

# Horticulture (HORT)

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Department of Horticulture Website (<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 courses that meet the state minimum core (<http://catalog.uark.edu/undergraduatecatalog/gened/stateminimum/>) and discipline specific general education (<http://catalog.uark.edu/undergraduatecatalog/gened/generaleducation/>) requirements:

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

<b>Communications</b>	<b>6</b>
<b>ENGL 10103 Composition I (ACTS Equivalency = ENGL 1013)</b>	
<b>ENGL 10203 Composition II (ACTS Equivalency = ENGL 1023)</b>	
<b>U.S. History and Government</b>	<b>3</b>

<b>HIST 20003 History of the American People to 1877 (ACTS Equivalency = HIST 2113)</b>	
<b>or HIST 20103 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)</b>	
<b>or PLSC 20003 American National Government (ACTS Equivalency = PLSC 2003)</b>	

<b>Mathematics</b>	<b>3</b>
<b>MATH 11003 College Algebra (ACTS Equivalency = MATH 1103)</b>	
<b>Physical and Biological Sciences</b>	<b>12-16</b>
<b>BIOL 10103 Principles of Biology (ACTS Equivalency = &amp; BIOL 10101 BIOL 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)</b>	
CHEM 26103 Organic Physiological Chemistry (ACTS & CHEM 26101 Equivalency = CHEM 1224 Lecture) and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)	
Select from one Chemistry group:	
<b>CHEM 12103 Fundamentals of Chemistry (ACTS Equivalency &amp; CHEM 12101= CHEM 1214 Lecture) and Fundamentals of Chemistry Laboratory (ACTS Equivalency = CHEM 1214 Lab)</b>	
<b>or CHEM 1414 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) &amp; CHEM 1414 and University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab) &amp; CHEM 1424 and University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) &amp; CHEM 1424 and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)</b>	
<b>Fine Arts and Humanities (6 hours)</b>	<b>6-8</b>
<b>Fine Arts Core Course (Select at least 3 hours from Fine Arts state minimum core)</b>	
<b>Humanities Core Course (Select at least 3 hours from Humanities state minimum core)</b>	
<b>Social Sciences</b>	<b>9</b>
<b>AGEC 11003 Principles of Agricultural Microeconomics</b>	
<b>or AGEC 21003 Principles of Agricultural Macroeconomics</b>	
<b>or ECON 22003 Principles of Microeconomics (ACTS Equivalency = ECON 2203)</b>	
<b>or ECON 21003 Principles of Macroeconomics (ACTS Equivalency = ECON 2103)</b>	
<b>or ECON 21403 Basic Economics: Theory and Practice</b>	
<b>Select 6 hours from University Core</b>	
<b>HLTS Core Requirements (30-31 hours)</b>	
UNIV 10051 University Perspectives	1
SPCH 10003 Public Speaking (ACTS Equivalency = SPCH 1003)	3
Communication Intensive Elective (3 hours - see advisor for approved list of courses)	3
CSES 22003 Soil Science & CSES 22001 and Soil Science Laboratory	4
HORT 20003 Principles of Horticulture	3
HORT 21001 Horticultural Career Development	1
HORT 44003 Plant Propagation	3

