

MAJOR IN AGRICULTURAL BIOLOGY, PLANT PATHOLOGY CONCENTRATION



The Agricultural Biology major with a concentration in Plant Pathology provides a strong scientific foundation in plant pathology to address challenges in natural and managed systems. Students will gain tools to foster sustainability and address pressing issues involving biophysical and sociocultural components of these systems. The major features courses in agriculture, biology, and ecology as well as practical training through internships and/or research experiences. Students will learn the complex interactions that occur among microbes, insects, and plant species in natural and managed ecosystems and develop skills to use systems thinking to solve real-world problems. Knowledge and skills gained from the major will enable students to identify and solve complex problems in natural and managed systems, especially in implementing effective and sustainable pest management.

Learning Objectives

1. **Technical Competencies:** Integrate skills and knowledge to solve problems related to plants, insects, and microbes in natural and managed ecosystems. Students will be able to apply knowledge of current technologies to:
 - a. Identify important plants, insects, and microbes, integrating methods such as molecular approaches and ocular use of taxonomic keys.
 - b. Explain the biology and ecology of important pests and beneficial species.
 - c. Provide cost effective, socially acceptable, and environmentally sound pest management solutions.
2. **Agricultural Literacy:** Demonstrate understanding of social, economic, and biophysical aspects of the management of biological problems in natural and managed ecosystems:
 - a. Identify participants and evaluate their roles in pest management policy, including regulatory frameworks.
 - b. Describe the similarities and differences among management of biological problems such as infestations of weeds, insect pests, and or disease in natural and managed ecosystems.

- c. Develop logical, objective, balanced arguments regarding contemporary issues in natural and managed ecosystems.
- d. Explain the benefits and risks of management practices in natural and managed ecosystems.
3. **Critical Thinking:** Describe, assess, analyze, and synthesize knowledge from across the curriculum to create solutions for pests and beneficial species in natural and managed ecosystems:
 - a. Describe critical problems and gaps in information for natural and managed ecosystems through assessment, analysis, and integration of facts.
 - b. Integrate, synthesize, and apply information from across the curriculum to create solutions to complex problems.
 - c. Analyze qualitative (facts) and quantitative (numerical) information and derive conclusions about challenges in the productivity, sustainability, and management of natural and managed ecosystems.
4. **Leadership:** Promote and practice inclusion to form effective teams that solve complex problems in natural and managed ecosystems:
 - a. Function effectively within diverse teams to solve complex problems (as defined in 3b above) and achieve desired outcomes in natural and managed ecosystems.
 - b. Create and facilitate inclusive and diverse teams.
5. **Communication:** Communicate effectively with diverse audiences regarding sustainable pest and pathogen management in natural and managed ecosystems:
 - a. Excel in written and verbal communication of scientific results and analyses of information related to sustainable pest and pathogen management to diverse audiences including peers, stakeholders, public and the media.
 - b. Engage stakeholders such as researchers, farmers, and industry representatives in the identification of pest and pathogen management needs.

Concentration-Specific Learning Objectives in Plant Pathology

Upon successful completion of the Plant Pathology Concentration, students will be able to:

1. Ability to identify and classify major groups of plant pathogens.
2. Explain the mechanisms of interactions between plant pathogens and plants.
3. Integrate basic and applied knowledge of plant pathology to implement appropriate integrated pest management tactics to mitigate the impact of plant diseases in agriculture and urban forests.

Potential Occupations

This major will be an excellent choice for students interested in careers as researchers, crop advisors, extension educators, growers, agriculture consultants, production managers, inspectors, diagnosticians, regulatory professionals and for those who wish to pursue careers in academia.

Advising

Reach out to Chris Amerman (Chris.Amerman@colostate.edu) to schedule an appointment to change your major/minor. The change of major form can be electronically submitted by a student's main advisor to the Registrar's Office.

