Faculty

Janet B. Carson, Associate Professor
John R. Clark, Distinguished Professor
Michael R. Evans, Professor
M. Elena Garcia, Professor
Douglas Edward Karcher, Professor
Jacquelyn A. Lee, Associate Professor
Wayne A. Mackay, Professor
Garry Vernon McDonald, Clinical Assistant Professor
Amanda L. McWhirt, Assistant Professor
Mike Richardson, Professor
James A. Robbins, Professor
Curt R. Rom, University Professor
Angela M. Shaw, Adjunct Assistant Professor
Ainong Shi, Assistant Professor
Margaret L. Worthington, Assistant Professor

Wayne A. Mackay
Head of the Department
316 Plant Sciences Building
479-575-2603
http://hort.uark.edu

The Department of Horticulture offers a broad, science-based degree with comprehensive and technical training: Horticulture, Landscape and Turf Sciences (HLTS).

Horticulture, landscape, and turf management involves selection, production, management, marketing, use, and research of ornamental crops (shrubs, trees, flowers, and turf), edible crops (herbs, vegetables, and fruits) and turf grasses for the economic, nutritional, aesthetic and recreational well-being of society. The major provides education and training in basic and applied sciences, arts and humanities, communication, and business and economics to provide an understanding of the underlying principles in plant growth and development and use of new technologies, and the operation of a horticultural enterprise. In consultation with an academic adviser and mentor, students may individually focus their academic programs through required and elective courses to focus training in specialized areas such as production, greenhouse and floriculture sciences, turfgrass management, golf course management, nursery production and management, edible crop production, pest management, sales and support services, education and training, and horticultural consulting. An internship in the industry is required to gain practical, hands-on experience.

Job opportunities for horticulturists include horticulture crop production and management, horticulture merchandising and business, consulting, inspection, research, teaching, Extension, communications, allied industries serving horticultural producers, journalism, and developing private business. Students who specialize in landscape and aspects of ornamental horticulture will be prepared for careers in the landscape service industry, landscape nurseries, landscape design firms, private and public gardens, and public agencies such as parks and recreation. Job opportunities for students studying turfgrass management include golf course superintendent, sports field manager, turfgrass science companies, seed or sod production, commercial landscape turfgrass management, research, sales, teaching, or private consulting. Advanced study may be required for some careers.

Requirements for a Major in Horticulture, Landscape and Turf Sciences (HLTS)

The HLTS major will consist of 120 hours to include the following:

State minimum core and discipline specific general education requirements:

(Course work that meets state minimum core requirements is in bold.)

Communications 0-6

Two English Core Courses (unless exempt)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1013</td>
<td>Composition I (ACTS Equivalency = ENGL 1013)</td>
<td></td>
</tr>
<tr>
<td>ENGL 1023</td>
<td>Composition II (ACTS Equivalency = ENGL 1023)</td>
<td></td>
</tr>
</tbody>
</table>

U.S. History and Government (3 hours) 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2003</td>
<td>History of the American People to 1877 (ACTS Equivalency = HIST 2113)</td>
<td></td>
</tr>
<tr>
<td>HIST 2013</td>
<td>History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)</td>
<td></td>
</tr>
</tbody>
</table>

Mathematics (3 hours) 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1203</td>
<td>College Algebra (ACTS Equivalency = MATH 1103)</td>
<td></td>
</tr>
</tbody>
</table>

Sciences (16-20) 16-20

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1543</td>
<td>Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture)</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOL 1544L</td>
<td>Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)</td>
<td></td>
</tr>
<tr>
<td>BIOL 1613</td>
<td>Plant Biology (ACTS Equivalency = BIOL 1034)</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOL 1611L</td>
<td>Plant Biology Laboratory (ACTS Equivalency = BIOL 1034 Lab)</td>
<td></td>
</tr>
<tr>
<td>CHEM 1073</td>
<td>Fundamentals of Chemistry (ACTS Equivalency = CHEM 1214 Lecture)</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 1071L</td>
<td>Fundamentals of Chemistry Laboratory (ACTS Equivalency = CHEM 1214 Lab)</td>
<td></td>
</tr>
<tr>
<td>or CHEM 111</td>
<td>University Chemistry I (ACTS Equivalency = CHEM 111L Lecture)</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 111L</td>
<td>University Chemistry I Laboratory (ACTS Equivalency = CHEM 111L Lab)</td>
<td></td>
</tr>
<tr>
<td>or CHEM 112</td>
<td>University Chemistry II (ACTS Equivalency = CHEM 1214 Lecture)</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 112L</td>
<td>University Chemistry II Laboratory (ACTS Equivalency = CHEM 1214 Lab)</td>
<td></td>
</tr>
</tbody>
</table>

