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.

Learn through real-world, hands-on experiences

Plant Pathology students learn in many field and lab courses, including classes that focus on economics of plant disease, interactions between plants and people, fungi, organic agriculture, and global food security. They can also take part in a summer field course, numerous internships, and research opportunities.

Build community and networks

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. Please visit the department’s Extension and Outreach (https://plantpath.wisc.edu/extension-overview/) overview page for additional details on the departments outreach activities, public education programs, and student organizations.

Customize a path of study

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.

Students are also able to explore double majors and a multitude of undergraduate certificates based on their unique educational and professional interests. More information about careers in plant pathology is available from the department.

Make a strong start

Freshman who are interested in plant pathology are encouraged to participate in a First-Year Interest Group (https://figs.wisc.edu/what/) (FIG) program. Topics of interest to Plant Pathology students include global food security, plants and human well-being, and many other fascinating options. See the latest Choose Your FIG (https://figs.wisc.edu/choose/) catalog for details.

Gain global perspective

The plant pathology program is a great choice for students who wish to participate in a study abroad experience. Students can choose from a multitude of destinations world-wide, and can travel abroad during Summer, Spring, or Fall terms. Students can explore studying abroad as a Plant Pathology major by utilizing the Plant Pathology Major Advising Page. Students work with their advisor and the CALS study abroad office to identify appropriate programs.

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 in the Contact Box for the major.

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/#requirementsforundergraduatestudytext) 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>
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<tbody>
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<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>
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<td>Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.</td>
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<td>First Year Seminar (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSFirstYearSeminarCourses">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSFirstYearSeminarCourses</a>)</td>
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<td>International Studies (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSGlobalFirstYearSeminarCourses">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSGlobalFirstYearSeminarCourses</a>)</td>
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<tr>
<td>Physical Science Fundamentals</td>
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<td>CHEM 103 General Chemistry I</td>
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<td>or CHEM 108 Chemistry in Our World</td>
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<td>or CHEM 109 Advanced General Chemistry</td>
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<tr>
<td>Biological Science</td>
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<tr>
<td>Additional Science (Biological, Physical, or Natural)</td>
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</tr>
<tr>
<td>Science Breadth (Biological, Physical, Natural, or Social)</td>
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</tr>
<tr>
<td>CALS Capstone Learning Experience: included in the requirements for each CALS major (see &quot;Major Requirements&quot;) (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement</a>)</td>
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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>
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<tr>
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<td>MATH 112 Algebra</td>
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<tr>
<td>&amp; MATH 113 and Trigonometry</td>
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<tr>
<td>MATH 114 Algebra and Trigonometry</td>
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<td>Core Chemistry</td>
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<tr>
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<td>&amp; CHEM 104 and General Chemistry II</td>
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<td>CHEM 109 Advanced General Chemistry</td>
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<td>Introductory Biology</td>
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<td>Select one of the following options:</td>
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<td>Option 1 (preferred):</td>
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<tr>
<td>BIOLOGY/ BOTANY/ ZOOLOGY 151 Introductory Biology</td>
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<tr>
<td>&amp; BIOLOGY/ BOTANY/ ZOOLOGY 152 and Introductory Biology</td>
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<td>Option 2:</td>
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<td>ZOOLOGY/ BIOLOGY 101 Animal Biology</td>
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<td>&amp; ZOOLOGY/ BIOLOGY 102 and Animal Biology Laboratory</td>
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<tr>
<td>&amp; BOTANY/ BIOLOGY 130 and General Botany</td>
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<td>Option 3:</td>
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<tr>
<td>BIOCORE 381 Evolution, Ecology, and Genetics</td>
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<td>&amp; BIOCORE 382 and Evolution, Ecology, and Genetics Laboratory</td>
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<tr>
<td>&amp; BIOCORE 383 Genetics Laboratory</td>
<td>3</td>
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<tr>
<td>&amp; BIOCORE 384 and Cellular Biology and Cellular Biology Laboratory</td>
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<td>Core Physics</td>
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<td>PHYSICS 201 General Physics</td>
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<td>PHYSICS 207 General Physics</td>
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<tr>
<td>Plant Pathology Core</td>
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<tr>
<td>PL PATH 300 Introduction to Plant Pathology</td>
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<tr>
<td>PL PATH/BOTANY 332 Fungi</td>
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<tr>
<td>Another PL Path course above 300 1</td>
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<td>Capstone</td>
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<td>PL PATH 590 Capstone in Plant Pathology</td>
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<td>Select one of the following:</td>
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<td>Plant-Microbe Biology Track</td>
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<tr>
<td>Plant Health and Industry Track</td>
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<td>Total Credits</td>
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## TRACKS