HORT 44103	Horticulture Physiology	3
HORT 4620V	Horticulture, Landscape, Turf Sciences Internship Experience	1
HORT 4720V	Horticulture, Landscape, Turf Sciences Internship Assessment	2
Select two of the following:		6-7
CSES 41403	Principles of Weed Control	
ENTO 30103	Introduction to Entomology	
PLPA 30003	Principles of Plant Pathology & PLPA 30001 and Principles of Plant Pathology Laboratory	
<b>Horticulture Electives</b>		<b>18</b>
Select 18 hours from the following:		
HORT 23003	Introduction to Turfgrass Management	
HORT 31003	Woody Landscape Plants	
HORT 31103	Herbaceous and Indoor Plant Materials	
HORT 33003	Vegetable Crops	
HORT 34003	Turfgrass Management	
HORT 35003	Sustainable and Organic Horticulture	
HORT 40303	Professional Landscape Installation and Construction	
HORT 40403	Professional Landscape Management	
HORT 41003	Fruit Production Science and Technology	
HORT 45003	Sustainable Nursery Production	
HORT 46003	Practical Landscape Planning	
HORT 47003	Greenhouse Management and Controlled Environment Horticulture	
HORT 47001	Greenhouse Management and Controlled Environment Horticulture Laboratory	
HORT 49004	Golf and Sports Turf Management	
HORT 4000V	Special Problems	
HORT 4010V	Special Topics in Horticulture, Turf or Landscape	
<b>Discipline-Related Electives</b>		<b>12-13</b>
Select at least 12 hours from the following:		
ASTM 31002	Small Power Units/Turf Equipment & ASTM 31001 and Small Power Units/Turf Equipment Laboratory	
ASTM 31503	Surveying in Agriculture and Forestry	
ASTM 49703	Irrigation	
ANSC/POSC 31203	Principles of Genetics	
HORT 11003	Plants, People and You	
HORT 4000V	Special Problems	
HORT 4010V	Special Topics in Horticulture, Turf or Landscape	
LARC 39104	Sustainable Design and Construction: Remediation and Plants on Structure	
LARC 21103	Design Visualization, Inquiry and Communications	
<b>PHYS 10243</b>	<b>Physics and Human Affairs &amp; PHYS 10241 and Physics and Human Affairs Laboratory (or higher level)</b>	
WCOB course electives (up to 9 hours) or any AGECE, ASTM, BIOL, CHEM, CSES, ENSC, ENTO, FDSC, HORT, PLPA class not taken in any other elective group.		
<b>General Electives</b>		<b>12-21</b>
<b>Total Hours</b>		<b>120</b>

## 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	Units		
	Fall	Spring	Summer
UNIV 10051 University Perspectives	1		
MATH 11003 College Algebra (ACTS Equivalency = MATH 1103) (or higher level math -Satisfies General Education Outcome 2.1)	3		
ENGL 10103 Composition I (ACTS Equivalency = ENGL 1013) (Satisfies General Education Outcome 1.1)		3	
BIOL 10103 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) & BIOL 10101 Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab) Satisfies General Education Outcome 3.4		4	
U.S. History or Government State Minimum Core Elective (Satisfies General Education Outcome 4.2)		3	
ENGL 10203 Composition II (ACTS Equivalency = ENGL 1023) (Satisfies General Education Outcome 1.1)			3
HORT 20003 Principles of Horticulture Fine Arts State Minimum Core Elective (Suggest LARC 1003 Basic Course in the Arts: The American Landscape) (Satisfies General Education Outcome 3.1) <sup>1</sup>			3
Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3) <sup>3</sup>			3
SPCH 10003 Public Speaking (ACTS Equivalency = SPCH 1003) (Satisfies General Education Outcomes 1.2 and 5.1)			3
Year Total:	14	15	
Second Year	Units		
	Fall	Spring	Summer
CHEM 12103 Fundamentals of Chemistry (ACTS Equivalency = CHEM 1214 Lecture) & CHEM 12101 Fundamentals of Chemistry Laboratory (ACTS Equivalency = CHEM 1214 Lab) Satisfies General Education Outcome 3.4	4		

Communication Intensive Class	3	
Horticulture Electives	6	
Discipline-related Elective	3	
Humanities State Minimum Core Elective (Suggest PHIL 20003 Intro to Philosophy) (Satisfies General Education Outcome 3.2) <sup>2</sup>		3-4
HORT 44103 Horticulture Physiology		3
Discipline-related Elective		3
HORT 21001 Horticultural Career Development		1
General Electives		4
Year Total:	16	14

Third Year	Units		
	Fall	Spring	Summer
CSES 22003 Soil Science & CSES 22001 Soil Science Laboratory	4		
Pest Management Elective	3-4		
Horticulture Elective <sup>4</sup>	3		
Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3)	3		
Discipline-Related Elective <sup>4</sup>	3		
CHEM 26103 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) & CHEM 26101 Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)		4	
Discipline-Related Elective <sup>4</sup>		3-4	
HORT 44003 Plant Propagation		3	
Horticulture Elective <sup>4</sup>		3	
HORT 4620V Horticulture, Landscape, Turf Sciences Internship Experience (Satisfies General Education Outcome 6.1)			1
Year Total:	16	13	1

Fourth Year	Units		
	Fall	Spring	Summer
Horticulture Elective <sup>4</sup>	3		
HORT 4720V Horticulture, Landscape, Turf Sciences Internship Assessment	2		
Pest Management Elective	3-4		
General Electives <sup>4</sup>	1-9		
Social Science State Minimum Core Elective (Satisfies General Education Outcomes 3.3 and 4.1) <sup>3</sup>		3	
Horticulture Elective <sup>4</sup>		3	
General Electives <sup>4</sup>		7-8	
Year Total:	17	14	

**Total Units in Sequence: 120**

<sup>1</sup> The Fine Arts Elective courses which satisfy General Education Outcome 3.1 include: ARCH 10003, ARHS 10003, COMM 10003, DANC 10003, LARC 10003, MUSC 10003, MUSC 100H3, MUSC 10103, MUSC 101H3, MUSC 13303, THTR 10003, THTR 10103, or THTR 101H3.

