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/#enteringthecollegecontent).

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/#requirementsforundergraduatetext) 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. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), 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</td>
<td>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>
</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>
<td></td>
</tr>
<tr>
<td>First Year Seminar</td>
<td>(<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a>)</td>
<td>1</td>
</tr>
<tr>
<td>International Studies</td>
<td>(<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a>)</td>
<td>3</td>
</tr>
</tbody>
</table>
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></td>
<td><strong>Core Mathematics</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following (or may be satisfied by placement exam):</td>
<td>5-6</td>
</tr>
<tr>
<td>MATH 112 &amp; MATH 113</td>
<td>Algebra and Trigonometry</td>
<td></td>
</tr>
<tr>
<td>MATH 114</td>
<td>Algebra and Trigonometry</td>
<td></td>
</tr>
<tr>
<td>MATH 171</td>
<td>Calculus with Algebra and Trigonometry I</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Core Chemistry</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>5-9</td>
</tr>
<tr>
<td>CHEM 103 &amp; CHEM 104</td>
<td>General Chemistry I and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Introductory Biology</strong></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY/ BOTANY/ ZOOLOGY 151 &amp; BIOLOGY/ BOTANY/ ZOOLOGY 152</td>
<td>Introductory Biology and Introductory Biology</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Option 1:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td>5-8</td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY 101 &amp; ZOOLOGY/ BIOLOGY 102 &amp; BOTANY/ BIOLOGY 130</td>
<td>Animal Biology and General Botany</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Option 3:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td>5-8</td>
</tr>
<tr>
<td>BIOCORE 381 &amp; BIOCORE 382 &amp; BIOCORE 383 &amp; BIOCORE 384</td>
<td>Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics and Cellular Biology and Cellular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Core Physics</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>4-5</td>
</tr>
<tr>
<td>PHYSICS 103 &amp; PHYSICS 201 &amp; PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Plant Pathology Core</strong></td>
<td></td>
</tr>
<tr>
<td>PL PATH 300</td>
<td>Introduction to Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>PL PATH/BOTANY</td>
<td>Fungi</td>
<td>4</td>
</tr>
<tr>
<td>PL PATH 332</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Another PL Path course above 300 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Capstone</strong></td>
<td></td>
</tr>
<tr>
<td>PL PATH 590</td>
<td>Capstone in Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Track</strong></td>
<td>29-39</td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plant-Microbe Biology Track</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plant Health and Industry Track</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits: 67-83


TRACKS

**PLANT–MICROBE BIOLOGY TRACK**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Additional Mathematics and Statistics</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>5</td>
</tr>
<tr>
<td>MATH 211</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II 1</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>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>MATH 222</td>
<td>Calculus and Analytic Geometry 2 2</td>
<td></td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Additional Chemistry</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>4-8</td>
</tr>
<tr>
<td>CHEM 341 &amp; CHEM 342</td>
<td>Elementary Organic Chemistry and Elementary Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Biology</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td>5-8</td>
</tr>
<tr>
<td></td>
<td>Option 1:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following options:</td>
<td>5-8</td>
</tr>
<tr>
<td>MICROBIO 303 &amp; MICROBIO 304</td>
<td>Biology of Microorganisms and Biology of Microorganisms Laboratory</td>
<td></td>
</tr>
<tr>
<td>GENETICS 466</td>
<td>Principles of Genetics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option 2:</td>
<td></td>
</tr>
</tbody>
</table>
Select two of the following:

BIOCORE 485 Principles of Physiology
BIOCORE 486 Principles of Physiology 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 I/MATH 217 Calculus with Algebra and Trigonometry II is a prerequisite for MATH 222 Calculus and Analytic Geometry 2

PLANT HEALTH AND INDUSTRY TRACK

Code Title Credits

Biology

GENETICS 466 Principles of Genetics 3

Core

PL PATH 559 Diseases of Economic Plants 3-4
or BOTANY 500 Plant Physiology

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
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
F&W ECOL/ ENVIR ST 100 Forests of the World
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/ ZOOLOGY 460 General Ecology
F&W ECOL 550 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
MICROBIO 304 Biology of Microorganisms Laboratory
NUTR SCI 132 Nutrition Today
NUTR SCI/AN SCI/ DY SCI 311 Comparative Animal Nutrition
NUTR SCI 332 Human Nutritional Needs
NUTR SCI/A A E/ AGRONOMY/ INTER-AG 350 World Hunger and Malnutrition
NUTR SCI/ BIOCHEM 510 Nutritional Biochemistry and Metabolism
NUTR SCI 540 Community Nutrition Programs and Policy Issues
PL PATH any course above 300 not already taken for another category
SOIL SCI/ ATM OCN 132 Earth’s Water: Natural Science and Human Use
SOIL SCI/ENVR ST/GEOG 230  Soil: Ecosystem and Resource
SOIL SCI 301  General Soil Science
SOIL SCI 322  Physical Principles of Soil and Water Management
SOIL SCI/ENVR ST 324  Soils and Environmental Quality
SOIL SCI 325  Soils and Landscapes
SOIL SCI/AGRNY/HORT 326  Plant Nutrition Management

