

# HORTICULTURE

To meet the educational needs of a student population with interests ranging from the biology of plants to landscape design/installation to fruit and vegetable production to golf course construction and management, considerable flexibility is built into the horticulture curriculum. The diversity of interests and need for flexibility are reflected in the impressive array of horticulture courses.

The Department of Horticulture offers six options within the horticulture major:

1. Greenhouse Plant Production
2. Horticultural Food Crop Production and Management
3. Landscape Design, Installation, and Management
4. Public Horticulture
5. Horticulture Research
6. Turfgrass Management

Graduates possess the technical knowledge and skills to become professional horticulturists. They understand principles of life science, plant growth and development, and are familiar with cultural and management principles for a wide assortment of horticultural crops. They are able to work and communicate effectively with fellow horticultural professionals and other citizens who share an interest in horticulture. Graduates also understand the ethical and environmental dimensions of problems and issues facing horticultural professionals.

A degree in horticulture opens the door to employment opportunities with production nurseries, seed companies, interior landscaping firms, greenhouses, garden centers, conservatories, landscape design/installation firms, public gardens and arboreta, orchards and vineyards, food processing companies, vegetable farms, golf courses, sports fields, sod production companies, and lawn care businesses. Several allied plant-science industries also provide employment opportunities in the areas of sales, management, and communication. Opportunities exist for careers in research, teaching, extension, and business after obtaining advanced training in graduate school.

## Minors

The Department of Horticulture offers two minors: 1) Horticulture and 2) Landscape Management. Both minors are earned by taking HORT 221 Principles of Horticulture Science plus 12 additional credits with a maximum of 3 credits at the 200-level and a minimum of 9 credits at the 300-level or above.

The Horticulture minor is a broad-based minor that does not focus within a specific area of horticulture. The 12 additional credits for this minor can be selected from the full list of Horticulture courses.

The Landscape Management minor focuses on landscape management including plant selection, landscape installation and management, and turfgrass management. The 12 additional credits for this minor can be selected from the following courses: HORT 240 Trees, Shrubs, and Woody Vines for Landscaping, HORT 281 Landscape Graphics, HORT 330 Herbaceous Ornamental Plants, HORT 341 Woody Plant Cultivars: Shade Trees, Ornamental Trees and Woody Shrubs, HORT 342 Landscape Plant Installation, Establishment, and Maintenance, HORT 351 Turfgrass Establishment and Management or HORT 444 Landscape Construction Management.

Visit our departmental website at [www.hort.iastate.edu](http://www.hort.iastate.edu) (<http://www.hort.iastate.edu>).

## Curriculum in Horticulture

Students majoring in horticulture will select an option in which to specialize before reaching junior standing and will fulfill the requirements described below under Options.

The Department of Horticulture offers two minors: 1) Horticulture and 2) Landscape Management. The requirements appear under Horticulture, Courses and Programs.

### Total Degree Requirement: 129 credits (cr.)

Only 65 cr. from a two-year institution may apply which may include up to 16 technical cr.; 9 P-NP cr. of free electives; 2.00 minimum GPA.

### Biological Sciences: 18 cr.

BIOL 211	Principles of Biology I	3
BIOL 211L	Principles of Biology Laboratory I	1
Select fourteen credit hours from the following:		14
AGRON 217	Weed Identification	
AGRON 260	Soils and Environmental Quality	
AGRON 316	Crop Structure-Function Relationships	
AGRON 317	Principles of Weed Science	
AGRON 354	Soils and Plant Growth	
AGRON 354L	Soils and Plant Growth Laboratory	
BIOL 212	Principles of Biology II	
BIOL 212L	Principles of Biology Laboratory II	
BIOL 312	Ecology	
BIOL 313 & 313L	Principles of Genetics and Genetics Laboratory	
or GEN 320	Genetics, Agriculture and Biotechnology	
BIOL 314	Principles of Molecular Cell Biology	
BIOL 355	Plants and People	
BIOL 366	Plant Systematics	
BIOL 430	Principles of Plant Physiology	
BIOL 454	Plant Anatomy	
BIOL 474	Plant Ecology	
ENT 201	Introduction to Insects	
ENT 211	Insects and Society	
ENT 370	Insect Biology	
ENT 375	Plant Protection Using Natural Enemies	
ENT 376	Fundamentals of Entomology and Pest Management	
FOR 416	Forest Insects and Diseases	
FOR 416L	Forest Insects and Diseases Laboratory	
PL P 408	Principles of Plant Pathology	

**Total Credits** **18**

### Communications Proficiency (with a grade of C or better)

6 credits of English composition (see approved courses below)

3 credits of speech fundamentals (see approved courses below)

**Communication/Library: 13 cr.**

ENGL 150	Critical Thinking and Communication	3
ENGL 250	Written, Oral, Visual, and Electronic Composition	3
ENGL 314	Technical Communication	3
or ENGL 302	Business Communication	
LIB 160	Information Literacy	1
One of the following:		3
SP CM 212	Fundamentals of Public Speaking	
AGEDS 311	Presentation and Sales Strategies for Agricultural Audiences	
COMST 214	Professional Communication	

**Total Credits** 13

**Ethics: 3 cr.**

3 cr. from approved list 3

**Humanities and Social Sciences: 6 cr.**

Approved Humanities course 3

Approved Social Science course 3

**Total Credits** 6

**International Perspective: 3 cr.**

3 cr. from approved list 3

**Total Credits** 3

**U.S. Diversity: 3 cr.**

3 cr. from approved list 3

**Total Credits** 3

**Life Sciences: 6 cr.**

BIOL 211 Principles of Biology I 3

Approved Life Sciences course 3

**Total Credits** 6

**Mathematical Sciences: 6 cr.**

Select one course from the following: 3

MATH 140 College Algebra

MATH 150 Discrete Mathematics for Business and Social Sciences

MATH 165 Calculus I

MATH 181 Calculus and Mathematical Modeling for the Life Sciences I

AND select one of the following: 3

STAT 101 Principles of Statistics

STAT 104 Introduction to Statistics

STAT 226 Introduction to Business Statistics I

STAT 301 Intermediate Statistical Concepts and Methods

STAT 401 Statistical Methods for Research Workers

**Total Credits** 6

**Physical Sciences: 11 cr.**

Complete one of the following: 5

CHEM 163	College Chemistry	
& 163L	and Laboratory in College Chemistry	
or CHEM 177	General Chemistry I	
& 177L	and Laboratory in General Chemistry I	

AND complete one course from the following: 3-4

AGRON 259 Organic Compounds in Plants and Soils

BBMB 221 Structure and Reactions in Biochemical Processes

CHEM 178 General Chemistry II and Laboratory in College Chemistry II

CHEM 231 Elementary Organic Chemistry and Laboratory in Elementary Organic Chemistry

CHEM 331 Organic Chemistry I and Laboratory in Organic Chemistry I

PHYS 101 Physics for the Nonscientist

PHYS 111 General Physics

PHYS 115 Physics for the Life Sciences

AND complete one course from the following: 3-5

BBMB 221 Structure and Reactions in Biochemical Processes

CHEM 231 Elementary Organic Chemistry and Laboratory in Elementary Organic Chemistry

CHEM 331 Organic Chemistry I and Laboratory in Organic Chemistry I

**Total Credits** 11-14

**Horticultural Sciences: Minimum of 30 cr.**

HORT 110 Professional and Educational Development in Horticulture. 1

HORT 221 Principles of Horticulture Science 3

HORT 321 Horticulture Physiology 3

HORT 445 Horticulture Management and Administration 2

Select 21 cr. hours from courses within selected option. 21

**Total Credits** Minimum of 30

**Soil Sciences: 3 cr.**

AGRON 154 Fundamentals of Soil Science 3

or AGRON 155 Soils for Horticultural Scientists

**Total Credits** 3

**Electives**

No more than 4 cr. of Hort 490 may count toward graduation.

