 312 or 316 or 9 hours in psychology. Historical and contemporary survey of human learning and memory.


Psych 517: Psychopharmacology. (3:0 Cr) 3: Prenau. 310 or 315, or equivalent and permission of instructor. Fundamentals of drug action and interactions with emphasis on psychoactive drugs and their use in experimental, therapeutic, and social settings.


Psych 533: Psychology of Learning, Cognition, and Motivation in Educational Settings. (Same as C 533) 1 credit. In an instructional setting, students are introduced to the basic concepts of learning, motivation, and behavior change in educational settings. Psychology commonly used in educational settings.

Psych 534: Applied Behavior Analysis. (Dual listed with 434) (3:0 Cr) 3: Prenau. 9 credits in human development and family studies or psychology. Design and evaluation of behavioral interventions in applied settings such as classrooms, institutions, and families. Basic research on single subject experimental design.

Psych 537: Character and Emotional Development. (Dual listed with 437 same as HD FS 537) (3:0 Cr) 3: Prenau. 9 credits in human development and family studies or psychology. Pr: Prenau 230 or HD FS 102 junior classification. Understanding of giftedness and talent from cognitive-developmental and social perspectives using a lifespan approach. Current conceptualizations and research regarding gifted children and adults. Implications for education and guidance.

Psych 538: Developmental Disabilities in Children. (Same as HD FS 538) 1 credit. Human Development and Family Studies.

Psych 540: Psychological Measurement II (3:0 Cr) 3: Prenau. 9 credits in psychology. Pr: Prenau 440. Statistics and permission of instructor or graduate classification in psychology. Measurement and scaling theory. Theoretical and statistical definitions of reliability and validity. Test and scale construction strategies.


Psych 550: Advanced Industrial and Organizational Psychology. (3:0 Cr) 3: Prenau 440. Critical examination of theories and methods and applications in industrial and organizational psychology. History and legal issues, predictor and criterion relationships, employee attitudes and behaviors, employee training and motivation, and human factors.

Psych 560: Advanced Personality Psychology. (3:0 Cr) 3: Prenau 4 courses in psychology including 360. Analysis of theories of personality concepts and current research issues.

Psych 561: Psychopathology and Behavior Deviations. (3:0 Cr) 3: Prenau. 460. Examination of theoretical perspectives and current research pertinent to the major forms of adult dysfunction, including adjustment anxiety mood somatoform dissociative sexual and gender identity personality schizophrenic eating and substance abuse disorders.

Psych 562: Personality Assessment. (3:0 Cr) 3: Prenau. 360, 440. Stat 401 Principles and methods of personality assessment. Though not a practicum course exposure is given to a variety of objective projective and situational tests.

Psych 563: Developmental Psychopathology. (3:0 Cr) 3: Prenau 230 and 460 or graduate classification. Theory and research related to major disorders of childhood and adolescence with an emphasis on assessment, etiology, and developmental processes and multidisciplinary interventions.

Psych 580: Advanced Social Psychology. Psychologcal Perspectives. (3:0 Cr) 3: Prenau 4 courses in psychology including 280. Current theories and methods and research in social psychology with an emphasis on cognitive and interpersonal processes such as attribution, social cognition, and attitude change, attraction, aggression, and social comparison.

Psych 581: Applications of Social Psychology. Theories. (3:0 Cr) 3: Prenau 12 credits in psychology including 280. Application of social psychological theory to various applied topics including physical and mental health, stress, coping, and alcoholism.

Psych 586: Research Methods in Social Psychology. (3:0 Cr) 3: Prenau. 402 permission of instructor. Pr: Psychological perspectives. Current tests, hypotheses, operationalizing independent and dependent variables, sampling and design issues, laboratory procedures, and interpretation of results in exploratory research. Literature and analysis of variance. Bayesian reasoning, and effect size estimation will be emphasized. As well writing and publication strategies.
Psych 588 The Meta Analytic Review (3) Cr 3
     Prereq: Stat 401. Presentation of and hands-on experience with all stages of meta analytic reviews including problem formulation, data collection, data evaluation, data analysis and interpretation and public presentation.

Psych 590 Special Topics Cr var Prereq: 12 credits in psychology and permission of instructor. Guided reading on special topics or individual research projects.
     A Counseling
     Q Cognitive
     R Social
     Z General

Psych 592 Seminar in Psychology (1 to 3) Cr 3 each time taken. Prereq: 12 hours in psychology
     A Counseling
     B Industrial Organizational
     M Professional Issues and Ethics
     P Research Methods and Psychometrics
     Q Cognitive
     R Social
     Z General

Psych 597 Internship in Counseling Psychology Cr 5 Prereq. M.S. degree candidacy, permission of instructor. Full-time non-clinical supervised experience in a setting relevant to psychology. Intended for master’s degree internships.

Psych 599 Creative Component Cr Var Offered on a satisfactory-fail grading basis only

Courses for Graduate Students
Psych 601 History of Philosophy of Psychology (3) Cr 3 Prereq: 4 courses in psychology. Origins of psychology in philosophical medical and related thought. Development of an independent discipline in the nineteenth and twentieth centuries as a science and as a practice including traditional and contemporary theory and philosophy.

Psych 621 Psychological Counseling Theory and Process (3-4) Cr 3 F Prereq: Graduate classification. Overview of major counseling theories with emphasis upon key concepts of theories, the role of the counselor, and applications of theory in fostering client change.

Psych 621L Techniques in Counseling (0-4) Cr 3 F Prereq: 621 or concurrent enrollment in 621 and permission of instructor. Basic theoretical counseling theories and their application to case work.

Psych 623 Vocational Behavior (3-3) Cr 3 Prereq: 3 courses in psychology. Psychological views and issues in career development through the life span. Methods of counseling including appraisal, interviewing, assessment, test interpretation, and use of information sources.

Psych 626 Group Counseling (2-2) Cr 3 Prereq: 621L 691A Theory, research, ethical and therapeutic considerations relevant to group counseling. Participation in lab exercises for development of group counseling skills and observation of ongoing groups.

Psych 628 Advanced Counseling Theory (2-0) Cr 2 Prereq: Practicum in counseling psychology. In-depth coverage of major theoretical positions including comparative analysis. Coverage and evaluation of research on counseling interventions.

Psych 633 Teaching of Psychology (3) Cr 3 Prereq: Enrollment in degree program in psychology completion of at least 1 year of graduate study permission of instructor. Orientation to teaching of psychology at college level. Academic issues and problems, instructional and evaluation techniques.

Psych 635 Interventions with Children and Adolescents (3) Cr 3 Prereq: Graduate classification and permission of instructor. Research and theory underlying application of behavioral and cognitive psychology to the treatment of childhood and adolescent psychopathology with an emphasis on internalizing disorders, developmental processes, and multimodal interventions.

Psych 691 Practicum in Psychology Cr var Prereq: Permission of instructor. Supervised practice and experience in the following fields of specialization in applied psychology:
     A Counseling
     E Group Counseling
     F Advanced Counseling
     T Teaching
     G General credit

Psych 692 Research Seminar (1 to 3) Cr 3 each time taken. Prereq: Permission of instructor
     A Counseling
     Q Cognitive
     R Social
     Z General

Psych 697 Internship in Counseling Psychology Cr 5 Prereq. Ph.D. candidacy in the Counseling Psychology program at the University of California approved dissertation proposal and permission of instructor. Full-time supervised predoctoral internship experience in a setting relevant to counseling psychology.

Psych 699 Research Offered on a satisfactory-fail grading basis only

Communication Disorders (CmDis)
(Administered by the Department of Psychology)
     The following courses are part of the Speech Communication Program. For more information refer to that section. CmDis 170, 275, 286, 371, 471

Courses Primarily for Undergraduate Students

CmDis 170 Speech Improvement for Nonnative Speakers (2) Cr 2. For nonnative speakers of English only. Development of effective English voice quality and consonant speech. Development of effective strategies for pronunciation.

CmDis 286 Basic Sign Language (Same as Ling 286) (3) Cr 3. Development of basic skills in the use and understanding of signed English. A modification of American Sign Language. Overview of the types causes and consequences of hearing impairment deaf culture and the education of hearing impaired children.


CmDis 471 Language Development (Same as Linguistics 471) (3-0) Cr 3. Prereq: Psych 230 or English 219. Definition of components of language. Overview of types and developmental processes related to each component of linguistic skill (semantic, syntactic, morphological, phonological). Overview of normative and abnormal phenomena of language development.

Sociology

www.ucdavis.edu

R. Paul Laskey, Chair of Department

Distinguished Professors: C. Fierro

University Professors: Lorenz

Professors: Blake Brunot, Butler Bystydzenski, Dobratz J. Flora, Hoberg, Harba, Johnson, Keith, Kirsching, Lasley, Padgitt, Ryan, Wells, Woodman, Fang, Squires, and Stathatos

Associate Professor: Agnew Anderson, Besler, Harrod, Litt, Mazur, Roberts, Sapp, Sawyer

Assistant Professors: Allain, Bird, Cast Delise, Frohlich, Hingch, Hochstatter, Morton, Munoz, Schmor, Schwenk, and Yoon

Assistant Professors (Adjunct): Hanson, Jarmag, Waggner

Graduate Study

The department offers courses and experience to certain students with or without prior preparation. The department offers courses for a minor in Criminal Justice Studies. Programs of study in sociology are outlined in the College of Agriculture and the College of Liberal Arts and Sciences. The program in sociology is designed for students interested in the social sciences.

Courses in Sociology

Graduates understand how social institutions and organizations work and change. They can examine the causes and consequences of social change. They can apply sociological understanding of human behavior to practical work situations and everyday life. Graduates can read critically and communicate effectively about social issues and social policy.

College of Liberal Arts and Sciences—Sociology

Sociology can serve as a liberal arts education as preparation for various professions in social service and related occupations in business and industry. Background for professional education in such areas as law and policy or as a basis for graduate professional training as a sociologist in academic government, business, and industrial settings.

Departmental requirements for all majors include the following supporting course philosophy including 230 and one upper-level philosophy course. English 302 or 303 or 314. One of the following courses: Sociology 101 or 104. At least three additional credits with a Mathematics designator.

A program of study that meets the needs and interests of the student and departmental requirements will be developed in consultation with the major advisor. Programs of study will include 15/130 or 134/207: three credits from 310, 319, 330, 420, 322, 330, 332, 401, 9 credits of upper-level electives. Majors must receive grades of C or better in Engl 104 and 105, and a grade of C or better in either Engl 302 or 303 or 314. Programs leading to a bachelor of arts degree will emphasize additional coursework in groups I and IV of the general education requirements. Programs leading to a bachelor of science degree will emphasize additional coursework in groups II and III.
Courses Primarily for Undergraduate Students

Soc 110 Orientation to Public Service and Administration in Agriculture (3-0) Cr. R F Survey of public service and administration in agriculture Exploration of career tracks and career planning Recommended during first semester of freshman year or as soon as possible after transfer into the department

Soc 115 Orientation to Sociology (1-0) Cr. R FS Orientation to sociology Familiarization with University and LAS College requirements and procedures Occupational tracks and career planning open to sociology introduction to career planning Recommended during first semester of freshman year or as soon as possible after transfer into the department Offered on a satisfactory-fail grading basis only

Soc 130 Rural Institutions and Organizations (3-0) Cr. 3 FS An introductory analysis of sociological concepts and theories as they relate to rural institutions and organizations Emphasis on the static structure and function of these institutions and organizations and on their dynamic adaptation to changing societal environmental and economic conditions General sociological principles and perspectives Credit for only 130 or 134 may be applied toward graduation

Soc 134 Introduction to Sociology (3-0) Cr. 3 FS SSS Social interaction and group behavior with emphasis on contemporary U S society including issues relating to socialization inequality and changing rural and urban communities Analysis of relationships among the institutions of family religion political participation work and leisure Credit for only 130 or 134 may be applied toward graduation H Honors

Soc 202 Introduction to Research Methods (3-0) Cr. 3 FS Prereq. 130 or 134 credit in Stat 101 or concurrent enrollment in Stat 101 A survey of the principal research methods used in sociological analysis

Soc 219 Sociology of Intimate Relationships (3-0) Cr. 3 FS Prereq. 130 or 134 Analysis of intimate relationships among couples using a sociological perspective Attention is given to singlehood dating and courtship sexuality mate selection cohabitation and marriage Relationship quality communication conflict and dissolution of these types of relationships will also be explored

Soc 235 Social Problems (3-0) Cr. 3 FS Prereq. 130 or 134 Sociological concepts and methods employed in the analysis of various social problems including crime substance abuse problems with institutions rural and urban problems and international concerns Consideration of various solutions

Soc 241 Youth and Crime (Same as CJ St 241) (3-0) Cr. 3 FS Prereq. 130 or 134 An examination of delinquency that focuses on the relationship between youth as victims and as offenders social and etiological features of delinquency the role of the criminal justice system delinquents rights and traditional and alternative ways of dealing with juveniles crime

Soc 264 Small Group Dynamics (3-0) Cr. 3 FS Prereq. 130 or 134 An introduction to intra and intergroup dynamics in small groups Group decision making coalitions conformity intergroup relations status and leadership group development and group conflict Includes student participation in small group processes

Soc 302 Advanced Research Methods (2-2) Cr. 3 FS Am SS offered 2004 Prereq. 202 Stat 101 Experience in designing research projects collecting and analyzing data and reporting results

Soc 305 Social Psychology A Sociological Perspective (3-0) Cr. 3 FS SSS Prereq. 130 or 134 Examination of human behavior in a social environment with emphasis on development of the self interpersonal relations attitudes and small groups

Soc 310 Community (3-0) Cr. 3 FS Prereq. 130 or 134 Analysis of evolving theory and research of community as an ideal type a ecological system a political ecology and an interactional field examination of the impact of economic cultural and political infrastructures on community power structures and change processes in a global era

Soc 325 Agriculture in Transition (3-0) Cr. 3 S The impacts of agricultural changes on farm families rural communities and consumers Past present and future trends in family farms and their social implications

Soc 327 Sex and Gender in Society (Same as W S 327) (3-0) Cr. 3 FS Prereq. 130 or 134 How the biological fact of sex is transformed into a system of gender stratification The demographics and social positions of women and men in the family education media politics and the economy Theories of gender sociology and sociological bases for behavior and attitudes of women and men The relationship between gender class and race

Soc 328 Sociology of Masculinities and Manhood (Same as W S 328) (3-0) Cr. 3 S Prereq. Soc 130 or W S 201 Examination of socially constructed and idealized images of manhood the nature of social hierarchies and relationships constructed on the basis of imagery ideologies and norms of masculinity Theories on gender sociological psychological and biological Particular attention given to theory and research on gender variations among men by race class ethnicity sexual orientation physical ability and age

Soc 330 Ethnicity and Race Relations (Same as AI Am 330) (3-0) Cr. 3 FS SSS Prereq. 130 or 134 Analysis of ethnic and race relations particularly in America emphasis on the sociology and psychology of race and ethnic relations

Soc 331 Social Class and Inequality (3-0) Cr. 3 FS Prereq. 130 or 134 Theoretical and methodological implications and processes resulting in poverty implications of status class and poverty for people of different races ethnicity and gender

Soc 332 The Latino/Latina Experience in U S Society (3-0) Cr. 3 FS Prereq. 130 or 134 Examination of the social historical economic and political experience of varied Latino ethnic groups in the U S primarily focusing on Mexican Puerto Ricans and Cubans

Soc 334 Politics and Society (Same as Pol S 334) (3-0) Cr. 3 FS Prereq. A course in political science or sociology The relationship between politics and society with emphasis on American society Discussion of theories of inequality power social movements elite ruling classes democracy and capitalism

Soc 340 Deviant and Criminal Behavior (Same as CJ St 340) (3-0) Cr. 3 SS SSS Prereq. 130 or 134 Theory and research on the etiology of types of social deviance issues relating to crime interpersonal behavior and social policies designed to control deviant behavior

Soc 341 Criminology (Same as CJ St 341) (3-0) Cr. 3 FS Prereq. 130 or 134 The nature of crime and criminology the concept of crime statistics and theories of criminality major forms of crime official responses to crime and control of crime

Soc 345 Population Problems and Society (Same as Env St 345) (3-0) Cr. 3 FS Prereq. 130 or 134 Human overpopulation impact on food resources and services population growth and development trends of births deaths and geographic movement projecting future population population control and family planning population policies and laws comparison of the United States with other societies throughout the world

Soc 371 High Risk Children and Adolescents (3-0) Cr. 3 SS Prereq. 130 or 134 This class traces life course developmental risk and resiliency through early adulthood its focus is on contextual factors that contribute to or impede problem outcomes in young
people with special emphasis on the origins and processes associated with cumulative risk. It reviews the literature on children and adolescents in high risk social contexts such as runaway and homeless adolescents inner city adolescents and gangs

Soc 377 Social Dimensions of Religion (Same as Relig 377) See Religious Studies Nonmajor graduate credit

Soc 380 Sociology of Work (3) Cr 3 F Prereq 130 or 134 Inequalities (gender race class) related to jobs occupations firms and industries. Satisfaction rewards alienation discrimination and other topics of importance to workers are examined

Soc 381 Social Psychology of Small Group Behavior (Same as Psych 381) (3) Cr 3 S Prereq 305 or Psych 280 A survey of small group theory and research from an interdisciplinary social psychological perspective

Soc 382 Environmental Sociology (Same as Env S 382) (3) Cr 3 F Prereq Soc 130 or 134 or Env S 201 Environment society relations social construction of nature and the environment social and environmental impacts of resource extraction production and consumption environmental inequality environmental mobilization and movements. U.S. and international examples

Soc 401 Contemporary Sociological Theories (3) Cr 3 FS SS Prereq 9 credits in sociology Both historical and modern social theories as applied to understanding and researching the social world Nonmajor graduate credit

Soc 411 Social Change in Developing Countries (3) Cr 3 S Prereq 130 or 134 plus 3 credits in social sciences Social change and development in developing countries international interdependence consequences and causes of persistent problems in agriculture city growth employment gender equality basic needs local and worldwide efforts to foster social change and international development Nonmajor graduate credit

Soc 412 Senior Seminar on Career Development (1-4) Cr 1 F Prereq Must of major core courses senior classification Transition from student to professional. Career development procedures including self assessment short and long term goals strategies for the job search development of contacts and sources resumes and interviews. Enrollment preferred in first semester as senior. Offered on a satisfactory fail grading basis only

Soc 415 Sociology of Technology (3) Cr 3 F Prereq 130 or 134 plus 3 credits in social sciences. Review of physical biological and social approaches to technology evaluation. Examination of public responses to complex and controversial technologies. Strategies for gaining adoption/rejection of technology. Application to topics in agriculture development and marketing. Nonmajor graduate credit

Soc 420 Complex Organizations (3) Cr 3 F Prereq 130 or 134 plus 3 credits in social sciences. Study of large organizations as social systems through the perspective of basis social processes and structural variables. Incorporates topics of organizational effectiveness power and change. Nonmajor graduate credit

Soc 425 Social Movements and Revolution (3) Cr 3 S Prereq 9 credits in sociology Theoretical approaches and contemporary evidence of the origins development and impact of social movements including social psychological organizational and structural dimensions. Nonmajor graduate credit

Soc 431 Chicano/Chicana in Contemporary Society (3) Cr 3 S Prereq 130 or 134 An interdisciplinary overview of Chicanos the largest U.S. Latino ethnic group. Special attention will be given to social conflict and social transformation as it relates to contemporary Chicanos issues particularly in the Midwest

Soc 435 Urban Society (3) Cr 3 Alt S Offered 2004 Prereq 130 or 134 plus 3 credits in social sciences Development of cities and urban systems human and spatial ecology urban transformation decline and revitalization poverty immigration homelessness gentrification housing policy urban social movements local governance alternative solutions and planning for cities international comparisons

Soc 450 Demographic Analysis Projections and Modeling (3) Cr 3 S Alt SS offered 2005 Prereq 6 credits in sociology Methods and techniques for analyzing trends and projecting demographic behavior and change. Focus on fertility migration and mortality extensions made to aging education labor force housing service utilization resource consumption and consumer markets. Integrating population variables into planning processes. Applications using surveys census data and other indicators. Nonmajor graduate credit

Soc 454 Field Observation and Practice Cr var maximum of 12 FS SS Prereq. Junior or senior classification permission of faculty internship coordinator major or minor in sociology or PSA or 201 302 305 Supervised practice in industrial plants business organizations and governmental agencies. Not more than a total of 12 credits of field experience (Soc 454 and 460) may be counted toward graduation. No credits in Soc 454 and 460 are used to satisfy minimum sociology requirements for sociology majors Offered on a satisfactory fail grading basis only

A General Sociological B Rural Sociology

Soc 460 Criminal and Juvenile Justice Practicum (Same as CJ 460) (3) Cr 3 FS SS Prereq. Junior or senior classification permission of criminal justice studies coordinator major or minor in sociology or criminal justice studies minor Study of the criminal and juvenile justice systems and social control processes. Supervised placement in a police department. probation. parole department. juvenile correctional institution. community based rehabilitation program or reentry agency. Not more than a total of 12 credits of field experience (Soc 454 and 460) may be counted toward graduation. No credits in Soc 460 may be used to satisfy minimum sociology requirements for sociology majors. Offered on a satisfactory fail grading basis only

Soc 461 Life Course Sociology (3) Cr 3 F Prereq 6 credits in sociology Theoretical and empirical perspectives on individuals facing developmental tasks age related norms values and subcultures. Decisions and issues faced by individuals as they progress through stages of the life cycle

Soc 464 Community Action and Leadership (3) Cr 3 S SS Prereq 6 credits in sociology Methods of planning organizing and conducting planned social change and other action programs in communities. Strategies of change change agent roles client need identification community organization strategies citizen participation leadership identification and development program planning and evaluation

Soc 473 Youth and Society (3) Cr 3 Alt S Offered 2004 SS Prereq 6 credits in sociology Analysis of problems of adolescents and youth created by the impact of changing institutional structure on the transition from childhood to adulthood. Nonmajor graduate credit

Soc 476 The Aged in American Society (Same as Geron 476) (3) Cr 3 S Prereq 6 credits in sociology A survey of sociological problems of the aged and the social implications of a sizable aged population. Nonmajor graduate credit

Soc 484 Topical Studies in Criminal and Juvenile Justice (3) Cr 3 Alt S offered 2004 Prereq 6 credits in sociology and permission from instructor. Theoretical or topical issues and studies dealing with the sociology of police judicial institutional and community based corrections gender/ethnicity and crime/substance abuse and crime and delinquency prevention

Soc 485 Sociology of the Family (3) Cr 3 S Prereq 6 credits in sociology The contemporary family in developing industrial and post industrial societies. Effects of modernization and family policies on family structures and functions

Soc 490 Independent Study Cr 1 to 3 each time Prereq 6 credits in sociology and permission of instructor. Students in the College of Agriculture must be of junior or senior classification and may use no more than 6 credits of Soc 490 toward the total of 128 credits required for graduation. Students in the College of Liberal Arts and Sciences may count no more than 9 credits of 490 toward graduation A General Sociology B Rural Sociology C Honors E Senior Seminar

Soc 496 Agriculture and Rural Development in Ireland (3) Cr 3 S Comparative analysis of the agricultural and rural development needs of Ireland and the U.S. Course involves a 2 week tour of the Irish countryside where students can observe and experience small town and farm life

Courses Primarily for Graduate Students

Soc 505 History of Social Thought (3) Cr 3 F Prereq 401 Reviews the historical origins of social ideas about society how social thought has evolved throughout history and how these affect modern sociological thinking

Soc 509 Agroecosystem Analysis (Co listed with Agron 509 Anthr 509 SusAg 509) (3) Cr 3 F Prereq 6 credits in social sciences 6 credits in natural biological or engineering sciences and senior or above classification Field study of commercial farm systems within the context of global energy flows and biogeochemical cycles including ecological agronomic and social perspectives

Soc 511 Intermediate Research Methods (2) Cr 3 S Prereq 302 and Stat 401 Research methods in sociology including problem selection research design hypothesis formulation sampling alternative data collection techniques. Designing a research strategy appropriate for a variety of social science questions and assessing the appropriateness validity and generalizability of published sociological research

Soc 512 Sociological Measurement (3) Cr 3 Alt F offered 2004 Prereq 511. Reliability and validity for observed and latent variables exploratory and confirmatory factor analysis and construction and evaluation of measurement models. Applications using LISREL AMOS and other programs

Soc 513 Qualitative Research Methods (2) Cr 3 Alt F offered 2003 Prereq 511 Applied qualitative research methods in sociology. Design and implementation of a course based research project including data collection analysis and presentation of results Qualitative data gathering techniques using observational in depth interviewing or content analysis approaches. Laboratory emphasis on completion of data gathering analysis and report writing

Soc 516 Sociology of Technology (3) Cr 3 Cr 3 of campus and nonmajors only. Offered as demand warrants. Prereq 6 hours of social science Linkages among science technology and society. Physical life and social sciences approaches to technology evaluation. Public responses to complex and controversial technologies Strategies for gaining adoption/rejection of technology. Required in the Master of Agriculture program

Soc 520 Social Psychology (3) Cr 3 Alt F offered 2004 Prereq 305 or Psych 280 Examination of cognitive symbolic interaction role reference group and dramaturgical approaches. Assessment of contemporary issues in social psychology
Speech Communication

Speech Communication (Administered by the College of Liberal Arts and Sciences)

Undergraduate Study

The cross-disciplinary program in speech communication offers introductory courses designed for all students as part of their general education, as a complement to higher-level courses in the major, and as an introduction to further study within the discipline.