- Individualized Appointment with Advisor Link for Scheduling - <https://calendly.com/socr-advising> (https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcalendly.com%2Fsocr-advising%2Fadvising-appointment%3Fmonth%3D2023-03&data=05%7C01%7CGiovanni.Tolentino_Ramos%40colostate.edu%7C1a3bedec788549031af108db20c2da86%7Caf58802ff7a4bb1ab21367ff2ec%7C0%7C0%7C638139793483113872%7CUnknown%7CTWFPbGZsb3d8eyJWljoimC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IkhawWILCjAVCl6Mm0%3D%7C3000%7C%7C%7C&sdata=a07T1zEgzLuGzC6TFEiqRYDibN5xb3xo2ZQzcn%2Fyjr0%3D&reserved=0) (https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcalendly.com%2Fsocr-advising%2Fadvising-appointment%3Fmonth%3D2023-03&data=05%7C01%7CGiovanni.Tolentino_Ramos%40colostate.edu%7C1a3bedec788549031af108db20c2da86%7Caf58802ff7a4bb1ab21367ff2ec%7C0%7C0%7C638139793483113872%7CUnknown%7CTWFPbGZsb3d8eyJWljoimC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IkhawWILCjAVCl6Mm0%3D%7C3000%7C%7C%7C&sdata=a07T1zEgzLuGzC6TFEiqRYDibN5xb3xo2ZQzcn%2Fyjr0%3D&reserved=0)
- Our majors and minors have no competitive entry requirements. Courses to take if you are interested in the programs include AB 111, BSPM 102, BSPM 302, BSPM 308, and BSPM 361. Students interested in our program should ideally declare in the first two years, but exceptions can be made depending on the student's previous coursework. For more information, please visit the Department of Agricultural Biology website (<https://agsci.colostate.edu/agbio/>).
- ## Requirements Effective Fall 2025

Freshman

		AUCC	Credits
AB 120 ^{1,2}	Agricultural Biology--Freshman Orientation		1
AB 130 ^{1,2}	Working with Agricultural Biology Data		1
CHEM 107	Fundamentals of Chemistry (GT-SC2)	3A	4
CHEM 108	Fundamentals of Chemistry Laboratory (GT-SC1)	3A	1
CO 150	College Composition (GT-CO2)	1A	3
Select one group from the following:			8
Group A			
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	
LIFE 103	Biology of Organisms-Animals and Plants (GT-SC1)	3A	
Group B			
BZ 110	Principles of Animal Biology (GT-SC2)	3A	
BZ 111	Animal Biology Laboratory (GT-SC1)	3A	
BZ 120	Principles of Plant Biology (GT-SC1)	3A	
Select one course from the following:			3-4
ATS 150	Science of Global Climate Change (GT-SC2)	3A	
BSPM 102	Insects, Science, and Society (GT-SC2)	3A	
HORT 100	Horticultural Science	3A	
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	6

Total Credits30-31

Sophomore

AB 230 ^{1,2}	Becoming an Agricultural Biology Professional		1
AB 303 ¹	General Entomology Laboratory		2
BSPM 302 ¹	Applied and General Entomology		2
CHEM 245	Fundamentals of Organic Chemistry		4
CHEM 246	Fundamentals of Organic Chemistry Laboratory		1
SPCM 200	Public Speaking		3
Select one course from the following:			3
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
LB 300	Specialized Professional Writing	2	
Select one course from the following:			3

LAND 220/LIFE 220 ¹	Fundamentals of Ecology (GT-SC2)	3A	
LIFE 320 ¹	Ecology		
Select a minimum of 3 credits from the following:			3
MATH 117	College Algebra in Context I (GT-MA1)	1B	
MATH 118	College Algebra in Context II (GT-MA1)	1B	
MATH 120	College Algebra (GT-MA1)	1B	
MATH 124	Logarithmic and Exponential Functions (GT-MA1)	1B	
MATH 155	Calculus for Biological Scientists I (GT-MA1)	1B	
Select one course from the following:			3
STAT 301	Introduction to Applied Statistical Methods		
STAT 307	Introduction to Biostatistics		
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		3C	3
Total Credits			28
Junior			
AB 330 ¹	Applications in Agricultural Biology I	4A,4B,4C	2
BSPM 201 or 308	Weed Management and Control Ecology and Management of Weeds		3
BSPM 361 ¹	Elements of Plant Pathology		3
BSPM 487	Internship		3
BZ 220 ¹	Introduction to Evolution		3
SOCR 240 ¹	Introductory Soil Science		4
Select one course from the following:			3-4
BZ 350 ¹	Molecular and General Genetics		
SOCR 330	Principles of Genetics		
Plant Pathology Elective (see list below) ¹			3
Electives			4-5
Total Credits			29
Senior			
AB 410	Understanding Pesticides		3
AB 430 ¹	Applications in Agricultural Biology II	4A,4B,4C	3
AB 451	Integrated Pest Management		3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
Plant Pathology Electives (see list below) ¹			9
Electives ³			11-12
Total Credits			32-33
Program Total Credits:			120

Plant Pathology Electives

Code	Title	Credits
Select a minimum of 12 credits from the following:		
AB 521	Forest Health Issues	2
AB 555	Topics in Plant Pathology-Plant Virology	2
BSPM 365	Integrated Tree Health Management	4
BSPM 450	Molecular Plant-Microbe Interaction	3
BZ 333	Introductory Mycology	4
BZ 350	Molecular and General Genetics	4
MIP 300	General Microbiology	3
SOCR 455	Microbiomes of Soil Systems	3
Lecture/laboratory combination:		4

MIP 432/ESS 432 Microbial Ecology

MIP 433/ESS 433 Microbial Ecology Laboratory

¹ A minimum grade of 'C' (2.000) must be obtained in this course in order to complete the program.

