		Select one of the following sets of courses:		
C	245	Fundamentals of Organic Chemistry (C/C CC 107 or C 113)	4	
C	246	Fundamentals of Organic Chemistry Laboratory (C/C CC 108 or C/C CC 112 or C 114; C 245 or concurrent reg.)	1	
		OR		
C	341	Organic Chemistry I (C 113)	3	
C	343	Organic Chemistry II (C 341)	3	
C	344	Organic Chemistry Laboratory (C 114; C 343 or concurrent reg.)	2	
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	
M CC	155	Calculus for Biological Scientists I (M/M CC 124, M/M CC 125)	4	2C
		Additional communications[3]	3	2B
		Arts/humanities[4]	3	3B
		TOTAL	32-35	
JUNIOR				
AN	310	Animal Reproduction (AY 230/PS 230 or AY 300/PS 300)	3	4B
AN	320	Principles of Animal Nutrition (one semester of chemistry)	3	4B
AN	330	Principles of Animal Breeding (three credits of statistics)	3	4A, 4B
AN	346	Equine Disease Management (AY 230/PS 230)	3	
AN	422	Animal Metabolism (C 245, C 246 or C 343, C 344)	3	
		OR		
BC	351	Principles of Biochemistry (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102; C 245 or C 343 or concurrent reg. in C 343)	4	
PHCC	121	General Physics I (concurrent reg. in M/M CC 125)	5	3A
		OR		
PHCC	141	Physics for Scientists and Engineers I (M/M CC 126; M/M CC 155 or M/M CC 160)	5	3A
		Select one of the following:		
STCC	301	Introduction to Statistical Methods (M/M CC 121)	3	2D
STCC EHCC	307/ 307	Introduction to Biostatistics (M/M CC 121)	3	2D
STCC	309	Statistics for Engineers and Scientists (M/M CC 161 or M/M CC 255)	3	2D
		Applied course[5]	5	
		Global and cultural awareness[6]	3	3E
		U.S. public values and institutions[7]	3	3F
		TOTAL	34-35	
SENIOR				
AN	440	Equine Production and Industry (AN 240, AN 346, AN 444, AN 446)	3	4C
AN	444	Equine Reproductive Management (AN 310)	3	
AN	446	Equine Nutrition (AN 320)	2	
MB	300	General Microbiology (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102; C 245 or C 341 or concurrent reg.)	3	
MB	302	General Microbiology Laboratory (MB 300 or concurrent reg.)	2	
		Advanced science[8]	3-4	
		Electives[9]	1-10	
		TOTAL	18-26	

PROGRAM TOTAL = 120 credits

[1] Select from the list of courses in category 3G of the All-University Core Curriculum (AUCC).
[2] Select from the list of courses in category 3D of the AUCC.
[3] Select from the list of courses in category 2B of the AUCC.
[4] Select from the list of courses in category 3B of the AUCC.
[5] Select from approved departmental list.
[6] Select from the list of courses in category 3E of the AUCC.
[7] Select from the list of courses in category 3F of the AUCC.
[8] Pick one course from approved departmental list.
[9] Select enough credits to bring total to the minimum of 120.

Preveterinary Medicine

Preveterinary medical students interested in animal or equine science are encouraged to follow the science concentration listed under the animal science and equine science majors in this section of the catalog. Maximum flexibility in career direction can be obtained by meeting the requirements for a degree in animal or equine science while simultaneously completing the admission requirements for the professional veterinary medical program. Students accepted into the professional veterinary medical program after receiving this degree will benefit from the background in nutrition, breeding, marketing, and management of livestock or nutrition, genetics, and marketing. Students not entering the veterinary medical program use this background in pursuing career suggestions mentioned in the science concentration of the animal science or equine science majors.

Graduate Programs in Animal Sciences

The department offers graduate programs leading to the master of science and the doctor of philosophy degrees. Students interested in graduate work should refer to the *Graduate and Professional Bulletin*.

DEPARTMENT OF BIOAGRICULTURAL SCIENCES AND PEST MANAGEMENT

Office in Plant Sciences Building, Room C 129
Professor Thomas O. Holtzer, Head

Major in Bioagricultural Sciences

Bioagricultural scientists study how to control or eliminate the presence of insects, plant pathogens, and weeds in field and horticultural crops, landscape plants, forests, livestock, or

households without damaging the environment. Graduates will have expertise in several of the following areas related to pests, pathogens, and their hosts: management, behavior, physiology, taxonomy, biodiversity, ecology, population dynamics, molecular biology, biotechnology, traditional and biological control methods, resistance to pesticides, and the balance of treatments that leads to sustainable, safe, and cost effective control. The curriculum combines biology courses with agricultural sciences and includes coursework in genetics, evolution, chemistry, economics, statistics, and computer applications. Three concentrations are offered within the major–agricultural biotechnology, plant health, and entomology.

Characteristics and Skills

- A strong interest in the biological and other natural sciences
- A strong interest in agriculture
- Analytical ability
- Ability to work independently or in a team
- Enjoy working outdoors as well as indoors
- Strong oral and written communication skills
- Organizational skills
- Ability and desire to understand basic business principles

Potential Occupations

An expanding population and a public increasingly focused on health and food safety will result in growing opportunities for agricultural scientists. Further research is necessary as insects and diseases continue to adapt to pesticides. The practice of "sustainable agriculture" is necessary in order to reduce the use of harmful chemicals and do little damage to the natural environment. Products developed using biotechnology methods will assist in these challenges. Participation in internships and cooperative education opportunities is highly recommended to enhance practical training and development. Graduates who go on for advanced studies can attain more responsible positions with the possibility of rising to top professional levels.