Students who major or minor in speech communication can prepare themselves for a wide variety of future employment opportunities depending upon individual interests in background and abilities. Present courses can prepare students for the study of law or the social sciences. Many courses are available for qualified students. The area s courses also provide a minor concentration for students in business English, journalism, foreign languages and literatures, and the social sciences.

Theatre

The theatre program is administered by the Department of Music (see Index).

Graduate Study

The program offers courses for a graduate minor in speech communication as well as supporting work for other disciplines. The Program of Speech Communication also participates in the interdepartmental program leading to a master's degree in Interdisciplinary Graduate Studies.

Courses open for nonmajor graduate credit. Sp Cm 305, 321, 323, 327, 410, 412, and 417.

Communication Studies (ComSt)

The communication studies major is administered by the Greenlee School of Journalism and Communication (see Index).

Interpersonal and Rhetorical Communication (Sp Cm)

Courses Primarily for Undergraduate Students

Sp Cm 110 Interpersonal Communication (3 Cr) 3 FS SS Theory principles and competency development. Sp Cm 411 Interpersonal Communication (3 Cr) 3 FS SS Theory principles and competency development. Sp Cm 411 T Co-requirements, which provide a solid foundation for major in communication with its various options are listed under their respective descriptions.

The English proficiency requirement may be met by (1) completion of Eng 101, 103 or 1B15 or (2) equivalent with a grade of 2.0 or better. (2) one additional writing course beyond Eng 101 with a grade of 2.0 or better from the following approved list: Eng 102-305, 309, 314, 415, 111, 115.

The requirements for minors in speech communication may be met by credit in Sp Cm 321 at least 15 additional hours of which 9 credits are in courses numbered 300 or above. Six credits must be taken within interpersonal and rhetorical communication. No credits in 290 490 499 and 599 may apply toward the minor.

The program provides the following interdisciplinary minor programs: the interdisciplinary program in linguistics and the interdisciplin ary program in technology and social change and the undergraduate program in gerontology.

Speech Communication Education

Students seeking endorsement to teach speech as an additional area to prepare to teach speech communication in teachers' arts and media at the secondary school level. In addition they prepare to direct co-curricular and extracurricular activities.

Each student seeking an additional endorsement in speech communication must fulfill the requirements outlined in the Teacher Education section of this bulletin.

Interpersonal and Rhetorical Communication (Sp Cm)

The interpersonal and rhetorical communication area provides a thorough understanding of communication theories, principles, and applications. Students will be required to complete courses which provide a grounding in the theories of communication. The nature of rhetorical principles in communication and the role of communication in creating, maintaining and changing human relationships. The following courses are required for an emphasis in interpersonal and rhetorical communication ComSt 101, Sp Cm 212, 305, 327, 412, and 417 (Capstone Seminar) plus an additional 15 credits from courses in interpersonal and rhetorical communication (Sp Cm).

Emphasis in the area prepares students for graduate study: the study of law or theology to teach speech communication in high school or enter a variety of communication related careers and occupations in business and professional organizations. Communication internships in business and professional settings are available for qualified students. The area's courses also provide a minor concentration for students in business English, journalism, foreign languages and literatures, and the social sciences.

Sp Cm 323 Gender and Communication (Same as W S 323) (3 Cr) Co-requirements: Prereq: 212. The rhetorical strategies women and men use to succeed in oral communication: the theory, principles and practice of effective gender communication. Sp Cm 324 Legal Communication (3 Cr) 3 FS SS Prereq: 212. Speech communication in the legal system inside and outside of trial process. Interviewing and counseling, negotiating and bargaining, voir dire, opening statements, examination of witnesses, and closing arguments. Sp Cm 324 T Prerequisites: judge's instructions, jury behavior and appellate advocacy.

Sp Cm 325 Nonverbal Communication (Same as ComSt 325) See Communication Studies

Sp Cm 327 Persuasion (3 Cr) 3 FS SS Prereq: 212. Examination of persuasive theories and strategies and research in persuasion. Empphasis on application and analysis (logical, emotive, and ethical proofs). Nonmajor graduate credit.

Sp Cm 380 Rhetoric and the History of Ideas (Same as Eng 350) See English.

Sp Cm 404 Seminar (Dual listed with 504) 4 Cr 3 each time taken. Sp Cm 18 credits in speech communication: A Interpersonal and Rhetorical Communication, B Speech Education.

Sp Cm 410 Persuasion in the Athenian Democracy (Same as CI St 410) See Classical Studies.

Sp Cm 412 Rhetorical Criticism (3 Cr) 3 FS SS Prereq: 212 and 6 credits in speech communication. Development of rhetorical theory and practice from ancient to modern times. Emphasis on application of principles of criticism to current public speaking practices. Remaining major graduate credit.

Sp Cm 416 American Public Address (3 Cr) 3 FS SS Prereq: 212. Background of candidates for state and national elections selected speeches and issues persuasive strategies and techniques of individual speakers. Nonmajor graduate credit.

Sp Cm 490 Independent Study (1-6 Cr) 1-6 each time taken. maximum of 9 FS SS Prereq: 3 credits in speech communication of permission of department chair. Remaining major graduate credit.

Sp Cm 495A Directed Speech Activities (1-6 Cr) 1-6 each time taken. maximum of 9 FS SS Prereq: 18 credits in speech communication. Minimum grade point of 2.5 in speech communication course. Problems and methods and materials related to directing speech activities in secondary schools. Remaining major graduate credit.

Sp Cm 495B Teaching Speech (Same as CI 495B) (3 Cr) 3 FS SS Prereq: 3 credits in speech communication. Minimum grade point of 2.5 in speech communication courses. Problems and methods and materials related to teaching speech theatre and media in secondary schools.

Sp Cm 497 Capstone Seminar (3 Cr) 3 FS SS Prereq: 15 credits in speech communication. Junior or senior classification. Students synthesize relevant theory and research concerning a concept in a capstone project/paper.

Sp Cm 499 Communication Internship (1-6 Cr) 1-6 each time taken. maximum of 9 FS SS Prereq: 18 credits in speech communication courses. Other courses deemed appropriate by faculty advisor. 2nd semester junior or senior standing. Cumulative GPA of at least 2.5 overall and 3.0 in speech communication and permission of the internship committee.

Applications should be submitted in the term prior to the term in which the internship is desired. Super vised application of interpersonal and rhetorical communication in professional settings.
Courses Primarily for Graduate Students, open to qualified undergraduates

Sp Cm 504 Seminar (Dual) started with 404 | Cr 3
each time taken maximum of 9 F S SS Prereq 9 credits in speech communication Topics may include the following:
A. Interpersonal and Rhetorical Communication B. Speech Education

Sp Cm 513 Prospects Teaching Fundamentals of Public Speaking (O 2 C) Cr 1 | F Required of all new Speech Communication 212 teaching assistants. Introduction to the teaching of public speaking Support and supervision of teaching assistants of Sp Cm 212. Discussion of lesson planning teaching methods development of speaking assignments and evaluation of student speaking

Sp Cm 590 Special Topics Cr 1 to 4 each time taken maximum of 12 credits Prereq Permission of department chair

Statistics

www.stat.nassau.edu

Kenneth J. Koehler Interim Chair of Department

Distinguished Professors Atreya Meekar

University Professors Koehler Lorenz Stephenson

Professors Amruta Bailey Bondel Delmuro Dixon Isaacson Kennedy Lahn Morris Shelley Vanderman Wölter

Professors (Collaborators) Themanu

Distinguished Professors (Emeritus) Herbert A

David Fuller

University Professors (Emeritus) D. Cox Herbert T David Groeneweld Hinz

Professors (Emeritus) C P Cox Harville Hickman Hotchkiss Polak Sirhan Wolins

Associate Professors Cook Kasper Marasinghe Nettleton Nussor Opsomer Roberts Rollins Sherman Yang

Associate Professors (Emeritus) Sukhatme

Assistant Professors Adams Dorman Dudworth Evans Froehlich Hoffmann Huang Mati Wu

Assistant Professors (Collaborators) Sarigden Sloan

Undergraduate Study

For the undergraduate curriculum in liberal arts and sciences major in statistics leading to the degree bachelor of science see Liberal Arts and Sciences Curriculum

The curriculum in liberal arts and sciences with a major in statistics is designed to prepare students for (1) entry level statistics positions requiring the B S degree in statistics in business industry or commerce nonprofit institutions and in state or federal government (2) graduate study in statistics. Entry level positions include the following types of work statistical design analysis and interpretation of experiments and surveys data processing and analysis using modern computer facilities and statistical computing systems application of statistical principles and methods in commercial areas such as finance insurance industrial research marketing manufacturing and quality control. Nonprofit organizations such as hospitals health study institutions have entry level positions for B S graduates in statistics.

Students completing the undergraduate degree in statistics should have a broad understanding of the discipline of statistics. They should have a clear comprehension of the theoretical basis of statistical reasoning and should be proficient in the use of modern statistical methods and computing. Such graduates should have an ability to apply and convey statistical concepts and knowledge in oral and written form. They should be aware of ethical issues associated with polling and surveys and in the summarization of the outcomes of statistical studies.

Undergraduate majors in this department usually include in their programs (a) Statistics 101 or an alternative introductory course (104 or 226) (b) Mathematics 185 186 265 or 16H 164H 265H 307 or 317I and Computer Science 2270 and (c) Statistics 341 342 401 422 421 479 480.

These courses plus at least two additional courses in statistics at the 400 level or above constitute the major. With the permission of the department 1 E Stat 361 may be substituted for one of these 400 level courses. It is advisable to have a minor in a field of application.

The department offers a minor in statistics which may be earned by completing an introductory course in statistics plus additional courses from 341 342 361 and 400 level or above to yield a total of at least 15 credits in statistics courses.

English and Speech proficiency requirement. The department requires a grade of C or better in each of Eng 104 and 105 and completion of one of Eng 202 or 214 with a grade of C or better. The department requires a passing grade in Comm 102 or Sp Cm 212.

Students intending to do graduate work in statistics normally will take additional courses in mathematics.

Graduate Study

The department offers the degrees master of science and doctor of philosophy with a major in statistics and minor work for students majoring in other departments. Within the statistics major the student chooses to emphasis topics such as experimental design probability and statistics methods. Statistical theory. Statistical computing survey sampling quality control. Spatial statistics. Time series reliability and applied statistics (e.g. Econometrics Environmental statistics Psychometrics Econometrics etc.). A major in operations research leading to a master of science degree is offered in cooperation with the Department of Industrial and Manufacturing Systems Engineering. The doctor of philosophy degree is offered as a co-major with other departments. Such departments have included Animal Science. Botany. Economics. Educational Leadership and Policy. Studies on Genomics. Industrial and Manufacturing Systems Engineering. Meteorology. and Psychology.

M S graduates have a basic understanding of statistical theory and methods. Elective courses in statistics provide the opportunity for the student to emphasize particular areas within the field of statistics based on interest and future career goals. Communication skills are developed through course projects. Assistantship duties and creative components. Ph D graduates study advanced theory and methods and are able to do independent research in statistics and collaborative research outside of statistics.

Prerequisite to major graduate work is the completion of an undergraduate curriculum essentially equivalent to the curriculum in liberal arts and sciences at this institution including at least a year of calculus.

The degree master of science may be earned on either a thesis or nonthesis basis. The nonthesis option requires the completion of at least 34 credits of acceptable graduate work including the completion of a creative component and satisfactory performance on a written examination. The thesis option requires the completion of 34 credits of acceptable graduate work including the completion of a creative component and satisfactory performance on a written examination.

The department encourages students to prepare themselves in foreign languages and in computer languages but specific requirements for the degree master of science and doctor of philosophy are at the discretion of the student's advisory committee.

The department participates in the interdisciplinary program in business administrative sciences and in

the interdepartmental major in genetics.

Courses open for nonmajor graduate credit 328 330 341 402 403 404 406 407 415 421 432 447 451 479 480 493 495 496.

Courses Primarily for Undergraduate Students

Stat 100 Orientation in Statistics (1 | Cr 1 F)

Opportunities challenges and the scope of the curriculum in statistics for students planning or considering a career in this area.

Stat 101 Principles of Statistics (3 | Cr 4 | F SS SS)

Principles of twells of high school algebra. Statistical concepts in modern society descriptive statistics and graphical displays of data. The normal distribution data collection elementary probability elements of statistical inference estimation and hypothesis testing. Linear regression and correlation contingency tables. Credit for only one of the following courses may be applied toward graduation 101 104 105 226.

Stat 104 Introduction to Statistics (2 | Cr 2 | F SS Prereq 1 1/2 years of high school algebra). Statistical concepts and their use in science. Collecting and drawing conclusions from data. Elementary probability. Normal and normal distributions regression estimation and hypothesis testing. For students in the agricultural and biological sciences. Credit for only one of the following courses may be applied toward graduation 101 104 105 226.

Stat 105 Introduction to Statistics for Engineers (3 | Cr 3 | F SS Prereq Math 165 or 165H). Statistical concepts with emphasis on engineering applications. Data collection descriptive statistics probability distributions and their properties. Elements of statistical inference. Regression statistical quality control. Use of statistical software. Use of student team project involving data collection. Description and analysis. Credit for only one of the following courses may be applied toward graduation 101 104 105 226. Credit for both 105 and 305 may not be applied for graduation.


Statistics

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Stat 326 - Introduction to Business Statistics II (2-2) Cr 3 S Prereq. 226 Multiple regression analysis, regression diagnostics, model building applications in analysis of variance and time series. Statistical process control methods; use of computers to visualize and analyze data.


Stat 341 - Introduction to the Theory of Probability and Statistics I (Same as Math 341) (3-0) Cr 3 S Prereq. Math 285 or 285H. Probability distribution functions and their properties; discrete and continuous functions; moment generating functions; multivariate probability distributions and their properties. Credit for both 341 and 447 may not be applied toward graduation.

Stat 342 - Introduction to the Theory of Probability and Statistics II (Same as Math 342) (3-0) Cr 3 S Prereq. 341. Sampling distributions, confidence intervals, theory of estimation and tests of hypotheses. Linear model theory. enumerative data. Nonmajor graduate credit.

Stat 361 - Statistical Quality Assurance (Same as IE 361) See Industrial Engineering. Nonmajor graduate credit.


Stat 401 - Statistical Methods for Research Workers (3-2) Cr 4 FS SS Prereq. 101 or 104 or 105 or 226. Graduate students without an equivalent course should contact the department. Methods of analyzing and interpreting experimental and survey data. Statistical concepts: estimation, hypothesis testing, confidence intervals, hypothesis tests with continuous and discrete data, simple and multiple linear regression and correlation introduction to analysis of variance. Nonmajor graduate credit.

Stat 401 - Statistical Methods for Field Biologists (Same as la LL 401) See Iowa Lakeside Laboratory.

Stat 402 - Statistical Design and the Analysis of Experiments (3-0) Cr 3 S Prereq. 401. The role of statistics in research and the principles of experimental design. Experimental units, randomization, replication, blocking, sub-division, and repeated measuring. Experimental units, factorial treatment designs, and confounding. Extensions of the analysis of variance to crossed and nested classifications and models that include both classification and continuous factors. Nonmajor graduate credit.


Stat 404 - Regression for Social and Behavioral Research (2-2) Cr 3 S Prereq. 401. Lorenz Roberts. Applications of generalized linear regression models to social science data. Assumptions of regression diagnostics and transformations; analysis of variance and covariance path analysis. Nonmajor graduate credit.

Stat 406 - Statistical Methods for Spatial Data (Dual listed with 506) (3-0) Cr 3 S Alt S offered 2004 Prereq. Six hours of statistics at the 400-level. Analysis of spatial data: geostatistical methods and spatial processes. 3D models for spatial data: Besag, Potts, and Markov random field models. Model building for spatial processes. Implications for applications and practical use of spatial statistical analysis. Nonmajor graduate credit.

Stat 407 - Methods of Multivariate Analysis (2-2) Cr 3 S Prereq. 401. Knowledge of matrix algebra and calculus I. Multivariate data analysis, including comparing group mean vectors using Hotelling’s T2, multivariate analysis of variance, reducing variance dimension with principal components analysis, and factor analysis. Nonmajor graduate credit.


Stat 421 - Survey Sampling Techniques (2-2) Cr 3 S Prereq. 323 or 328 or 401. Methods of designing and analyzing survey investigations. Simple, random, stratified and multistage sampling designs. Methods of estimation involving ratio and regression construction and use of sample frames. Nonmajor graduate credit.


Stat 447 - Statistical Theory for Research Workers (4-0) Cr 4 FS SS Prereq. Math 161 and permission of instructor or Math 285. Primarily for graduate students not majoring in statistics. Emphasis on aspects of the theory underlying statistical methods. Probability distributions, properties, and sampling distributions; point and interval estimation, tests of hypotheses, regression, and correlation. Credit for both 341 and 447 may not be applied toward graduation. Nonmajor graduate credit.

Stat 451 - Applied Time Series (3-0) Cr 3 S Prereq. 231 or 228 or 401. Meeker. Methods for analyzing data collected over time. Review of multiple regression analysis, elementary forecasting methods, moving averages and exponential smoothing, moving average (Box-Jenkins) models, identification, estimation, diagnostic checking, and forecasting. Nonmajor graduate credit.


Stat 490 - Independent Study Cr var Prereq. 10 cr credits in statistics. No more than 9 credits in Stat 490 may be counted toward graduation. H Honors

Stat 493 - Workshop in Statistics (1-0 or 2-0) Cr 1 or 2. Off-campus offered as demand warrants. Prereq. 101 or 104 or 226. Planning, executing, and interpreting experiments by understanding experimental design concepts, utilizing the statistical concepts of linear models. Designed for master of agriculture program only. Nonmajor graduate credit.

Stat 495 - Applied Statistics for Industry I (3-0) Cr 3 S Alt F offered 2004 Prereq. 101 or 104 or 105 or 226. Math 166 (or 166H). Graduate students without an equivalent course should consult the department. Statistical thinking applied to industrial processes. Assessing, monitoring, and improving processes using statistical methods. Analytical/numerical studies of graphs of data, process monitoring, control charts, capability analysis. Nonmajor graduate credit.


Courses Primarily for Graduate Students, Open to Qualified Undergraduates


Stat 506 - Statistical Methods for Spatial Data (Dual listed with 406) (3-0) Cr 3 S Alt S offered 2004 Prereq. 447 or 542. The analysis of spatial data: geostatistical methods and spatial processes. Discussion of Markov random field models. Descriptive index random fields and Markov random field models. Spatial point processes.


Stat 531 Quality Control and Engineering Statistics (Same as CSE 531) (3.0) Cr 3 Alt S offered 2005 Prereq 429 or 547 or 447 Statistical methods and theory applicable to problems of industrial process monitoring and improvement. 

Statistical issues in industrial measurement. Shewhart CUSUM and other control charts feedback control process characterization studies estimation of product and process characteristics acceptance sampling continuous sampling and sequential sampling economic and decision theoretic arguments in industrial statistics.

Stat 533 Reliability (Same as E E 533) (3.0) Cr 3 Alt S offered 2004 Prereq 447 or 449 or 447 or 442 or 449. Lehner. Probabilistic modeling and inference in reliability analysis of systems. Bayesian aspects product life time estimator; maximum likelihood estimation for censored data; accelerated failure time; and proportional hazard models with applications to accelerated life testing repairable system data. Planning studies to obtain reliability data.


Stat 536 Genetic Statistics (Same as Gen 536) (3.0) Cr 3 Alt F offered 2004 Prereq 401 447 Gen 320 or Biol 301. Probability applied to genetic systems random mating selection; mutation and migration theory of inbreeding and finite population size. Basic concepts in quantitative genetics prediction of progress from artificial selection. 

Stat 537 Statistics for Molecular Genetics (Same as Gen 537) (3.0) Cr 3 Alt S offered 2005 Prereq 536. Sampling designs and experimental designs to obtain information from markers detecting major genes linkage analysis and segregation analysis. Linking and similarities between DNA sequences constructing phylogenetic trees.


Stat 554 Introduction to Stochastic Processes (Same as Math 554) Sea Mathematics.

Stat 557 Theory of Stochastic Processes (Same as Math 555) Sea Mathematics.

Stat 557 Statistical Methods for Counts and Proportions (3.0) Cr 3 Alt F offered 2004 Prereq 500 or 541 or 543 or 447. Koehler. Statistical methods for analyzing simple random samples when outcomes are counts or proportions. Measures of association and relative risk chi-square tests loglinear models. Logistic regression and other general linear models extensions to longitudinal studies and complex designs models with fixed and random effects. Use of statistical software SAS or S Plus.

Stat 565 Methods in Biostatistics (Same as Bio 565) (3.0) Cr 3 Alt F. offered 2003 Prereq 500 543 or 447. Statistical methods for analyzing simple random samples when outcomes are counts or proportions. Measures of association and relative risk. Chi-square tests. Loglinear models. Logistic regression and other general linear models. Extensions to longitudinal studies and complex designs models with fixed and random effects. Use of statistical software SAS or S Plus.

Stat 575 Methods in Biostatistics (Same as Bio 575) (3.0) Cr 3 Alt F. offered 2003 Prereq 500. Statistical methods for analyzing simple random samples when outcomes are counts or proportions. Measures of association and relative risk. Chi-square tests. Loglinear models. Logistic regression and other general linear models. Extensions to longitudinal studies and complex designs models with fixed and random effects. Use of statistical software SAS or S Plus.

Stat 579 Orientation to Software Systems for Statistical Computing (1.0) Cr 1 F Prereq Graduate classification in statistics or equivalent Marasinghe. Orientation to scientific and statistical software available on campus. Offered on a satisfactory fail grading basis.


Stat 590 Special Topics Cr var. A Theory B Methods C Design of Experiments D Other Topics.

Stat 598 Cooperative Education Cr R F S SS Prereq Permission of the department chair Off. campus work periods for graduate students in a field of statistics.

Stat 599 Creative Component.

Courses for Graduate Students

Stat 601 Advanced Statistical Methods (4.0) Cr 4 F Prereq 511. This course is designed to provide students with computational and simulation skills needed to address current and recent developments in statistical modelling and applications. Topics may include resampling procedures Markov Chain Monte Carlo procedures for solving estimating equations nonparametric procedures analysis of large complex data. Assignments and examinations are designed to develop problem solving and communication skills and will include application of R and other software.


Stat 612 Advanced Design of Experiments (3.0) Cr 3 Alt S offered 2005 Prereq 512. Advanced designs. Topics of current interest in the design of experiments which may include design optimality criteria error ratios and other statistical aspects of design construction. Topics may include factorial fractional and fractional factorial designs. Theory and practice in approximations and the equivalence theorem. Crossover designs and applications.

Stat 621 Advanced Theory of Survey Sampling (3.0) Cr 3 Alt F offered 2004 Prereq 521. Advanced topics of current interest in the design of surveys and analysis of survey data including asymptotic theory for design and model based estimators. Use of advanced design and estimation techniques. Small area estimation non response modeling and imputation.

Stat 642 Advanced Probability Theory (Same as Math 642) (4.0) Cr 4 F Prereq 542 Athreya Lahiri. Probability spaces Kolmogorov's existence theorem for stochastic processes expectation.
Graduates of the program will be equipped with skills to design and manage agricultural systems that increase food security and support human communities and protect environmental quality. To acquire these skills, students will learn fundamental concepts, principles, study social relations underlying sustainable farming and food systems, and gain experience with practical techniques of sustainable agriculture. The program seeks to broaden specialized disciplinary knowledge with a systems level analytical framework. It integrates technical and social sciences through a sequence of team-taught interdisciplinary courses emphasizing higher order critical thinking skills and active collaborative approaches to engaged learning. Students choose an area of specialization and additional coursework in this area is developed via consultation with the student's Program of Study committee.

Graduates of the program will be qualified to work in a variety of settings, including university research education, extension agriculture, governmental and non-governmental organizations, and farming. Information on applications procedures, research interests of the faculty and specific requirements of the major can be obtained from the Office of Dr. Lorna Michael Butler. Chair, Sustainable Agriculture, 110 Curtiss Hall, gsm@astato.edu, or from the following internet address: http://www.sustagastate.edu/suaga

Courses for Graduate Students

SusAg 509 Agroecosystem Analysis (Same as Agron 509, Anr 511) 3 Cr. 3 cr. Prereq: Agron 509

SusAg 515 Integrated Crop and Livestock Production Systems (Same as Agron 515, An 511) 3 Cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Managing productivity and minimizing ecological impacts of agricultural systems by understanding nutrient cycles, crop residue and manure management, and intercropping techniques. Consideration of crop and livestock production as a whole.

SusAg 530 Ecologically Based Pest Management Strategies (Same as Agron 530) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Managing productivity and minimizing ecological impacts of agricultural systems by understanding nutrient cycles, crop residue and manure management, and intercropping techniques. Consideration of crop and livestock production as a whole.

SusAg 546 Organizational Strategies for Diversified Farming Systems (Same as Agron 546) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability andwhole crop systems.

SusAg 590 Special Topics: Climate Change 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.

Teaching Assistantships

SustAg 509 Agroecosystem Analysis (Same as Agron 509, Anr 511) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.

SustAg 515 Integrated Crop and Livestock Production Systems (Same as Agron 515, An 511) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.

SustAg 530 Ecologically Based Pest Management Strategies (Same as Agron 530) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.

SustAg 546 Organizational Strategies for Diversified Farming Systems (Same as Agron 546) 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.

