PLANT PATHOLOGY AND MICROBIOLOGY

Undergraduate Study

The department participates in the interdepartmental undergraduate Microbiology major. See www.catalog.iastate.edu/collegeofagricultureandlifesciences/microbiology/ (http://catalog.iastate.edu/collegeofagricultureandlifesciences/microbiology/) for more information.

Graduate Study

The department offers studies for the degrees master of science and doctor of philosophy with a major in plant pathology, and minor work 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 microbiology; toxicology; genetics; plant biology; molecular, cellular, and developmental biology; ecology and evolutionary biology; and sustainable agriculture.

Students entering graduate programs in the department need a sound background in the physical, 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 formal and informal settings. 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 primarily for undergraduates:

MICRO 1010: Microbial World
Credits: 3. Contact Hours: Lecture 3.
Prereq: 3 credits in Biology
Introduction to the importance of viruses, bacteria, fungi, archaea and parasites both to humans and to the biosphere. Topics include past and present microbial impact on humans and society, ecology and diversity of microbes, biotechnology and microbial impact on the biosphere. Recommended: High School Biology. (Typically Offered: Fall)

MICRO 1100: Professional and Educational Preparation in Microbiology
Credits: 1. Contact Hours: Lecture 1.
An introduction to curriculum and research opportunities in microbiology at Iowa State. Topics include: easing the transition to life as a university student, development of specific goals, strengthening interpersonal communication, professional portfolio creation and resume building. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

MICRO 1150: Phage Discovery Lab
Credits: 2.
An exploratory laboratory where students will purify phage from soil, visualize phage using electron microscopy and isolate genomic material for nucleic acid sequencing. (Typically Offered: Fall)

MICRO 1160: Phage Genome Annotation Lab
Credits: 2.
An experiential microbiology laboratory where students learn to annotate and submit a complete phage genome. MICRO 1150 recommended. (Typically Offered: Spring)

MICRO 2010: Introduction to Microbiology
Credits: 2. Contact Hours: Lecture 2.
Prereq: One BIOL course except BIOL 1100*,* BIOL 1110*,* BIOL 1120*,* BIOL 1730*,* BIOL 2010*,* BIOL 3070
Selected topics in microbiology with emphasis on the relationship of microorganisms to human and animal health, agricultural technology, and the environment. With written petition to the chair of the supervisory committee, students who obtain a grade of B or better may substitute 2010 for MICRO 3020 in advanced courses. (Typically Offered: Fall, Spring)

MICRO 2010L: Introductory Microbiology Laboratory
Credits: 1. Contact Hours: Laboratory 3.
Prereq: Credits or concurrent enrollment in MICRO 2010 *or* MICRO 3020
Basic microbiology laboratory techniques for non-microbiology majors. Graduation Restriction: Credit for either MICRO 2010L or 3020L, but not both, may be applied toward graduation. (Typically Offered: Fall, Spring)

MICRO 2650: Predicting the Next Epidemic: Living in a One Health World
Credits: 2. Contact Hours: Lecture 2, Discussion 2.
8 week course. “One Health” concept as a relatively new approach to disease control, sustainability, and the consequences of environmental disruption. Interconnectedness of human, animal, and environmental health. Importance of scientists communicating with the general public about One Health topics, such as habitat loss, agricultural practices, and the spread of antibiotic resistant organisms. Recommended: High School Biology or Environmental Science. (Typically Offered: Fall, Spring)

MICRO 3020: Biology of Microorganisms
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2110; BIOL 2120; 3 credits of CHEM
Basic cell biology, physiology, metabolism, genetics and ecology of microorganisms, with an emphasis on prokaryotes and viruses, as well as the roles of microorganisms in the environment, disease, agriculture, and industry. (Typically Offered: Fall, Spring, Summer)

MICRO 3020L: Microbiology Laboratory
Credits: 1. Contact Hours: Laboratory 3.
Prereq: Credits or concurrent enrollment in MICRO 2010 *or* MICRO 3020
Basic microbiology laboratory techniques for majors in microbiology, biological sciences and related fields. Graduation Restriction: Credit for either MICRO 2010L or 3020L, but not both, may be applied toward graduation. (Typically Offered: Fall, Spring)

MICRO 3100: Medical Microbiology
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 3020 (or MICRO 2010 if a B or better was obtained)
Study of infection by bacterial and viral pathogenic agents of humans with an overview of immune responses in controlling disease. (Typically Offered: Fall)

MICRO 3100L: Medical Microbiology Laboratory
Credits: 1. Contact Hours: Laboratory 3.
*Prereq: (*MICRO 2010 *or* MICRO 3020*); (*MICRO 2010L *or* MICRO 3020L*); credits or concurrent enrollment in* MICRO 3100
Microbiological tools and techniques to isolate, identify, and characterize medically significant microorganisms in relation to human diseases. Emphasis on the virulence factors of pathogenic organisms as compared to the normal flora. (Typically Offered: Fall)