Fine Arts and Humanities (6 hours) 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Arts Core Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities Core Course</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Social Sciences (9 hours total; 3 hours must be selected from the following) 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 1103</td>
<td>Principles of Agricultural Microeconomics</td>
<td></td>
</tr>
</tbody>
</table>
or AGEC 211 Principles of Agricultural Macroeconomics (Sp, Fa)
or ECON 20 Principles of Macroeconomics (ACTS Equivalency = ECON 2103) (Sp, Su, Fa)
or ECON 20 Principles of Microeconomics (ACTS Equivalency = ECON 2203) (Sp, Su, Fa)
or ECON 21 Basic Economics: Theory and Practice (Sp, Su, Fa)

HLTS Core Requirements (26-28 hours) 27-28

UNIV 1001 University Perspectives (Sp, Su, Fa)
COMM 1313 Public Speaking (ACTS Equivalency = SPCH 1003) (Sp, Su, Fa)
Communication Intensive Elective (3 hours from approved list of courses)
CSES 2203 Soil Science (Sp, Fa)
& CSES 2201L Soil Science Laboratory (Sp, Fa)
HORT 2003 Principles of Horticulture (Sp) (with lab component)
HORT 3901 Horticultural Career Development (Sp)
HORT 4403 Plant Propagation (Sp) (with lab component)
HORT 462V Horticulture, Landscape, Turf Sciences Internship (Sp, Su, Fa)

Select two of the following:
CSES 4143 Principles of Weed Control (Sp)
ENTO 3013 Introduction to Entomology (Fa)
PLPA 3004 Principles of Plant Pathology (Fa) (with lab component)

Horticulture Electives (18 hours) 18
Select 18 hours from the following:
HORT 2303 Introduction to Turfgrass Management (Fa)
HORT 3103 Woody Landscape Plants (Fa) (with lab component)
HORT 3113 Herbaceous and Indoor Plant Materials (Odd years, Sp) (with lab component)
HORT 3303 Vegetable Crops (Irregular)
HORT 3403 Turfgrass Management (Even years, Sp) (with lab component)
HORT 3503 Sustainable and Organic Horticulture (Even years, Fa)
HORT 4033 Professional Landscape Installation and Construction (Even years, Fa)
HORT 4043 Professional Landscape Management (Odd years, Fa)
HORT 4103 Fruit Production Science and Technology (Odd years, Sp) (with lab component)
HORT 4603 Practical Landscape Planning (Even years, Sp)
HORT 4703 Greenhouse Management and Controlled Environment Horticulture (Fa)
HORT 4701L Greenhouse Management and Controlled Environment Horticulture Laboratory (Odd years, Fa)
HORT 4803 Greenhouse Crops Production (Even years, Sp)
HORT 4801L Greenhouse Crops Production Laboratory (Even years, Sp)
HORT 4903 Golf and Sports Turf Management (Odd years, Fa) (with lab component)
HORT 4913 Rootzone Management for Golf and Sports Turf (Odd years, Sp)
HORT 4921 Golf Course Operations (Even years, Fa)
HORT 4932 Turf Best Management Practices (Odd years, Sp)
HORT 400V Special Problems (Sp, Su, Fa)
HORT 401V Special Topics in Horticulture, Turf or Landscape (Irregular)