## Options

### Greenhouse Plant Production

The following courses are required to meet the Horticulture requirement:

HORT 240 Trees, Shrubs, and Woody Vines for Landscaping 3

HORT 322 Plant Propagation 3

HORT 330 Herbaceous Ornamental Plants 3

HORT 331 Hydroponic Food Crop Production 3

HORT 332 Greenhouse Operation and Management 4

HORT 434 Fall Greenhouse Crop Production 3

HORT 435	Spring Greenhouse Crop Production	3
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Other recommended courses are:

HORT 376	Field Production of Horticultural Crops	
HORT 391	Horticultural Management Experience	
HORT 424	Sustainable and Environmental Horticulture Systems	
HORT 442	Nursery Production and Garden Center Management	

Required for option:

ACCT 284	Financial Accounting	3
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And select 9 cr. hours from the following: 9

ACCT 215	Legal Environment of Business	
ACCT 285	Managerial Accounting	
ACCT 316	Business Law	
AGRON 206	Introduction to Weather and Climate	
COM S 103	Computer Applications	
ECON 101	Principles of Microeconomics	
ECON 102	Principles of Macroeconomics	
ECON 230	Farm Business Management	
ECON 234	Small Business Management	
ECON 334	Entrepreneurship in Agriculture	
ENV S 461I	Introduction to GIS	
MGMT 310	Entrepreneurship and Innovation	
MGMT 313	Feasibility Analysis and Business Planning	
MGMT 370	Management of Organizations	
MGMT 371	Organizational Behavior	
MKT 340	Principles of Marketing	
MKT 442	Sales Management	
MKT 446	Retailing	
MKT 447	Consumer Behavior	
TSM 270	Principles of Injury Prevention	

## Horticultural Food Crop Production and Management

The following courses are required to meet the Horticulture requirement:

HORT 276	Understanding Grape and Wine Science	3
HORT 376	Field Production of Horticultural Crops	3
HORT 461	Fruit Crop Production and Management	3
HORT 471	Vegetable Production and Management	2
HORT 471L	Vegetable Production and Management Lab	1

Other recommended courses:

HORT 322	Plant Propagation	
HORT 331	Hydroponic Food Crop Production	
HORT 332	Greenhouse Operation and Management	
HORT 338	Seed Science and Technology	
HORT 391	Horticultural Management Experience	
HORT 484	Organic Agricultural Theory and Practice	

Required for option:

ACCT 284	Financial Accounting	3
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And select 9 cr. hours from the following: 9

ACCT 215	Legal Environment of Business	
ACCT 285	Managerial Accounting	
ACCT 316	Business Law	

COM S 103	Computer Applications	
ECON 101	Principles of Microeconomics	
ECON 102	Principles of Macroeconomics	
ECON 230	Farm Business Management	
ECON 234	Small Business Management	
ECON 334	Entrepreneurship in Agriculture	
ENV S 293	Environmental Planning	
ENV S 324	Energy and the Environment	
ENV S 382	Environmental Sociology	
ENV S 491	Environmental Law and Planning	
FS HN 403	Food Laws, Regulations, and the Regulatory Process	
FS HN 405	Food Quality Assurance	
FS HN 471	Food Processing I	
FS HN 472	Food Processing II	
MGMT 310	Entrepreneurship and Innovation	
MGMT 313	Feasibility Analysis and Business Planning	
MGMT 370	Management of Organizations	
MGMT 371	Organizational Behavior	
MKT 340	Principles of Marketing	
MKT 442	Sales Management	
MKT 446	Retailing	
MKT 447	Consumer Behavior	
TSM 270	Principles of Injury Prevention	
TSM 324	Soil and Water Conservation Management	

## Horticulture Research

The following courses are required for this option:

AGEDS 312	Science With Practice	3
HORT 322	Plant Propagation	3

Biological Sciences:

BIOL 430	Principles of Plant Physiology	3
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Other recommended course:

HORT 391	Horticultural Management Experience	8
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Mathematical Sciences Requirement:

MATH 165	Calculus I	
or MATH 181	Calculus and Mathematical Modeling for the Life Sciences I	
MATH 166	Calculus II	
or MATH 182	Calculus and Mathematical Modeling for the Life Sciences II	

Physical Sciences Requirement:

BBMB 301	Survey of Biochemistry	
or BBMB 404	Biochemistry I	
CHEM 177	General Chemistry I	
CHEM 177L	Laboratory in General Chemistry I	
CHEM 178	General Chemistry II	
CHEM 178L	Laboratory in College Chemistry II	
CHEM 331	Organic Chemistry I	
CHEM 331L	Laboratory in Organic Chemistry I	
CHEM 332	Organic Chemistry II	
CHEM 332L	Laboratory in Organic Chemistry II	

PHYS 111 & PHYS 112	General Physics and General Physics
And select 5 cr. hours from the following:	
BBMB 404	Biochemistry I
BBMB 405	Biochemistry II
BBMB 411	Techniques in Biochemical Research
BIOL 313	Principles of Genetics
BIOL 313L	Genetics Laboratory
BIOL 314	Principles of Molecular Cell Biology
BIOL 315	Biological Evolution
CHEM 211	Quantitative and Environmental Analysis
CHEM 211L	Quantitative and Environmental Analysis Laboratory
CHEM 316	Instrumental Methods of Chemical Analysis
CHEM 316L	Instrumental Analysis Laboratory
CHEM 321L	Laboratory in Physical Chemistry
CHEM 322L	Laboratory in Physical Chemistry
CHEM 324	Introductory Quantum Mechanics
COM S 107 or COM S 207	Applied Computer Programming Fundamentals of Computer Programming
GEN 409	Molecular Genetics
GEN 410	Analytical Genetics

### Landscape Design, Installation and Management

The following courses are required to meet the Horticulture requirement:

HORT 240	Trees, Shrubs, and Woody Vines for Landscaping	3
HORT 281	Landscape Graphics	2
HORT 330	Herbaceous Ornamental Plants	3
HORT 341	Woody Plant Cultivars: Shade Trees, Ornamental Trees and Woody Shrubs	2
HORT 342	Landscape Plant Installation, Establishment, and Maintenance	3
HORT 351	Turfgrass Establishment and Management	3
HORT 380	Principles of Garden Composition	2
HORT 381	Beginning Garden Composition Studio	2
HORT 444	Landscape Construction Management	3
HORT 481	Advanced Garden Composition	2

Other recommended courses are:

HORT 322	Plant Propagation
HORT 332	Greenhouse Operation and Management
HORT 391	Horticultural Management Experience
HORT 442	Nursery Production and Garden Center Management

Required for option:

ACCT 284	Financial Accounting	3
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And select 9 cr. hours from the following: 9

