PLANT PATHOLOGY, PH.D.

The discipline of plant pathology is directed toward understanding and solving disease problems of plants. The field is broad and complex, integrating disciplines as varied as molecular biology, genetics, cell biology, organismal biology, population and community ecology, meteorology, statistics, computer science, chemistry, and physics. Plant pathology encompasses basic and applied research, employs both model systems and economically important plants, and requires both laboratory and field experimentation. Active research programs in the department encompass this full spectrum of questions and approaches, including research on virology, nematology, fungal genetics, tissue culture, soil microbiology and ecology, forest pathology, bacterial plant pathogens, molecular biology of parasite-host interactions, microbial ecology, epidemiology, and integrated disease management strategies.

The graduate program in plant pathology educates students in the science of plant pathology and prepares them for successful careers. Students develop the following skills required to meet diverse professional situations: excellence in research; breadth and depth in plant pathology; breadth in an allied field; strong critical and analytical thinking skills; and effective communication skills. Students become sufficiently knowledgeable in all aspects of plant pathology to identify key research questions, recognize significant discoveries, and think analytically about interpretation of data.

The level of proficiency in specific areas will vary with the student's research area and career goals, and will be appropriate to the student's degree program (M.S. or Ph.D.). Specific areas of proficiency addressed by the Ph.D. curriculum include etiology, diagnosis, and management of plant disease; ecology and epidemiology; genetics and physiology of plant-microbe interactions; and organismal biology. Ph.D. students may elect an optional professional development experience as part of their curriculum. Graduates of the program attain positions in teaching, research in academic positions, government services, industry, extension services, and private practice.

The program is comprised of about 100 faculty members, graduate students, and research and support staff. It is housed in an eight-story wing of Russell Laboratories, a teaching and research facility on the UW-Madison campus, which is surrounded by other facilities that are also devoted to biological research. Russell Labs, together with the extensive research facilities available on the rest of the UW-Madison campus and at field research stations throughout Wisconsin, provide a rich and comprehensive environment for research and graduate studies in all branches of plant pathology.

ADMISSIONS

Students who are admitted to the department must meet the Graduate School requirements, including completion of a bachelor’s degree which typically consists of courses in biology, chemistry, math and physics. If foundation course requirements have not been fulfilled before matriculation, they must be completed as early as possible in the course of study. Successful applicants typically exceed the minimum requirement of a 3.0 GPA (on a 4.0 scale); exceed the minimum required Test of English as a Foreign Language (TOEFL) score of 92, or a 7 on the International English Language Testing System (IELTS) exam (international applicants); perform well on the Graduate Record Exam (GRE); and articulate a strong interest in the discipline in their application. Prior research experience is an asset for any applicant, and letters of recommendation from research advisors are viewed as one of the most useful means of evaluating applications.

The application deadline for the fall semester is the preceding January 2. Applications received after that date will be reviewed, but they are disadvantaged for admission and financial support.

Additional information can be found on the department’s application process webpage (http://plantpath.wisc.edu/graduate-apply).

GRADUATE SCHOOL ADMISSIONS

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

The department offers stipends to the most highly qualified applicants, and students are funded throughout their programs by research assistantships, fellowships, or traineeships. The department nominates outstanding students for external fellowships and supports and assists students who apply for scholarships and other forms of financial support.

Additional information regarding funding can be found on the department’s funding information webpage (http://plantpath.wisc.edu/graduate-funding).

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/ #policiesandrequrementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</tbody>
</table>

Mode of Instruction Definitions

Evening/Weekend: These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses.
and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

**Online**: These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

**Hybrid**: These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

**Accelerated**: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

### CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Minimum Credit Requirement</th>
<th>51 credits</th>
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<tbody>
<tr>
<td>Minimum Residence Credit Requirement</td>
<td>32 credits</td>
</tr>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (<a href="http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle">http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle</a>).</td>
</tr>
<tr>
<td>Overall Graduate GPA Requirement</td>
<td>3.00 GPA required</td>
</tr>
<tr>
<td>Other Grade Requirements</td>
<td>The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.</td>
</tr>
<tr>
<td>Assessments and Examinations</td>
<td>Students in the Plant Pathology Ph.D. must complete certification paperwork to outline their coursework, pass a departmental written qualifying exam, pass an oral preliminary examination, and prepare, publicly present, and defend a dissertation.</td>
</tr>
<tr>
<td>Language Requirements</td>
<td>Contact the program for information on any language requirements.</td>
</tr>
<tr>
<td>Doctoral Minor/Breadth Requirements</td>
<td>All doctoral students are required to complete a minor.</td>
</tr>
</tbody>
</table>

## REQUIRED COURSES

Students must complete the foundation requirements, the expectation is that a majority of these are met through undergraduate coursework. These courses include three of four from Genetics, Plant Anatomy/ Morphology, Plant Physiology, and General Ecology; 2 semesters of General Chemistry, Organic Chemistry (including a lab), and Biochemistry; two semester of General Physics (including electricity and light); and Introductory Calculus and Statistics.