Discipline-Related Electives 12
Select 12 hours from the following:
AGME 3102 Small Power Units/Turf Equipment (Sp)
& AGME 3101 Land Small Power Units/Turf Equipment Laboratory (Sp)
AGME 3153 Surveying in Agriculture and Forestry (Fa)
AGME 4973 Irrigation (Sp) (with lab component)
ANSC/POSC 3123 Principles of Genetics (Fa)
HORT 1103 Plants in the Home Environment (Fa)
HORT 3123 International Horticulture (Sp)
HORT 3203 Sustainable Landscape Practices (Fa)
HORT 4413 Horticulture Physiology (Sp)
HORT 4503 Sustainable Nursery Production (Even years, Sp) (with lab component)
HORT 400V Special Problems (Sp, Su, Fa)
HORT 401V Special Topics in Horticulture, Turf or Landscape (Irregular)
LARC 3914 Planting Design I (Fa)
LARC 2113 Design Communications I (Fa)
PHYS 1023 Physics and Human Affairs (Sp, Su, Fa)
& PHYS 1021L Physics and Human Affairs Laboratory (Sp, Su, Fa) (or higher level)
WCOB (up to 9 hours)
or any AGEC, BIOL, CHEM, CSES, ENSC, ENTO, HORT, PLPA class not taken in any other elective groups.

General Electives (15-26 hours of general electives to total 120 hours) 15-26

Total Hours 120

Horticulture, Landscape and Turf Sciences B.S.A.

Nine-Semester Degree Plan

Students wishing to follow the degree plan should see the Eight-Semester Degree Policy (http://catalog.uark.edu/undergraduatecatalog/academicregulations/eightsemesterdegreecompletionpolicy) for university requirements of the program.

First Year

<table>
<thead>
<tr>
<th>Units</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 1001 University Perspectives (Sp, Su, Fa)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MATH 1203 College Algebra (ACTS Equivalency = MATH 1103) (Sp, Su, Fa)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (Sp, Su, Fa)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>COMM 1313 Public Speaking (ACTS Equivalency = SPCH 1003) (Sp, Su, Fa)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) (Sp, Su, Fa) & BIOL 1541L Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab) (Sp, Su, Fa) 4

ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) (Sp, Su, Fa) 3

HORT 2003 Principles of Horticulture (Sp) 3

Fine Arts/Humanities University Core 3

History Core Elective 3

Social Science Core 3

Year Total: 14 15

Second Year

CHEM 1073 Fundamentals of Chemistry (ACTS Equivalency = CHEM 1214 Lecture) (Su, Fa) 4

& CHEM 1071L Fundamentals of Chemistry Laboratory (ACTS Equivalency = CHEM 1214 Lab) (Fa) 4

Communication Intensive Class 3

Horticulture Electives 6

BIOL 1613 Plant Biology (ACTS Equivalency = BIOL 1034 Lecture) (Sp, Su) 4

& BIOL 1611L Plant Biology Laboratory (ACTS Equivalency = BIOL 1034 Lab) (Sp, Su) 4

Fine Arts/Humanities University Core 3

HORT 3901 Horticultural Career Development (Sp) 1

Discipline-related Elective 3

General Electives 3

Year Total: 13 14

Third Year

CSES 2203 Soil Science (Sp, Fa) 4 & CSES 2201L Soil Science Laboratory (Sp, Fa) 4

Pest Management Elective 3-4

Horticulture Elective 3

Social Sciences University Core Elective 3

Discipline-Related Elective 3

CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) (Sp, Su, Fa) 4

& CHEM 2611L Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab) (Sp, Su, Fa) 4

Discipline-Related Elective 3-4

HORT 4403 Plant Propagation (Sp) 3

Horticulture Elective 3

HORT 462V Horticulture, Landscape, Turf Sciences Internship (Sp, Su, Fa) 3

Year Total: 16-17 13-14 3

Fourth Year

Discipline-Related Elective 3

Horticulture Elective 3

Pest Management Elective 3-4

General Electives 6-7

Social Science University Core Elective 3

Horticulture Elective 3

General Electives 8-9

Year Total: 15-17 14-15

Total Units in Sequence: 117-122

Minor in Horticulture (HORT-M)
The minor will consist of 18 hours to include:

HORT 2003 Principles of Horticulture (Sp) 3

HORT 4403 Plant Propagation (Sp) 3

Select 9-11 hours from the following: 9-11

HORT 2303 Introduction to Turfgrass Management (Fa) 3

HORT 3303 Vegetable Crops (Irregular) 3

HORT 400V Special Problems (Sp, Su, Fa) 3

HORT 4103 Fruit Production Science and Technology (Odd years, Sp) 3

HORT 4503 Sustainable Nursery Production (Even years, Sp) 3

HORT 4703 Greenhouse Management and Controlled Environment Horticulture (Fa) 3

& HORT 4701L Greenhouse Management and Controlled Environment Horticulture Laboratory (Odd years, Fa) 3

