

# COLLEGE OF AGRICULTURE AND LIFE SCIENCES

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[www.cals.iastate.edu](http://www.cals.iastate.edu) (<http://www.cals.iastate.edu>)

Students enrolled in the College of Agriculture and Life Sciences receive a broad-based education that includes: communications, biological, physical, and social sciences, humanities, and technical subject matter.

Graduates of the College are prepared for diverse career opportunities because of the well-balanced education they have received. Opportunities for graduates of the College of Agriculture and Life Sciences include: agribusiness and industry, production agriculture, biological and environmental sciences, value-added processing, natural resource management, rural development, public agencies, education, animal and human health professions, graduate studies and professional schools.

## Advising

Each student in the College of Agriculture and Life Sciences works closely with an academic advisor who is associated with the major in which the student is enrolled.

The advisors assist students in making personal adjustments to university life, offer suggestions on academic and co-curricular choices, and provide information on career choices. Advisors make a special effort to adjust course schedules in accordance with students' interests and capabilities.

All entering students are strongly encouraged to participate in the summer orientation program in which they will have the opportunity to meet and work with academic advisors in planning their first semester schedule of classes.

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 and Life Sciences. This may be accomplished through several majors; however, it is recommended that the student work closely with an academic advisor.

## Degree Requirements FOR ALL CALS MAJORS

All undergraduate majors in the College of Agriculture and Life Sciences (CALS) lead to a bachelor of science degree.

### High School Preparation

Requirements for students entering from high school or transferring with less than 24 college credits into the College of Agriculture and Life Sciences 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 and Life Sciences.

### College Requirements

To graduate with a degree from the College of Agriculture and Life Sciences a student must complete, while at Iowa State University, a minimum of 18 credits from the College's departmental offerings, program offerings, and cross-listed program offerings. Twelve or more of those 18 credits must be 300-level or above. Some majors within the College may have more restrictive requirements.

Each major has specific degree requirements for graduation based on the major and college student learning outcomes. College of Agriculture and Life Sciences course requirements for the four areas listed below provide the foundation for successful achievement of both major and college student learning outcomes.

The College of Agriculture and Life Sciences course requirements for all majors are:

Interpersonal and public communication skills 10 credits

6 credits of English composition with grades of C or better

3 credits of speech fundamentals with grades of C or better

1 credit of LIB 160 Introduction to College Level Research

Mathematical, physical, and life sciences from college-approved lists 17 credits

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 sciences including BIOL 101 Introductory Biology, or BIOL 211 Principles of Biology I, or BIOL 212 Principles of Biology II, or BIOL 251 Biological Processes in the Environment and 3 additional credits of life sciences

Personal development from approved lists 15 credits

3 credits of ethics (college list)

3 credits of humanities (college list)

3 credits of social sciences (college list)

3 credits of U.S. diversity (university list)

3 credits of international perspectives (university list)

Students pursuing a primary major in another college and taking a second major in the College of Agriculture and Life Sciences must fulfill the core course requirements of the College of Agriculture and Life Sciences, and all the requirements of the second major.

## Student Learning Outcomes

All students graduating with majors within the College of Agriculture and Life Sciences are expected to be able to do the following (college-level outcomes) at the time of graduation:

### Professional, Interpersonal and Cross-cultural Communications

- Speak and write clearly and persuasively.
- Prepare effective visual, oral, written and electronic presentations.
- Effectively read, listen, observe and reflect.

### Problem-Solving/Critical Thinking

- Apply a holistic approach to solving complex issue-laden problems.
- Apply a rational and objective process to:
  - Distinguish verifiable facts from value claims,
  - Determine the accuracy of statements,
  - Identify assumptions and detect bias,
  - Distinguish relevant from irrelevant information,
  - Prioritize needs.
- Summarize, analyze, and interpret research data and policy issues.

### Leadership

- Organize, facilitate, and participate effectively in a group, team, or organization.
- Define a problem or opportunity, implement an action plan, work towards a goal and justify actions taken.

### Entrepreneurship

- Demonstrate innovativeness and creativity.
- Identify and pursue opportunities that produce value.
- Be persistent in shepherding necessary resources and managing associated risk to facilitate change.

### Life-long learning

- Articulate how continued learning after graduation will enrich their lives.
- Identify and participate in new areas for learning beyond the classroom and after graduation.

## Ethics

- Define and assess their ethical perspective, moral responsibility, and values.
- Identify and critically evaluate contemporary ethical and moral issues in professional and private life.

## Environmental Awareness

- Explain the physical and biological interactions within ecosystems.
- Explain how human activities impact the environment and how societies are affected by environmental change.