ACCT 215	Legal Environment of Business
ACCT 285	Managerial Accounting
ACCT 316	Business Law
COM S 103	Computer Applications
ECON 234	Small Business Management
ECON 334	Entrepreneurship in Agriculture

MGMT 310	Entrepreneurship and Innovation
MGMT 313	Feasibility Analysis and Business Planning
MGMT 370	Management of Organizations
MGMT 371	Organizational Behavior
MKT 340	Principles of Marketing
MKT 343	Personal Sales
MKT 442	Sales Management
MKT 447	Consumer Behavior
TSM 324	Soil and Water Conservation Management

### Public Horticulture

The following courses are required to meet the Horticulture requirement:

HORT 240	Trees, Shrubs, and Woody Vines for Landscaping	3
HORT 282	Educating Youth Through Horticulture	3
HORT 322	Plant Propagation	3
HORT 330	Herbaceous Ornamental Plants	3

Other recommended courses:

HORT 281	Landscape Graphics
HORT 332	Greenhouse Operation and Management
HORT 341	Woody Plant Cultivars: Shade Trees, Ornamental Trees and Woody Shrubs
HORT 342	Landscape Plant Installation, Establishment, and Maintenance
HORT 351	Turfgrass Establishment and Management
HORT 351L	Turfgrass Establishment and Management Laboratory
HORT 376	Field Production of Horticultural Crops
HORT 380	Principles of Garden Composition
HORT 381	Beginning Garden Composition Studio
HORT 391	Horticultural Management Experience

And select 12 credit hours from the following: 12

ACCT 215	Legal Environment of Business
ACCT 284	Financial Accounting
ACCT 285	Managerial Accounting
ACCT 316	Business Law
AGEDS 310	Foundations of Agricultural Education Programs
AGEDS 401	Planning Agriculture and Life Sciences Education Programs
COMST 102	Introduction to Interpersonal Communication
COMST 214	Professional Communication
COMST 317	Small Group Communication
ECON 234	Small Business Management
ECON 334	Entrepreneurship in Agriculture
ENGL 220	Descriptive English Grammar
ENGL 303	Free-Lance Writing for Popular Magazines
ENGL 305	Creative Writing: Nonfiction
ENGL 309	Proposal and Report Writing
ENGL 313	Rhetorical Website Design
ENGL 415	Business and Technical Editing
ENGL 416	Visual Aspects of Business and Technical Communication

ENSCI 446	Integrating GPS and GIS for Natural Resource Management
ENSCI 461I	Introduction to GIS
FIN 301	Principles of Finance
JL MC 201	Reporting and Writing for the Mass Media
JL MC 310	Fundamentals of Photojournalism
JL MC 341	Contemporary Magazine Publishing
MGMT 370	Management of Organizations
MGMT 371	Organizational Behavior
MGMT 471	Personnel and Human Resource Management
P R 220	Principles of Public Relations
SP CM 312	Business and Professional Speaking
SP CM 313	Communication in Classrooms and Workshops

## Turfgrass Management

The following courses are required to meet the Horticulture requirement:

HORT 240	Trees, Shrubs, and Woody Vines for Landscaping	3
HORT 351	Turfgrass Establishment and Management	3
HORT 351L	Turfgrass Establishment and Management Laboratory	1
HORT 451	Professional Turfgrass Management	2
HORT 452	Integrated Management of Diseases and Insect Pests of Turfgrasses	3
HORT 453	Sports Turf Management	3
HORT 454	Turf & Landscape Irrigation	3
HORT 551	Growth and Development of Perennial Grasses	2

Other recommended courses:

HORT 330	Herbaceous Ornamental Plants
HORT 391	Horticultural Management Experience

Required for option:

ACCT 284	Financial Accounting	3
And select 9 cr. hours from the following:		9

ACCT 285	Managerial Accounting
ACCT 316	Business Law
AGRON 206	Introduction to Weather and Climate
AGRON 360	Environmental Soil Science
AGRON 459	Environmental Soil and Water Chemistry
COM S 103	Computer Applications
ECON 234	Small Business Management
ECON 334	Entrepreneurship in Agriculture
ENSCI 461I	Introduction to GIS
ENV S 201	Introduction to Environmental Issues
ENV S 324	Energy and the Environment
HSP M 101	Introduction to the Hospitality Industry
HSP M 289	Contemporary Club Management
MGMT 370	Management of Organizations
MGMT 371	Organizational Behavior
TSM 270	Principles of Injury Prevention
TSM 324	Soil and Water Conservation Management

Horticulture, B.S. - Horticulture Food Crop Production and Management Option

## Freshman

Fall	Credits Spring	Credits
CHEM 163	4 ENGL 250	3
CHEM 163L	1 BIOL 211	3
PSYCH OR SOC OR ECON	3 HORT 221	3
ENGL 150	3 AGRON 155	3
HORT 110	1 STAT 104	3
HORT 121	2 BIOL 211L	1
LIB 160	1	
	<b>15</b>	<b>16</b>

## Sophomore

Fall	Credits Spring	Credits
AGRON 260	3 ENT 376	3
BIOL Elective	3 HORT 276	3
ECON 101	3 HORT 322	3
International Perspectives	3 Humanities	3
HORT 376	3 PHYS 101 or 111 or 115	3-5
	<b>15</b>	<b>15-17</b>

## Junior

Fall	Credits Spring	Credits
CHEM 231	3 ACCT 284	3
CHEM 231L	1 ENT 375	3
Hort Elective	3 HORT 424	3
HORT 391	1 General Elective	2
HORT 445	2 HORT 471	2
MATH 140	3 HORT 471L	1
US Diversity	3 SP CM 212 or AGEDS 311	3
	<b>16</b>	<b>17</b>

## Senior

Fall	Credits Spring	Credits
ENGL 302 or 314	3 HORT 354	3
General Elective	2 HORT 461	3
HORT 321	3 Elective	1
HORT 391	1 Option Class	3
Option Class	3 Elective	3
Option Class	3 Ethics	3
	<b>15</b>	<b>16</b>

## Total Credits: 125-127

Horticulture, B.S. - Landscape Design, Installation, and Management

## Freshman

Fall	Credits Spring	Credits
ENGL 150	3 ENGL 250	3
CHEM 163	4 BIOL 211	3
CHEM 163L	1 BIOL 211L	1
PSYCH or SOC	3 STAT 104	3
LIB 160	1 AGRON 155	3
HORT 121	2 HORT 221	3
HORT 110	1	
	<b>15</b>	<b>16</b>