SustAg 590 Special Topics: Climate Change 3 cr. 3 cr. Prereq: Agron 509, Richard Russell, Wiedenhoff. Organizing and operation of complex diversified farming systems. Topics include systems analysis, ecological diversity, agronomic diversity, economic diversity, social diversity, and management strategies. Evaluating farming systems and their sustainability and whole crop systems.
Students may apply as early as four semesters before the one in which they plan to enroll for student teaching, however, they must be fully admitted into the Teacher Education Program by mid semester prior to their planned student teaching semester. Requirements for full admission to the Teacher Education Program are:

1. A minimum 2.5 cumulative grade point average that must be maintained through graduation to be recommended for licensure. (Some licensure areas may require a higher cumulative grade point average.)
2. One of the following:
   - Minimum ACT composite of 19
   - Minimum SAT I composite score of 910
   - High school rank above the 49th percentile
3. A composite Praxis I (PPST) score of 522 with a minimum of 170 for each subtest: reading, writing, and mathematics I. (Some licensure areas may require higher Praxis I scores.)

Details regarding the dates and fees for any of these tests are available in the Testing Office in 2030 Student Services Building or from the Teacher Education Program Coordinator in Education Student Services.

4. Documented completion of 10 hours of pre-student teaching field experiences.

**Student Teaching**

Student teaching is the culminating experience to the teacher preparation program at Iowa State University. To ensure that students are prepared for this experience, the following requirements must be met prior to student teaching:

1. Full admission to the teacher education program by mid point of the semester prior to the semester when student teaching is planned.
2. A passing grade must have been earned in all required professional teacher education courses (see The Professional Teacher Education Requirement) and selected courses in one's licensure area.
3. Completion of the student teaching application by the first week of fall semester for spring student teaching and the first week of spring semester for fall student teaching. Details regarding application are available in the Field Experiences Office, E105 Lagomarcino Hall.
4. A minimum ISU cumulative grade point average of 2.50 or higher at time of application for student teaching. (Some licensure areas may require a higher cumulative grade point average.)

**Teacher Licensure**

The Iowa Initial License may be recommended for those who hold the bachelor's degree from Iowa State and who have completed the following:

1. All requirements of an approved teacher education program, including the human relations requirement of C I 406.
2. A minimum of 33 semester hours in courses designed to serve the general needs of college students. This total will include ENG 104 and 105, one course appropriate for developing interpersonal or group presentation skills (see college or department for appropriate courses), PSY 230 or HD FS 102, Lib 160, two natural sciences courses and one mathematics course.
3. Additional requirements as designated by the State of Iowa that include but are not limited to a special education component and 50 hours of pre-student teaching field experience. 40 of which are to be taken after admission to the Teacher Education Program.
4. A minimum ISU cumulative grade point average of 2.50 or higher was maintained through graduation (or completion of the Teacher Education Program). (Some licensure areas may require a higher cumulative grade point average.)
5. Documentation from the student teaching supervisor that the student has successfully completed the final assessment of his/her program portfolio.
6. The State of Iowa has mandated that practicum preparation programs assess students teaching and content competencies relative to designated performance standards. Each licensure area at ISU has developed its own way of meeting these standards. In order to obtain a teaching license each student who started as a freshman in Fall 2001 or thereafter must demonstrate that he or she meets these licensure standards.

The state standards are:

1. **Student Learning:** The practitioner understands how students learn and develop and provides learning opportunities that support intellectual, career social, and personal development.
2. **Diverse Learners:** The practitioner understands how students develop in their approaches to learning and creates instructional opportunities that are equitable and are adaptable to diverse learners.
3. **Instructional Planning:** The practitioner plans instruction based upon knowledge of subject matter, students' community, curriculum goals and state curriculum models.
4. **Instructional Strategies:** The practitioner understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem-solving and performance skills.
5. **Learning Environment/Classroom Management:** The practitioner uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning and self-motivation.
6. **Communication:** The practitioner uses knowledge of effective verbal and non-verbal and media communication techniques and other forms of symbolic representation to foster active learning collaboration and support interaction in the classroom.
7. **Assessment:** The practitioner understands and uses formal and informal assessment strategies to evaluate the continuous intellectual, social and physical development of the learner.
8. **Foundations and Professional Development:** The practitioner continuously evaluates the effects of the practice of choices and actions on students' parents and other professionals in the learning community and actively seeks out opportunities to grow professionally.
9. **Collaboration, Ethics, and Relationships:** The practitioner fosters relationships with parents, school colleagues and organizations in the larger community to support students and learning.
10. **Computer Technology Related to Instruction:** The practitioner uses computer technology to enhance student learning.
11. **Subject Matter Specialization:** The practitioner understands the central concepts, tools of inquiry and structure of the discipline(s) her or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Note: Specific courses taken to be used for licensure may not be taken pass/no pass.

Complete details of the State of Iowa requirements for licensure are outlined in the University Teacher Education Handbook which may be purchased at the University Bookstore.

Approval for the early childhood education license requires successful completion of the licensure curriculum through either the Department of Curriculum and Instruction or the Department of Human Development and Family Studies.

Graduate programs are available for those seeking approval as elementary and secondary school principals, superintendents, counselors, or instructional media specialists. Students may also pursue a program for approval to teach in the area of special education, art, agriculture, family and consumer sciences, mathematics, reading, and other programs as approved by the Iowa Department of Education.

Information concerning licenses not described above as well as more detailed requirements for any license may be obtained from the Education Student Services Office in the College of Education.

**The General Education Requirement**

All prospective teachers are required to complete a program in general education which is integrated with their professional preparation and extends through the undergraduate curriculum.

The student is expected to complete studies in four groups in general education: Usually courses relating to a given area may be found in several different areas. Credits listed are minimum requirements.

<table>
<thead>
<tr>
<th>Crane</th>
<th>Required Categories</th>
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<tbody>
<tr>
<td>9</td>
<td>I Natural sciences and at least one mathematics course</td>
</tr>
<tr>
<td>9</td>
<td>II Social sciences</td>
</tr>
<tr>
<td>6</td>
<td>III Humanities</td>
</tr>
<tr>
<td>9</td>
<td>IV Communication skills</td>
</tr>
<tr>
<td>5</td>
<td>Library Skills</td>
</tr>
</tbody>
</table>

**The Professional Teacher Education Requirement**

As part of a total educational program, a prospective teacher must complete certain studies related directly to the profession of teaching. All students in teacher education must take the following courses prior to student teaching, unless one's licensure area has an approved content area course that addresses the same performance standards.

<table>
<thead>
<tr>
<th>Crane</th>
<th>Required Categories</th>
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<tbody>
<tr>
<td>3</td>
<td>C I 201—Instructional Technology</td>
</tr>
<tr>
<td>3</td>
<td>C I 204—Social Foundations of American Education</td>
</tr>
<tr>
<td>3</td>
<td>C I 333—Educational Psychology OR C I 332—Educational Psychology of Young Learners</td>
</tr>
<tr>
<td>3</td>
<td>C I 405—Multicultural Awareness and Non-sexism in the Classroom</td>
</tr>
</tbody>
</table>

**Secondary education students must also complete the following courses:**

<table>
<thead>
<tr>
<th>Crane</th>
<th>Required Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>C I 415—Senior Seminar</td>
</tr>
<tr>
<td>3</td>
<td>C I 426—Principles of Secondary Education</td>
</tr>
</tbody>
</table>

All students must satisfactorily complete at least one credit of pre-student teaching laboratory experience. This requirement may be met through a pre-student teaching course (e.g. C I 290) or in certain subject areas by a course designated to provide an equivalent experience.

**Professional Courses in Areas of Specialization**

AgEds—AgEds 211, 310, 401, 402, 416, 417, 418, 419, 468J, 468K, C /LAS 417D

Chemistry—LAS 417B, 419

Earth Sciences—C I 290M, 347, 419, 468J, 468K, C/ILAS 417J

English—C I 395, Engl 392, 394, 417, 419, 494, LAS 417E

Family and Consumer Sciences Education and Studies—Teacher Education option—FCEDES 206, 306, 318, 403, 413, 417A, 417B

Foreign Languages—Las 417E, 417F

Geography—C I 294, 295, 298, C I/AS 417B

Health Education—H S 375, 417

Mathematics—LAS 417C, 480C, Math 497, 542

Music—LAS 417K and/or 417L

Music—Mus 266, 366, 466
must complete one of the two sets of courses listed above plus sufficient additional courses to total 24 chemistry credits chosen from:
Chem 316 316L 301 321 322 321L
or
BBMB 301 320 311 451
In addition students are required to take the physical science teaching methods course LAS 419

Coaching Interscholastic Athletics
Coordinator Rich Englehorn

Students seeking approval for the Iowa State University endorsement to coach interscholastic athletics must:
- Satisfy the professional teacher education requirements of the College of Education
- Satisfy the requirements of a teaching specialization area
- Earn credits in the following Zool 155. EX SP 220 258 355 315 358 365

Curriculum and Instruction

Early Childhood Education See Curriculum

Elementary Education See Curriculum

Earth Sciences
Coordinator Kenneth Windom

Students seeking approval to teach earth sciences must earn credits in the following courses:
GeoL 100, 100L, 102, 102L 302 305 311 356 365 368 490
Meteo 120
Astr 120, 150
Chem 177, 177L, 178, 178L
Phys 112 or 221, 222
Math 151 or 150 or 165

And one course in biology
Students with an endorsement in a natural science who seek approval to teach earth sciences as an additional area must earn credits in the following courses:
GeoL 100, 100L, 102
Meteo 206
Astr 120, 150
Courses 300 or above—3 credits

Students with no other natural science endorsement but who seek endorsement in this area must take the listed courses plus additional credits in this area to give a total of 24. See area coordinator for approval prior to taking courses

English
Coordinator Robert Tremain

Students seeking endorsement to teach English (7 12) must earn 58 credits in the following courses:
12
English Studies 199

3
Advanced writing (selected from 302, 303 304, 305, 306, 307, 309, 313, 314, 315)
3

3
Classical Studies CI St 353
6
British literature (selected from 370, 373 374, 375, 376, 378)
6
American literature (selected from 360, 362, 363)
3
Any literature course
3
Women and/or multicultural literature (selected from 340, 344, 345, 346, 347, 348, 349, 480) or (301, 305, 386, 389, 461, 464, 480 when appropriate)
22
English Education 220 294 420 392
(CI 280 for 2 cr. must be taken concurrently with 329 494 (CI 280 for 2 cr. must be taken concurrently with 494)
C 1395

Students seeking to add English as an additional endorsement area must earn 43 credits in the following courses:
3
Advanced writing (selected from 302, 303, 304, 305, 306, 307, 309, 313, 314, 315)
9
English Studies 220, 260 and 310
3
British literature (selected from 370, 373, 374, 375, 376, 378)
6
American literature (selected from 360, 362, 364)
3
Any literature course
3
World women's or multicultural literature (selected from 340, 344, 345, 346, 347, 348, 349, 353, 354)
16
English education 394, 392 (CI 280 for 2 cr. must be taken concurrently with 392) 494 (CI 280 for 2 cr. must be taken concurrently with 494)
C 1395

English as a Second Language
Coordinator Roberta Vann

To add a K 12 teaching endorsement in English as a Second Language students must fulfill the certification requirements in a major subject area and complete twenty four semester hours in ESL.
Those twenty four hours must include Engl 518 and 586. In addition students must take at least one course each of the following areas. In some cases relevant special topics courses or experimental courses may be substituted. Some courses have prerequisites.
Teaching ESL
Engl/Ling 524, 525, 526
Applied Linguistics
Engl/Ling 220, 241, 516, 519, 526
Language in Culture
ComSt 310, Anthr/Ling 309, 500
Engl 344, 345, 549, 549, 598, 530
Bilingual Education
Engl/Ling 514
Nature of Language
Engl/Ling 219, 420, 511, 512, 527
Process in Language Acquisition
Engl/Ling 425, 517

Family and Consumer Sciences and Studies
Coordinator Beverly Kurompe

See Curriculum Family and Consumer Sciences Education Teacher Licensure option

Foreign Languages and Literatures
Coordinator Linda Quinn Allen

Students seeking approval to teach a foreign language as their first endorsement must have a major in the target language. For a second endorsement in a foreign language students must earn 25 credits in that language. Nine (9) credits must be at the 300 level or above, with six (6) of these credits in composition and conversion. Courses at the 100 level are not counted in the 25 required credits.
All students seeking to teach a modern foreign language must demonstrate their proficiency in the language by taking the ACTFL OPI (Oral Proficiency Interview) and scoring at least at the advanced low level. Students are responsible for the cost of the administration of the OPI and must request that the results of the OPI be added to their transcript. Students are required to take a mock OPI at no cost during their sophomore year.
For an endorsement in Latin the 25 credits must be at the 300 or 400 level and must include Hst 430 (Cl St 430). Students seeking approval to teach Greek or Portuguese as an additional language must earn 25 credits in the language. 9 of these credits must be at the 300 level or above. Endorsement in Greek also requires History 402

General Science

Coordinators Thomas Greenbowe David Melzer

Students seeking approval to teach general science must earn credits in the following courses:
Bio 201, 201L, 202, 202L
Chem 163, 163L, 164, 164L, 231, 231L
Geol 100, 100L
Phys 111, 112 or 221, 222
Math 151 or 150 or 165
At least 6 credits from courses numbered 300 or above in astronomy and astrophysics, biochemistry
and biophysics biology botany chemistry genetics geology meteorology microbiology physics and zoology

Health Education
Coordinator: Frank Schabel
Students seeking approval to teach health education must earn credit in the following courses: EX SP 258 H S 110 215 235 310 350 375 390 FS HN 167 HD FS 276 373 377 Zool 155 156

Human Development and Family Studies
Early Childhood Education See Curriculum Human Development and Family Studies or Curriculum and Instruction

Mathematics
Coordinator: Janet Sharp
Students majoring in mathematics and seeking approval to teach mathematics as a primary endorsement must take the following courses:

One of the following sequences: Mth 165 166 201 or 175 176
Math 265 266 or 267 301 302 or 307 or 317 304 or 341 365 414 436 436 486 485 487
Comp S 107 or 207 or 227
Students wishing to add mathematics as an additional endorsement area or as a minor mathematics major seeking a license to teach mathematics must take the following courses:

Mth 165 166 201
Math 266 or 267 301 304 or 341 302 or 307 or 317 414 436 436 486 485 497
Comp S 107 or 207 or 227

Music
Coordinator: Sylvia Munsen
Students seeking approval to teach music must earn credits in the following courses:

Music 119 120 219 221 222 223 222 232 248 266 311 331 331 332 333 338 361 362 366 419 466 3 credits of advanced music history and 3 credits of advanced music theory
Music 327 359A 350 367 and 465 and 3 credits of music theater or opera studio are required for students planning to teach vocal music
Music 350 351 352 353 354 355 356 358B 464 and either 368 or 369 are required for students planning to teach instrumental music

Physical Education
See Curriculum Exercise and Sport Science Physical Education Licensure

Physical Sciences
Coordinators: Thomas Greenbrowe and David Melzter
Students seeking approval to teach physical sciences must earn credits in the following courses:

Astro 120 150 or 342 346
Chem 163 163L 231 231L
Geol 100 100L
Metr 206
Phys 111 112 or 221 222
Biology one course
Math 151 or 150 or 105

Three credits from courses numbered 300 and above in astronomy and physics chemistry meteorology physics and geology

Students with an endorsement in a natural science who seek approval to teach physical sciences as an additional area must earn credits in the courses listed below. Students with no other science endorsement but who seek an endorsement in this area must take the listed courses plus additional credits in the area to yield a total of at least 24. See area coordinator for approval prior to taking additional courses:

Astro 120 or 150 or 342 or 346
Chem 163 163L
Geol 100 100L
Metr 206
Phys 111 112 or 221 222

Physics
Coordinator: David Melzter
Students seeking approval to teach physics must earn credits in the following courses:

Phys 221 222 311T 399 (2 cr) 321 or 324 and at least 12 credits from Phys 302 303 306 310 321L 322 322L 361 364 365 396 Astro 342 344L 346 Chem 321 322 E E 201 203 441 E M 274 345 378 M E 330 332

Students with an endorsement in a natural science who seek approval to teach physics as an additional area must complete one of the following sets of courses:

Phys 221 222 311T 321 321L 399 (2 cr) or Phys 111 112 302 311T 389 (2 cr)

Students with no other natural science endorsement who seek approval to teach physics as an additional area must complete one of the two sets of courses listed above plus sufficient additional credits from the following list of courses to total 24 credits:


Reading (K-6, 7-12)
Coordinator: Donna Merkley
Students seeking endorsement to teach reading (K-12) as an additional area must earn credits in the following courses:

Engl 219 394 Engl 302 or 304 or 305 or 306 or 404 or 405
C I 378 395 498B 598 Students seeking reading approval for grades K-6 see elementary education advisor

Speech Communication
Coordinator: Connie Ringlee
Students seeking endorsement to teach speech as an additional area must earn credits in the following courses:

Comp S 102 Sp Cm 212 313 322 412 496A 495B Thre 255 358 Jr MC 101

Advisers for Areas of Specialization in Teacher Education
Persons interested in teaching in one of the following areas should consult with the appropriate individual. Details of each area will be found in the appropriate departmental section:

Elementary Education—Al Campbell, Ern Sheldahl, Kan Soderheim
Early Childhood Education—Al Campbell (College of Education), Patricia Walsh (College of Family and Consumer Sciences)
Special Education—Pat Carlson

Secondary Education
Agricultural Sciences/Agribusiness Education—Gregory S. Miller
Art—Barbara Caldwell
Biology—Warren Dolphin, Mike Clough
Chemistry—Thomas Greenbrowe
Coaching Intercollegiate Athletics—Rich Engelhorn
Earth Sciences—David Melzter, Mike Clough
English—Robert Tremmel
English as a Second Language—Roberta Vann
Family and Consumer Sciences Education and Studies—Beverly Knumpel
Foreign Languages—Linda Quinn Allen

General Science—Michael Clough Thomas Greenbrowe
Health Education—Frank Schabel
Mathematics—Janet Sharp, Richard Tondra
Music—Sylvia Munsen
Physical Education—Kathenne Thomas
Physical Sciences—Mike Clough, Thomas Greenbrowe
Psychology—David Melzter
Reading—Donna Merkley
Speech Communication—Connie Ringlee

Technology and Social Change
Advisory Committee: Eric Abbott, coordinator Lulu Rodriguez, undergraduate coordinator Robert Mazur, graduate coordinator

Undergraduate Study
Technology and social change is a cross-disciplinary program examining the relationships between technologies and the social and cultural environments in which they operate. The program has a national and international perspective, with courses addressing the interrelationships, policies and impacts created by the international exchange of technology as through TSC students will better understand the institutional and sociocultural consequences of technological change from differing perspectives and will become sensitive to the issues attending the use of technology to improve people’s lives. Work in the program can also serve as preparation for advanced study in this field.

The program requirement for a minor in technology and social change is a minimum of 15 credit hours. One of the courses must be TSC 341. An additional 3 credits must be taken from TSC cross listed courses. The remaining 9 may be selected from TSC cross listed courses or from the list of TSC approved courses. At least 9 of the 15 credits must be in courses numbered 300 or above. Because technology and social change is an interdisciplinary study minor programs must include coursework in at least two departments. Students seeking a minor should develop a specific program of courses either with the TSC faculty representative in their department or with the TSC undergraduate coordinator. The student’s minor program must be approved by the TSC program coordinator.

TSC courses are listed below. The list of TSC approved courses is available from the program coordinator. Through the program coordinator students may petition for approval of courses not on the approved list that address matters relevant to technology and social change.

Graduate Study
The graduate minor in technology and social change is a cross-disciplinary program that enables students to study the interactions between technologies and their users, at both societal and individual levels. The minor strengthens the ability of students to apply differing perspectives in understanding the effects of the global exchange of technologies and to heighten their sensitivity to the institutional and sociocultural issues attending the use of technology to improve people’s lives.

Students choosing to minor in technology and social change will pursue a degree program in the major department. In consultation with their major professor students are to identify a TSC faculty member to serve on the committee guiding their program of study. This TSC faculty member must be on the Graduate faculty, and must be from a discipline outside the major field of study. With the agreement of the POS committee the student declaring a minor in TSC will select a group of courses from the list of TSC approved courses available through the program coordinators. For the master’s degree this group should be at least 9 credit hours for a doctoral degree the group should be at least 15 credit hours.
Courses Primarily for Undergraduate Students

TSC 431 Technology International, Social, and Human Issues (3-0) Cr 3 F Prereq: Junior classification An interdisciplinary study of the international significance of technology and the societal and human issues attending its development and adoption.

TSC 432 World Food Issues Past and Present (Same as Agron 432) See Agronomy: Nonmajor graduate credit.

TSC 433 Philosophy of Technology (Same as Phil 434) See Philosophy: Nonmajor graduate credit.

TSC 474 Communication Technology and Social Change (Same as JMC 474) See Journalism and Mass Communication.

TSC 490 Independent Study Cr var Prereq: 341 permission of instructor and of TSC coordinator.

Courses Primarily for Graduate Students

Open to Qualified Undergraduate Students TSC 541 Technological Innovation, Social Change, and Development (Same as Soc 541) See Sociology.

TSC 574 Communication Technologies and Societies (Same as JMC 574) See Journalism and Mass Communication.

TSC 590F Special Topics Technology and Social Change (Same as UST 590F) Cr var Prereq: 541 permission of instructor and of TSC coordinator.

Individual study of topics concerning global and local implications of technological change.

Courses for Graduate Students

TSC 640 Seminar in Technology and Social Change (Same as 640 Cr var Prereq: 541 Consideration of global issues and consequences arising from technological change. Specific topics vary each time offered.

Textiles and Clothing

(Assigned by the Department of Apparel Educational Studies and Hospitality Management)

Mary B Gregoire Chair of Department

University Professors Farrell Beck

Professors Kadalph Lilletter Stone

Distinguished Professors Emeritus Winakor

Professors Emeritus: Burnet Danielson

Associate Professors Damhore Fiore

Associate Professors Emeritus Brackelsberg Kunzel

Assistant Professors Campbell Nihm Park Parsons Paut

Assistant Professors Adjuncts Glick Fatzke Wise

Undergraduate Study

The program offers study for the degree bachelor of science with a major in apparel merchandising design and production. The program offers students a broad understanding of textile and apparel products and production practices and business techniques leading to a wide range of careers at national and international levels in business and industry. Courses in the program provide scientific technical and humanistic knowledge about textiles, apparel, and related products basic to career preparation. Courses also provide knowledge applicable to the development and use of apparel and textile products by individuals in families and communities. The program can be used as a foundation for graduate study. Graduates understand the production distribution and use of textiles and apparel with special attention to human concerns for protection and comfort, health and safety aesthetic expression and communication. They are prepared to plan, develop, and present textile and apparel products to meet the needs of consumers. They understand the issues involved in textile and apparel production and marketing both nationally and internationally. Graduates appreciate the interdependence of nations and cultures as producers and consumers of textile products.

The major in apparel merchandising design and production (AMD) provides a broad based program of study with flexibility in creating an individualized program option. Courses are required in the following groups: general education, family and consumer sciences core, and the AMDP core. To complete the program a student combines structured clusters of courses to form an option in merchandising design or production.

An option in merchandising prepares students for the planning, development, and presentation of market oriented product. Career opportunities are in product development, buying, promotion and management in both manufacturing and retailing sectors of the textile and apparel industry.

An option in apparel design is appropriate for those interested in the aesthetic creative and technical aspects of design, production and promotion of textiles. This option prepares the student for careers in fashion design, costume design, theatrical costume, costume related communications, and international trade quality assurance and technical design. The combinations of primary and secondary options allow students to individualize their programs.

The program offers a minor in apparel merchandising design and production. The minor can be earned by taking TSC 131 or 165, 232, 235, 231 or 245 at the 300-400 level for a total of 15 to 17 credits. Also available is an apparel merchandising design and production designated area of concentration combined with a major in communication and mass communication in the College of Liberal Arts and Sciences.

Grades on coursework All students majoring in apparel merchandising design and production are required to earn a C- or better in all TSC courses applied toward the degree including transfer credits.

English proficiency Undergraduate English proficiency is certified when the student has received a grade of C- or better in English 104 and 105. Students who receive a D- or D+ in English 104 or 105 may take English 329 391 314 instead of repeating the lower level course.

Graduate Study

The program offers work for the master of science and doctor of philosophy with a major in textiles and clothing. The program also participates in the Master of Policy and Consumer Sciences degree by offering a specialization within that program. For all programs the field of study is highly interdisciplinary programs of study are tailored to students background and interests.

Graduates understand how textiles and apparel are essential in meeting societal needs and understand the interdependence of nations and cultures as producers and consumers. Graduates understand diverse philosophies of scholarship and apply multiple methods to research and teaching. Strong writing and oral communication skills help graduates disseminate scholarship and compete successfully for awards and grants.

Graduates accept positions relevant to their academic experience. All doctoral graduates have teaching experience Masters and doctoral graduates have experience working in team-oriented and interactive environments. Graduates are prepared to adapt to future changes in their professions and to provide leadership in professional and public practice. They bring a strong sense of ethics to research teaching and business endeavors.

Program emphases for graduate study include consumer behavior entrepreneurialism craft marketing, merchandising and promotion aspects of textiles and clothing acquisition and use of textiles and apparel within cultures. Cultures and textiles of the 19th and 20th centuries textiles' social and psychological aspects of dress aesthetics product quality and development, textile conservation and computer-aided design.

The program participates in the interdepartmental minor programs of gerontology and housing.

Courses open for nonmajor graduate credit.