MICRO 3200: Molecular and Cellular Bacteriology
Credits: 4. Contact Hours: Lecture 4.
Prereq: BIOL 3130*;* MICRO 3020*;* CHEM 3320
A systems perspective of bacterial growth, survival, and cellular differentiation by integrating physiological and genetic principles. Emphasis is on prokaryotes although unicellular eukaryotes are also discussed. Topics include the structure, function, and assembly of cell components, molecular and genomic techniques, bioenergetics and metabolism, regulation of gene expression, genetic adaptation, stress tolerance, biofilms, and cell-cell interactions and communications. (Typically Offered: Spring)

MICRO 3530: Introductory Parasitology
(Cross-listed with BIOL 3530/ VPTH 3530).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2120
Biology and host-parasite relationships of major groups of animal parasites, and techniques of diagnosing and studying parasites. (Typically Offered: Spring)

MICRO 3600: Global Health
(Cross-listed with GLOBE 3600/ VMPM 3600).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2110
Explores human health across the world with particular emphasis on low- and lower-middle-income countries. Attention is given to the interconnectedness of health determinants, problems, and solutions found in global health, including the role of animals and the environment. Broad in scope, highlighting different cultures and the historical foundations of global health. Topics include colonialism, poverty, emerging diseases, climate change, biodiversity, one health, maternal and child health, HIV, malaria, urbanization, noncommunicable diseases and more. Current events will be a feature of all class meetings. Meets International Perspectives Requirement. (Typically Offered: Fall, Spring)

MICRO 3740: Insects and Our Health
(Cross-listed with ENT 3740).
Credits: 3. Contact Hours: Lecture 3.
Prereq: 3 credits in Biological Sciences
Identification, biology, and significance of insects and arthropods that affect the health of humans and animals, particularly those that are vectors of disease. Meets International Perspectives Requirement. (Typically Offered: Spring)

MICRO 3740L: Insects and Our Health Laboratory
(Cross-listed with ENT 3740L).
Credits: 1. Contact Hours: Laboratory 3.
Prereq: Credit or concurrent enrollment in ENT 3740 *or* MICRO 3740
Laboratory and field techniques for studying medical or public health entomology, including: collection, identification and maintenance of medically significant arthropods and experimental design and execution related to the biology of arthropods or arthropod-pathogen interactions. Offered even-numbered years. (Typically Offered: Spring)

MICRO 4020: Microbial Genetics and Genomics
(Cross-listed with GEN 4020).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 3130; MICRO 3020
The fundamental concepts of bacterial and bacteriophage genetics including mutagenesis, mechanisms of vertical and horizontal genetic information transfer and gene regulation are covered, along with genetic and genomic-based approaches to study these and other cellular processes of microorganisms. Review and discussion of research literature to examine experimental design, methodology, and interpretation of both historical and contemporary relevance to microbial genetics and genomics. Offered even-numbered years. (Typically Offered: Fall)

MICRO 4070: Microbiological Safety of Foods of Animal Origins
(Dual-listed with FSHN 5070/ MICRO 5070). (Cross-listed with FSHN 4070).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 2010 *or* MICRO 3020
Examination of the various factors in the production of foods, from production through processing, distribution and final consumption which contribute to the overall microbiological safety of the food. Upon successful completion of this class, the student will receive both the Preventive Controls for Human Foods certificate (FDA program) and the International HACCP Alliance certificate (USDA-FSIS program). Recommended: FSHN 4200 or MICRO 4200 and one semester of Microbiology Laboratory. (Typically Offered: Fall, Spring)

MICRO 4080: Virology
Credits: 3. Contact Hours: Lecture 3.
Prereq: BBMB 3010 *or* BIOL 3130
The molecular virology and epidemiology of human, animal, plant and insect viruses. BIOL 3140 recommended. (Typically Offered: Fall)

MICRO 4190: Foodborne Hazards
(Cross-listed with FSHN 4190/ TOX 4190).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 2010 *or* MICRO 3020*; 3 credits in BBMB*
Pathogenesis of human microbiological foodborne infections and intoxications, principles of toxicology, major classes of toxicants in the food supply, governmental regulation of foodborne hazards. Assessed service-learning component. Offered even-numbered years. Graduation Restriction: Only one of FSHN 4190 and FSHN 5190 may count toward graduation. (Typically Offered: Spring)

MICRO 4200: Food Microbiology
(Cross-listed with FSHN 4200/ TOX 4200).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 2010 *or* MICRO 3020
Effects of microbial growth in foods. Methods to control, detect, and enumerate microorganisms in food and water. Foodborne infections and intoxications. (Typically Offered: Fall)

MICRO 4210: Food Microbiology Laboratory
(Cross-listed with FSHN 4210).
Credits: 3. Contact Hours: Lecture 1, Laboratory 5.
Prereq: MICRO 2010 *or* MICRO 3020*;* MICRO 2010L *or* MICRO 3020L*. Credit or enrollment in FSHN/*MICRO 4200
Standard techniques used for the microbiological examination of foods. Independent and group projects on student-generated questions in food microbiology. Emphasis on oral and written communication and group interaction. (Typically Offered: Spring)

