

PLANT PATHOLOGY AND MICROBIOLOGY

Undergraduate Study

The department participates in the interdepartmental undergraduate Microbiology major. See /collegeofagricultureandlifesciences/microbiology/ (<http://catalog.iastate.edu/previouscatalogs/2016-2017/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:

PL P 391: Practical Plant Health

(0-4) 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 toxicities, herbicide injury, and environmental stress. Emphasis is on acquiring practical skills. Students will gain experience in written and oral communication.

PL P 408: Principles of Plant Pathology

(Dual-listed with PL P 508). (2-3) Cr. 3. F.S.

Prereq: 8 credits in life sciences, including BIOL 211 or 212.

Braun. Principles underlying the nature, diagnosis, and management of plant diseases. Laboratory complements lecture topics and provides experience in plant disease diagnosis.

PL P 416: Forest Insects and Diseases

(Cross-listed with FOR). (3-0) Cr. 3. F.

Prereq: 8 credits in biological sciences, including BIOL 211 or equivalent.

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.

PL P 416L: Forest Insects and Diseases Laboratory

(Cross-listed with FOR). (0-3) Cr. 1. F.

Prereq: 8 credits in biological sciences, including BIOL 211 or equivalent.

Credit or enrollment in PL P 416.

Laboratory experience working with insect and fungal pests of trees.

PL P 452: Integrated Management of Diseases and Insect Pests of Turfgrasses

(Dual-listed with PL P 552). (Cross-listed with ENT, HORT). (3-0) Cr. 3. Alt. S., offered even-numbered years.

Prereq: HORT 351

Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments.

PL P 477: Bacterial-Plant Interactions

(Dual-listed with PL P 577). (Cross-listed with MICRO). (3-0) Cr. 3. Alt. S., offered even-numbered years.

Prereq: 3 credits in microbiology or plant pathology

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.

PL P 483: Wood Deterioration and Preservation

(Cross-listed with FOR). (2-3) Cr. 3. Alt. F., offered odd-numbered years.

Prereq: FOR 280

Deterioration of wood in use by biological and physical agents. Wood preservation and fire retardant treatments. Environmental impact of wood treating.

PL P 490: Independent Study

Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

Prereq: Junior or senior classification, 7 credits in biological sciences, permission of instructor

A maximum of 6 credits of PL P 490 may be used toward the total of 128 credits required for graduation.

PL P 490A: Independent Study: Plant Pathology

Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

Prereq: Junior or senior classification, 7 credits in biological sciences, permission of instructor

A maximum of 6 credits of PL P 490 may be used toward the total of 128 credits required for graduation.

PL P 490H: Independent Study: Honors

Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

Prereq: Junior or senior classification, 7 credits in biological sciences, permission of instructor

A maximum of 6 credits of PL P 490 may be used toward the total of 128 credits required for graduation.

PL P 494: Seed Pathology

(Dual-listed with PL P 594). (2-0) Cr. 2. Alt. F., offered odd-numbered years.

Prereq: PL P 408

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 manage seedborne and soilborne pathogens and pests. Concurrent enrollment in PI P 494L/594L (Seed Pathology Laboratory) is strongly encouraged (on-campus students only). Credit may not be obtained for both PI P 494/594 and STB/PI P 592.

PL P 494L: Seed Pathology Laboratory

(Dual-listed with PL P 594L). (0-3) Cr. 1. Alt. F., offered odd-numbered years.

Prereq: PL P 408

Laboratory in seed pathology. Seed health testing methods; effects of seed treatments and seed conditioning on seedborne pathogens.

Courses primarily for graduate students, open to qualified undergraduates:

PL P 506: Plant-Pathogen Interactions

(2-0) Cr. 2. Alt. S., offered odd-numbered years.

Prereq: PL P 408 or PL P 416, BIOL 313

Baum, Whitham. Introduction to mechanisms of plant-parasite interaction. Genetics and molecular genetics of plant disease resistance and pathogenicity.

PL P 508: Principles of Plant Pathology

(Dual-listed with PL P 408). (2-3) Cr. 3. F.S.

Prereq: 8 credits in life sciences, including BIOL 211 or 212.

Braun. Principles underlying the nature, diagnosis, and management of plant diseases. Laboratory complements lecture topics and provides experience in plant disease diagnosis.