Courses Primarily for Undergraduate Students

TSC 121 Apparel Assembly Processes (1-4) Cr 3 FS Principles of garment assembly. Use of material production equipment and methods to develop and assemble garments.


TSC 165 Appearance in Society (3-0) Cr 3 FS Social science approaches to understanding clothing and appearance in contemporary U.S. society. Examination of diversity of consumers and future trends in consumer behavior.


TSC 225 Patternmaking II (2-4) Cr 4 FS Prereq: 121. 204 recommended. Permission of instructor. Basic flat pattern and draping methods for women's and men's clothing. Pattern making by computer.


TSC 245 Aesthetics of Apparel (2-2) Cr 4 FS Prereq: 165 Analysis of multisensory aesthetic aspects of apparel products and promotional settings affecting the consumer.

TSC 245L Aesthetics of Apparel Laboratory (2-2) Cr 1 FS Prereq: 131, 165. 245 or concurrent enrollment. Computer-aided design applied to analysis, development, and presentation of textiles and apparel products.


T C 321 Computer Integrated Textile and Fashion Design (3-0-Cr 3 S Prereq: 245L 278 recommended) Analysis and advanced use of industry specific software for textile and fashion design

T C 325 Patternmaking II (Dual listed with 525) (2-4) Cr 3 S Prereq: 278 recommended Principles of advanced patternmaking by flat pattern and draping techniques Interaction of fabric characteristcs with style features Analysis of fit problem solving Patternmaking by computer

T C 328 Experimental Design and Presentation (2-2) Cr 3 Alt F offered 2003 Prereq: 225 278 325 recommended Use of traditional non-traditional and recycled materials to create innovative garments

T C 331 Apparel Production Management (2-2) Cr 3 S Prereq: 231 Com S 103 TC 121 recommended Procedures and experiences related to application and use of process control methods analysis work measurement costing and production planning Resource management technology applications and quality assurance

T C 342 Aesthetics of Everyday Experience (3-0) Cr 3 S Design principles aesthetic concepts and philosophies applied to everyday living Influence of individual differences and cultural patterns on aesthetic preferences

T C 384 History of European and North American Costume (3-0) Cr 3 S Prereq: 3 credits from Hist or Art H Clothing and adornment of women men and children in Europe and the United States from antiquity to present social economic technological and cultural context of costume Nonmajor graduate credit

T C 385 History of Asian Costume (Dual listed with 566) (3-0) Cr 3 Alt S offered 2005 Prereq: 3 credits from Hist or Art H 204 recommended Clothing and adornment of men women and children in selected countries of Asia from prehistoric times through the 18th century

T C 362 Cultural Perspectives in Clothing and Textiles (3-0) Cr 3 S Prereq: 165 or 3 credits in anthropology psychology or sociology Analysis of multiple factors related to clothing and textiles in selected societies including technology aesthetics social organization ritual stability and change Applications to apparel business

T C 375 Merchandising I (Dual listed with 575) (2-0) Cr 5 S Prereq: 165 or 3 credits in Math junior Classification Principles of merchandising as applied in manufacturing and retailing business organizations Study of planning and development of primarily apparel and related product lines

T C 375L Merchandising Analysis (0-2) Cr 1 FS Prereq: Credit or concurrent enrollment in 375 Act 264 Com S 103 Interpretation of financial results of merchandising decisions based on computer simulation

T C 376 Merchandise Planning and Control (3-0) Cr 3 S Prereq: 375 Theories and procedures in planning sourcing and controlling retail inventories for the profitable management and operation of apparel and related product lines Computer applications in strategic retail management

T C 377 Merchandise Presentation (1-2) Cr 2 Alt S 2005 2004 245 and 375 Merchandise presentation and promotion at wholesale and retail levels as related to image sales and aesthetics Group project presentations of apparel and related products to diverse markets

T C 380 Field Study Cr 2 May be repeated FS SS Prereq: 9 credits in textiles and clothing junior classification Permission by application Study of end tours to textile mills apparel manufacturers design studios showrooms markets retailers museums testing laboratories trade seminars and exhibitions and other areas of interest within the textile and apparel industry

T C 381 International Field Study Cr 2 to 4 May be repeated Alt S offered 2005 and Alt SS offered 2004 Prereq 9 credits in textiles and clothing junior classification Permission by application Study of end tours to textile mills apparel manufacturing design studios showrooms markets retailers museums testing laboratories trade seminars and exhibitions and other areas of interest within the textile and apparel industry Countries vary

T C 398 Cooperative Education Cr R FS SS Prereq: Permission of department chair junior classification Required of all cooperative education students Students must register for this course prior to commencing each work period

T C 404 Textile Science II (Dual listed with 504) (3-0) Cr 3 Alt S offered 2005 Prereq: 204 245 one natural science course Theories and principles of textile science emphasis on fiber chemistry dyeing and deterioration Examination of product failure current research and environmental impact

T C 410 Synthesis of Merchandising Design and Production (2-3) Cr 3 FS Prereq: Senior classification permission by application 165 229 245 375 Multi functional team approach to creative problem solving and development of apparel Synthesis and presentation of line plans creative design and technical design

T C 411 Seminar on Current Issues Cr 1 to 3 each term taken Prereq: Senior classification 12 credits in textiles and clothing Trends and issues in textiles and apparel

T C 467 Consumer Behavior and Apparel (2-2) Cr 3 S Prereq: Stat 101 or 226 TC 165 or 3 credits in marketing psychology or sociology Application of consumer theory and the social sciences to the study of consumer behavior related to apparel and adornment Experience in conducting research

T C 470 Supervised Work Experience Cr 2 to 6 FS SS Prereq: Minimum 2 0 GPA permission by application junior or senior classification Supervised work experience with a cooperating firm or organization A Textile Industry Prereq
B Historic Textiles and Clothing Prereq 6 credits from 354 356 362 3 credits in anthropology recommended

C Apparel Design Prereq: 225 231 245 278 recommended I Merchandising Cr 4 or 6 Prereq: 375 J Extension Prereq: 6 credits in textiles and clothing

M Marketing Cr 2 to 6 Prereq: 257 N Apparel Production Management Prereq: 331 1E 271 recommended O Technical Design Prereq: 223 225 305 331 recommended Q Quality Assurance Prereq: 305 T Public Relations Prereq: T C 375 and JI MC 230

T C 472 Global Issues in Textiles and Apparel (Dual listed with 572) (3-0) Cr 3 S Prereq: 375 Econ 101 Evaluation of key issues facing textiles and apparel businesses in global markets considering ethical economic political and social implications

T C 474 Entrepreneurship in Family and Consumer Sciences (Dual listed with 574) same as HD FS 474 HR 474 (3-0) Cr 3 S Prereq: 6 credits in T Cat 300 level or above Explores entrepreneurship for family and consumer sciences related businesses Includes family home based rural and women owned businesses Development of a feasibility analysis Guest speakers

T C 490 Independent Study Cr 1 or 2 May be repeated FS Prereq: 6 credits in textiles and clothing permission of the instructor adviser and department

T C 495 Advanced Apparel Design I (3-0) Cr 3 S Prereq: 225 278 321 325 or 326 senior classification Course in a line of study from concept through completion Development of portfolio using manual and computer aided techniques Line must be submitted to a local regional or national competition

T C 498 Cooperative Education Cr R FS SS Prereq: Permission of department chair senior classification Required of all cooperative education students Students must register for this course prior to commencing each work period

T C 499 Undergraduate Research Cr 1 to 3 each time taken FS SS Prereq: Senior classification 15 credits in textiles and clothing permission of instructor adviser and department chair Research experience in textiles and clothing with application to a selected problem

Courses Primarily for Graduate Students Open to Qualified Undergraduate Students

T C 504 Textile Science II (Dual listed with 404) (3-0) Cr 3 Alt S offered 2005 Prereq: 204 245 one natural science course Theories and principles of textile science emphasis on fiber chemistry dyeing and deterioration Examination of product failure current research and environmental impact

T C 505 Quality Assurance of Textiles and Apparel (Dual listed with 305) (3-0) Cr 3 Alt F offered 2003 Prereq: 221 276 Stat 120 or 401 one natural science course Principles of product and materials evaluation and quality assurance Developing specifications and using standard practices for evaluating materials product characteristics performance and quality Proposal and research project

T C 510 Foundation of Scholarship in Textiles and Clothing (2-0) Cr 2 FS Prereq: Graduate classification Overview of scholarship in textiles and clothing with emphasis on current and future directions and interdisciplinary nature of the field Introduction to theory and philosophy of science

T C 521 Digital Textile and Apparel Design (1-4) Cr 3 S Prereq: Permission of instructor experience with flat pattern or draping techniques and image manipulation software required Developmental analysis and application of digital textile printing to textile products and garment forms Projects required

T C 525 Patternmaking II (Dual listed with 325) (2-4) Cr 3 Alt F offered 2004 Prereq: 204 225 278 recommended Principles of advanced patternmaking by flat pattern and draping techniques Interaction of fabric characteristics with style features Analysis of fit problem solving Patternmaking by computer

T C 545 Interdisciplinary Approach to Aesthetics (3-0) Cr 3 Alt F 2003 Prereq: 245 one course in design elements and principles consumer behavior or marketing Examination of the role of aesthetic features of the product or consumer focused environment in marketing and the effects on consumers Emphasis on consumer behavior design environmental psychology and marketing literature

T C 555 History of Asian Costume (Dual listed with 356) (3-0) Cr 3 Alt S offered 2005 Prereq: 3 credits from Hist or Art H 304 recommended clothing and adornment of men women and children in selected countries of Asia from prehistoric times through the 19th century

T C 557 Conservation of Textiles and Costume (3-0) Cr 3 Alt S offered 2004 Prereq: 204 354 or 355 Preventive and interventive approaches to textile conservation Focus on understanding textiles and costume and factors related to aging storage and exhibition research methods
326

Textiles and Clothing

T C 562 Dress and Culture (3.0) Cr 3 Alt F offered 2004 PreReq. 362 or 6 credits in social science or cultural anthropology. Analysis of dress as artifact behavior and symbol in selected cultures.

T C 564 Clothing Consumption (3.0) Cr 3 PreReq. Econ 101 or 604. Theories of clothing consumption factors affecting family expenditures and levels and standards of consumption for clothing and household textiles.

T C 567 Consumer Behavior and Apparel (3.0) Cr 3 Alt F offered 2003 PreReq. 467 or 447. Star 107. Application of concepts and theories from the social sciences to the study of consumer behavior involving apparel and adornment. Experience in conducting research, grant proposal and manuscript writing.

T C 570 Practicum in Textiles and Clothing (1.0 to 3.0) Cr 3 SS. PreReq. 510. Graduates credits in textiles and clothing. Permission by application. Supervised experience related to career objective. Proposal must be approved semester before placement.

T C 572 Global Issues in Textiles and Apparel (Dual listed with 472) (3.0-6.0) Cr 3 Alt F offered 2004 PreReq. 375 or 575. Econ 101. Evaluation of key issues facing textile and apparel businesses in global markets considering ethical, economic, political, social and professional implications. Theoretical foundations of sourcing.

T C 574 Entrepreneurship in Family and Consumer Sciences (Dual listed with 474) (3.0-6.0) Cr 3 Alt S offered 2004 PreReq. 8 credits in T C 300-level or above. Explores entrepreneurship for family and consumer sciences related businesses. Includes family home-based rural and women-owned businesses. Development of a feasibility analysis. Guest speakers.

T C 575 Merchandising (Dual listed with 375) (3.0) Cr 3 Alt S offered 2005 PreReq. 165. 3 credits of Math Principles of merchandising as applied in manufacturing and retailing businesses organizations. Study of planning and development of primarily apparel and related product lines. Computer applications and theoretical foundations in merchandising.

T C 581 International Study Cr var Alt S offered 2006 and Alt SS offered 2004 Pre Req. 9 credits in textiles and clothing permission by application. Study abroad of apparel and textile design merchandising production distribution and consumption textiles in museums. Countries vary. May be repeated.

T C 590 Special Topics Cr art: PreReq. Permission of department chair and instructor(s). Individualized designed text and clothing related projects that reflect the special interests of the student.

A Textile Science
B History of Textiles
C Textile and Apparel Design
D Aesthetics
E History of Costume
F Sociological and Psychological Aspects
G Consumer Behavior
I Merchandising
J Extension
K Cultural Analysis
L Conservation
M Museums
N Apparel Production Management
O Technical Design
P Interdisciplinary
Q Quality Assurance
S Small-Business/Entrepreneurship in Apparel

T C 593 Workshop Cr art: SS

Courses for Graduate Students

T C 610 Philosophical issues of Textiles and Clothing Scholarship (2-0) Cr 2 Alt S offered 2004 PreReq. FFC511 or Econ 560. 6 graduate credits in textiles and clothing. Models theory, alternative philosophies and ethics of science as applied in textiles and scholarship. Process of grant application and research program development.

T C 611 Seminar Cr 1 to 3 each time taken PreReq. 6 graduate credits in textiles and clothing. Permission of instructor. Discussion of scholarship and current issues. Topics vary.

T C 650 Advanced History of Costume and Textiles (3.0-6.0) Cr 3 Alt S offered 2004 PreReq. 204 254 or 355. Philosophy and techniques of history based research applied to clothing and textiles. Analysis of relationships and documents and individual and group projects.

T C 665 Social and Psychological Theories of Appearance (3.0-6.0) Cr 3 Alt S. offered 2005 PreReq. 200 or 6 credits in sociology or psychology. Analysis of social science theories and concepts applicable to clothing and appearance research.

T C 690 Advanced Topics Cr art: PreReq. Enrollment in departmental program. Permission of instructor and approval of department chair.

T C 699 Research

Theatre and Performing Arts

www.theatre.iastate.edu

(Administered by the Department of Music)

Undergraduate Study

Students interested in theatre as a major area of concentration declare a major in Performing Arts and select an emphasis in Theatrical Design or Acting/Directing. Students implement the theories and principles explored in the classroom by participation in production work. During the academic year Iowa State University Theatre presents up to ten mainstage and second stage productions in Fisher Theater and works in close collaboration with ISU Music and Dance.

The major in Performing Arts offers the undergraduate student a cross-disciplinary concentration in Music, Dance, and Theatre. The core curriculum consists of 24 credit hours in the three areas. Students elect a 24 credit hour emphasis in either Dance, Theatrical Design or Acting/Directing. In addition to coursework, Performing Arts majors and minors participate in concert, Orchesis, Footfall, workshop (Opera Studio Minority Theatre Workshop), and production (Barche Stars Over Vashoa ISU Theatre/Music Theatre/Second Stage and Studio) experiences.

Performing Arts graduates in addition to a solid theoretical and experiential background in the areas of performance, theatrical design, dance and music are prepared to meet the challenges of the work force or graduate school with their strengths in collaboration, creative problem solving, meeting deadlines and processing diverse input to yield cohesive output. Two required professional internships prior to graduation are vital to the student's appreciation and practical understanding of the rigor of the field.

Theatre area offers a wide variety of courses. Students may select from courses in acting design (costume scenic lighting/sound) make up stage direction/playing writing stage management and theatre history. Independent study and special topics courses supplement formal course offerings to provide opportunities to intensively study in a particular aspect of theatre.

Auditions for ISU Theatre productions are open to all students irrespective of academic major. Similarly participation at main stages production other than acting is open to both majors and nonmajors. Qualified students also present experimental laboratory and minority Theatre Workshop productions. Student actors, directors, designers and technical crewhead are required to maintain a grade point average of at least 2.0 to participate in productions.

Theatre scholarships are awarded on a yearly basis to students who make significant contributions to Iowa State University Theatre.

Bachelor of Arts - Performing Arts Major (Perf)

The Core for the Performing Arts Major (24 cr)

(For individual Dance and Music course descriptions see Index for individual department listing.)

Music 102 105
Dance 130-Ballet I 220-Modern Dance Composition Dance 270-Dance Appreciation
Theatre 255 263 365
Perf 105-6 (ex semesters) Perf 310 (2) Perf 401
Emphasis in Theatrical Design (24 cr)
Theatre 250 (2 cr) 360 366 455 461 465 466 Music 133

Emphasis in Dance (24 cr)
Art 292 Music 133 Ex So 355 Dance 222 224 (2 cr) 232 360 370
Select 2 credits from Dance 140 160 160 170 211
Instead of 160 170
Select 2 credits from Dance 223 223 242 243 262
Select 3 credits from Dance 320 384 385 386
All students enrolled in the Dance Emphasis must register for one dance technique course every semester to reside for a total of 8 credits and must complete one computer course (Com S 103 107 207 C 120i)

Emphasis in Acting/Directing (24 cr)
Theatre 151 210 (2 cr) 251 351 451 455 456 466 Music 133

Minor in Performing Arts (21 cr)
Perf 105 (three semesters)
Music 101 102
Dance 120 or 130 270
Theatre 255 263 or 251 plus six credits 300+ in Dance Thetre or Perf

English proficiency requirement. Select one course from Advanced Writing Engr 303 304 305 306 307 309 314 315 316 365 370

Graduate Study

The department offers graduate courses as supporting work in other fields.

Courses open for nonmajor graduate credit. Theatre 316 465 466 Perf 401

Performing Arts

Courses Primarily for Undergraduate Students

Perf 405 Issues in the Performing Arts (1-0) Cr 0 FS. Cross disciplinary analysis and discussion of topics in the performing arts. Six semester required of performing arts majors.

Perf 310 Performing Arts Internship Cr R FS SS Required of performing arts majors. A job or internship with a professional or semi-professional performing arts organization.

Perf 401 Performing Arts Seminar (2-0) Cr 2 Alt S offered 2004 Intensive collaborative study and practice of topics in music, dance and theatre Required of performing arts majors. Nonmajor graduate credit.

Theatre

Courses Primarily for Undergraduate Students

Theatre 106 Introduction to the Performing Arts (3.0) Cr 3 FS SS. An audience oriented broad based team taught survey of the performing arts which emphasizes theatre and includes segments on television radio film dance and music.

Theatre 110 Theatre and Society (0-0) Cr 3 FS. An introduction to Theatre focusing on its impact on society from the Greeks to modern times. Particular emphasis on the contemporary world theatre.

Theatre 151 The Actor's Voice (3.0) Cr 3. Study and practice of fundamentals of vocal production, breathing, quality articulation, projection and expressiveness for the performing artist.
Thre 244 Concert and Theatre Dance (Same as Dance 244) | See Health and Human Performance Dance

Thre 250 Theatre Practicum | Cr 1 or 2 each time taken maximum of 6 credits FS Prereq: Permission of instructor Practicum in various aspects of technical theatre production Offered on a satisfactory fail grading basis only

Thre 251 Acting I | (3-0) Cr 3 FS Theory and practice in fundamentals of acting

Thre 252 African American Theatre Production | (Same as Af Am 252) | (3-0) Cr 3 An exploration of African American theatre in production aesthetic foundations history and contributions to American theatre

Thre 256 Introduction to Theatrical Production | (3-0) Cr 4 FS Standard structure and procedures historical overview of performing arts production including the design and creation of scenery costumes and lighting

Thre 263 Script Analysis | (3-0) Cr 3 FS Theory and analysis of scripts for production

Thre 290 Special Projects | Cr 1 to 3 each time taken maximum of 6 credits FS Prereq: 3 credits in theatre permission of instructor approval of written proposal

Thre 316 Creative Writing—Playwriting | (Same as Eng 316) | (3-0) Cr 3 S Prereq: Engls 105 not open to freshmen Progressions from production of scenes to fully developed one act plays Emphasis on action staging writing analytical reading writing workshop criticism and individual conferences Nonmajor graduate credit

Thre 351 Acting II | (3-0) Cr 3 S Prereq: 251 Dance 120 recommended Theory and practice of techniques of acting with emphasis on character and scene analysis

Thre 352 Stage Combat | (1-2) Cr 2 Alt S offered 2004 Prereq: 351 Theory history and practice of theatrical combat Includes tumbling hand to hand quarterstaff broadsword rapier and dagger

Thre 354 Musical Theatre I | (2-2) Cr 3 S Prereq: 251 or Music 232 or 3 credits in Dance | Theory history and practical study of musical theatre techniques Designed to develop the musical theatre performance skills of singers dancers and actors

Thre 355 Musical Theatre II | (2-2) Cr 3 S Prereq: 354 Theory history and practice of musical theatre techniques Designed to develop the musical theatre performance skills of singers dancers and actors

Thre 357 Stage Make up | (1-2) Cr 2 F Theory and practice of make up and hair styling for the performing arts Theatre Opera Dance Television and Film Lab required

Thre 358 Oral Interpretation | (3-0) Cr 3 F Principles of oral interpretation practice in analysis in reading aloud of literary selections and in reader's theatre

Thre 359 Theatre for Children and Youth | (3-0) Cr 3 Study and practice of directing acting and the production of theatre for children and youth

Thre 360 Stagecraft | (3-0) Cr 4 S Prereq: 255 Tools materials and techniques of planning constructing and painting of performing arts scenography Basic principles of lighting technology Technical drawing for performing arts production

Thre 385 Theatrical Design I | (2-2) Cr 3 F Prereq 255 An exploration of the elements principles and art of theatrical design

Thre 386 Theatrical Design II | (2-2) Cr 3 S Prereq: 365 Intensive application of the principles introduced in 385 In depth study and practice of the graphic skills of rendering and drafting

Thre 367 Stage Management | (3-0) Cr 3 F Prereq: 255 The responsibilities and techniques of stage management for the performing arts

Thre 393 Workshop | Cr 3 each time taken maximum of 9 FS SS Prereq: 3 credits in theatre Offered to explore special topics

A Minority Theatre
B Repertory
C Children's Theatre
D Musical Theatre
E Creative Dramatics
F International Storytelling

Thre 451 Acting III | (3-0) Cr 3 F Prereq: 351 and permission of instructor Analysis and practice of performance of scenes

Thre 455 Directing I | (3-0) Cr 3 F Prereq: 255, 267 251 recommended Theory techniques and practice of directing

Thre 456 Directing II | (2-2) Cr 3 S Prereq: 455 Practical and theoretical experience in directing the stage play

Thre 461 Theatrical Design Studio | (3-2) Cr 4 each time taken maximum of 12 FS Prereq: Permission of instructor Focuses on the art and craft of specific areas of theatrical design Each semester the student will focus on one or two of the following: scenic costume or lighting design

Thre 465 History of Theatre | (3-0) Cr 3 S Prereq: Hist 201 or equivalent Theatre history from ancient times to 1800 Nonmajor graduate credit

Thre 466 History of Theatre II | (3-0) Cr 3 S Prereq: 465 Theatre history from 1800 to present Nonmajor graduate credit

Thre 469 Advanced Theatre Practicum | Cr 1 to 3 each time taken maximum of 3 credits per semester maximum of 6 credits total FS SS Prereq: 9 credits in theatre courses junior classification Practicum in production with IS Theatre with opportunities for specialization within various areas Required Approval of written proposal

Thre 490 Independent Study | Cr 1 to 3 each time taken FS SS Prereq: 3 credits in theatre approved written proposal junior classification Only one independent study enrollment within the department is permitted per semester no more than 9 credits in Thre 490 may be counted toward graduation

Thre 497 Senior Seminar | (3-0) Cr 3 S Prereq: 15 credits in theatre courses senior classification Directed study of a theatre issue or problem identified by each student Students synthesize relevant theory and research culminating in senior project or paper

Thre 499 Theatre Internship | Cr var 1 to 8 each time taken maximum of 8 FS SS Prereq: 18 credits in theatre other courses deemed appropriate by faculty advisor 2nd semester junior or senior standing cumulative GPA of at least 2.5 overall and 3.0 in theatre courses Supervised application of theatre in professional settings

Courses Primarily for Graduate Students, open to qualified undergraduates

Thre 504 Seminar | Cr 1 to 3 each time taken FS SS Prereq: 9 credits in theatre Topics may include the following

A Musical Theatre
B Acting Techniques
C Acting Styles
D Design and Technical Theatre
E Arts Management

Thre 590 Special Topics | Cr 1 to 4 each time taken maximum of 12 credits Prereq: Approved written proposal

Toxicology
www.toxicology.iastate.edu toximajor@iastate.edu
(Interdepartmental Graduate Major)

Supervisory Committee A Kanthasamy Char J Beathen J Coates G Plow

Work is offered for the degrees of master of science and doctor of philosophy with a major in toxicology in various cooperating departments Agricultural and Biosystems Engineering Animal Ecology Animal Science Biochemistry Biophysics and Molecular Biology Biomedical Sciences Botany Chemistry Entomology Food Science and Human Nutrition Geologic Al and Atmospheric Sciences Microbiology Plant Pathology Veterinary Diagnostic and Production Animal Medicine Veterinary Microbiology and Preventive Medicine Veterinary Pathology and Zoology and Genetics

The prerequisites for entrance into the graduate toxicology major include an undergraduate degree in a relevant area of study for example chemical engineering biology biochemistry chemistry ecology entomology food science and technology microbiology occupational health and safety veterinary medicine Minimum undergraduate coursework should include the following or their equivalent 1 year of college mathematics including calculus 1 year of inorganic chemistry with quantitative analysis 1 course in physics 1 or 2 years of 2 years of biological sciences including 1 course in physiology

Other courses that are considered desirable in the undergraduate preparation include biochemistry physical chemistry qualitative analysis and some specialized courses such as histology or advanced physiology Prospective students not meeting these requirements may be admitted on a provisional basis with approval of the admissions committee and the program of study committee

Facilities and faculty are available in these departments for fundamental research in such areas as aquatic toxicology environmental fate and effects of chemicals food safety neurotoxicology nutritional toxicology pesticides and veterinary medicine

Students mapping in toxicology will be affiliated with a cooperating department and choose a major professor from the participating faculty in that department All Ph D students take a core curriculum consisting of tox 501 and 502 credits of tox 504 Toxicology Seminar 7 credits in toxicology and biochemistry from BBM 404 405 420 451 511 5423 3 graduate credits in physiology histology or pathology Stat 401 and 402 M S students take a core of Toxicology 501 and 502 1 credit of Toxicology 504 Seminar 3 additional credits in toxicology tox 404 and 405 Stat 401 Additional coursework is selected to meet departmental requirements and to satisfy individual student research interests Toxicology courses may be chosen from those listed below The foreign language requirement is determined by the student's major department

Graduates of the Toxicology major will be able to carefully design execute and analyze experiments that extend the knowledge of toxicology and closely related sciences They will be able to clearly communicate research findings and thoroughly evaluate the literature of toxicology contributing significantly to the advancement of the field

A graduate minor in toxicology is available for students enrolled in other majors A minor for an M S degree includes tox 504 and 501 and 3 credits in other toxicology courses A minor at the Ph D level includes tox 504, 501 and in tox 404 and 405 8 credits in toxicology and 10 credits in toxicology coursework One member of the student's program of study committee will be a member of the toxicology faculty

Courses open for nonmajor graduate credit 419 420

Courses Primarily for Undergraduate Students

Tox 419 Foodborne Hazards | (Same as FS HN 419) | See Food Science and Human Nutrition Nonmajor graduate credit

Tox 420 Food Microbiology | (Same as Micro 420) | See Microbiology Nonmajor graduate credit

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Tox 501 Principles of Toxicology | (Same as VDPM 501) | See VDPM 501, 503, 3-0 Cr 3 F Prereq: 404 or equivalent Principles of toxicology governing entry fate and effects of toxics on living systems Includes toxikokinetics and foreign compound metabolism relative to toxicity or detoxification
Toxicology

Fundamentals of foreign compound effects on metabolism, physiology, and morphology of different cell types, tissues, and organ systems.