<b>Sophomore</b>			CHEM 231L	HORT 322	3
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>	OR		
AGRON 260	3 ACCT 284	3	BBMB 221		
ECON 101	3 Elective	3	HORT 240	3	
ENT 201	1 Select from the following:	3-4	MATH 140	3	
ENT 211	2 CHEM 231			<b>15-16</b>	<b>15-17</b>
HORT 281	2 CHEM 231L		<b>Junior</b>		
HORT 330	3 or		<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HORT 444	3 BBMB 221		AGEDS 311 or SP CM 212	3 ENGL 302 or 314	3
	HORT 380	2	HORT 321	3 ECON 101	3
	HORT 381	2	HORT 342	3 Humanity	3
	MATH 140	3	HORT 391	1 HORT 282	3
	<b>17</b>	<b>16-17</b>	PL P 408	3 HORT 283	2
			US Diversity	3 P R 220	3
<b>Junior</b>				<b>16</b>	<b>17</b>
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>	<b>Senior</b>		
AGEDS 311	3 Biol Science	3	<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HORT 240	3 Elective	2	Elective	3 AGRON 260	3
HORT 321	3 ENGL 302 or 314	3	HORT 330	3 Elective	1
HORT 342	3 HORT 341	2	HORT 391	1 ENGL 309	3
HORT 481	2 PHYS 101 OR 111 OR 115 OR AGRON 259	3-5	HORT 445	2 ENGL 313	3
HORT 391	1 International Perspective	3	International Perspectives	3 HORT 424	3
	<b>15</b>	<b>16-18</b>	MGMT 370	3 Ethics	3
<b>Senior</b>				<b>15</b>	<b>16</b>
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>	<b>Total Credits: 125-128</b>		
Elective	3 Ethics Elective	3	Horticulture, B.S. - Horticulture Research Option		
HORT 351	3 U.S. Diversity	3	<b>Freshman</b>		
HORT 391	1 Option Elective	3	<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HORT 445	2 Elective	1	ENGL 150	3 ENGL 250	3
PL P 408	3 ACCT 285	3	CHEM 177	4 BIOL 211	3
Option Elective	3 Humanity Elective	3	CHEM 177L	1 AGRON 155	3
	<b>15</b>	<b>16</b>	MATH 165 or 181	3 HORT 221	3
<b>Total Credits: 126-129</b>			PSYCH or SOC	3 STAT 104	3
Horticulture, B.S. - Public Horticulture Option			LIB 160	1 BIOL 211L	1
<b>Freshman</b>			HORT 110	1	
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>		<b>16</b>	<b>16</b>
CHEM 163	4 ENGL 250	3	<b>Sophomore</b>		
CHEM 163L	1 BIOL 211	3	<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
ENGL 150	3 HORT 221	3	BIOL 212	3 BIOL 430	3
HORT 110	1 AGRON 155	3	BIOL 212L	1 CHEM 331	3
SOC OR PSYCH OR ECON	3 STAT 104	3	CHEM 178	3 CHEM 331L	1
HORT 121	2 BIOL 211L	1	CHEM 178L	1 HORT Elective	3
LIB 160	1		HORT Elective	3 MATH 166 or 182	3
	<b>15</b>	<b>16</b>	PHYS 111	5 Option	3
<b>Sophomore</b>				<b>16</b>	<b>16</b>
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>	<b>Junior</b>		
ACCT 284	3 Biol Science	3	<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
Biological Science	3 Elective	3	Humanity	3 HORT Elective	3
Select from the following:	3-4 ENT 375	3	HORT 321	3 HORT 322	3
CHEM 231	PHYS 101 OR 111 OR 115 OR AGRON 259	3-5	HORT 391	1 ENGL 302 or 314	3
			International Perspectives	3 CHEM 332	3

BIOL 313	3 CHEM 332L	1
BIOL 313L	1 PHYS 112	5
BBMB 301 or 404	3	
	<b>17</b>	<b>18</b>

<b>Senior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HORT Elective	3 Ethics Elective	3
BIOL 314	3 General Elective	1
HORT 445	2 HORT Elective	3
Hort Elective	3 Option Elective	3
HORT 391	1 PL P 408	3
Option Class	3 US Diversity	3
	<b>15</b>	<b>16</b>

**Total Credits: 130**

Horticulture, B.S. - Turfgrass Management Option

<b>Freshman</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
ENGL 150	3 ENGL 250	3
CHEM 163	4 BIOL 211	3
CHEM 163L	1 STAT 104	3
PSYCH or SOC	3 AGRON 155	3
HORT 121	2 HORT 221	3
LIB 160	1 BIOL 211L	1
HORT 110	1	
	<b>15</b>	<b>16</b>

<b>Sophomore</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
ACCT 284	3 AGRON 260	3
ENT 201	1 ENT 376	3
ENT 211	2 HORT 322	3
HORT 240	3 HORT 451	2
HORT 351	3 PHYS 101 OR 111 OR 115	3-5
HORT 351L	1 AGEDS 311 or SP CM 212	3
MATH 140	3	
	<b>16</b>	<b>17-19</b>

<b>Junior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
Select from the following:	3-4 Elective	2
CHEM 231	HORT 354	3
CHEM 231L	HORT 452	3
OR	HORT 551	2
BBMB 221	Humanity	3
HORT 321	3 International Perspectives	3
HORT 391	1	
HORT 454	3	
PL P 408	3	
US Diversity	3	
	<b>16-17</b>	<b>16</b>

<b>Senior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
AGRON 206	3 Elective	3

HORT 391	1 ENGL 302 or 314	3
HORT 453	3 Ethics Elective	3
HORT 342	3 HORT 424	3
HORT 445	2 Option Elective	3
Elective	1	
Option Elective	3	
	<b>16</b>	<b>15</b>

**Total Credits: 127-130**

Horticulture, B.S. Greenhouse Plant Production Option

<b>Freshman</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
CHEM 163	4 ENGL 250	3
CHEM 163L	1 BIOL 211	3
ENGL 150	3 HORT 221	3
PSYCH or SOC or ECON	3 STAT 104	3
HORT 110	1 AGRON 155	3
HORT 121	2 BIOL 211L	1
LIB 160	1	
	<b>15</b>	<b>16</b>

<b>Sophomore</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
ACCT 284	3 AGRON 260	3
Biological Science	3 ENT 376	3
HORT 240	3 Elective	3
International Perspectives	3 US Diversity	3
MATH 140	3 HORT 332	4
	<b>15</b>	<b>16</b>

<b>Junior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
Select from the following:	3-4 HORT 322	3
CHEM 231	HORT 435	3
CHEM 231L	SP CM 212 or AGEDS 311	3
OR	ENT 375	3
BBMB 221	PHYS 101 OR 111 OR 115	3-5
HORT 321	3	
HORT 342	3	
PL P 391	2	
HORT 434	3	
	<b>14-15</b>	<b>15-17</b>

<b>Senior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
Elective	3 ACCT 285	3
HORT 330	3 Elective	3
HORT 331	3 ENGL 302 or 314	3
HORT 391	1 Ethics	3
HORT 442	2 Humanity	3
HORT 445	2	
Option Elective	3	
	<b>17</b>	<b>15</b>

**Total Credits: 123-126**

## Graduate Study

The graduate major in horticulture leads to the M.S. (thesis and non-thesis option) and Ph.D. Some faculty members of the department serve as major professors for students in interdepartmental graduate majors in plant biology; genetics and genomics; molecular, cellular, and developmental biology; ecology and evolutionary biology; sustainable agriculture; and environmental science.

Graduates possess a broad understanding of horticulture and the allied plant sciences. They are able to communicate effectively with members of the scientific community, industry groups, and other interested citizens. They are experienced in conducting research and communicating the results from that research. They are capable of addressing and solving complex problems that confront the many horticultural, agricultural, and plant science professions. They also understand the ethical, legal, social, and environmental issues associated with modern agricultural/horticultural practices.

### Courses primarily for undergraduates:

#### **HORT 110: Professional and Educational Development in Horticulture.**

(1-0) Cr. 1. F.

Intended for first-year students and others new to the horticulture curriculum. Introduction to professional and educational development within horticulture. Focus is on university and career acclimation. Assessed service-learning component.