MICRO 4280: Principles of Epidemiology and Population Health
(Cross-listed with VDPAM 4280/ VMPM 4280).
Credits: 3. Contact Hours: Lecture 3.
Epidemiology of disease in populations. Disease causality, observational study design and approaches to epidemiologic investigations. This course is available on campus and by distance. (Typically Offered: Spring)

MICRO 4300: Procaryotic Diversity and Ecology
(Cross-listed with BBMB 4300).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 3020; MICRO 3020L
Survey of the diverse groups of procaryotes emphasizing important and distinguishing metabolic, phylogenetic, morphological, and ecological features of members of those groups. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 4400: Laboratory in Microbial Physiology, Diversity, and Genetics
Credits: 4.
Prereq: MICRO 3020*,* MICRO 3020L, CHEM 3320*, and* BIOL 3130L
Fundamental techniques and theory for studying the cellular mechanisms, genetic processes and diversity of microbial life. Experimental techniques will include isolation and physiological characterization of bacteria that inhabit different environments as well as an emphasis on genetic and molecular techniques to understand antibiotic resistance processes and mechanisms. Also included are techniques for phylogenetic characterization, measuring gene expression, and genetic manipulation of bacteria. Essential components for the effective communication of scientific results are also emphasized. (Typically Offered: Fall, Spring)

MICRO 4500: Undergraduate Capstone Colloquium
Credits: 2. Contact Hours: Lecture 2.
Prereq: SPCM 2120*; 20 credits in MICRO*
Required of all undergraduate majors in microbiology. Students demonstrate mastery of core courses in microbiology through discussion of current literature in microbiology and immunology, issues in scientific conduct, and bioethics in microbiology. Students present current papers in a journal club format and gain experience in writing and reviewing grant proposals. This course is a capstone course and should be taken within the last two semesters. (Typically Offered: Spring)

MICRO 4510: Survey in Microbiology
Credits: Required. Contact Hours: Lecture 1.
Prereq: 12 credits in MICRO
Preparations for graduation. Topics include job search strategies, career information, mock interviews, graduate and professional school application processes and guidelines as well as outcomes assessment activities. (Typically Offered: Fall)

MICRO 4560: Principles of Mycology
(Cross-listed with BIOL 4560).
Credits: 3. Contact Hours: Lecture 2, Laboratory 3.
Prereq: 10 credits BIOL or MICRO
Morphology, diversity, and ecology of fungi; their relation to agriculture, industry, and human health. (Typically Offered: Fall)

MICRO 4750: Immunology
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 3100
An examination of humoral and cellular immune function as well as the interaction of the cells and factors of the immune system that result in health and disease. MICRO 4750L optional. Graduation Restriction: Credit for either MICRO 4750 or VMPM 5200, but not both, may be applied to graduation. (Typically Offered: Spring)

MICRO 4750L: Immunology Laboratory
Credits: 2. Contact Hours: Lecture 2, Laboratory 4.
Prereq: Credits or concurrent enrollment in MICRO 3100 *or* MICRO 4750 *or* MICRO 5750
Techniques in primary culture and tumor cell growth, measures of lymphocyte function, serological techniques and flow cytometry. Half semester course. (Typically Offered: Spring)

MICRO 4770: Bacterial-Plant Interactions
(Dual-listed with MICRO 5770/ PLP 5770). (Cross-listed with PLP 4770).
Credits: 3. Contact Hours: Lecture 3.
Prereq: 3 credits in MICRO or PLP
Overview of plant-associated bacteria including their ecology, diversity, and the physiological and molecular mechanisms involved with their interactions with plants. The course covers bacterial plant pathogens and pathogenesis, nitrogen fixation and plant symbioses, biological control and plant growth promotion, bacterial disease diagnosis and management, and approaches to the study of microbial communities in the rhizosphere and on leaves. Offered even-numbered years. (Typically Offered: Spring)

MICRO 4850: Soil and Environmental Microbiology
(Dual-listed with AGRON 5850/ ENSCI 5850/ MICRO 5850). (Cross-listed with ENSCI 4850/ AGRON 4850).
Credits: 3. Contact Hours: Lecture 2, Laboratory 3.
Prereq: AGRON 1820
The living organisms in the soil and what they do. Emphasis on soil biota composition, the carbon cycle and bioremediation, soil-plant-microbial relationships, and environmental issues. MICRO 2010; MICRO 2010L recommended. (Typically Offered: Fall)

MICRO 4870: Microbial Ecology
(Cross-listed with ENSCI 4870/ GEOL 4870/ BIOL 4870).
Credits: 3. Contact Hours: Lecture 3.
Prereq: 6 credits in Biology and 6 credits in Chemistry
Introduction to major functional groups of autotrophic and heterotrophic microorganisms and their roles in natural and environmental systems. Consequences of microbial activity on water chemistry, weathering, and precipitation/dissolution reactions will be emphasized. (Typically Offered: Fall)

MICRO 4900A: Independent Study: Laboratory Research
Credits: 1-30. Repeatable.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of MICRO 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Summer)

MICRO 4900B: Independent Study: Literature Review
Credits: 1-30. Repeatable.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of MICRO 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Summer)

MICRO 4900C: Independent Study: Instructional Assistant
Credits: 1-30. Repeatable.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of MICRO 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Summer)