<sup>2</sup> The Humanities Elective courses which satisfy General Education Outcome 3.2 include: AAST 20203, ANTH 10303, ARCH 10103, CLST 10003, CLST 100H3, CLST 10103, COMM 12303, DANC 10003, ENGL 12103, GNST 20003, HIST 11193, HIST 111H3, HIST 11293, HIST 112H3, HIST 20003, HIST 20103, HUMN 112H4, HUMN 22103, LALS 20103, MRST 20103, MUSY 20003, MUSY 200H3, PHIL 20003, PHIL 200H3, PHIL 21003, PHIL 23003, THTR 10003, THTR 10103, THTR 101H3, ENGL 11103, ENGL 11203, or intermediate-level world language.

<sup>3</sup> The Social Science Elective courses which satisfy General Education Outcomes 3.3 and 4.1 include: ANTH 10203, COMM 10203, HDFS 14003, HDFS 24103, HIST 11193, HIST 111H3, HIST 11293, HIST 112H3, HIST 20903, HUMN 111H4, HUMN 211H4, INST 28103, INST 281H3, PLSC 20103, PLSC 28103, PLSC 281H3, RESM 28503, SOCI 10103, SOCI 101H3, or SOCI 20103.

<sup>4</sup> Students must complete 40 hours of upper division courses (3000-4000 level). It is recommended that students consult with their academic adviser when making course selections.

## Minor in Horticulture (HORT-M)

The Horticulture minor is only available to students outside the Horticulture, Landscape and Turfgrass Sciences (HLTS) major. The minor will consist of 18 hours to include:

HORT 20003	Principles of Horticulture	3
HORT 44003	Plant Propagation	3
Select a minimum of 9 hours from the following:		9-11
HORT 23003	Introduction to Turfgrass Management	
HORT 33003	Vegetable Crops	
HORT 4000V	Special Problems	
HORT 41003	Fruit Production Science and Technology	
HORT 45003	Sustainable Nursery Production	
HORT 47003	Greenhouse Management and Controlled	
& HORT 47001	Environment Horticulture and Greenhouse Management and Controlled Environment Horticulture Laboratory	
Select one of the following:		3
HORT 31003	Woody Landscape Plants	
HORT 31103	Herbaceous and Indoor Plant Materials	

**Total Hours 18**

## Minor in Landscape Horticulture (LHRT-M)

The Landscape Horticulture minor is only available to students outside the Horticulture, Landscape and Turfgrass Sciences (HLTS) major. The minor will consist of 18 hours to include:

HORT 20003	Principles of Horticulture	3
HORT 40403	Professional Landscape Management	3
Select 3 hours from the following:		3

HORT 46003	Practical Landscape Planning	
LARC Studio Course		
Select one of the following:		3
HORT 31003	Woody Landscape Plants	
HORT 31103	Herbaceous and Indoor Plant Materials	
Select 6-8 hours from the following:		6-8
HORT 23003	Introduction to Turfgrass Management	
HORT 31003	Woody Landscape Plants	
HORT 31103	Herbaceous and Indoor Plant Materials	
HORT 34003	Turfgrass Management	
HORT 4000V	Special Problems	
HORT 40303	Professional Landscape Installation and Construction	
HORT 44003	Plant Propagation	
HORT 45003	Sustainable Nursery Production	
HORT 47003 & HORT 47001	Greenhouse Management and Controlled Environment Horticulture and Greenhouse Management and Controlled Environment Horticulture Laboratory	
LARC 37304	Sustainable Design and Construction: Material and Methods of Assembly	
<b>Total Hours</b>		<b>18</b>

### Minor in Turf Management (TURF-M)

The Turf Management minor is only available to students outside the Horticulture, Landscape and Turfgrass Sciences (HLTS) major. The Turf Management minor is comprised of 18 to 20 hours to include the following:

HORT 2303		
HORT 3403	(with lab component)	
Select one of the following:		3
HORT 4903	(with lab component)	
HORT 4913	(with lab component)	
Select 3 hours from the following:		3-4
ENTO 3013	(with lab component)	
PLPA 3003 & PLPA 3001L	and	
Select two of the following:		6-8
ASTM 4973		
ASTM 3102 & ASTM 3101L	and	
CSES 2203 & CSES 2201L	and	
ENTO 3013	(with lab component)	
PLPA 3003 & PLPA 3001L	and	
HORT 4903	(with lab component)	
HORT 4913	(with lab component)	
HORT 3103	(with lab component)	
HORT 4033		
HORT 4043		
<b>Total Hours</b>		<b>12-14</b>

### Faculty

**Bertucci, Matthew**, Ph.D., M.S. (North Carolina State University), B.S. (Spring Hill College), Assistant Professor, 2020.

