Twin Cities Campus

Plant Pathology Ph.D.

Plant Pathology

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2019
- Length of program in credits: 56
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements of the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a sound college background in the basic biological and physical sciences and mathematics.

PhD applicants must satisfy all the prerequisites for the master's degree program in plant pathology or have a master's degree in plant pathology or in a field of natural science.

Other requirements to be completed before admission:
Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, they must be corrected during the first year of the graduate program. Applicants should note that these courses cannot be counted as part of the degree program. All students accepted into the department with only a BS degree are admitted into the MS degree program. After a minimum of two semesters, students who qualify may elect to change their degree status to the PhD program. Criteria for the change include scholastic standing, potential for success in completing a PhD, and writing competency.

Special Application Requirements:
GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 148

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- General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations(GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must enroll in a supervised teaching or extension teaching experience, chosen in consultation with the advisor and director of graduate studies.
Degree plans are determined by the advisory committee, with approval of the director of graduate studies.
Regular attendance at weekly plant pathology seminars is expected.
Internships are encouraged as part of the graduate experience. Financial support for international or domestic internships is available on a competitive basis.

Required Coursework (13 credits)

All students take the following courses, if not completed previously. Take PLPA 8200 twice for a total of 2 credits. Take PLPA 8005 for 2 credits to fulfill the one-semester teaching experience requirement. Take GRAD 8101 concurrently with or after completing PLPA 8005.

PLPA 5480 - Principles of Plant Pathology (3.0 cr)
PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
PLPA 8200 - Plant Pathology Seminar (1.0 cr)
PLPA 8005 - Supervised Classroom or Extension Teaching Experience (1.0 - 2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)

Electives (12 credits)

Take at least 12 credits, in consultation with the advisor, to complete the outside credit requirement.

AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
EEB 5221 *{Inactive}*(3.0 cr)
AGRO 5021 - Plant Breeding Principles (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
PMB 5412 - Plant Physiology and Development (3.0 cr)

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CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
PLPA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Standard Program

Standard Program Courses (7 credits)
Take the following courses:
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (3.0 cr)
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)

Program Sub-plans

A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Molecular Plant Pathology

Students in the molecular plant pathology track complete specialized coursework that emphasizes molecular approaches to investigating plant diseases, increase their knowledge of basic science, and explore emerging strategies for disease control. Students in the Molecular Plant Pathology track will learn about topics such as pathogen effectomics, plant phenomics, molecular plant/microbe interactions, and an ever-evolving array of molecular research techniques, strategies, and analytical approaches. At the same time, students will garner a comprehensive understanding of plant interactions with pathogenic and non-pathogenic microbes from a systems level, building a firm knowledge base of classical and contemporary plant pathology concepts. Students completing the molecular plant pathology track will be well positioned for research careers in molecular plant pathology in academia, industry, and government.

Molecular Plant Pathology Courses (7 credits)
Take the following courses. Take PLPA 5300 twice for a total of 2 credits.
PLPA 5301 - Large Scale Omic Data in Plant Biology (3.0 cr)
PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 cr)
Virology OR Bacteriology
Take one of the following courses:
PLPA 8104 - Plant Virology (2.0 cr)
or PLPA 8105 - Plant Bacteriology (3.0 cr)

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