Some examples include: agricultural producer; biological control specialist; chemical ecologist; college teacher; entomologist; entomology technician; environmental specialist; extension agent; field consultant; forest resource manager; government specialist on pesticides; greenhouse disease/pest specialist; insect behavior researcher; international consultant; nematology technician; pest control applicator; plant pathologist or physiologist; research scientist; science teacher; technical representative for chemical company; toxicologist; university or government researcher; urban plant disease specialist; weed scientist.

Major in Bioagricultural Sciences

M CC 120A-B and M CC 121 are considered review courses; credits in these courses may not be used toward a degree in the major in bioagricultural sciences or the agricultural biotechnology or entomology concentrations.

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
		Select at least three credits from the following:		
A	140	Technology in Agriculture	3	
CS	110	Personal Computing	4	
CSCC	151	C++ for Scientists and Engineers (M/M CC 124, M/M CC 126)	4	2D
LI	301	Research in the Information Age	1	
PLCC	110	Logic and Critical Thinking	3	2D
PL	210	Introduction to Formal Logic (sophomore standing or higher or written consent of instructor)	3	
A CC	192	Orientation to Agricultural Systems	3	1
		Select one of the following sets of courses:		
BZCC	110	Principles of Animal Biology	3	3A
BZCC	111	Animal Biology Laboratory (BZ/BZCC 110 or concurrent reg.)	1	3A
BZCC	120	Principles of Plant Biology	4	3A
		OR		
LSCC	102	Attributes of Living Systems (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	
COCC	150	College Composition (Composition Placement Exam)	3	2A
M CC	124	Logarithmic and Exponential Function (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	125	Numerical Trigonometry (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	126	Analytic Trigonometry (M/M CC 125 or placement)	1	2C
		Foundations and perspectives[1]	6	3B-3F
		Health and wellness[2]	2	3G
		TOTAL	28-29	
SOPHOMORE				
C CC	111	General Chemistry I (M/M CC118 or M/M CC 121 or placement in M/M CC 124 or higher)	4	3A
C CC	112	General Chemistry Laboratory I (C/C CC 111 or concurrent reg.)	1	3A
C	113	General Chemistry II (C/C CC 107 or C/C CC 111; M/M CC 124 or M/M CC 141 or M/M CC 155 or M/M CC 160 or concurrent reg. in M/M CC 155 or M/M CC 160)	3	
C	114	General Chemistry Laboratory II (C/C CC 112; C 113 or concurrent reg.)	1	

		Select one course from the following:		
COCC	300	Writing Arguments (CO/COCC 150)	3	2B2
COCC	301A-D	Writing in the Disciplines (CO/COCC 150)	3	2B2
JTCC	300	Professional and Technical Communication (CO/COCC 150)	3	2B2
M CC	155	Calculus for Biological Scientists I (M/M CC 124, M/M CC 125)	4	
SPCC	200	Public Speaking	3	2B1
		Bioagricultural sciences electives[3]	3	
		Foundations and perspectives[1]	9	3B-3F
		TOTAL	31	

JUNIOR

		Select one course from the following:		
A CC IECC	116/ 116	Plants and Civilization	3	3E
A CC IECC	270/ 270A	World Interdependence-Population and Food	3	3E
A	300	Issues in Agriculture	2	
A PL	330/ 330	Agricultural Ethics	3	
EACC	202	Agricultural and Resource Economics	3	3C
C	245	Fundamentals of Organic Chemistry (C/C CC 107 or C 113)	4	
C	246	Fundamentals of Organic Chemistry Laboratory (C/C CC 108 or C/C CC 112 or C 114; C 245 or concurrent registration)	1	
BY	220	Fundamentals of Ecology (one course in biology; M/M CC 124 or M/M CC 141 or M/M CC 155)	3	
		OR		
NR	120A	Environmental Conservation	3	
PHCC	110	Descriptive Physics	3	3A
		Bioagricultural science electives[3]	12	
		Electives	6	
		TOTAL	31-32	

SENIOR

BI	402A-G	Plant Health Practica (see Courses of Instruction section of the catalog)	3	
BI	450	Plant Defense Mechanisms (one course in biology and one course in genetics)	2	4B
BI	451	Integrated Pest Management (EN 302 or PD 361 or W 308 or 10 credits of biology)	3	4A
BI	460	Plant Health Capstone (senior standing)	1	4C
SC	330	Principles of Genetics (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102)	3	
SC	331	Genetics Laboratory (SC 330 or concurrent reg.)	1	
		Select one course from the following:		
STCC	201	General Statistics (M/M CC 120A-B)	3	2D
STCC	301	Introduction to Statistical Methods (M/M CC 121)	3	2D
STCC EHCC	307/ 307	Introduction to Biostatistics (M/M CC 121)	3	2D
STCC	311	Statistics for Behavioral Sciences I (M/M CC 121)	3	2D
		Bioagricultural science electives[3]	4	
		Electives	9	
		TOTAL	29	

PROGRAM TOTAL = 120 credits

[1] Select one course each from categories 3B-3F of the All-University Core Curriculum (AUCC).
[2] Select from list of courses in category 3G in the AUCC.
[3] A total of 19 credits will be selected from a list provided by the department. At least 6 credits must be from BI, EN, PD, W. Selection must be approved by an adviser.

