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>
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</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
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>MATH 112</td>
<td>Algebra</td>
<td>5-6</td>
</tr>
<tr>
<td>&amp; MATH 113</td>
<td>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>CHEM 103</td>
<td>General Chemistry I</td>
<td>5-9</td>
</tr>
<tr>
<td>&amp; CHEM 104</td>
<td>and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY/</td>
<td>Introductory Biology</td>
<td>10</td>
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<tr>
<td>BOTANY/</td>
<td>and Introductory Biology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 151</td>
<td>Animal Biology</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOLOGY/</td>
<td>and Animal Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BOTANY/</td>
<td>and General Botany</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 152</td>
<td>Animal Biology</td>
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<tr>
<td>CHEM 343</td>
<td>Introductory Organic Chemistry</td>
<td>4-8</td>
</tr>
<tr>
<td>&amp; CHEM 344</td>
<td>and Introductory Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 345</td>
<td>Laboratory</td>
<td></td>
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<tr>
<td>CHEM 341</td>
<td>Elementary Organic Chemistry</td>
<td></td>
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<tr>
<td>&amp; CHEM 342</td>
<td>and Elementary Organic Chemistry Laboratory</td>
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### TRACKS

#### PLANT–MICROBE BIOLOGY TRACK

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 211</td>
<td>Calculus</td>
<td>5</td>
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<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 1</td>
<td>3-4</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>CHEM 343</td>
<td>Introductory Organic Chemistry</td>
<td>4-8</td>
</tr>
<tr>
<td>&amp; CHEM 344</td>
<td>and Introductory Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 345</td>
<td>Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 341</td>
<td>Elementary Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 342</td>
<td>and Elementary Organic Chemistry Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

MICROBIO 303  Biology of Microorganisms
& MICROBIO 304  and Biology of Microorganisms Laboratory
GENETICS 466  Principles of Genetics

Option 2:
Select two of the following:
BIOSY 485  Principles of Physiology
BIOSY 486  Principles of Physiology Laboratory
BIOSY 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

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 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>
</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:
AGR 100 Principles and Practices in Crop Production
AGR 300 Cropping Systems
AGR 302 Forage Management and Utilization
AGR/BOT 328 Integrated Weed Management
BIOCHEM 510 General Microbiology
BIOCHEM 102 General Microbiology Laboratory
BIOCHEM 303 Biology of Microorganisms
BIOCHEM 304 Biology of Microorganisms Laboratory
NUTR 132 Nutrition Today
NUTR 131 Comparative Animal Nutrition
NUTR 332 Human Nutritional Needs
NUTR 332 World Hunger and Malnutrition
NUTR 510 Nutritional Biochemistry and Metabolism
NUTR 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 215 Introduction to Agricultural and Applied Economics
A A E 320 Commodity Markets
A A E 323 Cooperatives
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

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 5 MATH 113, 114, or 221 3-5
CHEM 103 or 109 5 CHEM 104 2-5
First Year Seminar 1 Gen Ed 1 0-7
Gen Ed 1 0-11 0-17
Total Credits 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 5 CHEM 344 2
Select one of the following:
ZOOLOGY/BIOLOGY/BOTANY 151 3 Gen Ed 1 2-5
ZOOLOGY/ BIOLOGY 101
& ZOOLOGY/ BIOLOGY 102
Gen Ed\(^1\) 0-5

<table>
<thead>
<tr>
<th>Credits</th>
<th>Spring</th>
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<tbody>
<tr>
<td>13-18</td>
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<td>12-15</td>
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</table>

Total Credits 25-33

### Junior

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</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 Ed(^1)</td>
<td>0-6 Gen Ed(^1)</td>
<td>2-5</td>
</tr>
</tbody>
</table>

12-18 13-16

Total Credits 25-34

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</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 Ed(^1)</td>
<td>0-10 Gen Ed(^1)</td>
<td>0-15</td>
</tr>
</tbody>
</table>

8-23 9-30

Total Credits 17-53

\(^1\) 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)

### 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. Students in the major are welcome to make an individual appointment with Todd Courtenay, (todd.courtenay@wisc.edu) 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, 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

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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, Todd Courtenay. Students with questions regarding lab positions (both paid and unpaid) in plant pathology should contact Associate Professor Jeri Barak.

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### ADVISING AND CAREERS

#### UNDERGRADUATE ADVISING IN PLANT PATHOLOGY

Students in plant pathology are assigned two advisors, the staff advisor, Todd Courtenay (todd.courtenay@wisc.edu) and 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.

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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.