#### **HORT 112: Orientation to Learning and Productive Team Membership**

(Cross-listed with AER E, CON E, FS HN, NREM). (2-0) Cr. 2. F.

Introduction to developing intentional learners and worthy team members. Learning as the foundation of human enterprise; intellectual curiosity; ethics as a personal responsibility; everyday leadership; effective team and community interactions including team learning and the effects on individuals; and growth through understanding self, demonstrating ownership of own learning, and internalizing commitment to helping others. Intentional mental processing as a means of enhancing learning. Interconnectedness of the individual, the community, and the world.

#### **HORT 114: Developing Responsible Learners and Effective Leaders**

(Cross-listed with CON E, FS HN, NREM). (2-0) Cr. 2. S.

*Prereq: Hort 112 or NREM 112*

Focus on team and community. Application of fundamentals of human learning; evidence of development as a responsible learner; intentional mental processing as a habit of mind; planning and facilitating learning opportunities for others; responsibility of the individual to the community and the world; leading from within; holding self and others accountable for growth and development as learners and leaders.

#### **HORT 121: Home Horticulture**

(2-0) Cr. 2. F.S.

Growing plants in and around the home including requirements for growing house plants; plant propagation; designing and maintaining flower, fruit, and vegetable gardens; lawn, tree, and shrub maintenance.

#### **HORT 122: Hands-On Home Horticulture**

(1-0) Cr. 1. F.S.

Demonstration and activities that illustrate principles of growing plants for the home garden. Topics include floral and landscape design, plant identification, propagation, selection, and management for indoor and outdoor gardens.

#### **HORT 131: Floral Design**

(0-2) Cr. 1. S.

Introduces basic geometric design of fresh arrangements, corsages, and holiday arrangements. Includes use of tools and supplies.

#### **HORT 193: Topics in Horticulture**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193A: Topics in Horticulture: Greenhouse Crops**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193B: Topics in Horticulture: Nursery Crops**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193C: Topics in Horticulture: Turfgrass**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193D: Topics in Horticulture: Fruit Crops**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193E: Topics in Horticulture: Vegetable Crops**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193F: Topics in Horticulture: Cross-Commodity**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 193G: Topics in Horticulture: Landscape Horticulture**

Cr. arr. Repeatable. F.S.SS.

Practical courses in the field of horticulture. A maximum of 6 credits of Hort 193 may be used toward the total of 128 credits required for graduation.

#### **HORT 221: Principles of Horticulture Science**

(2-2) Cr. 3. F.S.

*Prereq: Biol 211 or concurrent enrollment*

Biological principles of growing horticultural crops including anatomy, reproduction, light, temperature, water, nutrition, and growth and development. Laboratory exercises emphasize environmental factors and permit detailed observation of plant growth.



**HORT 225: Spanish for Horticulture**

(3-0) Cr. 3. S.

Introduction to basic conversation and communication skills in Spanish, and cross-cultural skills for working with Spanish speakers in the Horticulture industry, emphasizing the use of vocabulary and expressions common in the workplace.

**HORT 240: Trees, Shrubs, and Woody Vines for Landscaping**

(3-0) Cr. 3. F.

Identification of trees, shrubs, and woody vines. Factors influencing the horticultural use of woody plants. Field trips outside of regular class time may be required.

**HORT 276: Understanding Grape and Wine Science**

(3-0) Cr. 3. Alt. S., offered even-numbered years.

*Prereq: High school biology and chemistry.*

A scientific introduction to viticulture (grape-growing) and enology (wine-making). Topics include grape species and varieties, viticulture practices, fruit quality, geography, history, principles of fermentation and aging, wine classification, appreciation, evaluation, storage and service, regulations, wine as food. No wine tasting.

**HORT 281: Landscape Graphics**

(0-4) Cr. 2. F.

Introduction to computer and hand rendering techniques of landscape graphics. Students will gain proficiency in plan view and elevation graphics. Intensive studio and computer based instruction.

**HORT 282: Educating Youth Through Horticulture**

(2-3) Cr. 3. Alt. S., offered even-numbered years.

Planning, developing, and implementing science-based educational programs in a garden setting. Through hands-on experiences students will learn about horticulture, learning theory, and the application of science principles as they pertain to educating youth. Assessed service-learning component.

**HORT 283: Pesticide Application Certification**

(Cross-listed with AGRON, ENT, FOR). (2-0) Cr. 2. S.

Core background and specialty topics in agricultural, and horticultural pesticide applicator certification. Students can select certification categories and have the opportunity to obtain pesticide applicator certification at the completion of the course. Commercial pesticide applicator certification is emphasized.

**HORT 321: Horticulture Physiology**

(3-0) Cr. 3. F.

*Prereq: HORT 221 or BIOL 211*

Principles of plant physiology relating to growth and development of horticultural plants including plant water relations, membrane transport, photosynthesis, photomorphogenesis, respiration, and phytohormones. Emphasis on plant's responses to environmental factors (temperature, water, and light) including cellular and whole-plant physiology under stressful environments.

**HORT 322: Plant Propagation**

(2-2) Cr. 3. S.

*Prereq: HORT 221 or BIOL 211*

Fundamental principles underlying sexual and asexual propagation of plants; practice in reproducing plants by use of seeds, cuttings, layering, grafting and budding and tissue culture.

**HORT 330: Herbaceous Ornamental Plants**

(2-2) Cr. 3. F.

*Prereq: HORT 221 or by permission of instructor*

Identification, botanical characteristics, origins, propagation, uses and general culture of herbaceous annual and perennial plants for Midwestern gardens and landscapes.

**HORT 331: Hydroponic Food Crop Production**

(2-2) Cr. 3. Alt. F., offered even-numbered years.

*Prereq: HORT 221 or AGRON 114 or 3 credits in biological sciences*

Principles and practices of hydroponic systems, crop production and culture, aquaponic systems, and new food crops for hydroponic systems will be discussed. Laboratories will focus on demonstration and participation in practices and procedures used in hydroponic food crop production. Assessed service-learning component.

**HORT 332: Greenhouse Operation and Management**

(3-3) Cr. 4. S.

*Prereq: Hort 221*

Operation and management of greenhouses and other controlled environment agriculture structures. Methods of monitoring and manipulating environmental, cultural, and management factors such as light, temperature, fertility, substrate, etc., to maximize production efficiency. Emphasis placed on the production of ornamental and food crops. Greenhouse design and specification project required. Field trips outside scheduled class time required.

**HORT 338: Seed Science and Technology**

(Cross-listed with AGRON). (2-3) Cr. 3. F.

*Prereq: AGRON 114 or HORT 221, BIOL 211*

Seed production, maturation, dormancy, vigor, deterioration, and related aspects of enhancement, conditioning, storage, and quality evaluation. Aspects of the seed industry and regulation of seed marketing.

**HORT 341: Woody Plant Cultivars: Shade Trees, Ornamental Trees and Woody Shrubs**

(2-0) Cr. 2. S.

*Prereq: Hort 240 or L A 221 or L A 222*

Cultivars of the most prevalent and economically important woody landscape plants will be taught. The importance of cultivars to the nursery and landscaping professions and suggestions for their proper usage will be discussed.

**HORT 342: Landscape Plant Installation, Establishment, and Maintenance**

(2-3) Cr. 3. F.