Agricultural Biotechnology Concentration

Agricultural biotechnology is an interdisciplinary approach designed for students interested in cellular and molecular processes, or the commercial production of agriculturally related products. The core curriculum in biological sciences may be combined with a specialization in a specific agricultural science, or with courses that provide a broader perspective. This concentration offers an excellent foundation for continuing with graduate work or careers involving scientific research and applications in agriculture.

M CC 120A-B and M CC 121 are considered review courses; credits in these courses may not be used toward a degree in the agricultural biotechnology concentration in the major in bioagricultural sciences.

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
		Select at least three credits from the following:		
A	140	Technology in Agriculture	3	
CS	110	Personal Computing	4	
CSCC	151	C++ for Scientists and Engineers (M/M CC 124, M/M CC 126)	4	2D
LI	301	Research in the Information Age	1	
PLCC	110	Logic and Critical Thinking	3	2D
PL	210	Introduction to Formal Logic (sophomore standing or higher or written consent of instructor)	3	
A CC	192	Orientation to Agricultural Systems	3	1
		Select one of the following sets of courses:		
BZCC	110	Principles of Animal Biology	3	3A
BZCC	111	Animal Biology Laboratory (BZ/BZCC 110 or concurrent reg.)	1	3A
BZCC	120	Principles of Plant Biology	4	3A
		OR		
LSCC	102	Attributes of Living Systems (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	

C CC	111	General Chemistry I (M/M CC 118 or M/M CC 121 or placement in M/M CC 124 or higher)	4	3A
C CC	112	General Chemistry Laboratory I (C/C CC 111 or concurrent reg.)	1	3A
COCC	150	College Composition (Composition Placement Exam)	3	2A
M CC	124	Logarithmic and Exponential Function (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	125	Numerical Trigonometry (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	126	Analytic Trigonometry (M/M CC 125 or placement)	1	2C
		Foundations and perspectives[1]	3	3B-3F
		Health and wellness[2]	2	3G
		TOTAL	30	

SOPHOMORE

C	113	General Chemistry II (C/C CC 107 or C/C CC 111; M/M CC 124 or M/M CC 141 or M/M CC 155 or M/M CC 160 or concurrent reg. in M/M CC 155 or M/M CC 160)	3	
C	114	General Chemistry Laboratory II (C/C CC 112; C 113 or concurrent reg.)	1	
C	245	Fundamentals of Organic Chemistry (C/C CC 107 or C 113)	4	
C	246	Fundamentals of Organic Chemistry Laboratory (C/C CC 108 or C/C CC 112 or C 114; C 245 or concurrent registration)	1	
		Select one of the following courses:		
COCC	300	Writing Arguments (CO/COCC 150)	3	2B2
COCC	301A-D	Writing in the Disciplines (CO/COCC 150)	3	2B2
JTCC	300	Professional and Technical Communication (CO/COCC 150)	3	2B2
M CC	155	Calculus for Biological Scientists I (M/M CC 124, M/M CC 125)	4	
SPCC	200	Public Speaking	3	2B1
		Foundations and perspectives[1]	9	3B-3F
		TOTAL	28	

JUNIOR

BY	310	Cell Biology (1 semester of organic chemistry or concurrent reg.; 2 semesters of introductory biology)	4	
BY	220	Fundamentals of Ecology (one course in biology; M/M CC 124 or M/M CC 141 or M/M CC 155)	3	
		OR		
NR	120A	Environmental Conservation	3	
MB	300	General Microbiology (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102; C 245 or C 341 or concurrent reg.)	3	
PHCC	110	Descriptive Physics	3	
SC	330	Principles of Genetics (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102)	3	
SC	331	Genetics Laboratory (SC 330 or concurrent reg.)	1	
		Select one of the following courses:		
STCC	201	General Statistics (M/M CC 120A-B)	3	2D
STCC	301	Introduction to Statistical Methods (M/M CC 121)	3	2D
STCC EHCC	307/ 307	Introduction to Biostatistics (M/M CC 121)	3	2D
STCC	311	Statistics for Behavioral Sciences I (M/M CC 121)	3	2D
		Agricultural and biological sciences[3]	6	
		Foundations and perspectives[1]	0-3	3B-3F
		Electives[4]	3-6	
		TOTAL	32	

SENIOR

		Select one of the following sets of courses:		
BC	351	Principles of Biochemistry (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102; C 245 or C 343 or concurrent reg. in C 343)	4	
BC	352	Principles of Biochemistry Laboratory (BC 351 or BC 401 or concurrent reg., 2 credits of college chemistry laboratory)	1	
		OR		
BC	401	Comprehensive Biochemistry I (C 245 or C 343 or concurrent reg. in C 343; M/M CC 155 or M/M CC 160)	3	
BC	403	Comprehensive Biochemistry II (BC 401)	3	
BC	404	Comprehensive Biochemistry Laboratory (BC 401 or concurrent reg.; C 246 or C 344; LS 212)	2	
BC	463	Molecular Genetics (BC 401 or concurrent reg. or BC 351; LSCC 201B)	3	
BI	460	Plant Health Capstone (senior standing)	1	4C
		Agricultural and biological sciences[3]	12	
		Electives[4]	9	
		TOTAL	30	

PROGRAM TOTAL = 120 credits

[1] Select one course each from categories 3B-3F of the All-University Core Curriculum (AUCC). The course selected for category 3F should also be listed in category 3C or 3D.
[2] Select from list of courses in category 3G of the AUCC.
[3] Select from the following list. Select one course each for AUCC category 4A and 4B.

