PLANT PATHOLOGY, B.S.

Plant pathology is the study of plants and their pathogens, the process of disease, and how plant health and disease are influenced by factors such as the weather, nonpathogenic microorganisms, and plant nutrition. It encompasses fundamental biology as well as applied agricultural sciences.

Plant pathology involves the study of plants and pathogens at the genetic, biochemical, physiological, cellular, population, and community levels, and how the knowledge derived is integrated and put into agricultural practice. Prerequisite to effective research, teaching, and extension in plant pathology is a breadth of interdisciplinary interest and knowledge, in a department and in its individual members, reaching from ecology to microbiology, from meteorology to applied mathematics, and from molecular biology to communication skills.

Plant pathology is a field that thrives in, and makes its greatest contribution to, comprehensive institutions like the University of Wisconsin–Madison where the proximity and complementarity of basic sciences and the other applied agricultural sciences are exceptionally strong.

Undergraduates in plant pathology can choose between two tracks. The plant–microbe biology track has courses in basic math and sciences, including biology, chemistry, and physics, along with upper-level courses in plant pathology, biochemistry, and microbiology. This track is geared toward students who have an interest in receiving a broad education in the basic sciences or plan to pursue a graduate or professional degree. The plant health and industry track includes some courses in basic math and sciences, as well as additional courses in agriculture and economics/management and upper-level courses in plant pathology, entomology and other agricultural sciences. This track is designed for students who intend to work in industry after receiving their undergraduate degree. More information about careers in plant pathology is available from the department.

This major is earned through the bachelor of science degree program.

HOW TO GET IN

To declare this major, students must be admitted to UW–Madison and the College of Agricultural and Life Sciences (CALS). For information about becoming a CALS first-year or transfer student, see Entering the College (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#enteringthecollegetext).

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences have the option to declare this major at SOAR. Students may otherwise declare after they have begun their undergraduate studies. For more information, contact the advisor listed under the Advising and Careers tab.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudystext) section of the Guide.

General Education

- *Breadth—Humanities/Literature/Arts: 6 credits*
- *Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits*
- *Breadth—Social Studies: 3 credits*
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALS must satisfy a set of college and major requirements. Specific requirements for all majors in the college and other information on academic matters can be obtained from the Office of Academic Affairs (http://www.cals.wisc.edu/academics), College of Agricultural and Life Sciences, 116 Agricultural Hall, 1450 Linden Drive, Madison, WI 53706; 608-262-3003. Academic departments and advisors also have information on requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies and Science), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Work: Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.</td>
<td></td>
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</tr>
</tbody>
</table>
First Year Seminar (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext) 1
International Studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext) 3

Physical Science Fundamentals 4-5
- CHEM 103 General Chemistry I
  or CHEM 108 Chemistry in Our World
  or CHEM 109 Advanced General Chemistry

Biological Science 5
- Additional Science (Biological, Physical, or Natural) 3
- Science Breadth (Biological, Physical, Natural, or Social) 3
- CALS Capstone Learning Experience: included in the requirements for each CALS major (see "Major Requirements") (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext)

**MAJOR REQUIREMENTS**

Courses may not double count within the major (unless specifically noted otherwise), but courses counted toward the major requirements may also be used to satisfy a university requirement and/or a college requirement. A minimum of 15 credits must be completed in the major that are not used elsewhere.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Mathematics</strong></td>
<td></td>
<td>5-6</td>
</tr>
<tr>
<td></td>
<td>Select one of the following (or may be satisfied by placement exam):</td>
<td></td>
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<tr>
<td></td>
<td>MATH 112 Algebra</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; MATH 113 and Trigonometry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 114 Algebra and Trigonometry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 171 Calculus with Algebra and Trigonometry I</td>
<td></td>
</tr>
<tr>
<td><strong>Core Chemistry</strong></td>
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<td>5-9</td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 103 General Chemistry I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 104 and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 109 Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td><strong>Introductory Biology</strong></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option 1 (preferred):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BIOLOGY/ BOTANY/ ZOOLOGY 151 &amp; BIOLOGY/ BOTANY/ ZOOLOGY 152</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option 2:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZOOLOGY/ BIOLOGY 101 &amp; ZOOLOGY/ BIOLOGY 102 &amp; BOTANY/ BIOLOGY 130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option 3:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BIOCORE 381 Evolution, Ecology, and Genetics &amp; BIOCORE 382 and Evolution, Ecology, and Genetics Laboratory &amp; BIOCORE 383 and Cellular Biology Laboratory &amp; BIOCORE 384 and Cellular Biology Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

**Core Physics**
Select one of the following: 4-5
- PHYSICS 103 General Physics
- PHYSICS 201 General Physics
- PHYSICS 207 General Physics

**Plant Pathology Core**
- PL PATH 300 Introduction to Plant Pathology 4
- PL PATH/BOTANY 332 Fungi 4
- Another PL Path course above 300 1
- **Capstone**
  - PL PATH 590 Capstone in Plant Pathology 3
- **Track**
  - Select one of the following: 29-39
    - Plant-Microbe Biology Track
    - Plant Health and Industry Track

