

MAJOR IN AGRICULTURAL BIOLOGY, WEED SCIENCE CONCENTRATION



The Agricultural Biology major with a concentration in Weed Science provides a strong scientific foundation in weed science 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 also 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

- 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:
 - Identify important plants, insects, and microbes, integrating methods such as molecular approaches and ocular use of taxonomic keys.
 - Explain the biology and ecology of important pests and beneficial species.
 - Provide cost effective, socially acceptable, and environmentally sound pest management solutions.
- Agricultural Literacy:** Demonstrate understanding of social, economic, and biophysical aspects of the management of biological problems in natural and managed ecosystems:
 - Identify participants and evaluate their roles in pest management policy, including regulatory frameworks.
 - 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.

- Develop logical, objective, balanced arguments regarding contemporary issues in natural and managed ecosystems.
 - Explain the benefits and risks of management practices in natural and managed ecosystems.
- 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:
 - Describe critical problems and gaps in information for natural and managed ecosystems through assessment, analysis, and integration of facts. This includes the productivity and sustainability of these ecosystems and issues described in 2c above.
 - Integrate, synthesize, and apply information from across the curriculum to create solutions to complex problems. Complex problems are challenges to productivity and sustainability of natural and managed ecosystems such as described in 2c above.
 - Analyze qualitative (facts) and quantitative (numerical) information and derive conclusions about challenges in the productivity, sustainability, and management of natural and managed ecosystems.
 - Leadership:** Promote and practice inclusion to form effective teams that solve complex problems in natural and managed ecosystems.
 - Function effectively within diverse teams to solve complex problems and achieve desired outcomes in natural and managed ecosystems.
 - Create and facilitate inclusive and diverse teams.
 - Communication:** Communicate effectively with diverse audiences regarding sustainable pest and pathogen management in natural and managed ecosystems:
 - 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.
 - Engage stakeholders such as researchers, farmers, and industry representatives in the identification of pest and pathogen management needs.

Concentration-Specific Learning Objectives in Weed Science

Upon successful completion of the Weed Science Concentration, students will be able to:

- Identify and classify weeds of economic importance in diverse systems.
- Explain the mechanisms and causes of herbicide resistance.
- Integrate basic and applied knowledge of weed science to develop effective weed management strategies in agricultural systems.

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

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
BZ 350 ¹	Molecular and General Genetics		
Select one course from the following:			3-4
SOCR 330	Principles of Genetics		
Weed Science Elective (Select from 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
Weed Science Electives (Select from list below) ¹			9
Electives ³			11-12

Total Credits **32-33**

Program Total Credits: **120**

Weed Science Electives

Code	Title	Credits
Select a minimum of 12 credits from the following:		
BZ 223	Plant Identification	3
BZ 331	Developmental Plant Anatomy	4
BZ 338	Comparative Morphology of Vascular Plants	4
BZ 440	Plant Physiology	3
BZ 450	Plant Ecology	4
HORT 221	Landscape Plants	4

HORT 341	Turfgrass Management	3
HORT 460/SOCR 460	Plant Breeding and Biotechnology	3
HORT 464A	Arboriculture	3

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)			3B	6
MATH 117, MATH 118, MATH 124, MATH 125	may be necessary for some students to fulfill pre-calculus requirements.	X			
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)			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:					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:	X		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		4A,4B,4C	2
BSPM 361 Elements of Plant Pathology	X			3
BSPM 487 Internship	X			3
Weed Science 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		4A,4B,4C	3
Weed Science 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
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)	X		3D	3
Weed Science Electives (see list on Concentration Requirements Tab)	X			6
Electives	X			5

The benchmark courses for the 8th semester are the remaining courses in the entire program of study.

Total Credits **17**

Program Total Credits: **120**