### PLANT–MICROBE BIOLOGY TRACK

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<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 211</td>
<td>Calculus</td>
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<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
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<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry I</td>
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<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
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<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>
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</tbody>
</table>

**Additional Mathematics and Statistics**

Select one of the following:

- MATH 211: Calculus
- MATH 217: Calculus with Algebra and Trigonometry II
- MATH 221: Calculus and Analytic Geometry I

**Additional Chemistry**

Select one of the following options:

- CHEM 343: Organic Chemistry I and Introductory Organic Chemistry Laboratory
- CHEM 344: Organic Chemistry I and Introductory Organic Chemistry Laboratory
- CHEM 345: Organic Chemistry I and Introductory Organic Chemistry Laboratory
- CHEM 341: Elementary Organic Chemistry and Elementary Organic Chemistry Laboratory
- CHEM 342: Elementary Organic Chemistry and Elementary Organic Chemistry Laboratory

**Biology**

Select one of the following options:

Option 1:

- MICROBIO 303: Biology of Microorganisms and Biology of Microorganisms Laboratory
- GENETICS 466: Principles of Genetics

Option 2:

- BIOCORE 485: Principles of Physiology
- BIOCORE 486: Principles of Physiology 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

**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
- EN TOM/ ZOOLOGY 302: Introduction to Entomology

### PLANT HEALTH AND INDUSTRY TRACK

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

**Biology**

- PL PATH 559 or BOTANY 500: Diseases of Economic Plants and Plant Physiology

**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
- BOTANY/ ENVR 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/ SOCIETY 140: Introduction to Community and Environmental Sociology
- C&E SOC/ SOCIETY 222: Food, Culture, and Society
- C&E SOC/ HIST SCI 230: Agriculture and Social Change in Western History
- C&E SOC/ SOCIETY 578: Poverty and Place
- C&E SOC/ SOCIETY 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

**Total Credits**

29-39

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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 Pathology, B.S.

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 350
World Hunger and Malnutrition

NUTR SCI/BIOCHEM 510
Nutritional Biochemistry and Metabolism

NUTR SCI 540
Community Nutrition and Health Equity

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:

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
Agricultural 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

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

Freshman

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<th>Fall</th>
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<th>Spring</th>
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<td>MATH 112, 113, or 114</td>
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<td>MATH 113, 114, or 221</td>
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<td>CHEM 103 or 109</td>
<td>4-5</td>
<td>CHEM 104</td>
<td>5</td>
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<tr>
<td>First Year Seminar</td>
<td>1 Gen Ed</td>
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<td>Gen Ed</td>
<td>0-11</td>
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Sophomore

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<tr>
<td>MATH 221</td>
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<td>ZOOLOGY/BIOLOGY/BOTANY 152 or BOTANY 130</td>
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<td>CHEM 343</td>
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<td>CHEM 344</td>
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<td>ZOOLOGY/ BIOLOGY/BOTANY 151</td>
<td>Gen Ed</td>
<td>2-5</td>
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<td>Gen Ed</td>
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Junior

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<td>PL PATH 300</td>
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<td>PHYSICS 104, 202, or 208</td>
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<td>PHYSICS 103, 201, or 207</td>
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<td>PL PATH/BOTANY 332</td>
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<td>MATH 222 or STAT 371</td>
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<td>GENETICS 466</td>
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<td>0-6 Gen Ed</td>
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Senior

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<td>BOTANY 500</td>
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<td>MICROBIO 304</td>
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Gen Ed: 0-10 Gen Ed: 0-15

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)

ADVISING AND CAREERS

ADVISING

Students in plant pathology are assigned to both a professional staff advisor 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

Details can be found on our faculty webpage (https://plantpath.wisc.edu/faculty/). Undergraduates in plant pathology are strongly encouraged to consult with an advisor before enrollment for the upcoming term.