MICRO 4900G: Independent Study: General
Credits: 1-30. Repeatable.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of MICRO 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Summer)

MICRO 4900H: Independent Study: Honors
Credits: 1-5. Repeatable, maximum of 6 credits.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of MICRO 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Spring, Summer)

MICRO 4950: Internship
Credits: 1-2. Repeatable.
Prereq: 6 credits of 3000-level credit MICRO; Permission of Instructor
Participation in the Cooperative Extension Intern Program or an equivalent work experience. Written report of activities required. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

Courses primarily for graduate students, open to qualified undergraduates:

MICRO 5020: Microbial Genetics and Genomics
(Cross-listed with VMPM 5020).
Credits: 3. Contact Hours: Lecture 3.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
The fundamental concepts of bacterial and bacteriophage genetics including mutagenesis, mechanisms of vertical and horizontal genetic information transfer and gene regulation are covered, along with genetic and genomic-based approaches to study these and other cellular processes of microorganisms. Review and discussion of research literature to examine experimental design, methodology, and interpretation of both historical and contemporary relevance to microbial genetics and genomics. Offered even-numbered years. (Typically Offered: Fall)

MICRO 5070: Microbiological Safety of Foods of Animal Origins
(Dual-listed with FSHN 4070/ MICRO 4070). (Cross-listed with FSHN 5070).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 4200 *or Graduate Classification*
Examination of the various factors in the production of foods, from production through processing, distribution and final consumption which contribute to the overall microbiological safety of the food. Upon successful completion of this class, the student will receive both the Preventive Controls for Human Foods certificate (FDA program) and the International HACCP Alliance certificate (USDA-FSIS program). Recommended: FSHN 4200 or MICRO 4200 and one semester of Microbiology Laboratory. (Typically Offered: Fall, Spring)

MICRO 5090: Plant Virology
(Cross-listed with PLP 5090).
Credits: 2. Contact Hours: Lecture 1, Discussion 1.
Prereq: (BBMB 3010 or BIOL 3130) or Graduate Classification
Taxonomy, molecular mechanisms, host-interactions, vector transmission, epidemiology, detection, control and exploitation of plant viruses. Course will consist of a mixture of lectures, and student-led presentations using primary literature. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 5170: Gut Microbiome: Implications for Health and Diseases
(Cross-listed with ANS 5170/ FSHN 5170/ VMPM 5170).
Credits: 3. Contact Hours: Lecture 3.
Explore current research on gut microbiome including modern tools used to study the gut microbiome. Examine the linkages between gut microbiome and health status, diseases, and manipulation of gut microbiome to improve health. (Typically Offered: Fall)

MICRO 5250: Intestinal Microbiology
(Cross-listed with VMPM 5250).
Credits: 3. Contact Hours: Lecture 3.
Overview of commensal microbiota in the health and well-being of vertebrates. Topics include diversity of intestinal structure, microbial diversity/function, innate immune development, community interactions and metabolic diseases associated with alterations of the intestinal microbiome. Offered even-numbered years. (Typically Offered: Spring)

MICRO 5300: Procaryotic Diversity and Ecology
(Dual-listed with MICRO 4300). (Cross-listed with BBMB 5300).
Credits: 3. Contact Hours: Lecture 3.
Prereq: (MICRO 3020 and MICRO 3020L) or Graduate Classification
In-depth exploration of plant biochemistry with a focus on the unique aspects of plants versus heterotrophic organisms. Analysis of unique pathways, metabolic trafficking between unique organelles and tissues, and techniques for their characterization. Offered even-numbered years. (Typically Offered: Fall)

MICRO 5400: Livestock Immunogenetics
(Cross-listed with ANS 5400/ VMPM 5400).
Credits: 2. Contact Hours: Lecture 2.
Prereq: ANS 5610 or MICRO 5750 or VMPM 5200 or Graduate Classification
Basic concepts and contemporary topics in genetic regulation of livestock immune response and disease resistance. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 5510: Microbial Diversity and Phylogeny
Credits: 1. Contact Hours: Lecture 1.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
Comparisons among the three kingdoms of life (Bacterica, Archaea, and Eukarya). Topics will include metabolism, adaptation, methods of phylogenetic analysis, and comparative genomics. (Typically Offered: Fall)

MICRO 5520: Bacterial Molecular Genetics and Physiology
Credits: 1. Contact Hours: Lecture 1.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
Review of genetics and selected physiological topics of model bacteria. (Typically Offered: Fall)

MICRO 5530: Pathogenic Microorganisms
Credits: 1. Contact Hours: Lecture 1.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
Review and contrast/comparison of common bacterial pathogens of plants and animals and their mechanisms of virulence, including toxins, protein secretion, host invasion and iron acquisition strategies. An overview of eukaryotic cell biology that is relevant to pathogenesis will also be included. (Typically Offered: Fall)

MICRO 5540: Virology
Credits: 1. Contact Hours: Lecture 1.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
Introduction to virus life cycles including entry, gene expression strategies, replication, and mechanisms to modify and overcome host defenses. The roles of specific viruses and sub-viral agents in animal and plant disease will also be included. (Typically Offered: Spring)