HORT 4803 Greenhouse Crops Production (Even years, Sp) 3

& HORT 4801L Greenhouse Crops Production Laboratory (Even years, Sp) 3

Select one of the following: 3

HORT 3103 Woody Landscape Plants (Fa) 3

HORT 3113 Herbaceous and Indoor Plant Materials (Odd years, Sp) 3

Total Hours 18

Minor in Landscape Horticulture (LHRT-M)
The minor will consist of 18 hours to include:

HORT 2003 Principles of Horticulture (Sp) 3

HORT 4043 Professional Landscape Management (Odd years, Fa) 3

Select 3 hours from the following: 3

HORT 4603 Practical Landscape Planning (Even years, Sp) 3

LARC Studio Course 3

Select one of the following: 3

Select one of the following: 3

Total Hours 18
### Minor in Turf Management (TURF-M)

18 to 20 hours to include the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 2303</td>
<td>Introduction to Turfgrass Management (Fa)</td>
<td>3</td>
</tr>
<tr>
<td>HORT 3403</td>
<td>Turfgrass Management (Even years, Sp) (with lab component)</td>
<td>3</td>
</tr>
<tr>
<td>HORT 4903</td>
<td>Golf and Sports Turf Management (Odd years, Fa) (with lab component)</td>
<td>3</td>
</tr>
<tr>
<td>HORT 4913</td>
<td>Rootzone Management for Golf and Sports Turf (Odd years, Sp) (with lab component)</td>
<td>3</td>
</tr>
<tr>
<td>HORT 3103</td>
<td>Woody Landscape Plants (Fa) (with lab component)</td>
<td></td>
</tr>
<tr>
<td>HORT 4033</td>
<td>Professional Landscape Installation and Construction (Even years, Fa)</td>
<td></td>
</tr>
<tr>
<td>HORT 4403</td>
<td>Plant Propagation (Sp)</td>
<td></td>
</tr>
<tr>
<td>HORT 4503</td>
<td>Sustainable Nursery Production (Even years, Sp)</td>
<td></td>
</tr>
<tr>
<td>HORT 4703</td>
<td>Greenhouse Management and Controlled Environment Horticulture (Fa)</td>
<td>3</td>
</tr>
<tr>
<td>HORT 4701L  &amp; Environmental Horticulture Laboratory (Odd years, Fa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HORT 4803</td>
<td>Greenhouse Crops Production (Even years, Sp)</td>
<td></td>
</tr>
<tr>
<td>HORT 4801L  &amp; Greenhouse Crops Production Laboratory (Even years, Sp)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LARC 3734</td>
<td>Landscape Architecture Construction III (Sp)</td>
<td></td>
</tr>
</tbody>
</table>

**Total Hours**: 18

### Courses

**HORT 1103. Plants in the Home Environment (Fa). 3 Hours.**

A course describing the aesthetic, nutritional and health value, and other importance of plants to humans. The course will highlight the use and importance of plants and gardening through the ages, study significant gardens to humankind, and introduce students to using plants to their benefit. The use of color, texture, aroma and flavor in the home and landscape will be presented. Basic home gardening, plant care and use will be discussed and practiced.

**HORT 2003. Principles of Horticulture (Sp). 3 Hours.**

A course introducing students to the biological and technologies underlying the propagation, production, handling and use of horticultural crops, turf and landscape plants. Students will be introduced to the various disciplines and commodities of horticulture. The use of plants for the benefit of humankind because of their aesthetic and nutritional value will be explored. Previous instruction in Plant Science, Plant Biology, or general Botany is strongly encouraged. Corequisite: Lab component.

**HORT 2303. Introduction to Turfgrass Management (Fa). 3 Hours.**

An introductory course in turfgrass management emphasizing turfgrass growth, adaptation, and management. Methods for establishment, fertilization, mowing, cultivation, irrigation, and pest management are presented, and their impact on culture of lawns, golf courses, athletic fields, and other managed turf areas discussed.