Business
Select 6 credits from the following: 6
ACCT I S 100  Introductory Financial Accounting
ACCT I S 211  Introductory Managerial Accounting
ACCT I S 300  Accounting Principles
ACCT I S 301  Financial Reporting I
ACCT I S 302  Financial Reporting II
ACCT I S/ LAW 329  Taxation: Concepts for Business and Personal Planning
A A E 215  Introduction to Agricultural and Applied Economics
A A E 320  Farming Systems Management
A A E 322  Commodity Markets
A A E 323  Cooperatives and Alternative Forms of Enterprise Ownership
A A E 419  Agricultural Finance
A A E/ECON 421  Economic Decision Analysis
A A E/ECON 474  Economic Problems of Developing Areas
ECON 101  Principles of Microeconomics
ECON 102  Principles of Macroeconomics
LSC 270  Marketing Communication for the Sciences
M H R 300  Managing Organizations
M H R 305  Human Resource Management

Total Credits 36-37

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

FOUR-YEAR PLAN
SAMPLE PLANT PATHOLOGY FOUR-YEAR PLAN—PLANT-MICROBE BIOLOGY TRACK

Freshman
Fall  Credits  Spring  Credits
MATH 112, 113, or 114  3  MATH 113, 114, or 221  3-5
CHEM 103 or 109  4-5  CHEM 104  5
First Year Seminar  1  Gen Ed1  0-7
Gen Ed1  0-11  8-20  8-17

Total Credits 16-37

Sophomore
Fall  Credits  Spring  Credits
MATH 221  5  ZOOLOGY/BIOLOGY/BOTANY 152 or BOTANY 130  5
CHEM 343  3  CHEM 344  2
Select one of the following:
ZOOLOGY/BIOLOGY/BOTANY 151  Gen Ed1  2-5
ZOOLOGY/BIOLOGY 101
& ZOOLOGY/BIOLOGY 102
Gen Ed1  0-5  13-18  12-15

Total Credits 25-33
Junior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits 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>
</tr>
<tr>
<td>PHYSICS 103, 201, or 207</td>
<td>4 PL PATH/BOTANY 332</td>
<td>4</td>
</tr>
<tr>
<td>MATH 222 or STAT 371</td>
<td>4 GENETICS 466</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed¹</td>
<td>0-6 Gen Ed¹</td>
<td>2-5</td>
</tr>
<tr>
<td></td>
<td>12-18</td>
<td>13-16</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>25-34</strong></td>
<td></td>
</tr>
</tbody>
</table>

Senior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROBIO 303</td>
<td>3 BOTANY 500</td>
<td>3-4</td>
</tr>
<tr>
<td>MICROBIO 304</td>
<td>2 Capstone Experience</td>
<td>3</td>
</tr>
<tr>
<td>Core or Breadth Electives</td>
<td>3-8 Core or Breadth Electives</td>
<td>3-8</td>
</tr>
<tr>
<td>Gen Ed¹</td>
<td>0-10 Gen Ed¹</td>
<td>0-15</td>
</tr>
<tr>
<td></td>
<td>8-23</td>
<td>9-30</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17-53</strong></td>
<td></td>
</tr>
</tbody>
</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 one of our faculty advisors. Current faculty advisors include:

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

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 either the lead undergraduate advisor, Professor Jeri Barak (jeri.barak@wisc.edu). Students with questions regarding lab positions (both paid and unpaid) in plant pathology should contact Professor Jeri Barak.

CAREERS AND PROFESSIONAL DEVELOPMENT

For more information on careers available to plant pathology students please visit our Internship & Job Resources (https://plantpath.wisc.edu/student-internship-job-resources-2/) 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. Students in the major are welcome to make an individual appointment with their advisor to discuss career related topics such as career exploration, search strategies, graduate school, and review of application materials (resume, CV, letters, etc.).

**PEOPLE**

**FACULTY**

- Ahlquist, Paul
- Allen, Caitilyn
- Barak-Cunningham, Jeri
- Bent, Andrew
- Gevens, Amanda (chair)
- Handelsman, Jo
- Kabbage, Mehdi
- Koch, Paul
- Lankau, Richard
- MacGuidwin, Ann
- Rakotondrafara, Aurelie
- Rioux, Renee
- Rouse, Douglas
- Silva, Erin
- Solís-Lemus, Claudia
- 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.