

# Plant Pathology and Microbiology

## Undergraduate Study

The department participates in the interdepartmental undergraduate Microbiology major.

## 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*

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 Insect and Disease Ecology.

(Cross-listed with FOR). (3-3) Cr. 4. F. *Prereq: 8 credits in biological sciences, including BIOL 211*

T. Harrington, M. Harris. 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.

#### 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 2014. *Prereq: HORT 351*

Gleason, D. Lewis. 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 2014. *Prereq: 3 credits in microbiology or plant pathology*

Focuses on plant-associated bacteria in terms of their ecology, diversity, and the physiological and molecular mechanisms involved in their interaction with plants; covers symbiotic nitrogen fixation, plant pathogenesis, plant growth promotion, and biological control.

#### PL P 483. Wood Deterioration and Preservation.

(Cross-listed with FOR). (2-3) Cr. 3. Alt. F., offered 2011. *Prereq: FOR 280*

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

#### 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). (2-3) Cr. 3. Alt. S., offered 2013. *Prereq: PL P 408*  
Munkvold. Significance of diseases on the major phases of seed production; growing, harvesting, conditioning, storing, and planting seed. Pathogens considered include fungi, bacteria, viruses, nematodes, and abiotic agents. Emphasis on epidemiology, management, host-pathogen relationships, seed transmission, and seed health testing. Credit may not be obtained for both PL P 494 and STB/PI P 592.

### Courses primarily for graduate students, open to qualified undergraduates:

#### PL P 506. Plant-Pathogen Interactions.

(2-0) Cr. 2. S. *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*

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

#### PL P 509. Plant Virology.

(Cross-listed with MICRO). (2-6) Cr. 4. Alt. S., offered 2013. *Prereq: PL P 408, BIOL 454, BBMB 405, CHEM 211*

Hill. Plant viruses and the diseases they cause. Emphasis on epidemiology and control. Structure, function, and biochemical-biophysical properties of plant viruses.

#### PL P 511. Integrated Management of Tropical Crops.

(Cross-listed with ENT, HORT). (3-0) Cr. 3. Alt. S., offered 2013. *Prereq: PL P 408 or PL P 416 or ENT 370 or ENT 376 or HORT 221*

Gleason, Lewis. 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 2014.

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.

(3-2) Cr. 4. Alt. F., offered 2013. *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 2014. *Prereq: HORT 351*

Gleason, D. Lewis. 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.**

(2-3) Cr. 3. Alt. F., offered 2012. *Prereq: PL P 408 or PL P 416*

Baum. Morphology, anatomy, identification, control, and life cycles of common plant-parasitic nematodes; host-parasite interactions; *Caenorhabditis elegans*.

**PL P 577. Bacterial-Plant Interactions.**

(Dual-listed with PL P 477). (Cross-listed with MICRO). (3-1) Cr. 3. Alt. S., offered 2014. *Prereq: 3 credits in microbiology or plant pathology*

Focuses on plant-associated bacteria in terms of their ecology, diversity, and the physiological and molecular mechanisms involved in their interaction with plants; covers symbiotic nitrogen fixation, plant pathogenesis, plant growth and biological control.

**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 2014. *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). (2-3) Cr. 3. Alt. S., offered 2013. *Prereq: PL P 408*  
Munkvold. Significance of diseases on the major phases of seed production; growing, harvesting, conditioning, storing, and planting seed. Pathogens considered include fungi, bacteria, viruses, nematodes, and abiotic agents. Emphasis on epidemiology, management, host-pathogen relationships, seed transmission, and seed health testing. Credit may not be obtained for both PI P 494 and STB/PI P 592.

**Courses for graduate students:**

**PL P 608. Molecular Virology.**

(Cross-listed with MICRO, V MPM). (3-0) Cr. 3. Alt. F., offered 2014. *Prereq: BBMB 405 or GDCB 511*

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

**PL P 691. Field Plant Pathology.**

(0-6) Cr. 2. Repeatable. Alt. SS., offered 2013. *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 2012. *Prereq: PL P 506 or BBMB 405 or GEN 411 or MICRO 402 or strong background in molecular biology*  
Bogdanove, Whitham. 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 an interinstitutional 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.