Tox 502 Toxicology Methods (Same as VDCMP 502, Zoology 502) 3 Cr. 3 P. Prereq 501. Provides demonstrations or laboratory experiences in the application of methods used in toxicology, including safety procedures, calculation and data analysis, teratologic and morphologic evaluation, electroencephalographic measures, vitellogenesis, body temperature, and behavioral toxicology testing.

Tox 504 Toxicology Seminar 1 Cr. 1 time taken. Prereq Permission of instructor. Presentation of a seminar about a current topic in toxicology as part of a weekly series of seminars for graduate students, faculty, and guest lecturers from off campus.

Tox 513 Ecological Toxicology (Same as A Ecol 513) See Animal Ecology.

Tox 519 Food Toxicology (Same as FS Hn 519) See Food Science and Human Nutrition.

Tox 526 Veterinary Toxicology (Same as VDCMP 526) 3 Cr. 3 P. Prereq Permission of instructor. A study of disease processes in animals caused by toxins and the use of differential diagnostic and therapeutic procedures.

Tox 544 Aquatic Toxicology (Same as A Ecol 544) See Animal Ecology.

Tox 546 Clinical and Diagnostic Toxicology (Same as VDCMP 546) 3 Cr. 3 to 3 Cr. 1 to 3 each time taken. Prereq VDCMP 546 or DVM degree. Advanced study of current problems and issues in toxicology. Emphasis on problems solving utilizing clinical epidemiological and laboratory resources.

Tox 550 Pesticides in the Environment (Same as En 550) See Entomology.

Tox 554 General Pharmacology (Same as B M S 554) See Biomedical Sciences.

Tox 555 Neurobehavioral Toxicology (Same as VDCMP 555) 3 to 3 Cr. 3 Alt. F. Offered 2003. Prereq VDCMP 551. Advanced study of neurotoxicology and behavior. Emphasis on methods in neurobehavioral toxicology and the effects of a broad spectrum of neurotoxic agents.

Tox 565 Methods of Biostatistics (Same as Stat 565) See Statistics.

Tox 590 Special Topics

Courses for Graduate Students

Tox 626 Advanced Food Microbiology (Same as FS Hn 626) See Food Science and Human Nutrition.


Tox 675 Insecticide Toxicology (Same as Ent 675) (2) 3 Cr. Alt. F. Offered 2003. Prereq Ent 655 or Tox 507. Coats Principles of insecticide toxicology classification, mode of action, metabolism, and environmental effects of insecticides.

Tox 859 Research

Transportation (Interdepartmental Graduate Major)

Supervisory Committee R R Souleymare Chair M R Curng R G Mahany

Work is offered for the degree of master of science (thesis option only) with a major in transportation under a cooperative arrangement with various departments including Civil and Construction Engineering (CCE); Community and Regional Planning (CPR); and Logistics Operations and Management Information Systems (LOMIS). Opportunities are afforded for research in such areas as modeling and performance of transportation systems, techniques for urban and regional transportation system planning, environmental and social policy analysis of transportation systems, transportation policy analysis, analysis of transportation systems at the commodity distribution level, public administration of the transportation planning process, regional development, and transportation system interrelationships. Transportation economics and finance and planning for logistics management.

Students majoring in transportation will develop a program of study under the guidance of a committee nominated by the administrative department head approved by the department transportation supervisory committee representative and appointed by the dean of the Graduate College. For administrative purposes, the student's home department will be the department originally admitting the student. A major professor may be selected from any of the three participating departments. A student must designate at least one member of the POS committee from his or her home department and at least one member from outside the home department.

A student must complete at least 36 credit hours of acceptable work including preparation of a thesis. A structured minor requires 12 credits of approved transportation courses and a thesis on a transportation related topic.

A required core includes C E 551, Trans 691, Stat 401, and at least one course from all three cooperating departments: (CRP, CCE, and LOMIS). Detailed requirements are available from the chair of the supervisory committee.

Graduate students pursuing a major in any of the cooperating departments who have an interest in transportation are encouraged to consider a formal declared minor in transportation. Students considering a declared minor should consult with the chair of the supervisory committee about the requirements for it.

Students typically focus their program of study to support a career in one of four areas: regional and statewide transportation planning; transportation service operations and transportation management; transportation policy and economic analysis; and transportation planning and operation for local and state governments. Graduates will have specific knowledge in one or more of these focus areas and the skills to conduct research and analysis of transportation issues. These skills allow graduates to be productive immediately in positions related to a focus area or to continue in more advanced transportation graduate work.

Courses Primarily for Graduate Students

Trans 555 Economic Analysis of Transportation Investments (3) 3 P. Prereq C E 350 or 353 or 354 or 355. Application of economic analysis methodologies to evaluate transportation projects. Multi model approaches to evaluate impacts of transportation investments and maximize economic efficiency while considering equity and other social issues related to investment options.

Trans 551 Seminar in Transportation Planning (1 to 3 S). Provides an overview of current transportation issues. Lectures provide seminars on a variety of timely transportation topics.

Trans 599 Research

Transportation and Logistics

(Administered by the Department of Logistics Operations and Management Information Systems)

Richard F Post, Jr. Interim Chair of Department Distinguished Professors Allen Baumel Professors Cran Post Professors (Emeritus) Thompson Voorhees

Associate Professors Henthink and Larson Lumnus Minnekaa Nilakam Premkumar Ruben Townsend Walter

Assistant Professors Hackathorn Johnson Montaab Strader Suzuki Zhu

Instructors (Adjunct) Blanshan Chang Choonabeh Clayton Tendralada

Undergraduate Study

For the undergraduate curriculum in business, major in transportation and logistics. See College of Business Curricula.

Transportation and logistics management is a diverse discipline concerned with the efficient flow of materials through our industrial and economic system. Transportation management deals with the management of the domestic and international modes of transportation in today's rapidly changing economic environment. Logistics management assumes the systems approach to the management of a wide variety of activities such as inventory control, warehousing, traffic management, location analysis, packaging, materials handling, and customer service.

The study of transportation and logistics serves as a specialized program for those who plan careers in transportation or logistics with shippers carriers and government agencies. It is a broad based educational program which emphasizes the managerial aspects of transportation and logistics systems and concepts.

The requirements for the transportation and logistics major are met by completion of the following courses:

To 410, 421, plus four of the following courses: two of which must be To 410 or 421.

The department offers a minor for non-transportation Logistics majors in the College of Business. The minor requires 15 credits from an approved list of courses for which 9 credits must stand alone. Students with declared majors have priority over students with declared minors in courses with space constraints.

Graduate Study

The department participates in two graduate degree programs: the M S in Business and the M B A, full-time and part-time weekend programs. The M S degree in Business is a 30-credit curriculum culminating in a thesis. The M B A program is a 48-credit nonthesis, noncreative component curriculum. Twenty-four of the 48 credit hours are core courses, and the remaining 24 are graduate electives. The department also participates in the interdepartmental transportation major.

Courses open for nonmajor graduate credit: 461, 462, 463, 466, 468, and 469.

Courses Primarily for Undergraduate Students

To 360 Business Logistics (3) 3 P. Prereq Econ 101. Introduction and analysis of the logistics concept to include the management of transportation inventory, packaging, warehousing, materials handling, order processing, facility location, and customer service.

To 460 Advanced Logistics Management (3) 3 P. Prereq 360 and Stat 226. Development of logistics topics introduced in 360. Emphasis on managing inbound and outbound flow of products and associated information requirements in the logistics system.

To 461 Transportation Economics (3) 3 P. Prereq Stat 226 Econ 101. The role of transportation in the economy. The economic characteristics of the various modes of transportation including the nature of transport demand and cost functions, economic dimensions of transport service - transport market structures and transport pricing theory and practice. Emphasis on managerial implications of transport economic principles. Nonmajor graduate credit.

To 462 Transportation Carrier Management (3) 3 P. Prereq Credit or enrollment in 461. Analysis of transportation systems relative to the market. Career management problems involving ownership and mergers, routes competition, labor, and other decision areas. Nonmajor graduate credit.
Courses Primarily for Undergraduate Students

U St 101 Interdisciplinary Studies Cr var Yr Offered when demand warrants. Experimental interdisciplinary courses offered by an interdisciplinary group. Intended primarily for freshmen and sophomore offerings.

U St 105 Carver Academy Seminar Freshmen Cr 1 F Prereq Acceptance in Carver Academy Program George Washington Carver scholarship recipient Orientation to the university for Carver Academy students focusing on success, time management, and adjustment to the university environment. Offered on a satisfactory fail grading basis only.

U St 106 Carver Academy Seminar Freshmen Cr 1 S Prereq Acceptance in Carver Academy Program George Washington Carver scholarship recipient Orientation to the university for Carver Academy students focusing on success, time management, and adjustment to the university environment. Offered on a satisfactory fail grading basis only.

U St 111 Hixon Scholars Seminar I (0-0) Cr 1 F Prereq Recipient of the Hixon Opportunity Award Orientation to Iowa State University and the Hixon Opportunity Awards Program. Offered on a satisfactory fail grading basis only.

U St 115 MVP Seminar I (0-0) Cr 1 F Prereq Recipient of the MVP Opportunity Award Orientation to Iowa State University and the MVP Program. Offered on a satisfactory fail grading basis only.

U St 131 Early Success Seminar (0-2) Cr 1 FS Orientation to the university for students in the Early Success Program. Offered on a satisfactory-fail grading basis only.

U St 150 Dialogues on Diversity Cr 1 FS An exploration of diversity within the context of the Iowa State University community through understanding human relations issues.

U St 180 Communication Skills for International Teaching Assistants (Same as Eng 180) FS Placement based upon SPEAK/TEACT test results. Persons whose native language is not English may not take 180 for credit. No more than one section of 180 may be taken per semester up to two sections total. Credit does not apply toward graduation. Offered on a satisfactory-fail grading basis only.

A Speaking Skills Cr 3 Emphasis on pronunciation improvement and greater fluency in spoken English for teaching purposes.

B Intermediate Spoken English Cr 3 Emphasis on classroom communication skills and strategies.

C Advanced Spoken English Cr 3 For students who have completed 100A or 100B but have not reached the passing level on the SPEAK/TEACT test.

D Presentation Skills Cr 3 Developing explanations and discussions in a teaching environment.

E Supervised Independent Study Cr 3 Seminar with individual observation and consultation.

U St 205 Carver Academy Seminar Peer Mentors Cr 1 F Prereq U St 106 or permission of instructor Leadership and peer mentor training for Carver Academy students who will be serving as peer mentors. Development of teaching skills intended primarily for sophomores. Offered on a satisfactory fail grading basis only.

U St 206 Carver Academy Seminar Peer Mentors Cr 1 S Prereq U St 106 or permission of instructor Introduction to research training for Carver Academy students. Development of research skills under faculty supervision. Intended primarily for sophomores. Offered on a satisfactory fail grading basis only.

U St 240 Predeparture Orientation for China Study Abroad Cr 1 An examination of the culture language history economics and agriculture of China in preparation for participating in the ISU Study Abroad Program. Offered on a satisfactory fail grading basis only.

U St 280 Special Problems Cr var Prereq Permission of the vice provost for undergraduate programs Independent study on topics of an interdisciplinary nature intended primarily for freshmen and sophomores.

N N Core The No Core Course on Race and Ethnicity in the United States Cr 3 Prereq Selection as an N Core student scholar. Attendance at N Core Exploration of issues of race and ethnicity in the United States.

U St 305 Carver Academy Seminar Scholars Cr 1 F Prereq U St 206 cumulative GPA 3.00 or permission of instructor Training for research writing and presentation for Carver Academy students under faculty supervision. Research project with a faculty mentor is strongly encouraged. Recitation peer mentors and program leaders for Carver Academy Freshmen students. Intended primarily for freshmen. Offered on a satisfactory fail grading basis only.

U St 306 Carver Academy Seminar Scholars Cr 1 S Prereq U St 206 cumulative GPA 3.00 or permission of instructor Preparation for graduate and professional school and career placement with continued preparation for research writing and presentation for Carver Academy students under faculty supervision. Research project with a faculty mentor is strongly encouraged. Recitation peer mentors and program leaders for Carver Academy Freshmen students. Intended primarily for juniors. Offered on a satisfactory-fail grading basis only.

U St 311 Leadership Seminar Cr 2 Prereq 115 selection as leader for Hixon Seminar or MVP Seminar For students serving as leaders under faculty supervision. Development of facilitation and leadership skills. Offered on a satisfactory fail grading basis only.

U St 336 International Perspectives in Career Development Cr 3 The course will give a student the opportunity to study career-related issues of career planning, careers and work issues in career exploration, the job search and cultural differences from international points of view. The course will prepare the student to seek career-related employment outside the United States for up to six months. Offered on a satisfactory-fail grading basis only.

U St 342 World Food Issues Fast and Present (Same as Agron 342) See Agroecy Nonmajor graduate credit.

U St 405 Carver Academy Seminar Fellows Cr 1 F Prereq U St 306 cumulative GPA 3.00 or permission of instructor Continued preparation for graduate school professional school and/or chosen profession. Research project experience with faculty members required. Recitation peer mentors and program leaders for Carver Academy Freshman and Sophomore students. Intended primarily for seniors. Offered on a satisfactory-fail grading basis only.

U St 406 Carver Academy Seminar Fellows Cr 1 S Prereq U St 306 cumulative GPA 3.00 or permission of instructor Oral and written presentation of research under faculty supervision. Recitations peer mentors and program leaders for Carver Academy Freshman and Sophomore students. Intended primarily for seniors. Offered on a satisfactory-fail grading basis only.

U St 471 Tones of Florence (Same as Music 471) See Music.

U St 490 Independent Study Cr var Prereq Permission of the vice provost for undergraduate programs Independent study on topics of an interdisciplinary nature intended primarily for juniors and seniors.

1 International Studies

Courses Primarily for Graduate Students, Open To Qualified Undergraduate Students

U St 541 Technological Innovation Social Change and Development (Same as Soc 541) See Sociology.

U St 590 Special Topics Prereq Permission of graduate college Independent study on topics of an interdisciplinary nature intended primarily for graduate students.

F Technology and Social Change (Same as SC 590F) Contact person: Eric Abbott.
Courses for Graduate Students
U St 640 Seminar in Technology and Social Change (Same as T Sc 640) See Technology and Social Change

Veterinary Clinical Sciences
Robert E. Holland Interim Chair of Department
Professors Betts Evans Greer Hoeftle Holland Hopkins Jackson McCree Merkley Noxon D Rediile Fam
Professors (Collaborators) Carpenter
Professors (Emeritus) Carruthers Clark Ennes
Associate Professors Baldwin Booth Comezzurum Fox Jorgens Knoll Miles O'Brien Reinerrenst E Rediile Fam
Associate Professors (Adjunct) Kng
Assistant Professors But Hopper McClure
Instructors (Adjunct) Aquino Castron Crandell Fisher Gordon Heile Horstman Kerah Kingbury Mason Morrison Endress Pressel presser Wilke Clinicomica Mclellan Miller

Professional Program of Study
For the professional curriculum in veterinary medicine leading to the degree doctor of veterinary medicine see Veterinary Medicine Curriculum.
The study of medicine and surgery expands the training previously received in anatomy physiology pharmacology pathology and microbiology.
The department presents coursework in animal reproduction concerning interferences with parturition diseases of the newborn and infertility.
The teaching of radiology emphasizes the production and interpretation of radiographs and the dangers of ionizing radiation to humans and animals. Alternate imaging modalities, including ultrasonography and nuclear medicine are also taught.
Hospital assignments during the fourth year provide the student an opportunity to participate in the application of clinical skills and knowledge.

Graduate Study
The department offers work for the degree master of science with major in veterinary clinical science and minor work for students majoring in other depart ment. Within the veterinary clinical sciences major the student may specialize in veterinary medicine swine production medicine surgery or theriogenology. The DVM degree or equivalent is prerequisite to a major graduate work.
Both thesis and nonthesis options are available and require the completion of a minimum of 30 graduate credits and a final examination.
Foreign language requirements may be established by the student's program of study committee.

Courses Primarily for Professional Curriculum Students
V C S 385 Seminar (Same as V D P A M 385) (1-0) Cr. R t each time taken. FS. Preparat Clasiffication in veterinary medicine. Seminars and case discussions on selected clinical subjects by staff and fourth year students of the College of Veterinary Medicine. Offered on a satisfactory-fail grading basis only.
V C S 391 Radiology (2-0) Cr 1 S 8 weeks. Preparat First year classification in veterinary medicine. Essentials of radiology and radiotography with special emphasis on radiation safety introduction to diagnostic imaging methods image interpretation and radiation therapy.
V C S 397 Principles of Surgery (6-0) Cr 6 S Preparat Second year classification in veterinary medicine. General principles of surgery of domestic animals.
V C S 398 Anesthesiology (1-0) Cr 1 S Preparat Second year classification in veterinary medicine. Anesthetic equipment agents and procedures for domestic animals.
V C S 399 Ophthalmology (1-0) Cr 1 S Preparat Third year classification in veterinary medicine. Principles and techniques of medical and surgical ophthalmology.
V C S 401 Advanced Small Animal Orthopedics (1-0) Cr 1 S Preparat Third or Fourth year classification in veterinary medicine. Elective course in advanced small animal orthopedics.
V C S 402 Electrocardiology (1-0) Cr 1 Alt. S offered 2004. V C S 444 Elective course in electrocardiology.
V C S 405 Pet Bird and Exotic Species Medicine (1-0) Cr 2 S Preparat Classification in veterinary medicine. Elective course in management and diseases of pets and birds and exotic species.
V C S 407 Feline Internal Medicine (1-0) Cr 1 F Preparat Third year classification in veterinary medicine. Elective course in feline internal medicine.
V C S 412 Veterinary Accounting and Operations Management (2-0) Cr 3 FS. Preparat Classification in Veterinary Medicine. Introduction to accounting and fiscal concepts related to the operation of a veterinary practice.
V C S 414 Companion Animal Nutrition (1-0) Cr 1 S Preparat Third or Fourth year classification in veterinary medicine. Elective course in small animal and equine nutrition.
V C S 415 Advanced Small Animal Dermatology (1-0) Cr 1 F Preparat Third or Fourth year classification in veterinary medicine. Elective course in dermatology.
V C S 419 Preceptorship in Veterinary Medical Practice Cr. 1 to 6 each time taken FS. Preparat Fourth or Fifth year classification in veterinary medicine. Course in companionship and department practices. Elective course in veterinary practice under the guidance of veterinarians in approved practice settings.
V C S 421 Husbandry and Diseases of Non traditional Species (2-0) Cr 1 Alt. F offered 2004. Preparat Second or Third year classification in veterinary medicine. Husbandry management and common diseases of rabbits guinea pigs hamsters gerbils rats and mice.
V C S 440 Introduction to Clinics (Same as V D P A M 440) (0-4) Cr R F 8 weeks. Preparat Third year classification in veterinary medicine.
V C S 443 Equine Lameness (1-0) Cr 1 S Preparat Third year classification in veterinary medicine. Orthopedic diseases of the equine.
V C S 444 Clinical Medicine I (5-0) Cr 5 F. Preparat Third year classification in veterinary medicine. Clinical diagnostic methods and consideration of diseases of domestic animals.
V C S 446 Clinical Neurology (0-40) Cr 2 Preparat Fourth year classification in veterinary medicine. Forty hours per week spent in neurology with emphasis on neurolocalization disease processes use of diagnostics in medical and surgical neurology and treatment options. Exposure to neurosurgical techniques.
V C S 448 Radiology (2-0) Cr 2 S Preparat Third year classification in veterinary medicine. Essentials of diagnostic imaging and radiology with emphasis on diagnostic interpretation and protection from radiation.
V C S 449 Junior Surgery Laboratory (1-0 4) Cr 3 F. Preparat Third year classification in veterinary medicine Preparatory laboratories and laboratories introducing the student to appropriate companion animal surgical methods and techniques.
A. Alternative Laboratory - neutering of Human Society cats and dogs.
B. Traditional Laboratory.
V C S 450 Disturbances of Reproduction (Same as V D P A M 450) (1-0 4) Cr 4 F Preparat Third year classification in veterinary medicine. General principles of diseases causing disturbances in reproduction.
V C S 451 Advanced Senior Surgery Laboratory (1-0 2 8 weeks. Preparat V D P A M 397 398 449. Advanced small animal soft tissue surgical procedures involving the abdominal cavity. Less emphasis will be placed on the thoracic cavity and head and neck injury.
A. Alternative Laboratory neutering of Humane Society cats and dogs.
B. Traditional Laboratory.
V C S 452 Clinical Dermatology Cr 2 Preparat Fourth year classification in veterinary medicine. Small animal option. Study of clinical dermatological problems via computer aided instruction case simulations and/or lectures. Clinical management of cases presented to Veterinary Teaching Hospital.
V C S 453 Small Animal Medicine I Cr 2 each time taken Preparat Fourth year classification in veterinary medicine Clinical assignment in small animal medicine.
V C S 454 Small Animal Medicine II Cr 2 each time taken Preparat Fourth year classification in veterinary medicine Clinical assignment in small animal medicine.
V C S 455 Small Animal Soft Tissue Surgery Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in soft tissue surgery.
V C S 456 Small Animal Orthopedic Surgery Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in orthopedic surgery.
V C S 457 Equine Medicine Cr 3 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in equine medicine.
V C S 458 Equine Surgery Cr 3 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in equine surgery.
V C S 459 Small Animal Overpopulation Medicine and Surgery FS SS (0-40) Cr 2 A 2 week rotation at a humane society that emphasizes the issues facing veterinarians and non veterinarian Human Society personnel in dealing with the animal population problems facing this country.
V C S 460 Radiology Cr 3 Preparat Fourth year classification in veterinary medicine. Clinical assignment in veterinary radiology.
V C S 463 Community Practice (0-40) Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Forty hours per week. Clinical experience in hospital based general practice.
V C S 464 Equine Field Services FS SS (0-40) Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in equine ambulatory practice.
V C S 465 Farrier FS SS (0-40) Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Elective clinical assignment on the principles and practices of normal and therapeutic horseshoeing and equine foot care.
V C S 466 Anesthesiology Cr 3 Preparat Fourth year classification in veterinary medicine. Clinical assignment in small animal and large animal anesthesiology.
V C S 468 Intensive Care Cr 4 Preparat Fourth year classification in veterinary medicine. Clinical assignment to provide supervision of hospital cases requiring intensive care and including emergency cases.
V C S 469 Special Senses Cr 2 each time taken Preparat Fourth year classification in veterinary medicine. Clinical assignment in ophthalmology.
V C S 470 Radiology Cr 4 each time taken Preparat Fourth year classification in veterinary medicine. Elective clinical assignment in veterinary radiology.
V C S 471 Animal Reproduction Cr 4 each time taken Preparat Fourth year classification in veterinary medicine.

330 University Studies 2003-2005
Veterinary Diagnostic and Production Animal Medicine

Robert E. Holland, Chair of Department
University Professors: McKoan
Professors: Carson Evans, Harris Hartwig
F. Holland Hopkins, Hopper, Hyde, Osweiler, Tampal
Professors (Emeritus): Kueness, Wass
Associate Professors: Agley, Halbur, Janke
Kersting, Larson, Thompson, Uhlenhopp, Yeager
Youn, Youngs, Zimmerman
Assistant Professors: Carr, Evans, O'Connor, Zhou
Assistant Professors (Adjunct): Harmon, Imerman, Knowl.
Kozak, Schwartz
Assistant Professors (Collaborators): Hurd
Instructors (Adjunct): Amen, Mahabadi, Pagnonch, Schmick, Villa

Professional Program of Study

For the professional curriculum in veterinary medicine leading to the degree of doctor of veterinary medicine see Veterinary Medicine Curriculum.