Course		Title (Prerequisite)	Cr	AUCC
Agricultural and Biological Sciences				
AN	430	Applied Animal Breeding (AN 330)	2	
BC	406A	Investigative Biochemistry-Protein Biochemistry (BC 404)	2	
BC	406B	Investigative Biochemistry-Molecular Genetics (BC 404)	2	
BC	406C	Investigative Biochemistry-Cellular Biochemistry (BC 404)	2	
BI	200	Principles of Plant Health	3	
BI	402A-G	Practica in Plant Health (see Courses of Instruction section of catalog)	3	4A, 4B
BI	450	Plant Defense Mechanisms (one course in biology and one course in genetics)	3	4A, 4B
BI	451	Integrated Pest Management (EN 302 or PD 361 or W 308 or 10 credits of biology)	3	4A, 4B

BY	311	Developmental Biology (BY 310 or written consent of instructor)	4	
BZ	346	Population and Evolutionary Genetics (BZ 220, M/M CC 155, ST/STCC 301 or ST/STCC 307 or EH/EHCC 307)	3	
BZ	402	Chromosomes of Eukaryotes (BY 310)	4	
BZ	433	Behavioral Genetics (one course in genetics)	3	
BZ	440	Plant Physiology (BZ/BZCC 120 or BY/LS 103; C 245 or concurrent reg.)	3	
BZ	441	Plant Physiology Laboratory (BZ 440 or concurrent reg.)	2	
BZ	455	Human Heredity and Birth Defects (BZ/BZCC 111 or BY/LS 103)	3	
EN	302	Applied and General Entomology	2	
EN	303A	Entomology Laboratory-General (EN 302 or concurrent reg.)	2	
EN	303B	Entomology Laboratory-Horticultural (EN 302 or concurrent reg.)	1	
EN	303C	Entomology Laboratory-Agricultural (EN 302 or concurrent reg.)	1	
EN MB BZ	462/ 462/ 462	Parasitology and Vector Biology (BZ/BZCC 110 or BY/LS 103; MB 301 or MB 302 or BZ 212)	5	
H CC	100	Horticultural Science (high school biology)	4	3A
H SC	460/ 460	Plant Breeding (SC 330)	3	
H SC	461/ 461	Plant Breeding Laboratory (H 460/SC 460 or concurrent reg.)	1	
MB	420	Medical and Molecular Virology (MB 342; BC 351 or BC 401 or concurrent reg.)	4	
MB	425	Virology and Cell Culture Laboratory (MB 301 or MB 302; MB 420 or concurrent reg.)	2	
MB	450	Microbial Genetics (MB 300; BC 351 or BC 401 or concurrent reg.)	3	
PD	361	Elements of Plant Pathology (BZ/BZCC 104 or BZ/BZCC 120 or H/H CC 100 or BY/LSCC 102)	3	
SC	100	General Crops	4	
SC	430	Applications of Plant Biotechnology (SC 330)	3	
W	308	Biology and Control of Weeds (BZ/BZCC 120 or BY/LS 103; C/C CC 107 or C/C CC 111)	4	4B

Entomology Concentration

Entomology focuses on and provides a broad knowledge of the biology and control of insects. Entomologists conduct research and develop new strategies and technologies to control or eliminate pests in infested areas and prevent the spread of harmful pests to new areas, while always considering the method's compatibility with the environment. Graduates are prepared for technical, research, and regulatory positions with the federal and state governments, high school and college teaching, insecticide manufacturers and processors, or their own businesses as beekeepers, pest control operators, or entomological consultants. Students have access to well-equipped laboratories and an insect collection of 800,000 specimens.

M CC 120A-B and M CC 121 are considered review courses; credits in these courses may not be used toward a degree in the entomology concentration in the major in bioagricultural sciences.

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
		Select a minimum of three credits from the following:		
A	140	Technology in Agriculture	3	
CS	110	Personal Computing	4	
CSCC	151	C++ for Scientists and Engineers (M/M CC 124, M/M CC 126)	4	2D
LI	301	Research in the Information Age	1	
PLCC	110	Logic and Critical Thinking	3	2D
PL	210	Introduction to Formal Logic (sophomore standing or higher or written consent of instructor)	3	
A CC	192	Orientation to Agricultural Systems	3	1
BI	200	Plant Health, the World and You	3	
		Select one of the following sets of courses:		
BZCC	110	Principles of Animal Biology	3	3A
BZCC	111	Animal Biology Laboratory (BZ/BZCC 110 or concurrent reg.)	1	3A
BZCC	120	Principles of Plant Biology	4	3A
		OR		
LSCC	102	Attributes of Living Systems (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	
COCC	150	College Composition (Composition Placement Exam)	3	2A
M CC	124	Logarithmic and Exponential Function (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	125	Numerical Trigonometry (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	126	Analytic Trigonometry (M/M CC 125 or placement)	1	2C
		Foundations and perspectives[1]	3	3B-3F
		Health and wellness[2]	2	3G
		TOTAL	28-29	
SOPHOMORE				
		Select one of the following courses:		
A CC IECC	116/ 116	Plants and Civilizations	3	3E
A CC IECC	270/ 270A	World Interdependence-Population and Food	3	3E
A	300	Issues in Agriculture	2	
A PL	330/ 330	Agricultural Ethics	3	
EACC	202	Agricultural and Resource Economics	3	3C
C CC	111	General Chemistry I (M/M CC 118 or M/M CC 121 or placement in M/M CC 124 or higher)	4	3A
C CC	112	General Chemistry Laboratory I (C/C CC 111 or concurrent reg.)	1	3A
C	113	General Chemistry II (C/C CC 107 or C/C CC 111; M/M CC 124 or M/M CC 141 or M/M CC 155 or M/M CC 160 or concurrent reg. in M/M CC 155 or M/M CC 160)	3	