*Prereq: Hort 240 or L A 221 or L A 222*

Principles and practices involved with establishment and maintenance of managed landscapes. Laboratory work involves site evaluation, installation techniques, postplant care, and maintenance of established landscape plants.

**HORT 351: Turfgrass Establishment and Management**

(Cross-listed with AGRON). (3-0) Cr. 3. F.

*Prereq: HORT 221 or AGRON 114 or BIOL 211*

Principles and practices of turfgrass propagation, establishment, and management. Specialized practices relative to professional lawn care, golf courses, athletic fields, highway roadsides, and seed and sod production. The biology and control of turfgrass pests.

**HORT 351L: Turfgrass Establishment and Management Laboratory**

(Cross-listed with AGRON). (0-3) Cr. 1. F.

*Prereq: Credit or enrollment in HORT 351*

Those enrolled in the horticulture curriculum are required to take 351L in conjunction with 351 except by permission of the instructor.

**HORT 354: Soils and Plant Growth**

(Cross-listed with AGRON). (3-0) Cr. 3. F.S.

*Prereq: AGRON 154 and BIOL 101 or BIOL 211*

Effects of chemical, physical, and biological properties of soils on plant growth, with emphasis on nutritive elements, pH, organic matter maintenance, and rooting development.

**HORT 354L: Soils and Plant Growth Laboratory**

(Cross-listed with AGRON). (0-3) Cr. 1. F.S.

*Prereq: Agron or Hort major with credit or enrollment in AGRON 354*

Laboratory exercises in soil testing that assess a soil's ability to support nutritive requirements for plant growth.

**HORT 376: Field Production of Horticultural Crops**

(3-0) Cr. 3. F.

*Prereq: Hort 221 or Agron 114*

An introduction to field production of fruit and vegetable crops and the theoretical and practical knowledge required for successfully producing them. Topics will include basic principles and practices of fruit and vegetable production, site selection, soil techniques, irrigation management, equipment and tools, integrated pest management, season extension strategies, postharvest handling and food safety, marketing, and basic business planning for fruit and vegetable enterprises. Additionally, this course will prepare students for HORT 461 and HORT 471, that are advanced level courses focusing on fruit and vegetable production.

**HORT 380: Principles of Garden Composition**

(2-0) Cr. 2. S.

*Prereq: HORT 240*

Functional and aesthetic aspects of landscape planning as a basis for design decisions; emphasis on spatial design and plant selection. Includes site analysis, development process, and design principles.

**HORT 381: Beginning Garden Composition Studio**

(0-4) Cr. 2. S.

*Prereq: HORT 240, HORT 281, HORT 330, concurrent enrollment in HORT 380*

Introduction to landscape design process. Intensive studio-based projects implementing principles of landscape design, concept development, and graphic communication. Not available as credit for L A majors.

**HORT 391: Horticultural Management Experience**

Cr. 1. Repeatable. F.S.SS.

*Prereq: HORT 221 or permission of instructor*

A structured work experience for the student to gain insight into management operations associated with production and management of horticultural crops. A report of 10 or more pages describing the student's experience is required. One credit is given for each term the student is enrolled in the course. A maximum of two credits may be used toward the horticultural sciences course requirements, and two additional credits may be used toward the 128 credits required for graduation.

**HORT 398: Cooperative Education**

Cr. R. Repeatable. F.S.SS.

*Prereq: Permission of department resource and career center coordinator*

Students must register for this course before commencing each work period.

**HORT 421: Introduction to Plant Breeding**

(Cross-listed with AGRON). (3-0) Cr. 3. F.

*Prereq: GEN 320 or BIOL 313*

Breeding methods used in the genetic improvement of self-pollinated, cross-pollinated and asexually reproducing agronomic and horticultural crops. Applications of biotechnology techniques in the development of improved cultivars.

**HORT 424: Sustainable and Environmental Horticulture Systems**

(Dual-listed with HORT 524). (Cross-listed with ENV S). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

Inquiry into ethical issues and environmental consequences of horticultural cropping systems, production practices and managed landscapes. Emphasis on systems that are resource efficient, environmentally sound, socially acceptable, and profitable.

**HORT 434: Fall Greenhouse Crop Production**

(2-3) Cr. 3. Alt. F., offered odd-numbered years.

*Prereq: HORT 332*

Principles and practices of greenhouse floriculture production. Emphasis is placed on production of foliage and containerized flowering species produced in greenhouses and other controlled environments. Field trips outside scheduled class time required. Greenhouse scheduling and costs of production projects are required.

**HORT 435: Spring Greenhouse Crop Production**

(2-3) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: HORT 330 and HORT 332*

Principles and practices of greenhouse production of ornamental crops for the spring garden market. Emphasis placed on the production of several ornamental crops, along with the complete palate of spring garden crops. Field trips outside scheduled class time required.

**HORT 442: Nursery Production and Garden Center Management**

(2-0) Cr. 2. Alt. F., offered odd-numbered years.

*Prereq: HORT 221*

Nursery layout, design, and cultural practices important for growing and shipping field and container-grown nursery crops. Overview of garden center design and retailing and marketing strategies. Field trip(s) outside scheduled class time may be required.

**HORT 444: Landscape Construction Management**

(2-3) Cr. 3. F.

Principles and practices of residential landscape construction. Encompasses business and project management, landscape estimating and overview of common landscape materials. Laboratory work involves construction project management and installation.

**HORT 445: Horticulture Management and Administration**

(2-0) Cr. 2. F.

*Prereq: HORT 221 and junior or senior classification*

In-depth presentation and discussion of skills and strategies needed to manage a horticultural enterprise. Topics include motivating employees, managing meetings, conducting performance appraisals, dealing with conflict, and managing an increasingly diverse work force.

**HORT 451: Professional Turfgrass Management**

(2-0) Cr. 2. Alt. S., offered odd-numbered years.

*Prereq: HORT 351*

Turfgrass science including the study of (1) specific information on soil chemistry and soil modification as they relate to the development and maintenance of turfgrass areas, (2) specialized management practices used in athletic field care, professional lawn care, and golf course industries, and (3) construction methods for golf courses and sports fields.

**HORT 452: Integrated Management of Diseases and Insect Pests of Turfgrasses**

(Dual-listed with HORT 552). (Cross-listed with ENT, PL P). (3-0) Cr. 3. Alt. S., offered even-numbered years.

*Prereq: HORT 351*

Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments.

**HORT 453: Sports Turf Management**

(3-0) Cr. 3. Alt. F., offered even-numbered years.

*Prereq: HORT 351*

Management techniques for today's specialized athletic fields. The horticultural and budgetary aspects of football, soccer, baseball, and softball fields will be presented. Field trips and laboratory exercises will develop a practical understanding of actual principles in field development, construction, and management.

**HORT 454: Turf & Landscape Irrigation**

(3-0) Cr. 3. Alt. F., offered odd-numbered years.

Irrigation systems and principles for turf and landscape environments. Topics include design, installation, equipment, management, and troubleshooting of irrigation systems for golf, athletic fields, residential lawns and landscapes. Participation in practical exercises and local field trips to irrigation sites is required.