**Total Credits** 67-83


**TRACKS**

**PLANT–MICROBE BIOLOGY TRACK**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Additional Mathematics and Statistics</strong></td>
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</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
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</tr>
<tr>
<td></td>
<td>MATH 211 Calculus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 217 Calculus with Algebra and Trigonometry II</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 221 Calculus and Analytic Geometry 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>MATH 222 Calculus and Analytic Geometry 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STAT 301 Introduction to Statistical Methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STAT 371 Introductory Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
<tr>
<td><strong>Additional Chemistry</strong></td>
<td></td>
<td>4-8</td>
</tr>
<tr>
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<td>Select one of the following options:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 343 Introductory Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 344 and Introductory Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 345 and Intermediate Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 341 Elementary Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 342 and Elementary Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td><strong>Biology</strong></td>
<td></td>
<td>5-8</td>
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</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option 1:</td>
<td></td>
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</table>
MICROBIO 303 & MICROBIO 304  
Biology of Microorganisms 
and Biology of Microorganisms Laboratory

GENETICS 466  
Principles of Genetics

Option 2:
Select two of the following:
BIOCORE 485  
Organismal Biology
BIOCORE 486  
Organismal Biology Laboratory
BIOCORE 587  
Biological Interactions

Additional Physics
Select one of the following:  
4-5
PHYSICS 104  
General Physics
PHYSICS 202  
General Physics
PHYSICS 208  
General Physics

Plant Physiology
BOTANY 500  
Plant Physiology 3-4

Plant-Microbe Electives
Select 5 credits from the following:  
5
BIOCHEM 501  
Introduction to Biochemistry
BOTANY 300  
Plant Anatomy
BOTANY 400  
Plant Systematics
or BOTANY 401  
Vascular Flora of Wisconsin
BOTANY/ 
F&W ECOL/ 
ZOOLOGY 460  
General Ecology
ENTOM/ 
ZOOLOGY 302  
Introduction to Entomology
Any PL PATH course above 300

Total Credits  
29-39

1 MATH 171 is a prerequisite for MATH 217.
2 MATH 221 Calculus and Analytic Geometry 1/MATH 217 Calculus with Algebra and Trigonometry II is a prerequisite for MATH 222 Calculus and Analytic Geometry 2

PLANT HEALTH AND INDUSTRY TRACK

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GENETICS 466</td>
<td>Principles of Genetics</td>
<td>3</td>
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</table>

Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL PATH 559</td>
<td>Diseases of Economic Plants</td>
<td>3-4</td>
</tr>
</tbody>
</table>
or BOTANY 500 | Plant Physiology                                    | 3-4     |

Plant Health and Industry Electives
Select 24 credits from at least two different departments from the following:  
24
AGRONOMY 100  
Principles and Practices in Crop Production
AGRONOMY 300  
Cropping Systems
AGRONOMY 302  
Forage Management and Utilization
AGRONOMY/ 
HORT 328  
Integrated Weed Management
BOTANY/ 
ENVIR ST/ 
ZOOLOGY 260  
Introductory Ecology

BOTANY 300  
Plant Anatomy
BOTANY/ 
F&W ECOL/ 
ZOOLOGY 460  
General Ecology

BOTANY 500  
Plant Physiology

BIOCHEM 501  
Introduction to Biochemistry
C&E SOC/ 
SOC 140  
Introduction to Community and Environmental Sociology
C&E SOC/ 
SOC 222  
Food, Culture, and Society
C&E SOC/ 
HIST SCI 230  
Agriculture and Social Change in Western History
C&E SOC/ 
AMER IND/ 
SOC 578  
Poverty and Place
C&E SOC/ 
SOC 650  
Sociology of Agriculture
ENTOM/ 
ENVIR ST 201  
Insects and Human Culture—a Survey Course in Entomology
ENTOM/ 
ZOOLOGY 302  
Introduction to Entomology
ENTOM 342  
Insect Ecology
F&W ECOL 100  
Introduction to Forestry
F&W ECOL/ 
ZOOLOGY 335  
Human/Animal Relationships: Biological and Philosophical Issues
F&W ECOL/ 
ENVIR ST/ 
ZOOLOGY 360  
Extinction of Species
F&W ECOL/ 
BOTANY 455  
The Vegetation of Wisconsin
F&W ECOL/ 
BOTANY 500  
General Ecology
F&W ECOL/ 
ZOOLOGY 460  
Forest Ecology
HORT 120  
Survey of Horticulture
HORT/ 
PL PATH 261  
Sustainable Turfgrass Use and Management
HORT/ 
LAND ARC 263  
Landscape Plants I
HORT 320  
Environment of Horticultural Plants
HORT 345  
Fruit Crop Production
MICROBIO 101  
General Microbiology
MICROBIO 102  
General Microbiology Laboratory
MICROBIO 303  
Biology of Microorganisms Laboratory
MICROBIO 304  
Biology of Microorganisms
NUTR SCI 132  
Nutrition Today
NUTR SCI/AN SCI/ 
DY SCI 311  
Comparative Animal Nutrition
NUTR SCI 332  
Human Nutritional Needs
NUTR SCI/ 
AGRONOMY/ 
INTER-AG 350  
World Hunger and Malnutrition
NUTR SCI/ 
BIOCHEM 510  
Biochemical Principles of Human and Animal Nutrition
### University Degree Requirements

**Total Degree**

To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency**

Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work**

Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

### Learning Outcomes

1. Define and explain major concepts in the biological sciences including Plant Pathology.
2. Appropriately use biological instrumentation and laboratory techniques.
3. Explain and apply the scientific method including designing and conducting experiments and testing hypotheses.
4. Recognize the relationship between structure and function at all levels: molecular, cellular, organismal, and ecological.
5. Demonstrate a style appropriate for communicating scientific results in written and oral form.
6. Integrate math, physical sciences, and technology to answer biological questions using the scientific method.