**Bowden, Anthony**, Ph.D. (Mississippi State University), M.S., B.S. (Auburn University), Assistant Professor, 2023.

**Cato, Aaron J.**, Ph.D. (University of Arkansas), M.S. (Kansas State University), B.S. (Arkansas State University), Assistant Professor, 2019.

**Dickson, Ryan W.**, Ph.D., B.S. (University of Florida), Assistant Professor, 2018.

**Hutchens, Wendell**, Ph.D. (Virginia Technical Institute), M.S., B.S. (North Carolina State University), Assistant Professor, 2022.

**McDonald, Garry Vernon**, Ph.D., M.S., B.S.A. (Texas A&M University), Teaching Associate Professor, 2016, 2022.

**McKern-Lee, Jacquelyn A.**, Ph.D., M.S. (University of Arkansas), B.S. (Arkansas Technical University), Associate Professor, 2016.

**McWhirt, Amanda L.**, Ph.D. (North Carolina State University), M.S. (Louisiana State University), B.S. (Tarleton State University), Associate Professor, 2016, 2022.

**Philyaw Perez, Amanda**, Ph.D., M.P.H. (University of Arkansas for Medical Sciences), B.S. (University of Arkansas at Little Rock), Associate Professor, 2020, 2022.

**Richardson, Mike**, Ph.D. (University of Georgia), M.S. (Louisiana State University), B.S. (Louisiana Tech University), Professor, 1998, 2007.

**Rom, Curt R.**, Ph.D., M.S. (The Ohio State University), B.S. (University of Arkansas), University Professor, 1989, 2014.

**Savin, Mary**, Ph.D., M.S. (University of Rhode Island), B.S. (University of Notre Dame), Professor, 2002, 2011.

**Shi, Ainong**, Ph.D. (North Carolina State University), M.S. (Graduate School of Chinese Academy of Agricultural Sciences), B.S. (Zhejiang University), Associate Professor, 2013, 2019.

**Worthington, Margaret L.**, Ph.D. (North Carolina State University), M.S. (University of California-Davis), B.S. (Duke University), Associate Professor, 2016, 2022.

**Wright-Smith, Hannah**, Ph.D. (University of Georgia), M.S. (University of Arkansas), B.S. (Mississippi State University), Assistant Professor, 2022.

### Courses

#### HORT 11003. Plants, People and You. 3 Hours.

Plants, People and You is a course designed to introduce students to the world of horticulture, with an emphasis on how plants can be used for food, fun, health, economic value or environmental contribution. (Typically offered: Fall)

#### HORT 20003. Principles of Horticulture. 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. (Typically offered: Spring)

#### HORT 21001. Horticultural Career Development. 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. (Typically offered: Spring)

**HORT 23003. Introduction to Turfgrass Management. 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. (Typically offered: Fall)

**HORT 31003. Woody Landscape Plants. 3 Hours.**

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

**HORT 31103. Herbaceous and Indoor Plant Materials. 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. (Typically offered: Spring Odd Years)

**HORT 33003. Vegetable Crops. 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 20003 and CSES 22003. (Typically offered: Fall Odd Years)

**HORT 34003. Turfgrass Management. 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 23003. (Typically offered: Spring Even Years)

**HORT 35003. Sustainable and Organic Horticulture. 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. (Typically offered: Fall Even Years)

**HORT 4000V. Special Problems. 1-6 Hour.**

Original investigations on assigned problems in horticulture. Prerequisite: Junior standing. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

**HORT 4010V. Special Topics in Horticulture, Turf or Landscape. 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. (Typically offered: Irregular) May be repeated for degree credit.

**HORT 4020V. Horticulture Judging and Competition Activity. 1-6 Hour.**

Training for and participation on horticultural identification, judging and competitive teams. Prerequisite: HORT 20003. (Typically offered: Irregular) May be repeated for up to 6 hours of degree credit.