## International/Multi-Cultural Awareness (University Outcomes)

- U.S. Diversity – Students should achieve three of the following outcomes:
  - Identify the experiences and contributions of underrepresented or marginalized groups and how they have shaped the history and culture of the United States;
  - Understand the analytical concepts of culture, ethnicity, race, gender, sexuality and/or religion and be able to apply these concepts to an analysis of the United States;
  - Analyze systemic oppression and personal prejudice and their impact on marginalized communities and the broad U.S. society; and
  - Evaluate important aspects of diversity, equity and inclusion so they can live, work and collaborate with others in the 21st century United States.
- International Perspectives – Students should achieve two of the following outcomes:
  - Analyze the accuracy and relevancy of their own worldviews and anticipate how people from other nations may perceive that worldview;
  - Describe and analyze how cultures and societies around the world are formed, are sustained, and evolve;
  - Analyze and evaluate the influence of global issues in their own lives;
  - Describe the values and perspectives of cultures other than their own and discuss how they influence individuals' perceptions of global issues and/or events; and
  - Communicate competently in a second language.

In addition to the College level learning outcomes, each major within the college has additional discipline-specific outcomes that apply to graduates of that major.

## Electives

Students use electives in addition to degree requirements 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).

## Other Requirements

- 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 major in which they expect to graduate.
- Students in ROTC may apply ROTC credits toward elective requirements. No more than 9 credits of 490 coursework from any Iowa State University major may be applied toward graduation, although some individual majors may establish a more restrictive use of 490 credits toward fulfillment of graduation requirements.

## Graduate Study

Graduate study in agriculture and life sciences is conducted through the Graduate College. Details are found in the Graduate College section of this catalog.

Various departments in the College of Agriculture and Life Sciences also participate in the following graduate-level interdepartmental offerings:

- Ecology and Evolutionary Biology
- Environmental Science
- Genetics and Genomics
- Immunobiology
- Microbiology
- Molecular, Cellular, and Developmental Biology
- Neuroscience
- Nutritional Sciences
- Plant Biology
- Seed Technology and Business
- Sustainable Agriculture
- Technology and Social Change (interdepartmental minor)
- Toxicology

## Departments in the College

Departments are the administrative units that offer undergraduate and graduate majors, minors and certificates in addition to their efforts in research, outreach and service. These are the departments in the College of Agriculture and Life Sciences:

- Agricultural and Biosystems Engineering (joint with the College of Engineering)
- Agricultural Education and Studies
- Agronomy
- Animal Science
- Roy J. Carver Department of Biochemistry, Biophysics, and Molecular Biology (joint with the College of Liberal Arts and Sciences)
- Ecology, Evolution, and Organismal Biology (joint with the College of Liberal Arts and Sciences)

- Economics (joint with the College of Liberal Arts and Sciences)
- Entomology
- Food Science and Human Nutrition (joint with the College of Human Sciences)
- Genetics, Development and Cell Biology (joint with the College of Liberal Arts and Sciences)
- Horticulture
- Natural Resource Ecology and Management
- Plant Pathology and Microbiology
- Sociology and Criminal Justice (joint with the College of Liberal Arts and Sciences)
- Statistics (joint with the College of Liberal Arts and Sciences)

## UNDERGRADUATE Majors, MINORS and CERTIFICATES

An undergraduate major is a subject area of study that results in a named baccalaureate degree upon completion of a set of requirements. All majors in the College of Agriculture and Life Sciences result in a Bachelor of Science degree.

A student has many majors from which to choose. Each major is unique although some courses are common across majors in the first two years. This is helpful to students in that they may transfer from one major to another before the second year with little loss of credits.

Options within a major further define some majors and specify certain required coursework. All majors are designed to help students achieve the learning outcomes and succeed in their chosen professions.

## Primary Majors

- Agricultural Business (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agriculturalbusiness/>)
- Agricultural and Life Sciences Education (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agriculturaleducationandstudies/#curriculuminagriculturalandlifescienceseducation/>)
- Agricultural and Rural Policy Studies (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agricultureandsociety/>)
- Agricultural Studies ([http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agricultural\\_studies/](http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agricultural_studies/))
- Agricultural Systems Technology (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/systemstechnology/>)
- Agronomy (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/agronomy/>)

Animal Ecology ([http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/animal\\_ecology/](http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/animal_ecology/))

Animal Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/animalscience/>)

Biochemistry ([http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/biochemistry\\_biophysics\\_andmolecularbiology/](http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/biochemistry_biophysics_andmolecularbiology/))

Biology (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/biology/>)

Culinary Food Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/culinaryscience/>)