MICRO 5550: Fungal Biology
Credits: 1. Contact Hours: Lecture 1.
Prereq: (GEN 3130 or GEN 3200) or Graduate Classification
Ecology, genetics, physiology and diversity of fungi, from yeasts to mushrooms, and their importance in human affairs. (Typically Offered: Spring)

MICRO 5560: Ecology of Microorganisms
Credits: 1. Contact Hours: Lecture 1.
Prereq: (BIOL 3130 and MICRO 3020) or Graduate Classification
The study of microorganisms in their natural environments, with a focus on terrestrial and aquatic ecosystems, including eukaryotic hosts; interactions within biofilms and communities, including intercellular communication and symbioses; microbial adaptations to extreme environments; and metagemomic, genomic, molecular and microscopy techniques for the study of microbes in natural systems. (Typically Offered: Spring)

MICRO 5750: Immunology
(Cross-listed with VMPM 5750).
Credits: 3. Contact Hours: Lecture 3.
Prereq: MICRO 3100 *or Graduate Classification*
An examination of humoral and cellular immune function as well as the interaction of the cells and factors of the immune system that result in health and disease. MICRO 4750L optional. Graduation Restriction: Credit for either MICRO 4750 or VMPM 5200, but not both, may be applied to graduation. (Typically Offered: Spring)

MICRO 5770: Bacterial-Plant Interactions
(Dual-listed with MICRO 4770/ PLP 4770). (Cross-listed with PLP 5770).
Credits: 3. Contact Hours: Lecture 3.
Prereq: (3 credits in MICRO or PLP) or Graduate Classification
Overview of plant-associated bacteria including their ecology, diversity, and the physiological and molecular mechanisms involved with their interactions with plants. The course covers bacterial plant pathogens and pathogenesis, nitrogen fixation and plant symbioses, biological control and plant growth promotion, bacterial disease diagnosis and management, and approaches to the study of microbial communities in the rhizosphere and on leaves. Offered even-numbered years. (Typically Offered: Spring)

MICRO 5850: Soil and Environmental Microbiology
(Dual-listed with AGRON 4850/ ENSCI 4850/ MICRO 4850). (Cross-listed with ENSCI 5850/ AGRON 5850).
Credits: 3. Contact Hours: Lecture 2, Laboratory 3.
Qualified Undergrad Prereq: AGRON 1820 *or graduate standing*
The living organisms in the soil and what they do. Emphasis on soil biota composition, the carbon cycle and bioremediation, soil-plant-microbial relationships, and environmental issues. MICRO 2010; MICRO 2010L recommended. (Typically Offered: Fall)

MICRO 5860: Medical Bacteriology
(Cross-listed with VMPM 5860).
Credits: 4. Contact Hours: Lecture 4.
Prereq: MICRO 3100 *or Graduate Classification*
Bacteria associated with diseases of vertebrates, including virulence factors and interaction of host responses. Concurrent students need to register for 5860L. (Typically Offered: Fall)

MICRO 5870: Microbial Ecology
(Cross-listed with ENSCI 5870/ GEOL 5870/ EEOB 5870).
Credits: 3. Contact Hours: Lecture 3.
Introduction to major functional groups of autotrophic and heterotrophic microorganisms and their roles in natural and environmental systems. Consequences of microbial activity on water chemistry, weathering, and precipitation/dissolution reactions will be emphasized. (Typically Offered: Fall)

MICRO 5900: Special Topics
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

Courses for graduate students:

MICRO 6040: Seminar
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Course will expose students to the breadth of subdisciplines within microbiology, offer opportunities for direct interaction between the students and the faculty members within the Interdepartmental Microbiology Graduate Program, and promote interactions among the students within the program. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

MICRO 6080: Molecular Virology
(Cross-listed with VMPM 6080/ PLP 6080).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BBMB 4050 or GDCB 5110
Advanced study of virus host-cell interactions. Molecular mechanisms of viral replication and pathogenesis. Offered even-numbered years. (Typically Offered: Fall)

MICRO 6150: Molecular Immunology
(Cross-listed with BBMB 6150/ VMPM 6150).
Credits: 3. Contact Hours: Lecture 3.
Current topics in molecular aspects of immunology: T and B cell receptors; major histocompatibility complex; antibody structure; immunosuppressive drugs and viruses; and intracellular signaling pathways leading to expression of genes that control and activate immune function. Offered odd-numbered years. (Typically Offered: Fall)

MICRO 6250: Mechanisms of Bacterial Pathogenesis
(Cross-listed with VMPM 6250).
Credits: 3. Contact Hours: Lecture 3.
Review of current concepts in specific areas of microbial pathogenesis including the genetic basis for bacterial disease, genetic regulation and control of virulence factors and their mechanisms of action, and host-pathogen interactions at the cellular and molecular levels. The application of microbial genetics to understanding pathogenesis will be included. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 6260: Advanced Food Microbiology
(Cross-listed with FSHN 6260/ TOX 6260).
Credits: 3. Contact Hours: Lecture 3.
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. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 6270: Rapid Methods in Food Microbiology
(Cross-listed with FSHN 6270/ TOX 6270).
Credits: 2. Contact Hours: Lecture 2.
Provides an overview of rapid microbial detection methods for use in foods. Topics include historical aspects of rapid microbial detection, basic categories of rapid tests (phenotypic, genotypic, whole cell, etc.), existing commercial test formats and kits, automation in testing, sample preparation and 'next generation' testing formats now in development. (Typically Offered: Fall, Spring, Summer)

