

PLANT PATHOLOGY, BS

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 department's 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

Freshmen 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 worldwide 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

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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/#enteringthecollegertext>).

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/#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 BS DEGREE PROGRAMS

Code	Title	Credits
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.		
Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.		
	First year seminar (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSThirdYearSeminarCourses)	1
	International studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSIInternationalStudiesCourses)	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/#CALSCapstoneRequirement)		

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 to complete university or college requirements.

Code	Title	Credits
Core Mathematics		
Complete one of the following (or may be satisfied by placement exam):		5-6
MATH 112 & MATH 113	Algebra and Trigonometry	
MATH 114	Algebra and Trigonometry	
MATH 171	Calculus with Algebra and Trigonometry I	
Core Chemistry		
Complete one of the following:		5-9
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
CHEM 109	Advanced General Chemistry	
Introductory Biology		
Complete one of the following options:		10
Option 1 (preferred):		
BIOLOGY/ BOTANY/ ZOOLOGY 151 & BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology and Introductory Biology	
Option 2:		
ZOOLOGY/ BIOLOGY 101 & ZOOLOGY/ BIOLOGY 102 & BOTANY/ BIOLOGY 130	Animal Biology and Animal Biology Laboratory and General Botany	
Option 3:		
BIOCORE 381 & BIOCORE 382 & BIOCORE 383 & BIOCORE 384	Evolution, Ecology, and Genetics and Evolution, Ecology, and Genetics Laboratory and Cellular Biology and Cellular Biology Laboratory	
Core Physics		
Complete one of the following:		4-5
PHYSICS 103	General Physics	
PHYSICS 201	General Physics	
PHYSICS 207	General Physics	
Plant Pathology Core		
PL PATH 300	Introduction to Plant Pathology	4
PL PATH/BOTANY 332	Fungi	4
Another PL PATH course numbered 300 and above ¹		3
Capstone		
PL PATH 590	Capstone in Plant Pathology	3

Focus Areas

Complete one of the following:	29-39
Plant-Microbe Biology Focus	
Plant Health and Industry Focus	

Total Credits **67-83**

¹ Not including PL PATH 375 Special Topics or independent study credits—PL PATH 299 Independent Study, PL PATH 399 Coordinative Internship/Cooperative Education, PL PATH 590 Capstone in Plant Pathology, PL PATH 681 Senior Honors Thesis, PL PATH 682 Senior Honors Thesis, or PL PATH 699 Special Problems.

FOCUS AREAS**Plant-Microbe Biology Focus**

Code	Title	Credits
Additional Mathematics and Statistics		
Complete one of the following:		5
MATH 211	Survey of Calculus I	
MATH 217	Calculus with Algebra and Trigonometry II ¹	
MATH 221	Calculus and Analytic Geometry I	
Complete one of the following:		3-4
MATH 222	Calculus and Analytic Geometry 2 ²	
STAT 301	Introduction to Statistical Methods	
STAT 371	Introductory Applied Statistics for the Life Sciences	

Additional Chemistry

Complete one of the following options:	4-8
CHEM 343 & CHEM 344 & CHEM 345	Organic Chemistry I and Introductory Organic Chemistry Laboratory and Organic Chemistry II
CHEM 341 & CHEM 342	Elementary Organic Chemistry and Elementary Organic Chemistry Laboratory

Biology

Complete one of the following options:	5-8
Option 1:	
MICROBIO 303 & MICROBIO 304	Biology of Microorganisms and Biology of Microorganisms Laboratory
GENETICS 466	Principles of Genetics
Option 2:	
Complete two of the following:	
BIOCORE 485	Principles of Physiology
BIOCORE 486	Principles of Physiology Laboratory
BIOCORE 587	Biological Interactions

Additional Physics

Complete 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
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Plant-Microbe Electives

Complete 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 numbered 300 and above	

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 Focus

Code	Title	Credits
Biology		
GENETICS 466	Principles of Genetics	3
Core		
PL PATH 559 or BOTANY 500	Diseases of Economic Plants Plant Physiology	3-4

Plant Health and Industry Electives

Complete 24 credits from at least two different subject listings 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/ 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 350	World Hunger and Malnutrition
NUTR SCI/ BIOCHEM 510	Nutritional Biochemistry and Metabolism
NUTR SCI 540	Community Nutrition and Health Equity
Any PL PATH course numbered 300 and above 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/ ENVIR ST 324	Soils and Environmental Quality
SOIL SCI/ AGRONOMY/ HORT 326	Plant Nutrition Management

Business

Complete 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 329	Taxation: Concepts for Business and Personal Planning
A A E 320	Agricultural Systems Management
A A E 101	Introduction to Agricultural and Applied Economics
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

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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

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This Sample Four-Year Plan is a tool to assist students and their advisor(s). Students should use it—along with their DARS report, the Degree Planner, and Course Search & Enroll tools—to make their own four-year plan based on their placement scores, credit for transferred courses and approved examinations, and individual interests.

Students must complete at least 120 total credits to be eligible for graduation.

SAMPLE PLANT PATHOLOGY FOUR-YEAR PLAN—PLANT-MICROBE BIOLOGY FOCUS AREA

First Year

Fall	Credits Spring	Credits
CHEM 103	4 CHEM 104	5
MATH 221	5 Humanities Course	3
First Year Seminar	1 MATH 222	4
COMM A or Elective	3 Electives	3
	13	15

Second Year

Fall	Credits Spring	Credits
CHEM 343	3 ZOOLOGY/BIOLOGY/ BOTANY 152 or BOTANY 130	5
ZOOLOGY/BIOLOGY/ BOTANY 151	5 CHEM 344	2
Humanities Course	3 CHEM 345	3
Social Science Course	3 Ethnic Studies Course	3
	14	13

Third Year

Fall	Credits Spring	Credits
PL PATH 300	4 PHYSICS 104	4
PHYSICS 103	4 PL PATH/BOTANY 332	4
Electives	6 GENETICS 466	3
International Studies Course	3 Electives	6
	17	17

Fourth Year

Fall	Credits Spring	Credits
MICROBIO 303	3 BOTANY 500	3
MICROBIO 304	2 PL PATH 590	3
Plant Pathology Core Elective	3 Plant Microbe Electives	5
Electives	6 Electives	6
	14	17

Total Credits 120

ADVISING AND CAREERS

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ADVISING

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

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
- golf courses, public parks, and landscape maintenance companies
- diagnostic laboratories
- seed, plant production, and tissue culture companies
- a variety of private consulting firms

If you would like to know more about what is Plant Pathology and how an undergraduate education in Plant Pathology can help you make an impact on the world around you, please check out the “Plant Pathology: taking you further than you ever imagined (<https://www.youtube.com/watch?v=mzTE3StOHIQ>)” video from the American Phytopathological Society (<http://www.apsnet.org/Pages/default.aspx>).

PEOPLE

PEOPLE FACULTY

Ahlquist, Paul
 Allen, Caitilyn
 Barak-Cunningham, Jeri
 Bent, Andrew
 DiGennaro, Peter
 Gevens, Amanda (chair)
 Gluck-Thaler, Emile
 Holland, Leslie
 Handelsman, Jo
 Kabbage, Mehdi
 Koch, Paul
 Lankau, Richard
 Rakotondrafara, Aurelie
 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

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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.

INTERNSHIPS

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 the 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

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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/>).