The study of veterinary diagnostic and production animal medicine provides the student with basic and advanced skills in diagnostics, reproduction, medicine, surgery, and health management of the major livestock species. Students in the fourth year of the curriculum in veterinary medicine may elect to take advanced courses in beef, dairy, swine, poultry, or sheep production medicine. Elective courses may include preceptorships in private practices, other veterinary schools, research, and disease control laboratories.

Production animal medicine emphasizes the integration of veterinary medicine with nutrition, genetics, economics, food safety, and other disciplines enabling graduates to use a broad knowledge base to support the health and production of food and fiber animals.

Graduate Study

Veterinary Preventive Medicine is a multidisciplinary program focused on the study of health and disease in populations. The various disciplines represented in the program are unified by a common approach based on the application of statistical methods to problem solving in populations. Through their research and coursework, students will learn to understand and apply a variety of disciplines, principles, and techniques to population health issues involving environmental, ecological, nutritional, genetic, infectious, or non-infectious diseases.

Graduate study in Veterinary Preventive Medicine will provide valuable skills and experience to persons interested in public health, food safety, emerging infectious diseases, zoo, or wildlife health management, and livestock health. A degree in Veterinary Preventive Medicine may be valuable for individuals considering a future in the biological or pharmaceutical industries, government regulatory agencies, public veterinary practice, or international service agencies responsible for population health.

Veterinary Preventive Medicine is an interdepartmental program administered by the Department of Veterinary Diagnostic and Production Animal Medicine (VDPAM) with participating faculty from colleges and departments across the University and collaborators from the National Animal Disease Center (USDA ARS) and the National Veterinary Services Laboratories (USDA APHIS) located in Ames, Iowa.

Both thesis and nonthesis options are available and require the completion of a minimum of 30 graduate credits for thesis and 36 graduate credits for nonthesis and final examination.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

C V8 590 Special Topics 1 to 3 Preaza Permission of instructor or department chair

A Medicine
B Surgery
C Theriogenology
D Radiology
E Anesthesiology

C V8 599 Creative Component Cr var Preaza Enrollment in nonthesis master's degree program

Courses for Graduate Students

C V8 604 Seminar Cr 1 each time taken FS


C V8 671 Advanced General Surgery (1 Cr) Cr 2 Alt S offered 2004, Preaza 441. An advanced course designed to investigate and discuss the responses of the body to surgical and anesthetic procedures.

C V8 672 Advanced Special Surgery (1 Cr) Cr 2 Alt S offered 2005-2006, Preaza 449. Advanced procedures in both clinical and research techniques in abdominal thoracic, orthopedic, cardiovascular, and neurological surgery.

C V8 676 Advanced Medicine (2 Cr) Cr 2 Alt F offered 2003, Preaza 445. Principles of general medicine. A study in depth of factors that contribute to the development of clinical signs as related to the pathogenesis of disease.


C V8 689 Research
A Medicine
B Surgery

C V8 695 Theriogenology
E Anesthesiology

Veterinary Diagnostic and Production Animal Medicine

C V8 472 Small Animal Medicine Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in small animal medicine.

C V8 473 Small Animal Surgery Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in small animal surgery.

C V8 474 Equine Medicine and Surgery Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in equine medicine and surgery.

C V8 476 Anesthesiology Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in small animal and large animal anesthesiology.

C V8 478 Intensive Care Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in intensive care.

C V8 479 Special Senses Cr var each time taken Preaza Fourth year classification in veterinary medicine. Elective clinical assignment in ophthalmology.

C V8 480 Veterinary Dentistry Cr 1 Alt F offered 2004 Preaza Third or Fourth year classification in veterinary medicine. All aspects of veterinary dentistry proximal/axial endodontics and orthodontics.

C V8 490 Independent Study Cr 1 to 5 Preaza Permission of instructor and department chair.

C V8 495 Seminar (Same as VDPAM 495) Cr 1 R S Preaza Fourth year classification in veterinary medicine. Seminars and case discussions on selected subjects by staff of the College of Veterinary Medicine and others, including student presentations. Offered on a satisfactory level grading basis only.

C V8 604 Seminar Cr 1 each time taken FS


C V8 671 Advanced General Surgery (1 Cr) Cr 2 Alt S offered 2004, Preaza 441. An advanced course designed to investigate and discuss the responses of the body to surgical and anesthetic procedures.

C V8 672 Advanced Special Surgery (1 Cr) Cr 2 Alt S offered 2005-2006, Preaza 449. Advanced procedures in both clinical and research techniques in abdominal thoracic, orthopedic, cardiovascular, and neurological surgery.

C V8 676 Advanced Medicine (2 Cr) Cr 2 Alt F offered 2003, Preaza 445. Principles of general medicine. A study in depth of factors that contribute to the development of clinical signs as related to the pathogenesis of disease.


C V8 689 Research
A Medicine
B Surgery

C V8 695 Theriogenology
E Anesthesiology

Courses Primarily for Professional Curriculum Students

VDPAM 401 Introductory Aquatic Animal Health and Medicine (Same as AECS 401) Cr 1 F 8 weeks. Introductory course with focus on fish, production, health, and medicine. Course content will help define future roles for veterinarians, producers, and service providers. Emphasis will be placed on anatomy, pathology, infectious diseases, nutrition, regulatory constraints in production, food safety, and current research. Field trip to aquaculture facility.

VDPAM 408 Poultry Medicine and Disease Prevention (Dual-listed with VDPAM 508) Cr 2 S Preaza Enrollment in College of Veterinary Medicine. Bacterial, viral, parasitic, and nutritional diseases of domestic poultry and livestock. Biosecurity, management, and disease control procedures to prevent poultry diseases.

VDPAM 409 Management Pathways in Veterinary Medicine (15) Cr 4 F 7 weeks. Introduction to veterinary operations management and marketing. Skills development related to being a valued practice associate. Self-development to assist the student in successfully balancing elements of fiscal responsibility and personal and professional success. Out of class work will be assigned.

VDPAM 411 Production Animal Medicine Cr 4 each time taken FS SS Preaza Fourth year classification in veterinary medicine. Seasonal enrollment limited. Clinical assignment in food animal production medicine and service. Emphasis on diagnosis, medicine, surgery, theriogenology, and treatment skills.

VDPAM 414 Veterinary Practice Entrepreneurship (Dual-listed with VDPAM 514) Cr 3 S To provide a formal exposure to the entrepreneurial and business skills necessary to own and operate a successful veterinary practice.

VDPAM 416 Bovine Reproduction Evaluation Laboratory (40) Cr 1 FS Preaza Third year classification in veterinary medicine. 10 students per section. Bovine rectal palpation techniques will be repeated in 4 hours. Students will also learn techniques of epidural anesthesia, artificial insemination, and ultrasonic imaging. University-owned cattle will be used.

VDPAM 420 Preceptorship in Veterinary Medical Practice Cr 1 to 6 each time taken FS SS Preaza Fourth year classification in veterinary medicine. Permission of department chair. Elective course in veterinary practice under the guidance of veterinarians in approved practice settings.

VDPAM 425 Veterinary Toxicology (Dual-listed with VDPAM 525) Cr 3 S Preaza Third year classification in veterinary medicine. A study of the disease processes in animals caused by poisons and the use of differential diagnostic and therapeutic procedures.

VDPAM 433 Beef Records Analysis Cr 1 per semester FS Preaza Classification in Veterinary Medicine. Students will learn to conduct and critically assess production and financial data using standardized Performance Analysis (SPA) in beef herds. Students will be matched with individual herds and work with producers to identify areas for improving profitability and sustainability. Enrollment in the class for multiple semesters will be encouraged.

VDPAM 437 Investigational Techniques in Dairy Production Medicine Dairy Herd Problem Identification (730) Cr 2 FS SS Preaza Fourth year classification in veterinary medicine. Seven hours rectal examination and 33 hours clinical experience per week. Course taken for two weeks at University of Wisconsin-Madison. Students will spend available time in herds for observation of cattle and work with producers to identify areas for improving profitability and sustainability. Enrollment in the class for multiple semesters will be encouraged.

VDPAM 438 Milk Quality in Dairy Production Medicine Mastitis/Milk Quality (931) Cr 2 FS SS Preaza Fourth year classification in veterinary medicine.
Veterinary Diagnostic and Production Animal Medicine

2003-2005

medicine Nine hours recitation/discussion and 31 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 439 Nutrition in Dairy Production Medicine (3 Cr 1 F 2 SS Prereq Fourth-year classification in veterinary medicine. Thirteen hours lecture, 37 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 440 Introduction to Clinicals (Same as VCS 440) (0-4 Cr 1 F 8 weeks Prereq Third-year classification in veterinary medicine

VDPM 445 Clinical Medicine (Same as VCS 445) (5 Cr 1 F, Prereq Third-year classification in veterinary medicine. 15 hours laboratory practicals. 20 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 450 Disturbances of Reproduction (Same as VCS 450) (4 Cr 1 F). Prereq Third-year classification in veterinary medicine. Endocrinology and general principles of diseases causing disturbance in reproduction.

VDPM 455 Diagnostic Laboratory Practice (3 Cr 1 F, Prereq Fourth-year classification in veterinary medicine. Practice experience in veterinary laboratories.

VDPM 477 Food Animal Medicine and Surgery (3 Cr 1 F 2 SS Prereq Fourth-year classification in veterinary medicine. Practice experience in livestock medicine.

VDPM 478 Introduction to Swine Production Medicine (4 Cr 1 F 2 SS Prereq Fourth-year classification in veterinary medicine. Two weeks practical experience in swine production medicine with emphasis on contemporary production practices in swine production and problem solving. Forty hours clinical experience per week. Assignments will include practical experiences and a practicing veterinarian and/or a production unit.

VDPM 480 Advanced Swine Production Medicine (15 Cr 1 F 2 SS Prereq 478) Two weeks advanced course in swine production medicine with emphasis on management production analyses and problem solving. Forty hours clinical experience per week. Assignments will include practical experiences with a practicing veterinarian and/or a production unit.

VDPM 483 Advanced Beef Production Medicine (15 Cr 2 F Prereq 481 Two weeks advanced course in beef production medicine with emphasis on management production analyses and problem solving. Forty hours clinical experience per week. Assignments will include practical experiences with a practicing veterinarian and/or a production unit.

VDPM 484 Introduction to Dairy Production Medicine (15 Cr 2 F Prereq Fourth-year classification in veterinary medicine. Two weeks introductory topics in dairy production medicine with emphasis on monitoring disease prevention, production economics and disease prevention.

VDPM 485 Dairy Production Medicine Preceptorship (0-4 Cr 1 F 2 SS Prereq 484 Two weeks advanced course in dairy production medicine with emphasis on herd management production analysis and problem solving. Forty hours clinical experience per week. Assignments will include practical experiences with a practicing veterinarian and/or a production unit.

VDPM 486 Introduction to Small Ruminant Production Medicine (15 Cr 2 F Prereq Fourth-year classification in veterinary medicine. Two weeks introductory topics in small ruminant production medicine with emphasis on monitoring disease prevention, production economics and disease prevention. Fifteen hours recitation/discussion and 20 hours clinical experience per week. Assignments will include practical experiences with a practicing veterinarian and/or a production unit.

VDPM 487 Livestock Disease Prevention (3 Cr 1 F 3 F Prereq Fourth-year classification in veterinary medicine. Applications of microbiological and immunological procedures to the diagnosis of infectious and immunologically mediated diseases.

VDPM 488 Laboratory in Clinical Microbiology (3 Cr 1 F 2 SS Prereq Fourth-year classification in veterinary medicine. Applications of microbiological and immunological procedures to the diagnosis of infectious and immunologically mediated diseases.

VDPM 489 Issues in Food Safety (Same as AnS 489) FS HN 489 HRI 489 (1 Cr 1 Alt S. Offered 2005 Prereq Credit or enrollment in FS HN 101 or 227 or HRI 233 FS HN 419 or 420 FS HN 403 Capstone seminar for the food safety minor. Course discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.

VDPM 490 Independent Study (1 to 5 SS Prereq Permission of department chair.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

VDPM 501 Principles of Toxicology (Same as Tox 502) 5 Zool 501 (3 Cr 3 SS Prereq BMIB 404 or equivalent. Prerequisites: Toxicology governing enzyme entry into the body and effects of toxins on living systems. Includes toxicokinetics and forensic compounds, metabolism, and toxicological evaluation. Electrophoresis and methods used in toxicology including safety procedures, calibration, and data analysis. Mutagenicity tests, cell culture, genotoxicity, and behavioral toxicology. 20 hours practical experience in veterinary medicine. Two weeks lecture, 37 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.


VDPM 514 Veterinary Practice Entrepreneurship (Dipl. with 411) (3 Cr 3 SS Prereq Graduate in Veterinary Medicine. To provide a foundation for exposure to the entrepreneurial and business skills necessary to own and operate a successful veterinary practice.

VDPM 522 Principles of Epidemiology and Population Health (Same as VPM 522) (3 Cr 3 SS Prereq Micro 310 or equivalent Epidemiology and ecology of disease in populations. Disease causality and biostatistics with an emphasis on issues in disease prevention and eradication.

VDPM 526 Veterinary Toxicology (Dipl. with 426) (Same as Tox 526) (3 Cr 3 SS Prereq Permission of instructor. A study of the disease processes in animals caused by toxins and the use of differential diagnostic and therapeutic procedures.

VDPM 537 Applied Statistical Methods in Population Studies (3 Cr 1 Alt F. Offered 2003 Prereq 401 Measurements of agreement in veterinary medicine. Two weeks practical experience in veterinary medicine. Two weeks lecture, 37 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 542 Introduction to Molecular Biology Techniques (Same as Zool 542) See Zoology.

VDPM 546 Clinical and Diagnostic Toxicology (Same as Tox 546) (3 Cr 0 or 0 Prereq 1 to 3 each time taken FS SS Prereq DVM degree or 526 Advanced study of current problems and issues in toxicology. Prerequisites: Toxology governing enzyme entry into the body and effects of toxins on living systems. Includes toxicokinetics and forensic compounds, metabolism, and toxicological evaluation. Electrophoresis and methods used in toxicology including safety procedures, calibration, and data analysis. Mutagenicity tests, cell culture, genotoxicity, and behavioral toxicology. 20 hours practical experience in veterinary medicine. Two weeks lecture, 37 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 551 Postmodern Veterinary Diagnostic Laboratory (0 to 0 Cr 0 to 0 Prereq 1 to 3 each time taken FS SS Prereq DVM degree or 526 Advanced study of current problems and issues in toxicology. Prerequisites: Toxology governing enzyme entry into the body and effects of toxins on living systems. Includes toxicokinetics and forensic compounds, metabolism, and toxicological evaluation. Electrophoresis and methods used in toxicology including safety procedures, calibration, and data analysis. Mutagenicity tests, cell culture, genotoxicity, and behavioral toxicology. 20 hours practical experience in veterinary medicine. Two weeks lecture, 37 hours clinical experience per week. Course taken for two weeks at University of Wisconsin Madison on a space availability basis. Production animal health, veterinary pathology, infectious disease prevalence. Students have the opportunity to participate in a successful veterinary practice.

VDPM 555 Neurobehavatorial Toxicology (Same as Tox 555) (3 Cr 3 SS Prereq Permission of instructor. A study of the disease processes in animals caused by toxins and the use of differential diagnostic and therapeutic procedures.

VDPM 590 Special Topics (1 to 3 SS Prereq Permission of instructor. Topics in medicine surgery theranostics. Beef swine dairy and sheep production medicine.

VDPM 599 Creative Component (C 1 F 2 SS Prereq Enrollment in nonthesis master's degree program.

Courses for Graduate Students

VDPM 650 Swine Diagnostic Medicine (1 Cr 1 F 2 SS Prereq DVM degree permission of instructor. A detailed study of swine diseases emphasizing the pathogenesis and diagnosis of swine respiratory enzootic reproduction metabolic and septicemic diseases.

VDPM 651 Disease Dynamics in Swine Production Medicine (2 Cr 1 F Prereq DVM degree permission of instructor. A detailed study of swine diseases emphasizing the pathogenesis and diagnosis of swine respiratory enzootic reproduction metabolic and septicemic diseases.

VDPM 652 Analytical Methods in Swine Production Medicine (2 Cr 2 SS Prereq DVM degree permission of instructor. An overview of experimental and observational study designs, analytical techniques and data interpretation emphasis on methodologies pertinent to swine production medicine.

VDPM 653 Clinical Trials in Production Medicine (1 SS Prereq DVM degree permission of instructor. Application of clinical trials in production.
Veterinary Microbiology & Preventive Medicine

Associate Professors: Griffith Holland Mxion Philips Thacker Ullehopp Wannemuehler Yoon Zimmerman
Associate Professors (Collaborators): Frey Harp
Panigy Richt Sharma Zuerlein
Assistant Professors: Cornell Davis
Assistant Professors (Adjoint): Flaming
Assistant Professors (Collaborators): Anderson Currier Halling Hasse Hurd Sacco Stibel Stanton Waters Wesley
Instructors (Adjoint): Brown
Instructors (Collaborators): Schlender

The Department of Veterinary Microbiology and Preventive Medicine offers instruction in the areas of bacteriology, mycology, virology, immunology, epidemiology, and public health at the graduate level. Microbiologic, immunologic, regulatory, and preventive medical aspects of infectious diseases of animals are emphasized in courses for students in veterinary education.

Professional Program of Study

The professional curriculum in veterinary medicine leading to the degree of doctor of veterinary medicine is summarized in the Veterinary Medicine curriculum. V Med 301, Professional Orientation (1.0 Cr) R F 8 weeks. Prereq: First year classification in veterinary medicine. An orientation to the College of Veterinary Medicine at ISU and the veterinary profession.

V Med 403 International Preceptorship (0.40) Cr 1-12 each time taken. FS SS Prereq: Second year classification in veterinary medicine. A preceptorship program provides opportunities for students to be involved in applied clinical production and research experiences in international locations. The course consists of 40 hours per week experiential learning opportunities.

V Med 404 Orientation for International Experience (2.0 Cr) S 8 weeks. Prereq: Classification in veterinary medicine. A preceptorship orientation for students abroad. Cultural considerations for the study abroad experience and a conversational language introduction. Out of class work will be assigned.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

V Med 593 International Preceptorship (0.40) Cr 1-12 each time taken. FS SS Prereq: Admission to the Graduate College. International preceptorships and study abroad programs. The course will provide opportunities for students to be involved in clinical training and the ability to address microbial based social, ethical, and environmental problems. Graduates acquire effective written and oral communication skills. Topics include: the role of research and teaching in the medical and veterinary sciences. The course also focuses on the role of science in society. The course consists of 40 hours per week experiential learning opportunities.

Veterinary Microbiology and Preventive Medicine

Donald L. Reynolds, Interim Chair of Department

Distinguished Professors: Cheville Ross Roth

Professors: Carpenter Dickson Moon Platt Reynolds Rosenbush Thoen

Professors (Collaborators): Donham Larsen Mengell Nystrom Dean O Berry Smolen Schultz Tabataba

Distinguished Professors (Emertus): Beran Kaebelle Switzer

Professors (Emertus): Hogle Kramer

Science courses. Emphasis on early integration of basic and clinical science concepts.

V MPM 380 Veterinary Immunology (2.0 Cr) 2 S Prereq: First-year classification in veterinary medicine. Structure and function of the immune system in animals.

V MPM 386 Veterinary Microbiology (3.0 Cr) 5 F Prereq: Second year classification in veterinary medicine. Bacteria and fungi of veterinary importance with emphasis on mechanisms of disease production and laboratory diagnostic procedures.

V MPM 387 Veterinary Virology (3.0 Cr) 3 S Prereq: Second year classification in veterinary medicine. The nature and ecology of animal viruses. Pathogenesis of viral diseases. The role of immune response in pathogenesis and immunity to viral diseases.

V MPM 388 Public Health (3.0 Cr) 3 S Prereq: Second year classification in veterinary medicine. Fundamental epidemiology. Food safety, occupational health and zoonoses.

V MPM 390 Topics in Veterinary History (2.0 Cr) 1 S 8 weeks. Significant persons, noteworthy events and pivotal scientific discoveries in the course of the development and advancement of veterinary medicine from ancient times to the present.

V MPM 409 Infectious Diseases of Captive Wild Animals (1.0 Cr) 1 F Prereq: Second year classification in veterinary medicine. Infectious diseases of birds (bacterial, viral and mycotic) of non-human primates, birds, ruminants, cold-blooded animals, marine mammals, and carnivores.

V MPM 436 Infectious Diseases and Preventive Medicine (2.0 Cr) 2 F Prereq: Third year classification in veterinary medicine. The role of epidemiology laboratory diagnosis, regulatory control, and preventive medicine aspects of the infectious diseases of small domestic animals.

V MPM 437 Infectious Diseases and Preventive Medicine (3.0 Cr) 3 S Prereq: Third year classification in veterinary medicine. The role of epidemiology laboratory diagnosis, regulatory control, and preventive medicine aspects of the infectious diseases of swine, sheep, goats, cattle, and horses.

V MPM 486 Laboratory in Public Health (Cr 1 each time taken. FS SS Prereq: Fourth-year classification in veterinary medicine. Data collection, lectures, exercises, and field trips related to veterinary public health.

V MPM 490 Independent Study (1.0 Cr) FS SS Prereq: Permission of instructor and department chair.

V MPM 494 Zoo Preceptorship (Cr 1 each time taken. FS SS Prereq: Fourth year classification in veterinary medicine. Elective course in zoo veterinary practice under guidance of approved veterinarians.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

V MPM 502 Microbial Genetics (Same as Micro 502) See Microbiology.

V MPM 504 Microbial Physiology (Same as Micro 504) See Microbiology.

V MPM 520 Medical Immunology 1 (4-8 Cr) 1-4 Prereq: Micro 310 or V MPM 286, 3 credits in biochemistry, immunology, or biochemistry. Nature of the immune system and its role in health and disease. Credit for either 520 or 575 but not both may be applied toward graduation.

V MPM 522 Principles of Epidemiology and Population Health (Same as VDPA 522) (3-0 Cr) 3 S Prereq: Micro 310 or equivalent. Behavioral sciences and the role of disease in population health. Disease causality and epidemiologic investigations. Issues in disease prevention and control.


V MPM 540 Livestock Immunogenetics (Same as C R 540) See Animal Science.
Veterinary Pathology

Claire B. Andreassen, Chair of Department

Distinguished Professors

Cheville

Professors

Ackermann Carson Haynes Hopper
Hylde Moon Myers Osborne

Professors (Collaborators)

Brodgen Meador Murray

University Professors (Emeritus)

Klug

Professors (Emeritus)

Daene Green Hagemoser Holter Jesus Ledet Miller Nyo Seaton Stahr

Associate Professors

Andreasen Bender Halbur
Janke Javneren Larson Sorden Yaeger

Assistant Professors

Beetem Brockus Felies Hostetter Jones

Assistant Professors (Collaborators) Palmer

Instructors (Adjunct) Greenlee Grubor Jones Meyernoh Preast

Lecturers Danielson Mills Vermeer

Professional Program of Study

For the professional curriculum in veterinary medicine leading to the degree of doctor of veterinary medicine see Veterinary Medicine Curriculum

The Department of Veterinary Pathology offers a systematic study of basic disease mechanisms with emphasis on the changes in cells, tissues, organs, and body fluids associated with disease. The theory and practice of veterinary pathology, veterinary clinical pathology, veterinary parasitology, veterinary toxicology, and related disciplines provide the basis for accurate diagnosis and a rational approach to the treatment and prevention of animal diseases.

Graduate Study

The department offers work for the degree of Master of Science and Doctor of Philosophy with a major in veterinary pathology. As an option, students within the veterinary pathology major may choose an area of specialization in cellular and molecular pathology, veterinary clinical pathology, veterinary parasitology, veterinary toxicology, or veterinary bacteriology. The master of science degree is available on a thesis or non-thesis basis in the veterinary pathology major with or without an area of specialization.

Graduates have a broad understanding of veterinary pathology and related disciplines. They are able to communicate with clinicians, other scientists, and other colleagues in scientific matters, and with the general public on science policy matters that relate to veterinary pathology.

Graduates are able to address complex problems facing the agricultural and biomedical sciences and are able to make appropriate diagnoses and investigations of animal diseases. They can convey ethical, social, legal, and environmental issues, and are skilled in carrying out research, communicating research results, and writing concise and persuasive grant proposals.

A minor in veterinary pathology requires a minimum of 12 graduate hours at the M.S. level and 12 graduate credits at the Ph.D. level. These credits must be from departmental courses. Additionally, a faculty member from the department must be a member of the student's program of study committee.

A veterinary degree is required for veterinary medicine or equivalent is required for the major in veterinary pathology and veterinary clinical pathology. Other specializations do not require the veterinary degree. A minimum score of 550 is required on the TOEFL examination for students whose native language is not English. Scores on the standardized Graduate Record Examination (GRE) General Test are required of students not having a veterinary degree from the United States or Canada. The GRE General Test is strongly recommended for all other applicants. The foreign language exam will be determined by the student's program of study committee. The approval of the departmental chair The Graduate English Examination is a graduate college requirement for native English speakers.