**HORT 3103. Woody Landscape Plants (Fa). 3 Hours.**

Identification, climatic adaptation and landscape design values of woody ornamental trees, shrubs and vines. Lecture 2 hours per week. Corequisite: Lab component.

**HORT 3113. Herbaceous and Indoor Plant Materials (Odd years, Sp). 3 Hours.**

Identification, culture, and use of annuals, perennials in landscapes and foliage plants in interiors. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component.

**HORT 3123. International Horticulture (Sp). 3 Hours.**

Considerable globalization of agriculture has occurred over the past several decades, especially in the area of horticultural crops. This course provides a base of knowledge of the international horticulture industry focusing on principles and practices of development and trade of horticultural crops.
HORT 3203. Sustainable Landscape Practices (Fa). 3 Hours.
New methods of landscape management are required to restore or protect the ecological services provided by developed landscapes. This course is focused on methods for sustainable land management. Included as part of the curriculum is a survey of sustainable management as it applies to site resources, including water, nutrients, energy and biodiversity. Retrofitting existing development, organic lawn, tree, and shrub care, successional landscapes, permaculture, sustainable material selection, and best available equipment will be covered in depth. Prerequisite: HORT 2003.

HORT 3303. Vegetable Crops (Irregular). 3 Hours.
General course in vegetable crops with attention to the principles underlying methods of production and handling related to yields and quality of the products. Lecture 2 hours, laboratory 2 hours per week. Prerequisite: HORT 2003 and CSES 2203.

HORT 3403. Turfgrass Management (Even years, Sp). 3 Hours.
Cultural and management practices of commercial and residential lawns. Principles and practices of mowing, fertilizing, irrigating, and control of weed, disease, and insects. Identification of turfgrass; equipment selection. Corequisite: Lab component. Prerequisite: HORT 2303.

HORT 3503. Sustainable and Organic Horticulture (Even years, Fa). 3 Hours.
This course will provide a base of knowledge of the principles and practices of sustainable, organic, and alternative horticulture management systems. The class will review and evaluate topics including soil biological processes (compost, humus and fertility), pest management, alternative farming systems, and organic agriculture. After this foundation information is studied, the class will study applications of sustainable agriculture principles to production systems such as greenhouse vegetable production, ornamental production, fruit production, and landscape and turf management.

HORT 3901. Horticultural Career Development (Sp). 1 Hour.
A course which presents concepts necessary for developing a career and becoming a professional in horticulture industries or businesses. Concepts of goal setting, effective communication and interpersonal skills, behaviors and performance, portfolio and resume, development and job hunting skills will be presented.

HORT 400V. Special Problems (Sp, Su, Fa). 1-6 Hour.
Original investigations on assigned problems in horticulture. Prerequisite: Junior standing. May be repeated for up to 6 hours of degree credit.

HORT 401V. Special Topics in Horticulture, Turf or Landscape (Irregular). 1-6 Hour.
Topics related to horticulture, turfgrass or landscape science or management not covered in other courses or a more intensive study of a specific topic. May be repeated for degree credit.

HORT 402V. Horticulture Judging and Competition Activity (Irregular). 1-6 Hour.
Training for and participation on horticultural identification, judging and competitive teams. Prerequisite: HORT 2003. May be repeated for up to 6 hours of degree credit.

HORT 4033. Professional Landscape Installation and Construction (Even years, Fa). 3 Hours.
Principles and practices involved in landscape installation and construction. Topics covered include sequencing construction activities, protecting existing topics, landscape soils, selecting plants, planting and transplanting plant materials, wood construction, cement and masonry construction, and low-voltage lighting. Lecture 3 hours per week. Preparatory training in agribusiness or business is suggested. Prerequisite: HORT 2003.

HORT 4043. Professional Landscape Management (Odd years, Fa). 3 Hours.
Principles and practices of landscape management and maintenance. Topics include low maintenance and seasonal color design, pruning and hazard tree management, water and fertilizer management, pesticide use, and other maintenance activities. Basic elements of marketing, specifications and contracts, estimating, personnel management, and equipment selection and acquisition relevant for landscape services will be introduced. Preparatory training in agribusiness or business is suggested. Prerequisite: HORT 2003 and HORT 3103.