**HORT 461: Fruit Crop Production and Management**

(2-2) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: HORT 221*

Principles and practices of small fruit, tree fruit, and nut culture and production. Morphology, physiology of growth and development, plant establishment, pest management, pruning, training, harvesting, storage, and marketing of commercial temperate fruit and nut crops. Emphasis on sustainable practices. Participation in practical exercises and local field trips is required.

**HORT 465: Horticulture Enterprise Management**

(Cross-listed with AGEDS). (1-6) Cr. 3. F.

*Prereq: Junior or senior classification.*

Participation in the management and operation of fruit and vegetable enterprises for local markets. The class is responsible for the plans, records, and decision for planting, operating, harvesting, and marketing fruit and vegetables.

**HORT 465A: Horticulture Enterprise Management - Planting**

(Cross-listed with AGEDS). (1-6) Cr. 3. S.

*Prereq: Junior or senior classification.*

Participation in the management and operation of fruit and vegetable enterprises for local markets. Principles and practices of researching and developing a commercial business plan that will meet industry standards and that will be linked to the operations and production associated with the Hort 465 class. Laboratory work includes development of a horticulture enterprise business plan, high tunnel site preparation and planting, development of summer crop protocols, seedling production for the summer crop (if applicable) and land preparation and planting of a portion of the summer crop.

**HORT 465B: Horticulture Enterprise Management: Harvesting**

(Cross-listed with AGEDS). (1-6) Cr. 3. SS.

*Prereq: Junior or senior classification.*

Participation in the management and operation of fruit and vegetable enterprises for local markets. Principles and practices of harvesting and marketing high tunnel crops and the planting and growing of a variety of summer vegetables in the field. Laboratory work includes all operation and production aspects involved with the day-to-day running of a horticultural enterprise. The class will be responsible for crop selection and crop protocols for the fall high tunnel crop and seedling production for this crop (if applicable). Additionally, the class will be responsible for all crop maintenance decisions and record keeping during the season.

**HORT 465C: Horticulture Enterprise Management: Marketing**

(Cross-listed with AGEDS). (1-6) Cr. 3. F.

*Prereq: Junior or senior classification.*

Participation in the management and operation of fruit and vegetable enterprises for local markets. Principles and practices of researching and developing a commercial horticulture enterprise market plan that could be used by a startup business and that will be linked directly to the operations and production associated with the Hort 465 class. Laboratory work includes completing the summer crop harvest, development of a horticulture marketing plan, high tunnel site preparation and planting, development of spring high tunnel crop protocols and all crop maintenance decisions and the record keeping for the fall high tunnel crop.

**HORT 471: Vegetable Production and Management**

(2-0) Cr. 2. Alt. S., offered even-numbered years.

*Prereq: HORT 221*

Principles of vegetable production with emphasis on sustainable production practices, market outlets, business aspects, and risk management. Topics will include crop classification and rotation; planting methods; crop climatic conditions, physiological growth & development; soil, water, and pest management; cover cropping; season extension strategies; harvest and postharvest management and marketing. Course involves visits to growers fields to observe/experience their production enterprise.

**HORT 471L: Vegetable Production and Management Lab**

(0-3) Cr. 1. Alt. S., offered even-numbered years.

*Prereq: Junior or Senior status and concurrent enrollment in Hort 471 is required.*

Hands-on training in the area of vegetable crop production. Students will have an opportunity to grow a variety of vegetables in a heated greenhouse and also conduct greenhouse and lab experiments. The lab also involves visits to vegetable production sites in Iowa to observe/experience and learn from growers and other agricultural professionals.

**HORT 475: Urban Forestry**

(Cross-listed with FOR). (2-3) Cr. 3. F.

*Prereq: Junior or senior classification, 3 credits in biology*

Discussion of establishment and management of woody perennials in community-owned urban greenspaces, consideration of urban site and soil characteristics, plant physiology, plant culture, urban forest valuation, inventory methods, species selection, and urban forest maintenance (health care and pest management).

**HORT 481: Advanced Garden Composition**

(0-4) Cr. 2. F.

*Prereq: HORT 240 and HORT 330 and HORT 380 and HORT 381*

Limited to Landscape Design Installation and Management option students. Development of residential landscapes using design principles and the design process. Projects encompass site analysis, concept development, preliminary design, final design, and graphic presentation techniques. Techniques will include hand and computer rendering.

**HORT 484: Organic Agricultural Theory and Practice**

(Dual-listed with HORT 584). (Cross-listed with AGRON). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: 9 cr. in biological or physical sciences*

Understanding of the historical origins and ecological theories underpinning the practices involved in organic agriculture. Interdisciplinary examination of crop and livestock production and socio-economic processes and policies in organic agriculture from researcher and producer perspectives.

**HORT 490: Independent Study**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490A: Independent Study: Greenhouse Crops**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490B: Independent Study: Nursery Crops**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490C: Independent Study: Turfgrass**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490D: Independent Study: Fruit Crops**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490E: Independent Study: Vegetable Crops**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490F: Independent Study: Cross-Commodity**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490G: Independent Study: Landscape Horticulture**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490H: Independent Study: Honors**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490I: Independent Study: International Study**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 490J: Independent Study: Entrepreneurship**

Cr. arr. Repeatable.

*Prereq: Junior or Senior classification in horticulture or permission of instructor*

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 128 credits required for graduation.

**HORT 491: Seed Science Internship Experience**

(Cross-listed with AGRON). Cr. 1-2. Repeatable, maximum of 1 times. F.S.SS.

*Prereq: Agron 338, advanced approval and participation of employer and instructor*

A professional work experience and creative project for seed science secondary majors. The project requires the prior approval and participation of the employer and instructor. The student must submit a written report.

**HORT 493: Workshop in Horticulture**

Cr. arr. Repeatable.

Off campus. Offered as demand warrants. Workshops in horticulture.

**HORT 494: Service Learning**

Cr. arr. Repeatable, maximum of 12 credits. F.S.SS.

*Prereq: Permission of instructor*

Selected projects that result in outcomes benefiting a non-Iowa State University entity while instilling professional ethics and accomplishing student learning goals. Course expenses paid by student. A maximum of 4 credits of 494 may be used toward the Horticulture credits required for graduation. Assessed service-learning component.

**HORT 494A: Service Learning: International**

Cr. arr. Repeatable, maximum of 12 credits. F.S.SS.

*Prereq: Permission of instructor*

Selected projects that result in outcomes benefiting a non-Iowa State University entity while instilling professional ethics and accomplishing student learning goals. Course expenses paid by student. A maximum of 4 credits of 494 may be used toward the Horticulture credits required for graduation. Assessed service-learning component.

**HORT 494B: Service Learning: Domestic**

Cr. arr. Repeatable, maximum of 12 credits. F.S.SS.

*Prereq: Permission of instructor*

Selected projects that result in outcomes benefiting a non-Iowa State University entity while instilling professional ethics and accomplishing student learning goals. Course expenses paid by student. A maximum of 4 credits of 494 may be used toward the Horticulture credits required for graduation. Assessed service-learning component.

**HORT 495: Horticulture Travel Course Preparation**

Cr. R. Repeatable. F.S.SS.

*Prereq: Permission of instructor*

Limited enrollment. Students enrolled in this course also intend to register for Hort 496 the following term. Topics include preparation for safe international travel, the horticultural/agricultural industries, climate, crops, economics, geography, history, marketing, soils, culture, traditions, and horticultural/agricultural development of the country to be visited. Students enroll in this course the term immediately before travel to the foreign country.