² Transfer students are required to take AB 270 in lieu of AB 120, AB 130, and AB 230.

³ Select enough elective credits to bring the program total to 120, of which at least 42 must be Upper-Division (300- to 400-level).

Major Completion Map

Distinctive Requirements for Degree Program: Each course used to satisfy requirements of the major requires a minimum grade of 'C' (2.000).

To prepare for first semester: The curriculum for the Agricultural Biology major assumes students enter college prepared to take calculus.

Entering students who are not prepared to take calculus will need to fulfill pre-calculus requirements in the first semester. Those pre-calculus requirements are listed as benchmark courses in Freshman Semester 1 below.

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
AB 120	Agricultural Biology–Freshman Orientation	X			1
CO 150	College Composition (GT-CO2)	X		1A	3
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	6
Total Credits					13
Semester 2		Critical	Recommended	AUCC	Credits
AB 130	Working with Agricultural Biology Data	X			1
CHEM 107	Fundamentals of Chemistry (GT-SC2)	X		3A	4
CHEM 108	Fundamentals of Chemistry Laboratory (GT-SC1)	X		3A	1
Select one group from the following:		X			8
Group A:					
LIFE 102	Attributes of Living Systems (GT-SC1)			3A	
LIFE 103	Biology of Organisms-Animals and Plants (GT-SC1)			3A	
Group B:					
BZ 110	Principles of Animal Biology (GT-SC2)	X		3A	
BZ 111	Animal Biology Laboratory (GT-SC1)	X		3A	
BZ 120	Principles of Plant Biology (GT-SC1)	X		3A	
Select one course from the following:		X			3-4
ATS 150	Science of Global Climate Change (GT-SC2)			3A	
BSPM 102	Insects, Science, and Society (GT-SC2)			3A	
HORT 100	Horticultural Science			3A	
Total Credits					17-18

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
AB 230	Becoming an Agricultural Biology Professional	X			1
AB 303	General Entomology Laboratory	X			2
BSPM 302	Applied and General Entomology	X			2
SPCM 200	Public Speaking	X			3
Select one course from the following:		X			3
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)			2	
JTC 300	Strategic Writing and Communication (GT-CO3)			2	
LB 300	Specialized Professional Writing			2	
Select one course from the following:		X			3
LAND 220/ LIFE 220	Fundamentals of Ecology (GT-SC2)			3A	
LIFE 320	Ecology				
Total Credits					14

Semester 4		Critical	Recommended	AUCC	Credits
CHEM 245	Fundamentals of Organic Chemistry	X			4
CHEM 246	Fundamentals of Organic Chemistry Laboratory	X			1
Select a minimum of 3 credits from the following:					3
MATH 117	College Algebra in Context I (GT-MA1)			1B	

MATH 118	College Algebra in Context II (GT-MA1)		1B	
MATH 120	College Algebra (GT-MA1)		1B	
MATH 124	Logarithmic and Exponential Functions (GT-MA1)		1B	
MATH 155	Calculus for Biological Scientists I (GT-MA1)		1B	
Select one course from the following:		X		3
STAT 301	Introduction to Applied Statistical Methods			
STAT 307	Introduction to Biostatistics			
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)			X 3C	3
Total Credits				14
Junior				
Semester 5		Critical	Recommended	AUCC Credits
BSPM 201 or 308	Weed Management and Control Ecology and Management of Weeds	X		3
BZ 220	Introduction to Evolution	X		3
SOCR 240	Introductory Soil Science	X		4
Select one course from the following:				3-4
BZ 350	Molecular and General Genetics	X		
SOCR 330	Principles of Genetics			
Total Credits				13-14
Semester 6		Critical	Recommended	AUCC Credits
AB 330	Applications in Agricultural Biology I	X		2 4A,4B,4C
BSPM 361	Elements of Plant Pathology	X		3
BSPM 487	Internship	X		3
Plant Pathology Electives (see list on Concentration Requirements Tab)			X	3
Electives			X	4-5
Total Credits				15-16
Senior				
Semester 7		Critical	Recommended	AUCC Credits
AB 410	Understanding Pesticides	X		3
AB 430	Applications in Agricultural Biology II	X		3 4A,4B,4C
Plant Pathology Electives (see list on Concentration Requirements Tab)			X	3
Electives			X	6-7
Total Credits				15-16
Semester 8		Critical	Recommended	AUCC Credits
AB 451	Integrated Pest Management	X		3
Plant Pathology Electives (see list on Concentration Requirements Tab)		X		6
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)				3 3D
Electives		X		5
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X		
Total Credits				17
Program Total Credits:				120