C	114	General Chemistry Laboratory II (C/C CC 112; C 113 or concurrent reg.)	1	
		Select one from the following courses:		
COCC	300	Writing Arguments (CO/COCC 150)	3	2B2
COCC	301A-D	Writing in the Disciplines (CO/COCC 150)	3	2B2
JTCC	300	Professional and Technical Communication (CO/COCC 150)	3	2B2
M CC	155	Calculus for Biological Scientists I (M/M CC 124, M/M CC 125)	4	2C
SPCC	200	Public Speaking	3	2B1
		Foundations and perspectives[1]	9	3B-3F
		TOTAL	30-31	

JUNIOR

BY	220	Fundamentals of Ecology (one course in biology; M/M CC 124 or M/M CC 141 or M/M CC 155)	3	
		OR		
NR	120A	Environmental Conservation	3	
BZ	212	Animal Biology-Invertebrates (BZ/BZCC 110 and BZ/BZCC 111 or BY/LS 103)	4	
C	245	Fundamentals of Organic Chemistry (C/C CC 107 or C 113)	4	
C	246	Fundamentals of Organic Chemistry Laboratory (C/C CC 108 or C/C CC 112 or C 114; C 245 or concurrent reg.)	1	
EN	302	Applied and General Entomology	2	4B
EN	303A	General Entomology Laboratory (EN 302 or concurrent reg.)	2	
EN	303B	Horticultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
		OR		
EN	303C	Agricultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
PHCC	110	Descriptive Physics	3	
SC	330	Principles of Genetics (BY/LSCC 102 or BZ/BZCC 110 or BZ/BZCC 120)	3	
SC	331	Genetics Laboratory (SC 330 or concurrent reg.)	1	
		Departmental electives[3]	4	
		Electives[4]	1-3	
		TOTAL	29-31	

SENIOR

BC	351	Principles of Biochemistry (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102; C 245 or C 343 or concurrent reg. in C 343)	4	
BC	352	Principles of Biochemistry Laboratory (BC 351 or BC 401 or concurrent reg.; two credits of college chemistry laboratory)	1	
BI	460	Plant Health Capstone (senior standing)	1	4C
		Select one course from the following:		
STCC	201	General Statistics (M/M CC 120A-B)	3	2D
STCC	301	Introduction to Statistical Methods (M/M CC 121)	3	2D
STCC EHCC	307/ 307	Introduction to Biostatistics (M/M CC 121)	3	2D
STCC	311	Statistics-Behavioral Sciences I (M/M CC 121)	3	2D
		Departmental electives[3]	8	
		Electives[4]	14	
		TOTAL	31	

PROGRAM TOTAL = 120 credits

[1] Select from courses in categories 3B, 3C, 3D, 3E, and 3F in the All-University Core Curriculum (AUCC). The course selected for 3F must also be listed in category 3C or 3D.
[2] Select from the list of courses in category 3G in the AUCC.
[3] A minimum of 12 credits must be taken from the following list of departmental electives. Select one course for AUCC category 4A.

Course		Title (Prerequisite)	Cr	AUCC
Departmental Electives				
BI	310	Fundamentals of Pesticides (introductory biological science or introductory chemistry)	2	
BI	402A-F	Plant Health Practica (See Courses of Instruction section in the catalog)	3	4A
BI	450	Plant Defense Mechanisms (one course in biology and one course in genetics)	2	4A
BI	451	Integrated Pest Management (EN 302 or PD 361 or W 308 or 10 credits of biology)	3	4A
BI	487	Internship	Var.	
EN	423	Evolution and Classification-Insects (EN 303A or B or C)	4	4A
EN BZ	424/ 424	Principles of Systematic Zoology (BZ/BZCC 111 or BY/LS 103)	3	4A
EN	445	Aquatic Insects (BZ/BZCC 111 or BY/LS 103)	4	
EN BZ MB	462/ 462/ 462	Parasitology and Vector Biology (BZ/BZCC 110 or BY/LS 103; MB 301 or MB 302 or BZ 212)	5	
PD	361	Elements of Plant Pathology (BZ/BZCC 104 or BZ/BZCC 120 or H/H CC 100 or BY/LSCC 102)	3	
W	308	Biology and Control of Weeds (BZ/BZCC 120 or BY/LS 103; C/C CC 107 or C/C CC 111)	4	4B

[4] Electives must be approved by adviser.

Plant Health Concentration

Plant health combines the study of weeds, insects and plant diseases. The science option focuses on biological sciences and prepares students for careers in research, industry or graduate work. For those interested in pursuing a master's in business administration or business positions in industry, the business management option is available.

