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/#enteringthecollege). 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. 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>
<td></td>
</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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>or CHEM 108</td>
<td>Chemistry In Our World</td>
<td></td>
</tr>
<tr>
<td>or CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

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>Code</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td><strong>Core Mathematics</strong></td>
<td>Select one of the following (or may be satisfied by placement exam):</td>
<td>5-6</td>
</tr>
<tr>
<td></td>
<td>MATH 112 Algebra &amp; MATH 113 Algebra 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>
<td>Select one of the following:</td>
<td>5-9</td>
</tr>
<tr>
<td></td>
<td>CHEM 103 General Chemistry I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 104 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>Select one of the following options:</td>
<td>10</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>Introduction Biology &amp; Introductory Biology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal Biology &amp; Animal Biology Laboratory &amp; General Botany</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>ZOOLOGY/BIOLOGY 101 &amp; ZOOLOGY/BIOLOGY 102 &amp; BOTANY/BIOLOGY 130</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>ZOOLOGY/BIOLOGY 101 &amp; ZOOLOGY/BIOLOGY 102 &amp; BOTANY/BIOLOGY 130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZOOLOGY/BIOLOGY 101 &amp; ZOOLOGY/BIOLOGY 102 &amp; BOTANY/BIOLOGY 130</td>
<td></td>
</tr>
</tbody>
</table>

**Plant Pathology Core**

<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 332</td>
<td>Fungi</td>
<td>4</td>
</tr>
<tr>
<td>Another PI Path course above 300</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Capstone</strong></td>
<td>PL PATH 590 Capstone in Plant Pathology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Track**

Select one of the following:

- 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>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td><strong>Additional Mathematics and Statistics</strong></td>
<td>Select one of the following:</td>
<td>5</td>
</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 I</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>
</tbody>
</table>

**Additional Chemistry**

Select one of the following options: 4-8

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 341 &amp; CHEM 342</td>
<td>Elementary Organic Chemistry &amp; Elementary Organic Chemistry Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

**Biology**

Select one of the following options: 5-8

Option 1:
MICROBIO 303 and 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:  
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:  
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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENETICS 466</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 559</td>
<td>Diseases of Economic Plants</td>
<td>3-4</td>
</tr>
<tr>
<td>or BOTANY 500</td>
<td>Plant Physiology</td>
<td></td>
</tr>
</tbody>
</table>

Plant Health and Industry Electives
Select 24 credits from at least two different departments from the following:  
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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOTANY 300</td>
<td>Plant Anatomy</td>
<td></td>
</tr>
</tbody>
</table>
| BOTANY/  
F&W ECOL/  
ZOOLOGY 460 | General Ecology                                    |         |
| BOTANY 500 | Plant Physiology                                    |         |
| BIOTECH 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                        |         |
| 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/  
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 | Biochemical Principles of Human and Animal Nutrition |         |
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/ ENVIR 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/ ENVIR ST 324  Soils and Environmental Quality

SOIL SCI 325  Soils and Landscapes

SOIL SCI/ AGRONOMY/ 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 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  Communication in Life Science Industries
M H R 300  Managing Organizations
M H R 305  Human Resource Management

Total Credits 36-37

UNIVERSITY DEGREE REQUIREMENTS

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

Freshman
Fall  Credits  Spring  Credits
MATH 112, 113, or 114  3  MATH 113, 114, or 221  3
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 125 or BOTANY 130  5
CHEM 343  3  CHEM 344  2
Select one of the following:  5  CHEM 345  3
ZOOLOGY/BIOLOGY/BOTANY 151  Gen Ed1  2-5
Total Credits 30-34
Undergraduate Advising in Plant Pathology

Students in plant pathology are assigned two advisors, the staff advisor (Sara Rodock, rodock@wisc.edu, appointment link (http://calendar.wisc.edu/scheduling-assistant/public/profiles/eBLVAOve.html)) and one of our faculty advisors. Current faculty advisors include:

- Caitlyn 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 either the lead undergraduate advisor, Associate Professor Jeri Barak, or the student services coordinator, Sara Rodock. Students with questions regarding lab positions (both paid and unpaid) in plant pathology should contact 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/careers/undergraduate-students/career-services) page. Students in the major are welcome to make an individual appointment with Sara Rodock, rodock@wisc.edu (appointment link for current UW–Madison students (https://calendar.wisc.edu/scheduling-assistant/public/profiles/eBLVAOve.html)) to discuss career related topics such as career exploration, search strategies, graduate school, and review of application materials (resume, CV, letters, etc.).

People

Professors

- Ahlquist, Paul
- Allen, Caitlyn
- 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
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.