Major requirements include, the remaining credits to fulfill the credit minimum are electives in consultation with the student’s advisor and committee.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL PATH 300</td>
<td>Introduction to Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>PL PATH/BOTANY/ENTOM 505</td>
<td>Plant-Microbe Interactions: Molecular and Ecological Aspects</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 559</td>
<td>Diseases of Economic Plants</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 602</td>
<td>Ecology, Epidemiology and Control of Plant Diseases</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 799</td>
<td>Practicum in Plant Pathology Teaching</td>
<td>2</td>
</tr>
<tr>
<td>PL PATH 875</td>
<td>Special Topics</td>
<td>2</td>
</tr>
<tr>
<td>2 instances of PL PATH 875</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>PL PATH 923</td>
<td>Seminar</td>
<td>2</td>
</tr>
<tr>
<td>2 instances of PL PATH 923</td>
<td></td>
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</tr>
</tbody>
</table>

Additional information regarding program-specific courses can be found on the department’s handbook and forms webpage (http://plantpath.wisc.edu/graduate-handbook).

### GRADUATE SCHOOL POLICIES

The Graduate School’s Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

### MAJOR-SPECIFIC POLICIES

#### GRADUATE PROGRAM HANDBOOK

The Graduate Program Handbook (http://plantpath.wisc.edu/graduate-handbook) is the repository for all of the program’s policies and requirements.

#### PRIOR COURSEWORK

**Graduate Work from Other Institutions**

For well-prepared advanced students, the program may accept prior graduate coursework from other institutions toward the minimum graduate degree credit and minimum graduate coursework (50%) requirement. The minimum graduate residence credit requirement can be satisfied only with courses taken as a graduate student at UW–Madison. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

**UW–Madison Undergraduate**

For well-prepared advanced students, the program may decide to accept up to 7 credits numbered 300 or above completed at UW–Madison toward fulfillment of minimum degree and minor credit requirements. This work would not be allowed to count toward the 50% graduate coursework minimum unless taken at the 700 level or above. Coursework earned ten or more
years prior to admission to a doctoral degree is not allowed to satisfy requirements.

**UW–Madison University Special**
The program may decide to accept up to 15 University Special student credits as fulfillment of the minimum graduate residence, graduate degree, or minor credit requirements on occasion as an exception (on a case-by-case basis). UW–Madison coursework taken as a University Special student would not be allowed to count toward the 50% graduate coursework minimum unless taken at the 700 level or above. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

**PROBATION**
The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**
Every graduate student is required to have an advisor. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies. An advisor generally serves as the thesis advisor. In many cases, an advisor is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor.

To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

A committee often accomplishes advising for the students in the early stages of their studies.

**CREDITS PER TERM ALLOWED**
15 credits

**TIME CONSTRAINTS**
Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within five years after passing the preliminary examination may be required to take another preliminary examination and to be admitted to candidacy a second time.

**OTHER**
Applications to graduate studies act as the application for financial support. Offers of financial support accompany most offers of admission for students admitted to Plant Pathology. Most students hold research assistantships (RAs). The availability of RAs is limited.

**PROFESSIONAL DEVELOPMENT**

**GRADUATE SCHOOL RESOURCES**
Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

**PROGRAM RESOURCES**
Students in the Department of Plant Pathology are strongly encouraged to participate in events through the Plant Pathology Graduate Colloquium (http://labs.russell.wisc.edu/ppgc).

**LEARNING OUTCOMES**
1. Demonstrate an understanding of the basic processes of pathogenesis, plant defense, and defense circumvention at the molecular, genetic and physiological level for each of the major groups of plant pathogens and other plant associated microorganisms.

2. Demonstrate an understanding of the basic biology of microorganisms that are symbiotic with plants including fungi, bacteria, viruses, oomycetes, and nematodes.

3. Demonstrate an understanding of the etiology, ecology, and epidemiology of economically significant diseases caused by the major groups of plant pathogens.

4. Construct disease management strategies for the different groups of important plant pathogens.

5. Demonstrate excellent problem solving skills and a deep conceptual understanding of the science of Plant Pathology.

6. Convey knowledge in a variety of formats to diverse audiences including the public, students, and fellow scientists.

**PEOPLE**

**PROFESSORS**
Ahlquist, Paul
Allen, Caitilyn
Bent, Andrew
Handelsman, Jo
MacGuidwin, Ann
McManus, Patricia (chair)
Rouse, Douglas

**ASSOCIATE PROFESSORS**
Barak-Cunningham, Jeri
Gevens, Amanda

**ASSISTANT PROFESSORS**
Kabbage, Mehdi
Koch, Paul
Lankau, Richard
Rakotondrafara, Aurelie
Silva, Erin
Smith, Damon
AFFILIATED FACULTY
Ane, Jean-Michel (Bacteriology)
Groves, Russell (Entomology)
Havey, Michael (Horticulture)
Keller, Nancy (Medical Microbiology & Immunology)
Pringle, Ann (Botany)
Whitman, Thea (Soil Science)
Yu, Jae-Hyuk (Bacteriology)

FACULTY ASSOCIATE
Hudelson, Brian