**HORT 496: Horticulture Travel Course**

Cr. 1-4. Repeatable. F.S.SS.

*Prereq: Permission of instructor*

Limited enrollment. Study and tour of production methods in major horticultural regions of the world. Influence of climate, economics, geography, soils, landscapes, markets, cultures, and history of horticultural crops. Location and duration of tours will vary. Tour expenses paid by students.

Meets International Perspectives Requirement.

**Courses primarily for graduate students, open to qualified undergraduates:**

**HORT 506: Crop Genetics**

(Cross-listed with AGRON). Cr. 3. F.

Introduction to genetics of reproductive systems, recombination, segregation and linkage analysis, inbreeding, quantitative inheritance, fertility regulation, and polyploidy to prepare students for subsequent courses in crop improvement. Enrollment is restricted to off-campus MS in Plant Breeding students.

**HORT 511: Integrated Management of Tropical Crops**

(Cross-listed with ENT, PL P). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: PL P 408 or PL P 416 or ENT 370 or ENT 376 or HORT 221*

Applications of Integrated Crop Management principles (including plant pathology, entomology, and horticulture) to tropical cropping systems. Familiarization with a variety of tropical agroecosystems and Costa Rican culture is followed by 10-day tour of Costa Rican agriculture during spring break, then writeup of individual projects.

Meets International Perspectives Requirement.

**HORT 524: Sustainable and Environmental Horticulture Systems**

(Dual-listed with HORT 424). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

Inquiry into ethical issues and environmental consequences of horticultural cropping systems, production practices and managed landscapes. Emphasis on systems that are resource efficient, environmentally sound, socially acceptable, and profitable.

**HORT 530: Research Orientation**

(1-3) Cr. 2. F.

Instruction in scientific methods and communication skills.

**HORT 542: Introduction to Molecular Biology Techniques**

(Cross-listed with B M S, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.SS.

Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

**HORT 542A: Introduction to Molecular Biology Techniques: DNA Techniques**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.

Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only.

**HORT 542B: Introduction to Molecular Biology Techniques: Protein**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. S.S.

*Prereq: Graduate classification*

Techniques. Includes: fermentation, protein isolation, protein purification, SDS-PAGE, Western blotting, NMR, confocal microscopy and laser microdissection, Immunophenotyping, and monoclonal antibody production. Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

**HORT 542C: Introduction to Molecular Biology Techniques: Cell Techniques**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.

Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only.

**HORT 542D: Introduction to Molecular Biology Techniques: Plant Transformation**

(Cross-listed with B M S, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.

Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of transformants. Offered on a satisfactory-fail basis only.

**HORT 542E: Introduction to Molecular Biology Techniques: Proteomics**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.

Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only.

**HORT 542F: Introduction to Molecular Biology Techniques: Metabolomics**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.

Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only.

**HORT 542G: Introduction to Molecular Biology Techniques: Genomic**

(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.

Offered on a satisfactory-fail basis only.

**HORT 543: Seed Physiology**

(Cross-listed with STB). (2-0) Cr. 2. Alt. F., offered even-numbered years.

*Prereq: Admission to the Graduate Seed Technology and Business Program or approval of the instructor*

Brief introduction to plant physiology. Physiological aspects of seed development, maturation, longevity, dormancy and germination. Links between physiology and seed quality.

**HORT 546: Strategies for Diversified Food and Farming Systems**

(Cross-listed with AGRON, SUSAG). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: SUSAG 509*

Project-focused engagement in food and farming systems using tools and perspectives drawn from multiple disciplines. Includes a field component.

**HORT 551: Growth and Development of Perennial Grasses**

(Cross-listed with AGRON). (2-0) Cr. 2. Alt. S., offered even-numbered years.

*Prereq: Junior or senior or graduate classification or permission of instructor*

Selected topics on anatomy, morphology, and physiology relative to growth and development of perennial grasses. Emphasis on growth and development characteristics peculiar to grasses and variations of such characteristics under natural and managed conditions.

**HORT 552: Integrated Management of Diseases and Insect Pests of Turfgrasses**

(Dual-listed with HORT 452). (Cross-listed with ENT, PL P). (3-0) Cr. 3. Alt. S., offered even-numbered years.

*Prereq: HORT 351*

Identification and biology of important diseases and insect pests of turfgrasses. Development of integrated pest management programs in various turfgrass environments.

**HORT 584: Organic Agricultural Theory and Practice**

(Dual-listed with HORT 484). (Cross-listed with AGRON, SUSAG). (3-0) Cr. 3. Alt. S., offered odd-numbered years.

*Prereq: 9 cr. in biological or physical sciences*

Understanding of the historical origins and ecological theories underpinning the practices involved in organic agriculture. Interdisciplinary examination of crop and livestock production and socio-economic processes and policies in organic agriculture from researcher and producer perspectives.

**HORT 590: Special Topics**

Cr. arr. Repeatable.

*Prereq: a major or minor in horticulture*

**HORT 593: Workshop in Horticulture**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593A: Workshop in Horticulture: Greenhouse Crops**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593B: Workshop in Horticulture: Nursery Crops**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593C: Workshop in Horticulture: Turfgrass**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593D: Workshop in Horticulture: Fruit Crops**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593E: Workshop in Horticulture: Vegetable Crops**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593F: Workshop in Horticulture: Cross-Commodity**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 593G: Workshop in Horticulture: Landscape Horticulture**

Cr. arr. Repeatable.

Workshops in horticulture, with emphasis on off-campus instruction.

**HORT 599: Creative Component**

Cr. arr. Repeatable.

**Courses for graduate students:****HORT 610: Graduate Seminar**

Cr. 1. Repeatable. F.S.

Offered on a satisfactory-fail basis only.

**HORT 690: Advanced Topics**

Cr. arr. Repeatable.

**HORT 696: Research Seminar**

(Cross-listed with AGRON, BBMB, FOR, GDCB, PLBIO). Cr. 1. Repeatable.

F.S.

Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only.

**HORT 698: Horticulture Teaching Practicum**

(1-0) Cr. 1. S.

*Prereq: Graduate student classification*

Discussions are intended to foster the development of graduate students as teaching assistants and future horticulture/plant science teachers.

Topics include establishing a classroom presence, improving lectures, motivating students, dealing with difficult or disruptive students, and developing a teaching philosophy. Offered on a satisfactory-fail basis only.

**HORT 699: Thesis and Dissertation Research**

Cr. arr. Repeatable.

**HORT 699A: Thesis and Dissertation Research: Greenhouse Crops**

Cr. arr. Repeatable.

**HORT 699B: Thesis and Dissertation Research: Nursery Crops**

Cr. arr. Repeatable.

**HORT 699C: Thesis and Dissertation Research: Turfgrass**

Cr. arr. Repeatable.

**HORT 699D: Thesis and Dissertation Research: Fruit Crops**

Cr. arr. Repeatable.

**HORT 699E: Thesis and Dissertation Research: Vegetable Crops**

Cr. arr. Repeatable.

**HORT 699F: Thesis and Dissertation Research: Cross-Commodity**

Cr. arr. Repeatable.

**HORT 699G: Thesis and Dissertation Research: Landscape Horticulture**

Cr. arr. Repeatable.

**HORT 699I: Thesis and Dissertation Research: Biotechnology**

Cr. arr. Repeatable.