### Four-Year Plan

#### Sample Plant Pathology Four-Year Plan—Plant-Microbe Biology Track

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 112, 113, or 114</td>
<td>MATH 113, 114, or 221</td>
<td>3-5</td>
</tr>
<tr>
<td>CHEM 103 or 109</td>
<td>CHEM 104</td>
<td>5</td>
</tr>
<tr>
<td>First Year Seminar</td>
<td>Gen Ed¹</td>
<td>0-7</td>
</tr>
<tr>
<td>Gen Ed¹</td>
<td></td>
<td>0-11</td>
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<tr>
<td></td>
<td></td>
<td>8-20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8-17</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>16-37</td>
<td></td>
</tr>
</tbody>
</table>

**Credit:**

- **Total Credits:** 36-37
- **Credits Spring:** 3-5
- **Credits:** 5-5
Plant Pathology, B.S.

<table>
<thead>
<tr>
<th>ZOOLOGY/ BIOLOGY 101  &amp; ZOOLOGY/ BIOLOGY 102</th>
<th>0-5</th>
<th>12-15</th>
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<tbody>
<tr>
<td>Gen Ed</td>
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<td></td>
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<tr>
<td>Total Credits</td>
<td>25-33</td>
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</table>

Junior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL PATH 300</td>
<td>4 PHYSICS 104, 202, or 208</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 103, 201, or 207</td>
<td>4 PL PATH/BOTANY 332</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 222 or STAT 371</td>
<td>4 GENETICS 466</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Gen Ed</td>
<td>0-6 Gen Ed</td>
<td>2-5</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>12-18</td>
<td>13-16</td>
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</table>

Senior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROBIO 303</td>
<td>3 BOTANY 500</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 304</td>
<td>2 Capstone Experience</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Core or Breadth Electives</td>
<td>3-8 Core or Breadth Electives</td>
<td>3-8</td>
<td></td>
</tr>
<tr>
<td>Gen Ed</td>
<td>0-10 Gen Ed</td>
<td>0-15</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>8-23</td>
<td>9-30</td>
<td></td>
</tr>
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</table>

1 Gen-Ed requirements include communications, ethnic studies, humanities, social science, or international studies. See Requirements tab for more details.

Note: Possible places where students may cut down on courses:
COMM-A placement test, COMM-B taken as ZOOLOGY/BIOLOGY/BOTANY 152, QR-A placement test, AP/IB credits (biology, social sciences, humanities, language, chemistry, physics, math, statistics)

ADVISING AND CAREERS

UNDERGRADUATE ADVISING IN PLANT PATHOLOGY

Students in plant pathology are assigned to one of our faculty advisors. Current faculty advisors include:

Caitilyn Allen
Jeri Barak (lead faculty advisor)
Amanda Gevens
Mehdi Kabbage
Paul Koch
Richard Lankau
Patty McManus

Undergraduates in plant pathology are required to meet with their advisor before they can enroll for the upcoming term. A hold will be placed on student records until they meet with their advisor. For more information about the Plant Pathology major or the department in general, please contact the lead undergraduate advisor, Associate Professor Jeri Barak.

CAREERS AND PROFESSIONAL DEVELOPMENT

For more information on careers available to plant pathology students please visit our Internship & Job Resources (http://www.plantpath.wisc.edu/student-internships-jobs) page. For more information on other academic, co-curricular, financial aid, and career opportunities and services available to plant pathology students, please visit the CALS Career Services (https://cals.wisc.edu/academics/undergraduate-students/career-services) page.

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

WISCONSIN EXPERIENCE

WISCONSIN EXPERIENCE

Undergraduates majoring in plant pathology at UW–Madison will find an inclusive, welcoming community where professors know their students and are able to provide guidance based on students’ specific academic and career goals. There are numerous opportunities to conduct research with internationally prominent faculty and to take part in the Wisconsin Idea, whereby faculty and students extend the knowledge developed
at the university to stakeholders in Wisconsin and beyond for the betterment of society.

Plant pathology offers paid research internships during summer term, as well as paid or credit-earning research opportunities year-round. Undergraduates get a firsthand view of how research is conducted and what it means to be a professional scientist.

By joining the Plant Pathology Undergraduate Club, majors get to know their fellow students outside the classroom. The department provides resources for students to meet experts who lead discussions on a range of topics including cutting-edge research and technology, career options, and how to apply and compete for jobs.