MICRO 6900A: Current Topics: Microbiology
Credits: 1-3. Contact Hours: Lecture 3.
Repeatable.
Prereq: Instructor Permission for Course
Colloquia or advanced study of specific topics in a specialized field. (Typically Offered: Fall, Spring, Summer)

MICRO 6900B: Current Topics: Immunology
Credits: 1-3. Contact Hours: Lecture 3.
Repeatable.
Colloquia or advanced study of specific topics in a specialized field. (Typically Offered: Fall, Spring, Summer)

MICRO 6900C: Current Topics: Infectious Diseases
Credits: 1-3. Contact Hours: Lecture 3.
Repeatable.
Colloquia or advanced study of specific topics in a specialized field. (Typically Offered: Fall, Spring, Summer)

MICRO 6920: Molecular Biology of Plant-Pathogen Interactions
(Cross-listed with PLP 6920).
Credits: 3. Contact Hours: Lecture 3.
Semil and current research in molecular and physiological aspects of plant interactions with pathogens, including mechanisms of pathogenesis, host-pathogen recognition and host defense, with an emphasis on critical evaluation of primary literature. Students also complete a research proposal writing and peer review exercise. Offered odd-numbered years. (Typically Offered: Spring)

MICRO 6970: Graduate Research Rotation
Credits: 0. Contact Hours: Laboratory 30.
Repeatable.
Graduate research projects performed under the supervision of selected faculty members in the Interdepartmental Microbiology major. (Typically Offered: Fall, Spring)

MICRO 6980: Seminar in Molecular, Cellular, and Developmental Biology
(Cross-listed with BBMB 6980/ GDCB 6980/ MCDB 6980/ VMPM 6980).
Credits: 1-2. Contact Hours: Lecture 2.
Repeatable.
Student and faculty presentations. (Typically Offered: Spring)

MICRO 6990: Research
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course

Courses primarily for undergraduates:

PLP 4080: Principles of Plant Path
(Dual-listed with PLP 5080).
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Principles underlying the nature, diagnosis, and management of plant diseases. Laboratory complements lecture topics and provides experience in plant disease diagnosis. (Typically Offered: Fall, Spring)

PLP 4160: Forest Insects and Diseases
(Cross-listed with FOR 4160).
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
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. Laboratory experience working with insect and fungal pests of trees. (Typically Offered: Fall)

PLP 4520: Integrated Management of Diseases and Insect Pests of Turfgrasses
(Cross-listed with ENT 4520/ HORT 4520).
Credits: 3. Contact Hours: Lecture 3.
Prereq: HORT 3510
Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments. Offered even-numbered years. (Typically Offered: Spring)

PLP 4770: Bacterial-Plant Interactions
(Dual-listed with MICRO 5770/ PLP 5770). (Cross-listed with MICRO 4770).
Credits: 3. Contact Hours: Lecture 3.
Prereq: 3 credits in MICRO or PLP
Overview of plant-associated bacteria including their ecology, diversity, and the physiological and molecular mechanisms involved with their interactions with plants. The course covers bacterial plant pathogens and pathogenesis, nitrogen fixation and plant symbioses, biological control and plant growth promotion, bacterial disease diagnosis and management, and approaches to the study of microbial communities in the rhizosphere and on leaves. Offered even-numbered years. (Typically Offered: Spring)

PLP 4900A: Independent Study: Plant Pathology
Credits: 1-3. Repeatable, maximum of 6 credits.
Prereq: 7 credits in BIOL; Junior or Senior classification; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of PLP 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Spring, Summer)

PLP 4900H: Independent Study: Honors
Credits: 1-3. Repeatable, maximum of 6 credits.
Prereq: 7 credits in BIOL; Junior or Senior classification; Permission of Instructor
Graduation Restriction: A maximum of 6 credits of PLP 4900 may be used toward the total of 128 credits required for graduation. (Typically Offered: Fall, Spring, Summer)

PLP 4940: Seed Pathology
(Dual-listed with PLP 5940).
Credits: 2. Contact Hours: Lecture 2.
Prereq: PLP 4080
Significance of biotic and abiotic diseases that affect the production and utilization of seeds, during each phase of the seed life cycle: growing, harvesting, conditioning, storing, and planting seed. Mechanisms of seed infection and seed-to-seedling transmission are considered for fungi, bacteria, viruses/viroids, and nematodes. Aspects of epidemiology, management, and host-pathogen relationships are discussed. Emphases include the role of seed health testing in the global seed industry for quality control and phytosanitary certification, as well as the use of seed treatments to mage seedborne and soilborne pathogens and pests. Concurrent enrollment in PLP 4940L/5940L (Seed Pathology Laboratory) is strongly encouraged (on-campus students only). Graduation Restriction: Credit may not be obtained for both PLP/STB 5920 and PLP 5940. Offered odd-numbered years. (Typically Offered: Fall)