PL P 511: Integrated Management of Tropical Crops

(Cross-listed with ENT, HORT). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

Prereq: PL P 408 or PL P 416 or ENT 370 or ENT 376 or HORT 221

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 10-day tour of Costa Rican agriculture during spring break, then writeup of individual projects. Meets International Perspectives Requirement.

PL P 530: Ecologically Based Pest Management Strategies

(Cross-listed with AGRON, ENT, SUSAG). (3-0) Cr. 3. Alt. F., offered even-numbered years.

Durable, least-toxic strategies for managing weeds, pathogens, and insect pests, with emphasis on underlying ecological processes.

PL P 543: Ecology and Epidemiology of Plant Diseases

(2-2) Cr. 3. Alt. F., offered odd-numbered years.

Prereq: PL P 408 or PL P 416

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. Analysis 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.

PL P 552: Integrated Management of Diseases and Insect Pests of Turfgrasses

(Dual-listed with PL P 452). (Cross-listed with ENT, HORT). (3-0) Cr. 3. Alt. S., offered even-numbered years.

Prereq: HORT 351

Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments.

PL P 574: Plant Nematology

(2-0) Cr. 2. Alt. SS., offered odd-numbered years.

Prereq: 8 credits in biological sciences, including BIOL 211 or equivalent
Morphology, anatomy, identification, management, and life cycles of common plant-parasitic nematodes; host parasite interactions; recent advances in plant nematology.

PL P 574L: Laboratory Techniques in Plant Nematology

(0-3) Cr. 1. Alt. SS., offered odd-numbered years.

Prereq: 8 credits in biological sciences, including BIOL 211 or equivalent.

Must also be registered for PI P 574.

Practical skills of sample collection, processing, extraction, and identification of plant-parasitic nematodes from soil and roots; other techniques will be discussed.

PL P 577: Bacterial-Plant Interactions

(Dual-listed with PL P 477). (Cross-listed with MICRO). (3-0) Cr. 3. Alt. S., offered even-numbered years.

Prereq: 3 credits in microbiology or plant pathology

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.

PL P 590: Special Topics

Cr. 1-3. Repeatable. F.S.SS.

Prereq: 10 credits in biological sciences, permission of instructor

PL P 592: Seed Health Management

(Cross-listed with STB). (2-0) Cr. 2. Alt. S., offered even-numbered years.

Prereq: Admission to the Graduate Program in Seed Technology and Business/Consent of instructor

Munkvold. 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. Credit may not be obtained for both PI P/STB 592 and PI P 594.

PL P 594: Seed Pathology

(Dual-listed with PL P 494). (2-0) Cr. 2. Alt. F., offered odd-numbered years.

Prereq: PL P 408

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 manage seedborne and soilborne pathogens and pests. Concurrent enrollment in PI P 494L/594L (Seed Pathology Laboratory) is strongly encouraged (on-campus students only). Credit may not be obtained for both PI P 494/594 and STB/PI P 592.

PL P 594L: Seed Pathology Laboratory

(Dual-listed with PL P 494L). (0-3) Cr. 1. Alt. F., offered odd-numbered years.

Prereq: PL P 408

Laboratory in seed pathology. Seed health testing methods; effects of seed treatments and seed conditioning on seedborne pathogens.

Courses for graduate students:**PL P 608: Molecular Virology**

(Cross-listed with MICRO, V MPM). (3-0) Cr. 3. Alt. F., offered even-numbered years.

Prereq: BBMB 405 or GDCB 511

Advanced study of virus host-cell interactions. Molecular mechanisms of viral replication and pathogenesis.

PL P 628: Improving Professional Presentation Skills

(2-0) Cr. 2. F.

Prereq: Graduate student status.

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.

PL P 691: Field Plant Pathology

(0-6) Cr. 2. Repeatable. Alt. SS., offered even-numbered years.

Prereq: PL P 408 or PL P 416

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.

PL P 692: Molecular Biology of Plant-Pathogen Interactions

(Cross-listed with MICRO). (3-0) Cr. 3. Alt. F., offered even-numbered years.

Prereq: PL P 506 or BBMB 405 or GEN 411 or MICRO 402 or strong background in molecular biology

Seminal 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.

PL P 694: Colloquium in Plant Pathology

(2-0) Cr. 2. Repeatable. F.S.

Prereq: PL P 408 or PL P 416, permission of instructor

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.

PL P 698: Seminar

Cr. 1. Repeatable. F.S.

PL P 699: Thesis and Dissertation Research

Cr. arr. Repeatable.

F.S.SS.