The M.S. thesis degree in veterinary pathology with or without an area of specialization requires a minimum of 30 full units. Following completion of all other requirements, a comprehensive final examination is administered covering all graduate work including the thesis. The examination is typically oral, but a written component may be specified by the program of study committee. The degree candidate must submit a thesis, including at least one manuscript suitable for publication to the major professor at least one week prior to the final examination. The departmental requirement for graduate courses includes 3 credits of basic biological sciences (biochemistry, genetics, cell biology), 4 credits of statistics, 4 credits of a course in systematic pathology (from V Ph 640) and 1 credit for postmortem pathology (V Ph 651). 1 credit of seminar (V Ph 605) and a significant number of research credits (V Ph 699).

The M.S. nonthesis degree in veterinary pathology will or without an area of specialization requires a minimum of 40 graduate credits including at least 10 graduate credits earned outside the department. Every nonthesis major's degree program requires evidence of individual accomplishment demonstrated by completion of a creative component, special report, scientific study, or a minimum of 3 credits of such independent work (V Ph 559) and a practical diagnostic examination (V Ph 606) corresponding to the area of specialization required on every program of study. The final examination is comprehensive and consists of written and oral questions. The departmental requirement for graduate courses includes those for the M.S. thesis degree plus additional courses corresponding to the area of degree emphasis of specialization. Contact the department for a more complete list of requirements and information on areas of specialization.

The Ph.D. degree in veterinary pathology will or without an area of specialization requires a minimum of 72 graduate credits including at least 12 graduate credits earned outside the department. This degree is encouraged, but not required. The preliminary examination consisting of written and oral components is comprehensive and not restricted to the content of graduate courses. The degree candidate must submit a dissertation including at least two manuscripts suitable for publication to the major professor at least one week prior to the final examination. The final examination is primarily a defense of the dissertation but may include questions on other areas of specialized knowledge.

The department also offers a combined DVM/Ph.D. program designed for completion of courses for the Ph.D. degree in Veterinary Pathology simultaneously with study in the professional curriculum in the College of Veterinary Medicine. Contact the department for a more complete list of requirements for the Ph.D. degree and information on areas of specialization.

Minor work is recommended in other departments in the College of Veterinary Medicine or departments or programs in other colleges. The department participates in the interdepartmental program in immunology and the interdepartmental major in toxicology (See Index).

Courses open for nonmajor graduate credit 478

Courses Primarily for Professional Curriculum Students

V Ph 342 General Pathology (Dual listed with 542) (3) Cr. 2 or 3 S 8 weeks Offered second half semester only. V Ph 699 First year classification in veterinary medicine Basic pathology with emphasis on disease in animals.

V Ph 372 Systemic Pathology (2-3) Cr 3 F Ph 342 Response to injury by each body system.

V Ph 376 Veterinary Parasitology (Dual listed with 576) (3) Cr 4 F Ph 432 Second-year classification in veterinary medicine Parasitic diseases of domestic animals and their control.

V Ph 377 Case Study III (4) Cr 2 F Ph 342 Second year classification in veterinary medicine Clinical applications where the basic sciences taught concurrently in the fall, the second year in veterinary medicine.

V Ph 401 Basics of Medical Terminology (1) Cr 1 F 8 weeks offered second half semester only. Discussion of prefixes, suffixes, and roots (mostly from Latin and Greek) that comprise medical terms.

V Ph 408 Clinical Pathology Interpretation (1-0) Cr 1 5 Ph 425 Interpretation of laboratory data.
V Ph 409 Introduction to Veterinary Cytology (1-0) Cr 1 S Prereg: Second or third year classification in veterinary medicine Description and interpretation of cellular preparations from tissues and body fluids
V Ph 410 Llama Medicine (1-0) Cr 1 S Prereg: Second or third year classification in veterinary medicine Introduction to basic camelid medicine including anatomy, behavior, restraint, handling and husbandry of these common diseases surgical conditions and anesthesia protocols
V Ph 422 Special Pathology (3-3) Cr 4 S Prereg 372 Pathogenesis of diseases in domestic animals
V Ph 425 Clinical Pathology (1-0) Cr 3 F Prereg 372 Principles of clinical hematology and clinical chemistry in domestic animals
V Ph 456 Necropsy Laboratory Practicum Cr 1 each time taken Prereg: Fourth year classification in veterinary medicine Practicum in postmortem examination and diagnosis
V Ph 457 Clinical Pathology Laboratory Practicum Cr 1 each time taken Prereg: Fourth-year classification in veterinary medicine Methodology in clinical chemistry hematology and cytology practice in interpretation of laboratory data
V Ph 478 Global Protozoology Molecular Biology of Protozoa (Dual listed with 578 same as Ent 478) (2-1) Cr 3 F Prereg: Permission of instructor Analysis of cellular systems molecules and organelles of pathogenic protozoan parasites Emphasis is placed on processes and systems that are unique to protozoa important to understanding vector-parasite host interaction or are targets of disease prevention/treatment programs for international disease control Nonmajor graduate credit
V Ph 490 Independent Study Cr 1-4 Prereg: Permission of instructor and department chair

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students
V Ph 542 General Pathology (Dual listed with 342) (3-3) Cr 2 S 8 weeks offered second half semester only Prereg: Graduate classification and BMS 330 or Zool 322 or graduate credit Basic pathology with emphasis on disease in animals
V Ph 549 Diagnostic Parasitology Laboratory (0-0) Cr 0 S 9 Cr 1 to 3 FS SS Prereg: 376 or 576 A laboratory experience in the technical and applied aspects of veterinary parasitology
V Ph 549 Clinical Pathology Laboratory (0-0) Cr 1 each time taken F Prereg: 457 Laboratory procedures and clinical interpretations with emphasis on hematology cytology and clinical chemistry Offered on a satisfactory-fail grading basis only
V Ph 550 Surgical Pathology Laboratory (0-0) Cr 1 to 3 each time taken FS SS Prereg: 422 570 or 571 Diagnosis of lesions in biopsy specimens classification of neoplasms Course includes rotation through departmental biopsy service and review of selected cases from departmental archives Offered on a satisfactory-fail grading basis only
V Ph 551 Postmortem Pathology Laboratory (0-0) Cr 1 to 3 each time taken FS SS Prereg: 422 542 or 422 Necropsy techniques of animals with emphasis on gross and microscopic lesions and diagnosis Offered on a satisfactory-fail grading basis only
A Veterinary Pathology
B Veterinary Diagnostic Laboratory
V Ph 554 Ethics in Scientific Research and Writing (1-1) Cr 1 Alt SS offered 2004 Prereg: Prerequisite classification Ethical conduct in biomedical research criticism writing and adherence to regulations Offered on a satisfactory-fail grading basis only
V Ph 570 Systemic Pathology I (2-4) Cr 1 to 4 Alt F offered 2004 Prereg 342 or 542 Pathology of the respiratory reproductive endocrine musculoskel
18 credits selected from women's studies core courses (W S)

A Required core courses
W S 201 301 and 401 or 402. Students must also choose between a thesis (W S 490 (3 cr) or an internship by W S 481 (3 cr)
B The remaining 6 credits should be chosen from the Women's Studies core courses (W S 450 and 350 may be taken more than once)
C No more than 6 credits of W S 490 may be counted toward the W S major

15 credits selected from W S cross-listed courses or W S core courses

Women's Studies majors must also declare either a minor or a second major in a different program or department.

English proficiency required.

Undergraduate students may minor in Women's Studies by taking 15 semester hours of Women's Studies courses, including W S 201 301 and one 400 level core Women's Studies course plus 6 additional credits of core or cross-listed courses.

Because course listings vary from year to year, any student interested in a minor or major in Women's Studies should consult their faculty advisor for a list of courses.

Graduate Study
Courses open for nonmajor graduate credit: 301 321 322 330 340 350 360 394 401 402 422 and 450

Courses Primarily for Undergraduate Students
W S 201 Introduction to Women's Studies (3 cr) 3 F S Introduction to the interdisciplinary field of Women's Studies. Contemporary status of women in the U.S. and worldwide from a socio-economic-historical-political-philosophical-literary-perspectives. Analysis of intersection of gender race and class and sexuality topics include work health sexuality and violence. Background for other courses in the program.

W S 203 Lesbian Cultures and Communities (3 cr) 3 S An exploration of contemporary and historical lesbian cultures and communities in the United States. Examining the roots and politics of conflicts and perspectives on women and gender. Nonmajor graduate credit.

W S 258 Human Reproduction. (Same as Zool 258) See Zoology.

W S 301 International Perspectives on Women and Gender (3 cr) 3 May be repeated for up to 6 credits. F Spring, 201 or 3 credits in Women's Studies at the 300 level. Study of women in a range of cultures depending on faculty expertise. Special emphasis on women in development seen in postcolonial context. Nonmajor graduate credit.

W S 321 Economics of Discrimination. (Same as Econ 321) See Economics. Nonmajor graduate credit.

W S 323 Gender and Communication. (Same as Sp Cm 323) See Speech Communication. Nonmajor graduate credit.

W S 327 Sex and Gender in Society. (Same as Soc 327) See Sociology.

W S 328 Sociology of Mensculinity and Manhood. (Same as Soc 328) See Sociology.

W S 336 Women and Religion. (Same as Relg 336) See Religious Studies. Nonmajor graduate credit.

W S 340 Survey of Women's Literature. (Same as Eng 340) See English. Nonmajor graduate credit.

W S 345 Women and Literature. Selected Topics. (Same as Eng 345) See English. Nonmajor graduate credit.

W S 346 Psychology of Women. (Same as Psych 346) See Psychology.

W S 350 African American Women. (Same as Afr Am 350) 3 S Prerequisite: 201 or Afr Am 201 or 3 credits in Women's Studies or African American Studies at the 300 level and above. Economic, social, political and cultural roles of African American women in the U.S. Includes literary and artistic expression. Myths and realities explored. Nonmajor graduate credit.

W S 374 Women in the Ancient Mediterranean World. (Same as C St 374) See Classical Studies.


W S 383 Women in Science and Engineering. (Same as Zool 383) See Zoology.

W S 386 Women in Politics. (Same as Pol S 385) See Political Science.

W S 388 History of Women in America. (Same as Hist 388) See History.

W S 394 Women in Art. (Same as Art H 394) See Art History. Nonmajor graduate credit.

W S 401 Feminist Theories. (3 cr) C F Prereq 201 or 3 credits in Women's Studies at the 300 level and above. Current theories of feminism. The feminine and the sexual difference. Topics in race class sexuality and ethnicity as they are addressed in diverse feminisms. May include readings in black postcolonial psychoanalytic and postmodern theory. Nonmajor graduate credit.

W S 402 Feminist Research Methodologies and Scholarship. (3 cr) C S Prereq 201 and 301.

Introduction to feminist research methods and the history and influence of feminist research. Examination of scholarly works by U.S. and international feminists. Nonmajor graduate credit.

W S 422 Women Men and the English Language. (Same as Eng 422) See English. Nonmajor graduate credit.

W S 430 Seminar in International Studies. (Same as Int'l 430) See International Studies.

W S 444 Sex and Gender in Cross-cultural Perspective. (Dual listed with 544 same as Anthr 444) See Anthropology.

W S 450 Topics in Women's Studies. (3-0 cr) C 3 each time taken maximum of 6. S Prereq 201 or 3 credits in Women's Studies at the 300 level and above. Special and/or experimental topics in a specific discipline e.g. women and education, women and religion, and the law, women and science. Nonmajor graduate credit.

W S 490 Independent Study. C 1 to 3 each time taken. maximum of 6. Prereq Any two courses in Women's Studies. permission of instructor. Consultation with the Women's Studies Program Director. Independent study on a topic in Women's Studies.

W S 491 Senior Internship. (3 cr) F S SEN. Prereq Senior classification. Internship designed to provide an application of Women's Studies principles and methods in a workplace. To be arranged with an internal or external employer and conducted under the supervision of a member of the Women's Studies faculty.

W S 499 Senior Thesis. (3 cr) F S SEN. Prereq Senior classification. Senior theses to be independently researched and written under the supervision of a member of the Women's Studies faculty.

Courses for Graduate Students, Open To Qualified Undergraduate Students
W S 523 Gender Roles and Sport. (Same as Ex Sp 523) See Health and Human Performance.

W S 528 Sociology of Gender. (Same as Soc 528) See Sociology.

W S 544 Sex and Gender in Cross-cultural Perspective. (Dual listed with 444 same as Anthr 544) See Anthropology.
Zoology and Genetics

www.mbb.iastate.edu/html/index.html

M Duane Enger, Chair of Department

University Professors

Dolphin

Professors

Ackerman Atherly Brendel Campbell Drewes Enger Henderson Howell J Johansen K Johansen Lee Mayfield Myers Peterson Schnell Sheney Veyts

Professors (Collaborators)

Haydon Link Palmer Shearmaker

Distingushed Professors (Emeritus)

Tauber Ulmer

University Professors (Emeritus)

Steadler

Professors (Emeritus)

Bishop Brown Buttry Hollandes Imsarya Jeske Miller Mchughnor Pattie Pollak Reamsson Robison Wylton

Associate Professors

Ambrosio Becraft Buss Dobbs Emery Farrar Ford Giron Gu Ingebretsen Janzen McCloskey Minion Naylor Peterson Powell Sakaguchi Viles Viek

Associate Professors (Adjunct)

D Viek

Associate Professors (Collaborators)

Mahajan Tucker

Associate Professors (Emeritus)

Shaw

Assistant Professors

Adams Chou Dorman Powell-Coffman Powell

Assistant Professors (Adjunct)

Bronkowkski Coffman Pleasant

Instructors (Adjunct)

Doyle Leshem Ackerman Miller

Instructors (Collaborators)

Bowman Sime

Undergraduate Study

The department offers majors in genetics, zoology and co-administers biology. The zoology and genetics majors are available to students in both the College of Agriculture and the College of Liberal Arts and Sciences. The programs for these majors are listed below and under the Curricula in Agriculture and 'College of Liberal Arts and Sciences. College requirements can be found under Curricula in Agriculture and Curriculum in Liberal Arts and Sciences. The department offers minors in both genetics and zoology. B S M S programs are available in which a student, with proper planning, can complete the requirements for both bachelor's and master's degrees in five years. Students interested in the B S or M S program must apply during their sophomore year.

Training in genetics, zoology or biology may lead to employment in teaching, research, or any of a variety of health-related professions. In most cases students should plan on continuing their education in graduate or professional school. Students with the B S degree may expect to find employment in the biotechnology, health or food industries. Recent graduates have also developed careers in conservation biology, technical writing, science journalism, technical sales, business and genetic counseling.

The required course work and associated electives are designed to provide students with knowledge of the basic biological sciences, mathematics, chemistry and physics. This background is essential for professions involving modern biological sciences. As part of these courses, students develop skills in problem solving, critical thinking, writing, research related activities and an introduction to biological professions.

The respective communications and English proficiency requirements of both colleges are met by an average of C or better in Eng 104 105 or 105H and an English writing course. The lowest grade acceptable in any of these courses is C. Students in the College of Agriculture must also achieve a C or better in an oral communications course.

A grade of C or better is required in all biological science courses within the majors with a cumulative GPA of at least 2.0.

Specific entrance requirements for medical and health-related professions are established by the professional schools. Students interested in fulfilling preprofessional requirements for such professions as cytotechnology, dental hygiene, dentistry, human medicine, medical technology, nursing, optometry, pharmacy, physical therapy, physician assistant, and veterinary medicine may major in either genetics or zoology while fulfilling the preprofessional requirements (See Preprofessional Study).

Genetics

Genetics is the scientific study of heredity. The understanding of heredity is fundamental to all biological sciences. The department offers a full range of instruction in all aspects of genetics from the molecular genetics of microorganisms to population genetics.

In addition to basic degree requirements listed in the Curricula in Agriculture or the Curriculum in Liberal Arts and Sciences, genetics majors must satisfy the following requirements:

1. Biol 201, 202, 202L 301 301L 302L 302L 303 and Micro 302

2. Gen 110, 410, 411, 411L, and either 452 or 563

3. Eleven credits of calculus and statistics including at least one course in each

4. Three years of chemistry and biochemistry

5. One year of general college physics

6. Nine credits for the degree in the College of Agriculture and 6 credits for the degree in the College of Liberal Arts and Sciences. Support electives chosen from an approved list

7. Majors in the College of Liberal Arts and Sciences must take one course that involves both humanities and biology such as history of science or bioethics. This course may also count toward a college group requirement. A list of acceptable courses is available from the departmental office.

8. Majors in the College of Agriculture must include Biol 1A Ecol 312 in their program

The department offers a minor in genetics that may be earned by completing BIOL 201, 201L, 301, 301L, 302, 302L, Gen 410, 411 and 451. A Genetics major may not double major or minor in Biology.

Zoology

The study of zoology includes all aspects of animal life. The department offers instruction in a wide range of zoological subjects ranging from the structure and function of cells to the behavior of animals and their populations.

In addition to the basic degree requirements listed in the Curricula in Agriculture and the Curriculum in Liberal Arts and Sciences, zoology majors (including those preparing for professional programs in medical and other health related fields) must complete satisfactorily the following requirements:


2. Zoology electives 17 credits in zoology at the 300 level or above are required including seven credits at the 400 level or above and two laboratory courses with at least one at the 400 level. Biol 312 333 and Gen 462 or Gen 563 are also acceptable electives. A maximum of 4 credits of 490R and no credits of 490S and 490U may be used toward the 17 credits however only 2 credits of 490R may be applied to the requirement of seven 400 or above credits and no 490R credits can be applied to the laboratory requirement. The 17 credits must also include at least one organizational course

3. Two years of chemistry or biochemistry totaling 15 credits to include one year of general chemistry and one semester of organic chemistry with laboratory

4. Eleven credits of calculus and statistics including at least one course in each

5. One year of general college physics

6. Majors in the College of Liberal Arts and Sciences must take one course that involves both humanities and biology such as history of science or bioethics. This course may also count toward a college group requirement. A list of acceptable courses is available from the departmental office.

7. Majors in the College of Agriculture must take 6 credits of agricultural biology electives. This requirement is satisfied by passing six credits at the 300 level or above from the departments of Animal Ecology, Animal Science or Entomology.

8. Majors in the College of Agriculture must include Biol 1A Ecol 312 in their program.

Majors are encouraged to take advantage of special opportunities available in summer courses at the Iowa Lakeside Laboratory at Lake Okoboji and at the Gulf Coast Research Laboratory between Mississippi (See Index). Generally these credits may be applied toward the zoology elective requirement. Interested students should consult their advisors.

The department offers a minor in zoology which may be earned by receiving credit for Biol 201, 201L, 301, 302, 302L, Zool 555, and 3 additional zoology credits taken at the 300 level or above. A Zoology major may not double major or minor in Biology.

Information of the faculty programs, staff and course requirements for the genetics or zoology major can be found at the Zoology and Genetics web site www.mbb.iastate.edu/html/index.html

Graduate Study

The department offers work for the master of science and doctor of philosophy degrees.

Students entering any graduate major or program in the department need a sound background in the biological, physical and mathematical sciences and must be committed to research. Applicants are required to submit Graduate Record Examination (GRE) scores for both the aptitude and the biology advanced tests.

Many of the graduate students in the department are in interdisciplinary graduate majors or interdepartmental graduate programs such as Ecology and Evolutionary Biology, Biological and Computational Biology, Immunology, Interdisciplinary Genetics, Molecular, Cellular and Developmental Biology and Neuroscience.
Zoology and Genetics

The requirements for the genetics major can be found under Genetics in the separate interdisciplinary listing.

Specific course requirements for advanced degrees depend largely upon previous training and experience in the major area of specialization. There is no foreign language requirement in the use of written English is required. All graduate students must acquire teaching experience, usually in laboratory courses as part of their graduate program. All graduate students will participate in a journal club seminar and a research seminar in an area of interest each academic year.

Courses open for non-major graduate credit. Zool 555 403i 404i 405i 419i 420i 428i 454i 456i 459i 482i 464i 461i 462i 495i 2003-2005

Genetics (Gen)

Courses Primarily for Undergraduate Students

Gen 110 Genetics Orientation (1-0) Cr 0.5 F 1st 8 weeks Orientation to the area of genetics. For students considering a major in genetics. Specializations and career opportunities. Offered on a satisfactory fail grading basis only.

Gen 260 Human Heredity and Society (3-0) Cr 3 F Prereq 1 semester of college biology or Anth 202 A survey course in genetics for non-biology majors interested in heredity and its importance and implications to self and society. Not recommended for those intending to take advanced courses in genetics. Credit for graduation will not be allowed for more than one of the following: 280, 301, 320, Biol 301 and 301L and Agron 320.

Gen 298 Cooperative Education Cr R FS SS Prereq Permission of department cooperative education coordinator. Sophomore classification. Required of all cooperation education students. Students must register for this course prior to the beginning of the next semester. Credit for graduation will not be allowed for more than one of the following: 280, 301, 301L, 320, Biol 301 and 301L and Agron 320.

Gen 301 Principles of Genetics (Same as Biol 301) See Biology. Credit for graduation will not be allowed for more than one of the following: 280, 301, 301L, 320, Biol 301 and 301L and Agron 320.

Gen 301L Principles of Genetics Laboratory (Same as Biol 301L) See Biology.

Gen 308 Biotechnology in Agriculture, Food, and Human Health (Dual listed with 508i) (3-0) Cr 3 F SS Prereq Biol 201 and 202. Scientific principles and techniques in biotechnology. Products and applications in agriculture, food and human health. Ethical, legal, and social implications of biotechnology. A research paper is required for graduate credit.

Gen 320 Genetics: Agriculture and Biotechnology (Same as Agron 320) (3-0) Cr 3 F SS Prereq Biol 202. Transmission genetics with an emphasis on applications in agriculture. The structure and expression of the gene. How genes behave in populations and how recombinant DNA technology can be used to improve agriculture. Credit for graduation will not be allowed for more than one of the following: 260, 301, 320, Biol 301 and 301L and Agron 320.

Gen 340 Human Genetics (3-0) Cr 3 Alt S offered 2004 Prereq Biol 301 or Gen 301. Fundamental concepts and current research on the human genome. An introduction to the human chromosome analysis pedigree analysis gene mapping, the human genome project, sex determination, the genetics of the immune system, genetics of cancer, and gene therapy. The genetic basis of human diversity will be investigated.

Gen 398 Cooperative Education Cr F SS Prereq Permission of department cooperative education coordinator. Sophomore classification. Required of all cooperative education students. Students must register for this course prior to the beginning of each work period.

Courses Primarily for Graduate Students, Open to Qualified Undergraduate Students

Gen 509 Biotechnology in Agriculture, Food, and Human Health (Dual listed with 509i) (3-0) Cr 3 F SS Prereq Biol 201 and 202. Scientific principles and techniques in biotechnology. Products and applications in agriculture, food and human health. Ethical, legal, and social implications of biotechnology. A research paper is required for graduate credit.

Gen 510 Transmission Genetics (3-0) Cr 3 Prereq 410 or graduate standing. An in-depth investigation of the modern research practices of transmission genetics. Descriptive and statistical genetics. Applications and theoretical genetics. Topics include Mendelian genetic analysis, analytical genetics, and genetic linkage analysis. The principles and practice of transmission genetics. The Mendelian principles of molecular genetics gene structure and function at the molecular level including regulation of gene expression and rearrangement and the organization of genetic information in prokaryotes and eukaryotes.

Gen 536 Plant Growth and Development (Same as Bot 512) See Botany.

Gen 539 Genetic Engineering (Same as BBMB 530) MCDB 520 (3-0) Cr 3 Alt F offered 2003 Prereq 411 or BBMB 405. Strageties and methods of gene cloning, restriction endonuclease mapping, southern hybridization, isolation, and manipulation of plasmid DNA and detection of specific genes in bacteria.

Gen 536 Genetic Statistics (Same as Stat 536) See Statistics.

Gen 537 Genetic Statistics (Same as Stat 537) See Statistics.

Gen 548 Fundamental Algorithms in Computational Biology (Same as CS 548) See Bioinformatics and Computational Biology.

Gen 550 Evolutionary Problems for Computational Biologists (Same as CS 550) See Bioinformatics and Computational Biology.

Gen 556 Computational Genomics and Evolution (Same as CS 556) (3-0) Cr 3 Alt S offered 2005 Prereq Biol 301. Introduction to evolutionary sequence analysis. The genome level topics. Include sequence alignment and phylogenetic inference. Molecular clock analysis. Ancestral state inference. Sequence structure relationships. Functional divergence and prediction evolutionary development and genome duplication. Comparative genomics. Focus will be on data mining and bioinformatics interpretation.


Gen 562 Evolutionary Genetics (Dual listed with 462i) (Same as Bot 562) Zool 622 (3-0) Cr 3 S Prereq Biol 303. Graduate study in conjunction with 462. The genetic basis of evolutionary processes in higher organisms. The role of genetic variation in adaptation and natural selection adaptive processes. And the influence of random processes on evolutionary change.

Gen 563 Molecular Phylogenetics (Same as Zool 563) See Zoology.

Gen 565 Professional Practice in the Life Sciences (Same as PIP 565) See Plant Pathology.

Gen 566 Molecular Evolution (Same as Bot 566) See Botany.

Gen 590 Special Topics Cr 1 to 3 Prereq. 320 or 320.

Gen 594 Computational Molecular Biology (Same as CS 594) Com S 594 Math 594 (3-0) Cr 3 FS Prereq. 484. BCB 484. BCB 485. Stat 422i. or equivalent courses and programming experience. This class focuses on the introduction to bioinformatics with emphasis on concepts and principles. Combined with hands-on (keyboard) applications. Topics typically include molecular databases, score based sequence alignment and scoring matrices, query search problems, dynamic programming and other methods for pairwise sequence alignment. Motif identification, multiple sequence alignment construction, phylogenetic trees from sequencing data, gene structure prediction, protein structure prediction and other applications.