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
		Select at least three credits from the following courses:		
A	140	Technology in Agriculture	3	
CS	110	Personal Computing	4	
CSCC	151	C++ for Scientists and Engineers (M/M CC 124, M/M CC 126)	4	2D
LI	301	Research in the Information Age	1	
PLCC	110	Logic and Critical Thinking	3	2D
PL	210	Introduction to Formal Logic (sophomore standing or higher or written consent of instructor)	3	
A CC	192	Orientation to Agricultural Systems	3	1
BI	200	Plant Health, the World and You	3	
		Select one of the following sets of courses:		
BZCC	110	Principles of Animal Biology	3	3A
BZCC	111	Animal Biology Laboratory (BZ/BZCC 110 or concurrent reg.)	1	3A
BZCC	120	Principles of Plant Biology	4	3A
		OR		
LSCC	102	Attributes of Living Systems (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	
COCC	150	College Composition (Composition Placement Exam)	3	2A
M CC	124	Logarithmic and Exponential Function (M/M CC 118 or M/M CC 121 or placement)	1	2C
		Health and wellness[1]	2	3G
		TOTAL	23-24	
SOPHOMORE				
		Select one of the following:		
COCC	300	Writing Arguments (CO/COCC 150)	3	2B2
COCC	301A-D	Writing in the Disciplines (CO/COCC 150)	3	2B2
JTCC	300	Professional and Technical Communication (CO/COCC 150)	3	2B2
SC	240	Introductory Soil Science (C/C CC 107 or C/C CC 111)	4	
SPCC	200	Public Speaking	3	2B1
		Foundations and perspectives[2]	12	3B-3F
		TOTAL	22	
JUNIOR				
BI	310	Fundamentals of Pesticides (introductory biological science or introductory chemistry)	2	
EN	302	Applied and General Entomology	2	
EN	303A	General Entomology Laboratory (EN 302 or concurrent reg.)	2	
EN	303B	Horticultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
		OR		
EN	303C	Agricultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
		Select one of the following:		
F	210	Forest Ecogeography (BZ/BZCC 120)	3	
H	221	Landscape Plants	4	
H	322	Herbaceous Plants (one course in botany or biological science or horticulture)	3	
PD	361	Elements of Plant Pathology (BZ/BZCC 104 or BZ/BZCC 120 or H/H CC 100 or BY/LSCC 102)	3	
		Select one of the following:		
STCC	201	General Statistics (M/M CC 120A-B)	3	2D
STCC	301	Introduction to Statistical Methods (M/M CC 121)	3 3	2D 2D
STCC EHCC STCC	307/ 307 311	Introduction to Biostatistics (M/M CC 121) Statistics for Behavioral Sciences I (M/M CC 121)	3	2D
W	308	Biology and Control of Weeds (BZ/BZCC 120 or BY/LS 103; C/C CC 107 or C/C CC 111)	4	4A, 4B
		TOTAL	20-21	
SENIOR				
		Select one course from the following:		
A CC IECC	116/ 116	Plants and Civilization	3	3E
A CC IECC	270/ 270A	World Interdependence-Population and Food	3	3E
A	300	Issues in Agriculture	2	
A PL	330/ 330	Agricultural Ethics	3	
EACC	202	Agricultural and Resource Economics[3]	3	3C
BI	402A-G	Plant Health Practica (see Courses of Instruction section of catalog)	3	
BI	450	Plant Defense Mechanisms (one course in biology and one course in genetics)	2	4B
BI	451	Integrated Pest Management (EN 302 or PD 361 or W 308 or 10 credits of biology)	3	4A
BI	460	Plant Health Capstone (senior standing)	1	4C
BY	220	Fundamentals of Ecology (one course in biology; M/M CC 124 or M/M CC 141 or M/M CC 155)	3	
		OR		
NR	120A	Environmental Conservation	3	
		TOTAL	14-15	

CORE TOTAL = 80-81 credits[4]

[1] Select from list of courses in category 3G of the All-University Core Curriculum (AUCC).
[2] Select one course from each of the AUCC categories 3B to 3F. The course selected for 3F should also be listed in category 3C or 3D.
[3] EACC 202 is required for the business management option in the freshman year. Those students must select another course here.
[4] In addition, students must select one of the following options: business management or science.

Business Management Option

In addition to the plant health concentration courses, the following must be completed:

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
EACC	202	Agricultural and Resource Economics	3	3C
M CC	120A-B	College Algebra I (Math Placement Exam)	1	2C
M CC	121	College Algebra II (M/M CC 120A-B or placement)	1	2C
		TOTAL	5	
SOPHOMORE				
		Select one of the following pairs of courses:		
C CC	107	Fundamentals of Chemistry (M/M CC 117 or M/M CC 120A-B or placement in M/M CC 121 or higher)	4	3A
C CC	108	Fundamentals of Chemistry Laboratory (C/C CC 107 or concurrent reg.)	1	3A
		OR		
C CC	111	General Chemistry I (M/M CC 118 or M/M CC 121 or placement in M/M CC 124 or higher)	4	3A
C CC	112	General Chemistry Laboratory I (C/C CC 111 or concurrent reg.)	1	3A
		Agricultural management electives[1]	3-4	
		Business electives[2]	3	
		TOTAL	11-12	
JUNIOR				
		Plant health electives[3]	4	
		Electives[4]	4	
		TOTAL	8	
SENIOR				
		Business electives[2]	9	
		Plant health electives[5]	3	
		Electives[4]	2-4	
		TOTAL	14-16	

PROGRAM TOTAL = 120 credits

[1] Select from the following list:

Course		Title (Prerequisite)	Cr	AUCC
Agricultural Management Electives				
H CC	100	Horticultural Science (high school biology)	4	3A
H	310	Greenhouse Management	4	
H	321	Nursery Production and Management (H/H CC 100)	4	
H	341	Turfgrass Management (H/H CC 100)	3	
H	464	Arboriculture and Urban Plant Management (H/H CC 100, SC 240)	3	
RS	300	Principles of Range Management (BZ/BZCC 120 or BY/LS 103)	3	
SC	100	General Crops	4	
SC / RS	320	Forage and Range Management (one course in biological sciences)	3	
SC	350	Soil Fertility Management (SC 240)	3	
SC	420	Crop and Soil Management Systems I (H/H CC 100 or SC 100, SC 240)	3	