**HORT 40303. Professional Landscape Installation and Construction. 3 Hours.**

Principles and practices involved in landscape installation and construction. Topics covered include sequencing construction activities, protecting existing trees, 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 20003. (Typically offered: Fall Even Years)

**HORT 40403. Professional Landscape Management. 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 20003 and HORT 31003. (Typically offered: Fall Odd Years)

**HORT 41003. Fruit Production Science and Technology. 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 20003. (Typically offered: Spring Odd Years)

**HORT 41503. Sustainable Techniques in Urban Horticulture. 3 Hours.**

Sustainable Techniques in Urban Horticulture is a practicum based course where the student will learn basic techniques in sustainable production of horticultural crops in an urban or small-scale environment. Crops may include vegetables, cut flowers, or small fruits. This course is intended for students who do not have an agricultural production background or for those students wanting to learn more about the production of high-value horticultural crops under sustainable production systems. (Typically offered: Summer)

**HORT 44003. Plant Propagation. 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: HORT 20003. (Typically offered: Spring)

**HORT 440H3. Honors Plant Propagation. 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: HORT 20003 and honors standing. (Typically offered: Spring)  
This course is equivalent to HORT 44003.

**HORT 44103. Horticulture Physiology. 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 20003 and CHEM 12103. (Typically offered: Spring)

**HORT 45003. Sustainable Nursery Production. 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). (Typically offered: Spring Even Years)

**HORT 46003. Practical Landscape Planning. 3 Hours.**

Ornamental planting design and landscape planning concepts. Preparing planting plans, materials sheets, and cost estimates for residential properties. Prerequisite: HORT 31003. (Typically offered: Spring Even Years)

**HORT 4620V. Horticulture, Landscape, Turf Sciences Internship Experience. 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: SPCH 10003 and HORT 21001. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

**HORT 47001. Greenhouse Management and Controlled Environment**

**Horticulture Laboratory. 1 Hour.**

Laboratory involving hands-on experiments designed to demonstrate principles discussed in the lecture section. Includes field trips. Corequisite: HORT 47003.

(Typically offered: Fall Odd Years)

**HORT 47003. Greenhouse Management and Controlled Environment**

**Horticulture. 3 Hours.**

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 20003 and CHEM 12103. (Typically offered: Fall)

**HORT 4720V. Horticulture, Landscape, Turf Sciences Internship Assessment. 1-6 Hour.**

The objective of the HORT 4720V Internship Assessment is for the student to gain mastery in written and oral communication skills and critical thinking skills by reflection and analysis of ideas, artifacts, and events gained from a prior internship experience. The student is expected to master specific skills in the context, content development, syntax and mechanics and purpose of writing in a visual presentation relating to the internship experience. The student will also master skills in the organization, central message, language, and delivery of an oral presentation related to the internship experience. The student will master critical thinking skills through the explanation of issues, personal perspective, evidence presentation, and conclusions and outcomes related to the internship experience. Prerequisite: HORT 4620V. (Typically offered: Fall, Spring and Summer)

**HORT 48104. HYDROPONICS AND SOILLESS CROPS. 4 Hours.**

Hydroponic and Soilless Crop Production is an online lecture course focusing on greenhouse hydroponic crop production. This course will provide a broad overview of hydroponic and soilless crop production as well as production information for common crops such as leafy greens (i.e., lettuce, basil, arugula), vegetables and vine crops (i.e. tomatoes, cucumbers, peppers), and hydroponic berry crops (i.e. strawberry). Corequisite: Lab component. Pre- or corequisite: HORT 20003. (Typically offered: Spring)

**HORT 49004. Golf and Sports Turf Management. 4 Hours.**

This course focuses on turf management techniques for golf courses and athletic fields, including species selection, turfgrass physiology, soil physical and chemical properties as related to turfgrass management, and environmental management. Corequisite: Lab component. Prerequisite: CSES 22003 and CSES 22001. (Typically offered: Fall Odd Years)

**HORT 49201. Golf Course Operations. 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 49004.

(Typically offered: Fall Even Years)

**HORT 49903. Global Horticulture and Human Nutrition to Enhance Community Resilience and Food Security. 3 Hours.**

This course covers three broad areas (Global Horticulture, Sustainable International Development, Human Health and Nutrition) and experts on three campuses created the instruction. The course is intended to be multi-disciplinary, and students should use their contextual knowledge to add to weekly discussions. (Typically offered: Spring Even Years)