For more information about the Plant Pathology major or the department in general, please see the Contact Information on this page. Students with questions regarding Plant Pathology lab positions - both paid and unpaid - should contact Professor Jeri Barak.

CAREER OPPORTUNITIES

Please visit our Internship & Job Resources (https://plantpath.wisc.edu/undergrad-overview/undergrad-student-internship-job-resources/) page for information on career opportunities available to plant pathology students. For more information on other academic, co-curricular, financial aid, and career 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 an advisor to discuss career related topics such as career exploration, search strategies, graduate school, and review of application materials (resume, CV, letters, etc.).

Plant Pathologists, from all educational levels, are able to seek employment in a variety of areas. Some examples include:

- colleges and universities
- biotechnology companies
- state and federal agencies
- international agricultural research centers
- nurseries, greenhouses and garden centers
- non-governmental organizations
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. For more information on internship opportunities available to plant pathology students please visit our Internship & Job Resources (https://plantpath.wisc.edu/undergrad-overview/undergrad-student-internship-job-resources/) page.

**RESEARCH EXPERIENCE**

Nearly all Plant Pathology undergraduates participate in field- or lab-based research with a professor. Research in the department has a long tradition of supporting grower needs. Many faculty are using the plethora of research tools available, including molecular biology and systematics, to answer questions that are directly applicable to grower groups. Please visit the department’s Research (https://plantpath.wisc.edu/research/) page for additional details on research activities in Plant Pathology.

**STUDENT ORGANIZATIONS**

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.

Undergraduate students are also welcome to join What’s Eating My Plants (https://www.facebook.com/wemp.uw/) (WEMP). This organization, founded in 2010 by Plant Pathology graduate students, is dedicated to bridging the gap between the University and the greater Madison community. The students visit Family Science Nights at schools, community centers, and Saturday Science at the Wisconsin Institute for Discovery (WID) throughout the year.

**GLOBAL ENGAGEMENT**

Plant Pathology students interested in studying issues on a global scale are encouraged to enroll in Plant Path 311: Global Food Security, which explores drivers of food insecurity: barriers to food production (pests, land availability, climate), barriers to food availability (politics, price, biofuels), and a greater need due to population growth. The Plant Pathology program is an excellent choice for students wishing to participate in a study abroad experience. Students can find more information about study abroad on the CALS study abroad advising page (https://cals.wisc.edu/academics/undergraduate-students/international-programs/study-abroad-advising/).

**COMMUNITY ENGAGEMENT AND VOLUNTEERING**

The UW-Madison Division of Extension provides statewide access to the resources and research of the University of Wisconsin, other universities and the United States Department of Agriculture, so that people of Wisconsin can learn, grow and succeed at all stages of life. The UW-Madison Division of Extension carries out the tradition of the Wisconsin Idea (http://www.wisconsinidea.wisc.edu/) – extending the boundaries of the university to the boundaries of the state. UW-Madison Extension and outreach activities support educational programs for farmers, businesses, communities, families and youth. More details can be found on the department Extension & Outreach (https://plantpath.wisc.edu/extension-overview/) page.

On campus, the Morgridge Center for Public Service (https://morgridge.wisc.edu/) provides resources to help students connect with volunteer opportunities based on their interests and goals.
RESOURCES AND SCHOLARSHIPS

Department scholarships are available to Plant Pathology students and fellowships are available to support research work with a professor. Students across the College of Agricultural and Life Sciences receive more than $1.25 million in scholarships annually. Learn more about college scholarships here (https://cals.wisc.edu/academics/undergraduate-students/financing-your-education/cals-scholarships/).