[2] Select from the following list:

Course		Title (Prerequisite)	Cr	AUCC
Business Electives				
A	320A	Computer Applications in Agriculture-Optimization (A 140 or BD 150 or CS 110)	1	
A	320B	Computer Applications in Agriculture-Data Base (A 140 or BD 150 or CS 110)	1	
A	320C	Computer Applications in Agriculture-Communications (A 140 or BD 150 or CS 110)	1	
A	320D	Computer Applications in Agriculture-Project Management (A 140 or BD 150 or CS 110)	1	
A	320E	Computer Applications in Agriculture-Spreadsheets (A 140 or BD 150 or CS 110)	1	
BA	205	Fundamentals of Accounting	3	
BGCC	205	Fundamentals of Business Law	3	3F
BN	305	Fundamentals of Management	3	
BN	310	Human Resource Management	3	
BN	350	Employment Law and Policy	3	
EA	228	Agricultural Business Management I (EA/EACC 202 or EC/ECCC 202)	3	
EA	308	Agricultural Finance (EA/EACC 202 or EC/ECCC 202)	3	
EA	310	Agricultural Marketing (EA/EACC 202 or EC/ECCC 202)	3	
EA	375	Agricultural Law	3	
ECCC	204	Principles of Macroeconomics (EA/EACC 202 or EC/ECCC 202)	3	3F

[3] Select from the following list:

Course		Title (Prerequisite)	Cr	AUCC
Plant Health Electives				
BI	365	Integrated Tree Health Management (BZ/BZCC 120 or BY/LSCC 102)	4	
BI	487	Internship	1	
EN	423	Evolution and Classification of Insects (EN 303 A or B or C)	4	
EN / BZ	424	Principles of Systematic Zoology (BZ/BZCC 111 or BY/LS 103)	3	
EN	445	Aquatic Insects (BZ/BZCC 111 or BY/LS 103)	4	
EN	453	Population Ecology (M/M CC 155; one previous course in ecology)	3	
EN / MB / BZ	462	Parasitology and Vector Biology (BZ/BZCC 110 or BY/LS 103; MB 301 or MB 302 or BZ 212)	5	

[4] Choice must be approved by adviser. Select enough elective credits to bring total number of credits to 120.
[5] Select from the list in note 3.

Science Option

In addition to the plant health concentration courses, the following must be completed:

Course		Title (Prerequisite)	Cr	AUCC
FRESHMAN				
C CC	111	General Chemistry I (M/M CC 118 or M/M CC 121 or placement in M/M CC 124 or higher)	4	3A
C CC	112	General Chemistry Laboratory I (C/C CC 111 or concurrent reg.)	1	3A
M CC	125	Numerical Trigonometry (M/M CC 118 or M/M CC 121 or placement)	1	2C
M CC	126	Analytic Trigonometry (M/M CC 125 or placement)	1	2C
		TOTAL	7	
SOPHOMORE				
C	113	General Chemistry II (C/C CC 107 or C/C CC 111; M/M CC 124 or M/M CC 141 or M/M CC 155 or M/M CC 160 or concurrent reg. in M/M CC 155 or M/M CC 160)	3	
C	114	General Chemistry Laboratory II (C/C CC 112; C 113 or concurrent reg.)	1	
M CC	155	Calculus for Biological Scientists I (M/M CC 124, M/M CC 125)	4	2C
		TOTAL	8	
JUNIOR				
C	245	Fundamentals of Organic Chemistry (C/C CC 107 or C 113)	4	
C	246	Fundamentals of Organic Chemistry Laboratory (C/C CC 108 or C/C CC 112 or C 114; C 245 or concurrent reg.)	1	
		Plant health electives[1]	3	
		Electives[2]	3-4	
		TOTAL	11-12	
SENIOR				
BZ	440	Plant Physiology (BZ/BZCC 120 or BY/LS 103, C 245 or concurrent reg.)	3	
PHCC	110	Descriptive Physics	3	3A
SC	330	Principles of Genetics (BZ/BZCC 110 or BZ/BZCC 120 or BY/LSCC 102)	3	
SC	331	Genetics Laboratory (SC 330 or concurrent reg.)	1	
		Plant health electives[3]	3	
		TOTAL	13	
PROGRAM TOTAL = 120 credits				

[1] Select from the list below:

Course		Title (Prerequisite)	Cr	AUCC
Plant Health Electives				
AT	350	Introduction to Weather and Climate	2	
BI	365	Integrated Tree Health Management (BZ/BZCC 120 or BY/LSCC 102)	4	
BZCC	120	Principles of Plant Biology	4	3A
BZ	223	Plant Identification (BZ/BZCC 120 or BY/LS 103)	3	
BZ	250	Economic Biology (BY/LS 103 or BZ/BZCC 110 and BZ/BZCC 120)	3	
BZ	325	Plant Systematics (BZ/BZCC 120 or BY/LS 103)	4	
BZ	331	Developmental Plant Anatomy (BZ/BZCC 120 or BY/LS 103; C 245 or C 343; BZ 350 or concurrent registration)	4	
BZ	333	Introductory Mycology (BZ/BZCC 120 or BY/LS 103 or written consent of instructor)	4	
BZ	421	Grass Systematics (BZ 223 or BZ 325 or written consent of instructor)	3	
BZ	441	Plant Physiology Laboratory (BZ 440 or concurrent reg.)	2	
H CC	100	Horticultural Science (high school biology)	4	3A
H	341	Turfgrass Management (H/H CC 100)	3	
H	441	Turfgrass Science (BZ/BZCC 120, H 341, SC 240)	3	
H	464	Arboriculture and Urban Plant Management (H/H CC 100, SC 240)	3	
SC	100	General Crops	4	
SC	414	Agricultural Experimental Design (ST/STCC 201 or ST/STCC 301)	3	
SC	430	Applications of Plant Biotechnology (SC 330)	3	

[2] Choice of electives must be approved by adviser.
[3] Select from the list in note 1.