HORT 4103. Fruit Production Science and Technology (Odd years, Sp). 3 Hours.
The management technologies and cultural practices of fruit crops including (but not limited to) blueberries, blackberries, raspberries, strawberries, grapes, peaches, and apples will be presented. The underlying scientific principles of crop genetics, nutrition, and physiology will be presented as a basis for making management decisions in fruit crop productions. Corequisite: Lab component. Prerequisite: HORT 2003.

HORT 4403. Plant Propagation (Sp). 3 Hours.
Principles of plant propagation using seeds, cuttings, grafting, budding, layering, and tissue culture. The physiological basis of propagation is described. Knowledge of plant growth and physiology is needed. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component. Prerequisite: BIOL 1613 and BIOL 1611L.

HORT 4413. Horticulture Physiology (Sp). 3 Hours.
This course provides students with a background into the physiological processes of plants with an emphasis on horticultural crops and how the processes relate to horticultural crop production practices. Among the topics covered are photosynthesis, respiration, water relations and morphogenesis. Prerequisite: HORT 2003 and CHEM 1073.

HORT 4503. Sustainable Nursery Production (Even years, Sp). 3 Hours.
This course addresses issues and practices involved in production of quality woody nursery crops (e.g. trees and shrubs produced in open filed and containerized systems).

HORT 4603. Practical Landscape Planning (Even years, Sp). 3 Hours.
Ornamental planting design and landscape planning concepts. Preparing planting plans, materials sheets, and cost estimates for residential properties. Prerequisite: HORT 3103.

HORT 462V. Horticulture, Landscape, Turf Sciences Internship (Sp, Su, Fa). 1-6 Hour.
A supervised practical work experience in a horticulture, landscape design, or turf business or research program to gain professional competence and insight into employment opportunities. Prerequisite: COMM 1313. May be repeated for up to 6 hours of degree credit.

HORT 4701L. Greenhouse Management and Controlled Environment Horticulture Laboratory (Odd years, Fa). 1 Hour.
Laboratory involving hands-on experiments designed to demonstrate principles discussed in the lecture section. Includes field trips. Corequisite: HORT 4703.

Operation and management of greenhouses and other controlled environments used in horticultural production. Emphasis on system design and construction, control of light intensity and photoperiod, heating and cooling systems, substrates, mineral nutrition, water quality and irrigation systems. Prerequisite: HORT 2003 and CHEM 1073.

HORT 4801L. Greenhouse Crops Production Laboratory (Even years, Sp). 1 Hour.
Laboratory involving hands-on experiments designed to demonstrate principles discussed in the lecture section. Includes field trips. Corequisite: HORT 4803.
HORT 4803. Greenhouse Crops Production (Even years, Sp). 3 Hours.
Principles and practices of production and marketing of crops commonly grown in controlled environments including flowering containerized herbaceous species, geophytes, annual and perennial bedding plants, hydroponic vegetables and herbs. Prerequisite: HORT 4703.

HORT 4903. Golf and Sports Turf Management (Odd years, Fa). 3 Hours.
Turf management techniques for golf courses, and athletic fields including species selection, root-zone construction and modification, fertilization, mowing, irrigation and pest control. Corequisite: Lab component. Prerequisite: CSES 2203 and CSES 2201L and (HORT 2303 or HORT 3403).

HORT 4913. Rootzone Management for Golf and Sports Turf (Odd years, Sp). 3 Hours.
An overview of the fundamental concepts of the physical and chemical properties of rootzones as related to construction and turfgrass management. Prerequisite: HORT 2303.

HORT 4921. Golf Course Operations (Even years, Fa). 1 Hour.
This course is designed to cover specific aspects of golf course operations that would not be included in traditional turfgrass management courses. Topics will include budgeting, personnel management, tournament setup and operation, dealing with golf club committees, communication, and other relevant topics related to managing a golf course maintenance operation. Prerequisite: HORT 4903.

HORT 4932. Turf Best Management Practices (Odd years, Sp). 2 Hours.
The course covers the impacts of turfgrass management practices on turf quality and the environment. In addition, the identification, biology, and control practices for the major insects, diseases, and weeds that infest turf will be covered. Emphasis will be placed on management strategies that include both chemical and non-chemical approaches to the prevention and control of common turfgrass pests. Prerequisite: HORT 2303 and 6 hours selected from CSES 2003, PLPA 3004, and ENTO 3013.