PLP 4940L: Seed Pathology Laboratory
(Dual-listed with PLP 5940L).
Credits: 1. Contact Hours: Laboratory 3.
Prereq: PLP 4080
Laboratory in seed pathology. Seed health testing methods; effects of seed treatments and seed conditioning on seedborne pathogens. Offered odd-numbered years. (Typically Offered: Fall)

Courses primarily for graduate students, open to qualified undergraduates:

PLP 5060: Plant-Pathogen Interactions
Credits: 2. Contact Hours: Lecture 2.
Prereq: (BIOL 3130 and PLP 4080 or PLP 4160) or Graduate Classification
Introduction to mechanisms of plant-parasite interaction. Genetics and molecular genetics of plant disease resistance and pathogenicity. Offered odd-numbered years. (Typically Offered: Spring)

PLP 5080: Principles of Plant Pathology
(Dual-listed with PLP 4080).
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Principles underlying the nature, diagnosis, and management of plant diseases. Laboratory complements lecture topics and provides experience in plant disease diagnosis. (Typically Offered: Fall, Spring)

PLP 5090: Plant Virology
(Cross-listed with MICRO 5090).
Credits: 2. Contact Hours: Lecture 1, Discussion 1.
Prereq: (BBMB 3010 or BIOL 3130) or Graduate Classification
Taxonomy, molecular mechanisms, host-interactions, vector transmission, epidemiology, detection, control and exploitation of plant viruses. Course will consist of a mixture of lectures, and student-led presentations using primary literature. Offered odd-numbered years. (Typically Offered: Spring)

PLP 5110: Integrated Management of Tropical Crops
(Cross-listed with ENT 5110/ HORT 5110).
Credits: 3. Contact Hours: Lecture 3.
*Prereq: (*ENT 3700 *or* ENT 3760 *or* HORT 2210 *or* PLP 4080 *or* PLP 4160*) or Graduate Classification*
Applications of Integrated Crop management principles (including plant pathology, entomology, and horticulture) to tropical cropping systems. Familiarization with a variety of tropical agroecosystems and Costa Rican culture is followed by a 10-day tour of Costa Rican agriculture during spring break, then writeup of individual projects. Offered odd-numbered years. Meets International Perspectives Requirement. (Typically Offered: Spring)

PLP 5120: Lifestyles of plant pathogenic fungi and oomycetes.
Credits: 2. Contact Hours: Lecture 2.
Exploration of the major groups of plant pathogenic fungi and oomycetes, focusing on the diseases they cause as well as pathogen ecology, diagnosis, crop resistance, and fungicide resistance. Offered odd-numbered years. (Typically Offered: Spring)

PLP 5300: Ecologically Based Pest Management Strategies
(Cross-listed with AGRON 5300/ ENT 5300/ SUSAG 5300).
Credits: 3. Contact Hours: Lecture 3.
Durable, least-toxic strategies for managing weeds, pathogens, and insect pests, with emphasis on underlying ecological processes. Offered even-numbered years. (Typically Offered: Fall)

PLP 5430: Ecology and Epidemiology of Plant Diseases
Credits: 3. Contact Hours: Lecture 3.
Prereq: (PLP 4080 or PLP 4160) or graduate classification
Nutter. Theory and practice related to the ecology and epidemiology of plant disease epidemics. Interactions among host and pathogen populations as affected by the environment are quantified with respect to time and space. Alysis of ecological and host and pathogen genetic factors that alter the course of plant disease epidemics. Risk assessment theory, disease forecasting, and modeling the impact of biotic plant stresses on yield and quality are also emphasized. Offered odd-numbered years. (Typically Offered: Fall)

PLP 5520: Integrated Management of Diseases and Insect Pests of Turfgrasses
(Cross-listed with ENT 5520/ HORT 5520).
Credits: 3. Contact Hours: Lecture 3.
Prereq: HORT 3510 or Graduate Classification
Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments. Offered even-numbered years. (Typically Offered: Spring)

PLP 5740: Plant Nematology
Credits: 2. Contact Hours: Lecture 2.
Morphology, atomy, identification, management, and life cycles of common plant-parasitic nematodes; host parasite interactions; recent advances in plant nematology. Offered odd-numbered years. (Typically Offered: Fall)

PLP 5740L: Laboratory Techniques in Plant Nematology
Credits: 1. Contact Hours: Laboratory 3.
Practical skills of sample collection, processing, extraction, and identification of plant-parasitic nematodes from soil and roots; other techniques will be discussed. Offered odd-numbered years. (Typically Offered: Fall)