Minor Programs

Minors are offered in entomology and plant health. Students are provided with maximum breadth and depth while utilizing a limited number of requirements. The minors also serve to broaden the academic background of students seeking employment in the interdisciplinary job markets associated with most plant science majors. The minors provide adequate credits to meet most federal and state certification requirements for employment.

Minor in Entomology

Course		Title (Prerequisite)	Cr	AUCC
LOWER DIVISION				
		Select one pair of the following:		
LSCC	102	Attributes of Living Systems (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants (BY/LSCC 102)	4	
		OR		
BZCC	110	Principles of Animal Biology	3	3A
BZCC	111	Animal Biology Laboratory (BZ/BZCC 110 or concurrent reg.)	1	3A
		TOTAL	4-8	
UPPER DIVISION				
EN	302	Applied and General Entomology	2	

EN	303A-C	Entomology Laboratory (EN 302 or concurrent reg.)	3
		Select 12-13 credits from the following:	
EN	423	Evolution and Classification of Insects (EN 303A or B or C)	4
EN	445	Aquatic Insects (BZ/BZCC 111 or BY/LS 103)	4
EN	451	Insect Pest Management (EN 303A or B or C)	4
EN MB BZ	462/ 462/ 462*	Parasitology and Vector Biology (BZ/BZCC 110 or BY/LS 103; MB 301or MB 302 or BZ 212)	5
		TOTAL	17-18

PROGRAM TOTAL = 21-26 credits

*Additional course work may be required because of prerequisites.

Minor in Plant Health

Course		Title (Prerequisite)	Cr	AUCC
BI	310	Fundamentals of Pesticides (introductory biological science or introductory chemistry)	2	
EN	302	Applied and General Entomology	2	
EN	303A	General Entomology Laboratory (EN 302 or concurrent reg.)	2	
EN	303B	Horticultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
		OR		
EN	303C	Agricultural Entomology Laboratory (EN 302 or concurrent reg.)	1	
PD	361*	Elements of Plant Pathology (BZ/BZCC 104 or BZ/BZCC 120 or H/H CC 100 or BY/LSCC 102)	3	
W	308*	Biology and Control of Weeds (BZ/BZCC 120 or BY/LS 103; C/C CC 107 or C/C CC 111)	4	
		Select a minimum of 8 credits from the following:		
BI	365*	Integrated Tree Health Management (BZ/BZCC 120 or BY/LSCC 102)	4	
BI	495	Independent Study	3	
BZCC	110	Principles of Animal Biology[1]	3	3A
BZCC	111	Animal Biology Laboratory[1] (BZ/BZCC 110 or concurrent reg.)	1	3A
BZCC	120	Principles of Plant Biology[1]	4	3A
		OR		
LSCC	102	Attributes of Living Systems[1] (high school chemistry)	4	3A
LS	103	Biology of Organisms-Animals and Plants[1] (BY/LSCC 102)	4	
EN	423	Evolution and Classification of Insects (EN 303A or B or C)	4	
EN	445	Aquatic Insects (BZ/BZCC 111 or BY/LS 103)	4	
EN	451	Insect Pest Management (EN 303A or B or C)	4	
EN MB BZ	462/ 462/ 462*	Parasitology and Vector Biology (BZ/BZCC 110 or BY/LS 103; MB 301 or MB 302 or BZ 212)	5	

PROGRAM TOTAL = 22 credits without prerequisites

*Additional course work may be required because of prerequisites.
[1]May be taken as electives by students in majors that are not in the biological or agricultural sciences.

Graduate Programs in Bioagricultural Sciences and Pest Management

The department offers graduate programs leading to master of science and doctor of philosophy degrees in entomology and plant pathology and weed science. A specialization in crop protection is available in the master of science program. These programs are described in the *Graduate and Professional Bulletin*.

DEPARTMENT OF HORTICULTURE AND LANDSCAPE ARCHITECTURE

Office in Shepardson Building, Room 111
Professor Stephen J. Wallner, Head

Major in Horticulture

Horticulture is the application of scientific principles in the growing, developing, marketing, processing and utilizing of fruits, vegetables, flower and foliage plants, trees, shrubs, and turfgrasses. The major requires a strong grounding in botany, chemistry, horticulture, and business. There are four concentrations in the horticulture major–floriculture, horticultural business management, horticultural food crops, and horticultural science.

Characteristics and Skills

- Strong interest in growing and propagating plants
- Strong interest in the natural sciences
- Problem solving skills
- Enjoy working, outdoors
- Oral communication skills
- Organizational skills
- Analytical skills
- Written communication skills

Potential Occupations

A major challenge facing the horticulture industry today is keeping up with the demand for its services. There is a growing need for well-educated professional horticulturists. The industry will be looking for professionals who can manage greenhouses, nurseries, and floral outlets, buy and sell supplies and equipment, or edit journals and newsletters. Meeting the nutritional needs of the world population is an important challenge. Researchers are needed to develop improved fruit and vegetable varieties. Other professionals are needed to improve production and transportation methods, and to develop and market better fertilizers. Within this field, students can exercise their talents and interests in computers, construction, engineering, chemistry, physics, social services,