Dairy Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/dairyscience/>)

Diet and Exercise (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/dietandexercise/>)

Dietetics (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/dietetics/>)

Environmental Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/environmentalscience/>)

Food Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/foodscience/>)

Forestry (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/forestry/>)

Genetics (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/genetics/>)

Global Resource Systems (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/globalresourcesystems/>)

Horticulture (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/horticulture/>)

Industrial Technology (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/industrialtechnology/>)

Microbiology (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/microbiology/>)

Nursing (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/nursing/>)

Nutritional Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/nutritionalscience/>)

### Secondary Majors\*

Environmental Studies (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofliberalartsandsciences/environmentalstudies/>)

International Agriculture (<http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofagricultureandlifesciences/internationalagriculture/>)

Seed Science (<http://catalog.iastate.edu/previouscatalogs/2022-2023/interdisciplinaryprograms/undergraduate/seedsience/>)

\*A secondary major must be taken in conjunction with a primary major.

## Minors

An undergraduate minor is an academic area of emphasis in addition to a major consisting of at least 15 credits. It must be earned concurrent with a major.

Agricultural Business

Agricultural and Life Sciences Education

Agricultural Systems Technology

Agronomy

Animal Ecology

Animal Science

Biochemistry

Biology

Culinary Food Science

Entrepreneurial Studies\*

Environmental Studies

Feed Technology\*

Food and Society

Food Safety\*

Food Science

Forestry

Genetics

Global Health\*

Horticulture

Industrial Technology

Insect Science

International Agriculture

Landscape Management

Learning and Leadership Sciences\*

Meat Science

Microbiology

Nutrition

Sustainability\*

\*The College of Agriculture and Life Sciences participates in these interdepartmental minors.

## Certificates

An undergraduate certificate is an academic credential in a focused area of study consisting of at least 20 credits. It may be earned concurrent with a major or on its own.

Beef Cattle Production Management  
 Equine Science and Management  
 Poultry Production Management  
 Swine Production Management  
 Occupational Safety

## Special Programs

### Agriculture Exploration

Agriculture Exploration is a starting place for students who wish to pursue careers in the life sciences, food science, natural resources, production agriculture, business, or communications but who are unsure of which majors to choose. Students entering this program will be advised in the Student Services Office until they select their majors.

### Preveterinary Medicine

Students in the College of Agriculture and Life Sciences 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 veterinary medicine.

New students direct from high school who are undecided about choice of major may enroll as a general preveterinary studies (Gen PV) student. These students will also enroll in an orientation course, which describes the various college majors. By the end of their first semester, a Gen PV student must select a major. Transfer students, however, must select a major prior to enrolling in their first semester classes.

Enrollment as a Gen PV student does not guarantee admission into the College of Veterinary Medicine (veterinary school). See the College of Veterinary Medicine section of this catalog for specific admissions requirements.

Students accepted into the College of Veterinary Medicine without a bachelor of science degree 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 and Life Sciences after admission into 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 and Life Sciences Honors Program. Further details are available from an academic advisor or from members of the College of Agriculture and Life Sciences Honors Committee.

### Honors Program

The College of Agriculture and Life Sciences 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 and Life Sciences Honors Committee, or a department Honors contact person.

### Off-Campus Programs

Online courses, certificates, and graduate programs from the College of Agriculture and Life Sciences are designed for working professionals and recent graduates alike giving students anywhere in the world the opportunity to enhance their careers and advancing in their profession.

Students learn from the same faculty and in the same classes as our resident students. Start your adventure with one of our online certificates or programs to advance your career.

Master's Programs: Agricultural Education, Agronomy, Plant Breeding, Seed Technology and Business

Graduate Certificates: Agronomy, Biochemistry, Food Safety and Defense, Meat Science, Seed Science and Technology, Seed Business Management

Undergraduate BS: Agricultural Studies Hybrid Online/Campus

Undergraduate Certificates: Swine Science, Occupational Safety

### Study Abroad and International Travel Opportunities

Agriculture and life sciences are part of a highly interconnected global system; decisions made in one sector have profound impacts worldwide. It is important for students to develop an understanding and appreciation for the global system and the role that U.S. agriculture plays in providing a safe and predictable food supply for a growing world population. The College of Agriculture and Life Sciences provides study abroad and international internship opportunities on all seven continents. Students can enroll in CALS travel courses, spend a semester or more at a partner university abroad or develop an independent academic opportunity like research, service learning or working abroad. Travel ranges from two weeks to a year and students travel to over 30 countries annually. For additional information, contact the Office of Global Programs in the College of Agriculture and Life Sciences.

### 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 advisor or internship coordinator.