PLP 5770: Bacterial-Plant Interactions
(Dual-listed with MICRO 4770/ PLP 4770). (Cross-listed with MICRO 5770).
Credits: 3. Contact Hours: Lecture 3.
Prereq: (3 credits in MICRO or PLP) or Graduate Classification
Overview of plant-associated bacteria including their ecology, diversity, and the physiological and molecular mechanisms involved with their interactions with plants. The course covers bacterial plant pathogens and pathogenesis, nitrogen fixation and plant symbioses, biological control and plant growth promotion, bacterial disease diagnosis and management, and approaches to the study of microbial communities in the rhizosphere and on leaves. Offered even-numbered years. (Typically Offered: Spring)

PLP 5810: Experience in Plant Science Extension and Outreach
(Cross-listed with AGRON 5810/ ENT 5810/ HORT 5810).
Credits: 1.
A supervised learning experience in several extension delivery methods used in the plant sciences. Participation in Iowa State University-based extension programs that may include field crops horticulture, or Master Gardener programming. Offered odd-numbered years. (Typically Offered: Summer)

PLP 5900: Special Topics
Credits: 1-3. Repeatable.
Prereq: 10 credits in biological sciences, Permission of Instructor
(Typically Offered: Fall, Spring, Summer)

PLP 5920: Seed Health Management
(Cross-listed with STB 5920).
Credits: 2. Contact Hours: Lecture 2.
Occurrence and management of diseases during seed production, harvest, conditioning, storage, and planting. Emphasis on epidemiology, disease management in the field, seed treatment, effects of conditioning on seed health, and seed health testing. Graduation Restriction: Credit may not be obtained for both PLP/STB 5920 and PLP 5940. Offered even-numbered years. (Typically Offered: Spring)

PLP 5940: Seed Pathology
(Dual-listed with PLP 4940).
Credits: 2. Contact Hours: Lecture 2.
Prereq: PLP 4080 or Graduate Classification
Significance of biotic and abiotic diseases that affect the production and utilization of seeds, during each phase of the seed life cycle: growing, harvesting, conditioning, storing, and planting seed. Mechanisms of seed infection and seed-to-seedling transmission are considered for fungi, bacteria, viruses/viroids, and nematodes. Aspects of epidemiology, management, and host-pathogen relationships are discussed. Emphases include the role of seed health testing in the global seed industry for quality control and phytosanitary certification, as well as the use of seed treatments to mage seedborne and soilborne pathogens and pests. Concurrent enrollment in PLP 4940L/5940L (Seed Pathology Laboratory) is strongly encouraged (on-campus students only). Graduation Restriction: Credit may not be obtained for both PLP/STB 5920 and PLP 5940. Offered odd-numbered years. (Typically Offered: Fall)

PLP 5940L: Seed Pathology Laboratory
(Dual-listed with PLP 4940L).
Credits: 1. Contact Hours: Laboratory 3.
Prereq: PLP 4080 or Graduate Classification
Laboratory in seed pathology. Seed health testing methods; effects of seed treatments and seed conditioning on seedborne pathogens. Offered odd-numbered years. (Typically Offered: Fall)

PLP 5990: Creative Component
Credits: 1-30. Repeatable.
Independent study related to the student's area of specialization and approved by the student's major professor. (Typically Offered: Fall, Spring, Summer)

Courses for graduate students:

PLP 6080: Molecular Virology
(Cross-listed with MICRO 6080/ VMPM 6080).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BBMB 4050 or GDCB 5110
Advanced study of virus host-cell interactions. Molecular mechanisms of viral replication and pathogenesis. Offered even-numbered years. (Typically Offered: Fall)

PLP 6280: Improving Professional Presentation Skills
Credits: 2. Contact Hours: Lecture 2.
Skill building to improve oral presentation fundamentals for graduate students in biological sciences. Principles and guidance in both personal speaking style and maximizing impact of presentation software. In-depth lectures and class discussions on all aspects of presentation skills. Video and anonymous peer review of individual speeches. (Typically Offered: Spring)

PLP 6910: Field Plant Pathology
Credits: 2. Contact Hours: Laboratory 6.
Repeatable.
Prereq: (PLP 4080 or PLP 4160) or graduate classification
Diagnosis of plant diseases, plant disease assessment methods, and the integration of disease management into commercial crop production practices. Objectives are to familiarize 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. Offered even-numbered years. (Typically Offered: Summer)

PLP 6920: Molecular Biology of Plant-Pathogen Interactions
(Cross-listed with MICRO 6920).
Credits: 3. Contact Hours: Lecture 3.
Semil and current research in molecular and physiological aspects of plant interactions with pathogens, including mechanisms of pathogenesis, host-pathogen recognition and host defense, with an emphasis on critical evaluation of primary literature. Students also complete a research proposal writing and peer review exercise. Offered odd-numbered years. (Typically Offered: Spring)

PLP 6940: Colloquium in Plant Pathology
Credits: 2. Contact Hours: Lecture 2.
Repeatable.
Advanced topics in plant pathology, including biological control, cultural control, resistance gene deployment, genetic engineering for disease resistance, chemical control, integrated pest management, emerging diseases, fungal genetics, insect vector biology, professional communications, etc. (Typically Offered: Spring)

PLP 6980: Seminar
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

PLP 6990: Thesis and Dissertation Research
Credits: 1-30. Repeatable.
Thesis and dissertation research. (Typically Offered: Fall, Spring, Summer)