Gen 596 Genetic Data Processing (Same as CS 596) Com S 596 Math 594 (3-0) Cr 3 F Prereq. Some knowledge of programming. Chou, Practical aspects of genomic data processing. Emphasis on projects that carry out major steps in data processing using important bioinformatics tools. Topics include database assembly, annotation, and removal. Shotgun assembly, and EST.
clustering methods, genome closure strategies, and practices. Sequence homology search and function prediction annotation and submission of GenBank reports and data collection and dissemination through the Internet.

**Courses for Graduate Students**

Gen 615 Molecular Immunology (Same as BBMB 615) See Biochemistry, Biophysics and Molecular Biology

Gen 675 Nucleic Acid Structure and Function (Same as BBMB 675) See Biochemistry, Biophysics and Molecular Biology

Gen 696 Seminar in Plant Physiology and Molecular Biology (Same as Bot 696) See Botany

Gen 699 Seminar in Molecular Cellular, and Developmental Biology (Same as MCDB 699) See Molecular Cellular and Developmental Biology

Gen 699 Research

**Zoology (Zool)**

**Courses Primarily for Undergraduate Students**

Zool 110 Zoology Orientation (1) 0 0 5 F First 8 weeks. Orientation to the area of zoology for students considering a major in zoology. Specialized courses and career opportunities in the biological sciences including medically related professions. Offered on a satisfactory/unsatisfactory basis only.

Zool 155 Introduction to the Human Body (3) 0 3 FS SS Preq: HSC biology and chemistry or Biol 109. A survey course of the human body including principal structures and functions of the body systems and the diseases and disorders associated with them. Designed to meet general education requirements in natural science. Not recommended for those seeking a career in the allied health professions or for students majoring in life science.

Zool 156 Introduction to the Human Body Laboratory (1) 0 1 FS SS Preq: Zool 155. A hands-on introduction to selected aspects of the human body through the use of moults specimens videos student conducted experiments and computerized demonstrations.


Zool 334 Embryology (2) 0 2 S Preq: Biol 202. Basic concepts and processes of development. Course will cover classical as well as current aspects of developmental biology. Emphasis will be on vertebrate models. Not acceptable for credit in the major for General Zoology majors.

Zool 334L Embryology Laboratory (0) 3 C 1 S Preq Creedit or enrollment in 334. Selected experiments demonstrating basic concepts in development. Mixture of live embryo experiments and vertebrate developmental anatomy.

Zool 355 Principles of Physiology (3) 4 C 1 S Preq: Biol 302. Introduction to systemic functions with emphasis on mammals. Nonmajor graduate credit.

Zool 383Z Women in Science and Engineering (Same as W S 383) 3 C 0 3 At F offered 2003. Prereq: A 200 level course in science, engineering or women's studies. Eng 105. The intersectional roles of women and science and engineering examined from historical, sociological, philosophical and biological perspectives. Factors contributing to underrepresentation and criticisms of science examination of successful strategies

Zool 388 Cooperative Education C R F SS Preq: Permission of the department cooperative education coordinator. Junior classification. Required of all cooperative education students. Students must register for this course prior to beginning each work period.

Zool 4031 Evolution (Same as la 4031) See Iowa Lakeside Laboratory. Nonmajor graduate credit

Zool 4041 Behavioral Ecology (Same as la 4041) See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Zool 405 Biology of Invertebrates (Dual listed with 505) (3) 3 C 0 3 C 3 C 4 F Prereq: Biol 302 Emphasis on diversity, development, physiology and behavior of invertebrate organisms. The species. Characteristic of the world. Laboratory emphasizes hands on study and experimentation with living invertebrates. Nonmajor graduate credit.

Zool 4151 Freshwater Invertebrates (Same as la 4151) See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Zool 4151 Vertebrate Ecology and Evolution (Same as la 4151) See Iowa Lakeside Laboratory. Nonmajor graduate credit.

Zool 4201 Amphibians and Reptiles (Same as la 4201) See Iowa Lakeside Laboratory. Nonmajor graduate credit.


Zool 433 Developmental Biology (Same as Biol 433) (3) 3 C 3 S Preq: Biol 302. Principles of multivariate development from genetogenesis and fertilization through reproductive development. Emphasis is placed on understanding the underlying mechanisms that govern developmental processes.

Zool 433L Developmental Biology Laboratory (Same as Biol 433L) (3) 3 C 1 S Preq: Biol 302. Principles of multivariate development from genetogenesis and fertilization through reproductive development. Emphasis is placed on understanding the underlying mechanisms that govern developmental processes.

Zool 454 General and Comparative Endocrinology (Dual listed with 554) (3) 0 3 C 4 F Prereq: Biol 302. Chemical integration of vertebrate organs. The structure and development of the endocrine glands and the function and structure of their hormones. Laboratory techniques for studying hormonal phenomena. Laboratory experiments require animal surgery and involvement outside of scheduled class time. Nonmajor graduate credit.

Zool 456 Environmental Physiology (Dual listed with 559) (3) 0 3 C 4 F Prereq: Biol 302. Chemical integration of vertebrate organs. The structure and development of the endocrine glands and the function and structure of their hormones. Laboratory techniques for studying hormonal phenomena. Laboratory experiments require animal surgery and involvement outside of scheduled class time. Nonmajor graduate credit.

Zool 461 Evolutionary Genetics (Dual listed with 562) same as Gen 462). See Genetics. Nonmajor graduate credit.

Zool 464 Morphometric Analysis (Dual listed with 564) (3) 3 C 4 F Preq: Stat 401. A comprehensive overview of the theory and methods for the analysis of biological shape with emphasis on data acquisition, standardization, statistical analysis and visualization of results. Methods for both landmark and outline data will be discussed. Nonmajor graduate credit.

Zool 490 Independent Study (Prereq: 15 credits in zoological sciences. Permission of instructor. Students in the College of Agriculture may use no more than 6
D Plant Transformation Includes Agrobacterium and particle gun-mediated transformation of tobacco Arabidopsis and maize and analysis of transformants
(S)
E Proteomics Includes two-dimensional electrophoresis, laser scanning mass spectrometry and database searching (F)
Zool 554 General and Comparative Endocrinology (Dual listed with 454)(G) 3 0 Cr 3 or 3 0 Cr 4 S Prereq: 355 and Biol 302. Graduate study in conjunction with 454. Chemcal integration of vertebrate organs. The structure development and evolution of the endocrine glands and the function and structure of their hormones. Laboratory techniques for studying hormonal phenomena. Laboratory experiments require animal surgery and involvement outside of scheduled class time.
Zool 556 Neurobiology (Dual listed with 456 same as Neuro 556)(I) 3 0 Cr 3 or 3 0 Cr 4 F Prereq. 355 or 310. physics recommended. permission of instructor to enroll in lab. Graduate study in conjunction with 456. Integration coding plasticity and development in nervous systems.
Zool 557 Advanced Neuroscience Techniques (Same as Neuro 557) See Neuroscience.
Zool 559 Environmental Physiology (Dual listed with 459)(I) 3 0 Cr 3 or 3 0 Cr 4 Alt. S offered 2006 Prereq. 355 or a Ecol 311. physics recommended. Graduate study in conjunction with 459. Physiological adaptations to the environment with emphasis on vertebrates.
Zool 562 Evolutionary Genetics (Dual listed with 462 same as Gen 562) See Genetics.
Zool 563 Molecular Phylogenetics (Same as Gen 563) BioL 563(I) 3 0 Cr 3 F. Prereq. Biol 202 and 201. Estimation of phylogenetic trees from DNA sequence data. Course provides an overview of uses phylogenetic trees in bioinformatics genomics molecular genetics and systematics and explores the relationship between data models of molecular evolution and patterns of biological diversification.
Zool 564 Morphometric Analysis (Dual listed with 464 (I) 3 0 Cr 4 S. Prereq. Stat 401. A comprehensive overview of the theory and methods for the analysis of biological shape with emphasis on data analysis standard statistical analyses and visualization of results. Methods for both landmark and outline data will be discussed.
Zool 566 Molecular Evolution (Same as Bot 566) See Botany.
Zool 568 Advanced Systematics (Same as Ent 568) See Entomology.
Zool 569 Biogeography (Same as Bot 578) See Botany.
Zool 590 Special Topics (Same as la 590) Cr 1 to 5 each time. Prereq. Permission of instructor.
Zool 5901 Graduate Independent Study (Same as la 590) See Iowa Lakeside Laboratory.
Courses for Graduate Students
Zool 632 Current Topics in Signal Transduction (I) Cr 2 to 3 each time. Prereq. Permission of instructor. Selected topics in signal transduction events their molecular mechanisms and their relation to cellular processes. Topics may include cell recognition, second messenger systems, information integration and transform cell cycle, cell differentiation and pattern formation.
Zool 680 Current Topics in Neurobiology and Behavior (Same as Neuro 680) Cr 2 to 3 each time. Prereq. Permission of instructor. Topics may include communication, hormones and behavior of neuronal integration, developmental neurobiology, neuroanatomy, and ultrastructure, sensory biology, social behavior, techniques in neurobiology, and behavior.
Zool 690 Seminar in Zoology (Cr 1 each time.) Journal article critique and discussion by faculty and graduate students. Offered on a satisfactory-fail grading basis only.
A Cellular Molecular and Developmental Biology
B Biology of Populations and Organisms
C Neurobiology
D Physiology
E Evolution
F Animal Models of Genetic Therapy
G Behavior
H Bioinformatics.
Zool 698 Research Seminar 1 hr each time. Research seminars by faculty and graduate students. Offered on a satisfactory-fail grading basis only.
A Cellular Molecular and Developmental Biology
B Biology of Populations and Organisms
C Neurobiology
D Physiology
E Evolution
F Animal Models of Genetic Therapy
G Behavior
H Bioinformatics.
Zool 698 Seminar in Molecular Cellular, and Developmental Biology. (Same as MCDB 698) See Molecular Cellular and Developmental Biology.
Zool 699 Research 1 hr each time. Research seminars by faculty and graduate students. Offered on a satisfactory-fail grading basis only.
A Cellular Molecular and Developmental Biology
B Biology of Populations and Organisms
C Neurobiology
D Physiology
E Evolution
F Animal Models of Genetic Therapy
G Behavior
H Bioinformatics.
Zool 698 Seminar in Molecular Cellular, and Developmental Biology. (Same as MCDB 698) See Molecular Cellular and Developmental Biology.
Distinguished Professor denotes those faculty members who have been recognized for having attained outstanding national and international reputations within their professional disciplines. University Professor denotes those faculty members who have been recognized for having made outstanding contributions to the quality of education at Iowa State University.

Inquiries concerning the faculty list should be directed to the Office of the Provost, 1550 Beardshear Hall.


ABRAHAM, WILLIAM H., Emeritus Professor of Chemical Engineering. B.Ch.E., 1952; Cornell; Ph.D., 1957, Purdue.

ACKER, DAVID G., Professor of Agricultural Education and Studies; Assistant Dean of the College of Agriculture. B.A., 1975, Wilmington; M.Ed., 1980, M.S., 1980, California (Davis); Ph.D., 1989, Oregon State.

ACKER, DUANE, Professor of Animal Science (Collaborator). B.S., 1952, M.S., 1953, Iowa State; Ph.D., 1957, Oklahoma State.

ACKERMAN, RALPH A., Professor of Zoology. B.A., 1967; Rutgers; Ph.D., 1975, Florida.


ACKERSON, GARY L., Emeritus Associate Professor of Management. B.A., 1956, Northern Iowa; M.A., 1961, Northern Colorado; Ph.D., 1972, Iowa State.


AKINC, MUFTI, Professor of Materials Science and Engineering and Chair of the Department. B.S., 1970, M.S., 1973, Middle East Technical (Turkey); Ph.D., 1977, Iowa State.


ALEXANDER, ROGER K., Associate Professor of Mathematics. B.A., 1968, Kansas; M.A., 1974, Ph.D., 1975, California (Berkeley).


ALLEN, BENJAMIN J., Professor of Logistics, Operations and Management Information Systems; Professor of Economics; Distinguished Professor in Business; Vice President for Academic Affairs and Provost. B.S., 1969, M.A., 1973, Ph.D., 1974, Illinois.

ALLEN, BEVERLY LUNDY, Assistant Professor of Sociology. B.S.W., 1975, M.S.W., 1977 Temple; Ph.D., 1995, Iowa State.


ALLEN, LINDA QUINN, Assistant Professor of Foreign Languages and Literatures; Assistant Professor of Curriculum and Instruction. B.A., 1978, Purdue; M.A., 1982, Ball State; Ph.D., 1994, Purdue.


ALLEN, VIRGINIA, Associate Professor of English; Associate Professor of Curriculum and Instruction. B.A., 1965, Florida State; M.A., 1972, Chicago State; Ph.D., 1980, Florida State.


ALRUD, SRINIVAS, Associate Professor of Electrical and Computer Engineering; Associate Professor of Computer Science. B.Tech, 1989, Indian Institute of Technology; M.S., 1991, Ph.D., 1994, Iowa State.

AMAYA, JOSE M., Assistant Professor of Zoology and Genetics. B.S., 1976, New York (Stony Brook); Ph.D., 1986, Princeton.


ALTHISON, GARY L., Emeritus Associate Professor of Management. B.A., 1956, Northern Iowa; M.A., 1961, Northern Colorado; Ph.D., 1972, Iowa State.

AMANDA, KEVIN SCOTT, Assistant Professor of Foreign Languages and Literatures. M.A., 1995, Ph.D., 2001, Princeton.

AMIN, VIREN R., Adjunct Assistant Professor of Electrical and Computer Engineering; Adjunct Assistant Professor of Animal Science. B.S., 1987, NHL Medical College; M.S., 1989, Ph.D., 1992, Iowa State.

AMOS, ROSALIE JEANNE, Emeritus Associate Professor of Family and Consumer Sciences Education and Studies; Emeritus Associate Professor of Curriculum and Instruction. B.S., 1953, Iowa State; M.S., 1960, Ph.D., 1976, Cornell.

ANANTHARAM, VELLEDDRY, Adjunct Assistant Professor of Biomedical Sciences. B.S., 1980, St. Josephs College, Bangalore, India; M.S., 1982, St. Josephs, Bangalore Univ, India; Ph.D., 1987, Indian Institute of Science (India).

ANDERSON, CARL E., Emeritus Associate Professor of Agricultural and Biosystems Engineering. B.S.A.E., 1962, Pennsylvania State; M.S.A.E., 1965, Arizona; Ph.D., 1975, Kansas State.


ANDERSON, JULIA F., Emeritus Professor of Family and Consumer Sciences Education and Studies. B.S., 1941, Iowa State; M.S., 1942, Washington.

ANDERSON, KEVIN F., Assistant Professor of Veterinary Microbiology and Preventive Medicine (Collaborator). B.S., 1975, Iowa Wesleyan; M.S., 1983, Western Illinois.

ANDERSON, LINDA LOU, Adjunct Instructor in English. B.S., 1969, Northwest Missouri; M.A., 1974, Louisiana State.

ANDERSON, LLOYD LEE, Professor of Animal Science; Charles F. Curtiss Distinguished Professor in Agriculture. B.S., 1987, Ph.D., 1991, Iowa State.


AMENSON, JERRY L., Adjunct Instructor in Civil, Construction and Environmental Engineering.


APEGU, KEVIN SCOTT, Assistant Professor of Foreign Languages and Literatures. M.A., 1995, Ph.D., 2001, Princeton.


CHEN, CHING-SHIH, Professor of Industrial Education and Technology. B.S., 1962, Ph.D., 1972, National Taiwan (Taiwan); M.S., 1988, Ph.D., 1994, Auburn.

CHEN, DEGAN, Associate Professor of Electrical and Computer Engineering. B.S., 1984, Tsinghua (China); M.S., 1988, Ph.D., 1992, California (Santa Barbara).

CHEN, TSING-CHANG, Professor of Meteorology. B.A., 1965, Taiwan Normal; M.S., 1968, National Central (Taiwan); M.A., 1972, Johns Hopkins; Ph.D., 1975, Michigan.

CHEVILLE, NORM, Professor of Veterinary Pathology; Professor of Veterinary Microbiology and Preventive Medicine; Clarence Hartley Coavall Distinguished Professor in Veterinary Medicine; Dean of the College of Veterinary Medicine; Director of the Veterinary Medical Research Institute. D.V.M., 1959, Iowa State; M.S., 1963, Ph.D., 1964, Wisconsin; Dr.H.C., 1986, Liege.

CHIDISTER, MARK J., Associate Professor of Landscape Architecture; Assistant to the President. B.A., 1977, Ball State; M.S.A., 1981, Wisconsin.

CHIMENTI, DALE E., Associate Professor of Electrical Engineering. B.A., 1986, Cornell College; M.S., 1972, Ph.D., 1974, Colorado.

CHIN, PARAG RAM, Professor of Biochemistry, Biophysics and Molecular Biology. B.S., 1981, Konkan Agricultural (India); M.S., 1983, Indian Agricultural; Ph.D., 1987, California (Los Angeles).


CHOOBINEH, FARHAD, Adjunct Instructor in Logistics, Operations and Management Information Systems. B.S., 1974, Management (Iran); M.E., 1983, Iowa State.

CHOU, HUI-HSIENT, Assistant Professor of Zoology and Genetics; Assistant Professor of Computer Science. B.S., 1989, National Taiwan; Ph.D., 1996, Maryland.


CHRISTENSEN, GEORGE C., Emeritus Professor of Biomedical Sciences; Clarence Hartley Coavall Distinguished Professor in Veterinary Medicine. D.V.M., 1949, M.S., 1950, Ph.D., 1953, Cornell; Ph.D., 1957, Nebraska.


COCHRAN, JAMES, Assistant Professor of Zoology and Genetics; Assistant Professor of Computer Science. B.S., 1980, St. Louis; M.A., 1982, Wyoming; Ph.D., 1986, Colorado.

COFFEE, RENALDO A., Associate Professor of Sociology. B.A., 1982, Buffalo; M.S., 1983, Ph.D., 1985, Iowa State.


COOK, CHRISTINE C., Associate Professor of Veterinary Clinical Sciences; Associate Professor of Veterinary Microbiology and Preventive Medicine. B.V.M., 1974, Iowa State; Ph.D., 1980, Iowa State.


CORTES, VALENTINO, Emeritus Professor of Chemistry. B.S., 1948, Iowa; Ph.D., 1952, Washington.


COURTNEY, GREGORY W., Associate Professor of English. B.A., 1982, Oregon State; Ph.D., 1989, Minnesota.


CROWLEY, TONI R., Emeritus Professor of German. B.S., 1958, Ph.D., 1965, Minnesota.
COX, JANE F., Associate Professor of Theatre. B.S., 1962, Iowa State; M.A., 1964, Drake.
COX, RONALD ARTHUR, Adjunct Associate Professor of Aerospace Engineering. B.S., 1979, ISU; M.S., 1992, Texas (Arlington); Ph.D., 1989, Iowa State.
DALE ALESSANDRO, DOMENICO, Assistant Professor of Mathematics. Ph.D., 1996, Padua (Italy); Ph.D., 1999, California (Santa Barbara).
DAKE, DENNIS MYRON, Professor of Art and Design. B.S., 1966, Upper Iowa; M.A., 1969, Northern Iowa.
DALAL, VIKRAM L., Professor of Agricultural and Atmospheric Sciences. B.S., 1972, Illinois; M.S., 1975, Wisconsin; Ph.D., 1983, California (Los Angeles).
DAMHORST, MARY LYNN, Associate Professor of Apparel, Educational Studies and Hospitality Management. B.S., 1972, Illinois; M.S., 1975, California (Davis); Ph.D., 1981, Texas.
DANA, JANICE T., Adjunct Assistant Professor of Apparel, Educational Studies and Hospitality Management. B.S., 1964, North Carolina; M.S., 1966, Iowa State; Ed.D., 1992, Kansas State.
DANIELS, DONNA R., Emeritus Professor of Textiles and Clothing; Emeritus Professor of Art and Design. B.S., 1957 M.S., 1961, Iowa State.
DANIELSON, BRENT J., Associate Professor of Veterinary Pathology. B.V.M., 1942, Colorado State; M.S., 1977, Iowa State.
DANIELSON, DONNA R., Emeritus Professor of Textiles and Clothing; Emeritus Professor of Art and Design. B.S., 1957 M.S., 1961, Iowa State.
DARK, VERONICA JOY, Associate Professor of Psychology. B.A., 1971, Arkansas; Ph.D., 1977, Washington.
DAVID, HERBERT ARN, Emeritus Professor of Statistics; Distinguished Professor in Liberal Arts and Sciences. B.Sc., 1947, Sydney; Ph.D., 1953, London.
DAVID, HERBERT T., Emeritus Professor of Statistics; Emeritus Professor of Industrial and Manufacturing Systems Engineering; University Professor. A.B., 1947, Harvard; M.A., 1948, Columbia; Ph.D., 1955, Chicago.
DAVIDSON, JENNIFER L., Associate Professor of Electrical and Computer Engineering; Associate Professor of Mathematics. B.S., 1979, Mount Holyoke; Ph.D., 1989, Florida.
DAVIS, JANE M., Associate Professor of English. B.A., 1976, Hofstra; Ph.D., 1984, Stanford.
DAVIS, NICOLA E., Professor of Curriculum and Instruction. B.Sc., 1972, Edinburgh; Ph.D., 1976, Queen's(Belfast).
DAY, TIMOTHY A., Assistant Professor of Biomedical Sciences. B.S., 1988, Kansas State; M.S., 1990, Ph.D., 1993, Michigan State.
DAYAL, VINAY, Associate Professor of Aerospace Engineering. B.Tech., 1977, Indian Institute of Technology; M.S., 1983, Missouri; Ph.D., 1987, Texas A and M.
DEACON, RUTH ELINOR, Emeritus Professor of Veterinary Development and Family Studies. B.S., 1944, Ohio State; M.S., 1948, Ph.D., 1954, Cornell.
DECARLO, THOMAS E., Associate Professor of Marketing. B.S., 1982, North Carolina State; Ph.D., 1993, Georgia.
DEJONG, PAUL S., Associate Professor of Mechanical Engineering. B.S., 1960, M.S., 1965, Iowa State.
DEJATE, KATHLEEN, Assistant Professor of Horticulture; Associate Professor of Agronomy. M.S., 1986, B.S., 1988, Florida, Ph.D., 1991, California (Berkeley).
DELISI, MATTHEW J., Assistant Professor of Sociology. B.A., 1995, Syracuse; Ph.D., 2000, Colorado.
DELLMANN, H. DIETER, Emeritus Professor of Biomedical Sciences; Clarence Hartley Covault Distinguished Professor in Veterinary Medicine. Dr. Veterinary, 1954, Altoft; Habi(PhD), 1961, Munich.
HALLBERG, PATRICK G., Associate Professor of Veterinary Diagnostic and Production Animal Medicine; Associate Professor of Veterinary Pathology. D.V.M., 1986, M.S., 1992, Ph.D., 1995, Iowa State.

HALE, HARRY W., Emeritus Professor of Electrical and Computer Engineering. B.S., 1942, M.S., 1949, Ph.D., 1953, Purdue.

HALVORSEN, CHARLES B., Emeritus Professor of Horticulture. B.S., 1956, M.S., 1953, Arkansas; Ph.D., 1960, Kansas State.


HALL, RICHARD BIAN, Professor of Natural Resource Ecology and Management. B.S., 1969, Iowa State; Ph.D., 1974, Wisconsin.

HALLAM, J. ARNE, Professor of Economics and Chair of the Department. B.S., 1977, Brigham Young; M.S., 1980, Ph.D., 1983, California (Berkeley).

HALLAUER, ARNELL ROY, Emeritus Professor of Agronomy; Charles F. Curtiss Distinguished Professor in Agriculture. B.S., 1954, Kansas State; M.S., 1958, Ph.D., 1960, Iowa State.


HALLBERG, SHAUNA R., Assistant Professor of Civil Engineering. B.S., 1991, Brigham Young; M.S., 1996, Utah State; Ph.D., 1999, Georgia Institute of Technology.

HALLERSEN, LARRY J., Assistant Professor of Agronomy; Assistant Professor of Microbiology. B.A., 1981, Luther College; M.S., 1983, Tennessee; Ph.D., 1991, Wisconsin.

HAMMOND, EARL G., Professor of Food Science and Human Nutrition; Professor of Biochemistry, Biophysics and Molecular Biology; University Professor. B.S., 1948, M.A., 1950, Texas; Ph.D., 1953, Minnesota.


HANSENS, RICHARD L., Emeritus Professor of Civil, Construction and Environmental Engineering; Anson Marston Distinguished Professor in Engineering. B.S., 1951, M.S., 1953, Ph.D., 1956, Iowa State.


HANNEMAN, LARRY F., Adjunct Associate Professor of Chemical Engineering. B.S., 1966, Iowa State; M.S., 1972, Kansas State.


HANNUM, THOMAS E., Emeritus Professor of Psychology. B.A., 1941, M.S., 1949, Iowa State; Ph.D., 1952, Nebraska.

HANSEN, CHRISTINE, Assistant Professor of Food Science and Human Nutrition. B.S., 1987, Washington; Ph.D., 1995, Oregon State.

HANSEN, DAVID E., Adjunct Professor of Economics. B.S., 1960, M.S., 1961, California (Davis); Ph.D., 1971, Iowa State.

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