

# HORTICULTURE

Horticulture involves the production, genetic improvement, storage, and marketing of fruits, nuts, vegetables, flowers, and vegetable crops; and the design, construction, and management of landscape plantings such as parks, gardens, golf courses, restoration projects, and sports fields. It is a science, an art, an avocation, and a business.

Horticultural and other high-value specialty crops are the largest components of Oregon's agricultural industry. Landscape horticulture is a rapidly expanding service industry in the urban areas of the Pacific Northwest and throughout the nation. Excellent and varied career opportunities exist for college graduates in both crop and landscape horticulture.

The undergraduate program provides students with a solid background in the fundamental life and physical sciences, as well as an understanding of the technologies and management systems used in the horticultural industry. Problem-solving and decision-making skills are stressed, as is student involvement. Field trips are an important component of many of the courses.

## The program has seven options:

1. *Ecological Management of Turf, Landscape & Urban Horticulture*
2. *General Horticulture (Online)*
3. *Horticultural Research*
4. *Plant Breeding and Genetics*
5. *Sustainable Horticultural Production*
6. *Therapeutic Horticulture*
7. *Viticulture and Enology*

The **Ecological Management of Turf, Landscape & Urban Horticulture** option prepares students for careers in turf management or sustainable landscape design.

The **General Horticulture** option is an online option and is especially recommended for students already working in the horticultural industry, whose careers will benefit from post-secondary education in the horticultural sciences.

The **Horticultural Research** option prepares students to assist in research or to pursue graduate studies.

The **Plant Breeding and Genetics** option provides an interdisciplinary approach to applied plant breeding and practical experience in breeding and genetic analysis working in the greenhouse, field, and laboratory.

The **Sustainable Horticultural Production** option prepares students for careers dealing directly or indirectly with the production, breeding, post-harvest handling, marketing, and scientific study of horticultural crops.

The **Therapeutic Horticulture** option prepares students to design healing and adapted gardens and to provide therapy programs used to improve the quality of people's lives.

The **Viticulture and Enology** option prepares students for careers in Oregon's growing vineyard and winery industry.

All options allow the student considerable flexibility to pursue a minor or to tailor course work to meet individual goals. Qualified students interested in the business aspects of horticulture are encouraged to

pursue a minor in business. All undergraduates are required to complete either an approved internship or an undergraduate research project.

A high school student preparing for the program should follow a well-balanced college preparatory curriculum. Course work in biology, chemistry, and mathematics is strongly recommended. Course work in the social sciences, humanities, arts, and foreign languages is also encouraged, and the student should develop public speaking and writing abilities.

The program was designed to facilitate timely completion of degree requirements by transfer and postbaccalaureate students. Students intending to transfer into the program from a two- or four-year institution should complete as many of the lower-division requirements as possible. Some professional-technical courses from community colleges may be equivalent to lower-division horticulture courses. Equivalent credit can be given for such courses. Contact a departmental advisor for further information.

For additional information about the program, contact one of the undergraduate advisors: Kelly Donegan (head advisor, all options) and Sarah McDonald (advisor for the General Horticulture option).

## Undergraduate Program

### Major

- Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/>)

#### Options:

- Ecological Management Turf, Landscape & Urban Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/ecological-management-turf-landscape-urban-horticulture-option/>)
- General Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/general-horticulture-option/>)
- Horticultural Research (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/horticultural-research-option/>)
- Plant Breeding and Genetics (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/plant-breeding-genetics-option/>)
- Sustainable Horticultural Production (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/sustainable-horticultural-production-option/>)
- Therapeutic Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/therapeutic-horticulture-option/>)
- Viticulture and Enology (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-bs-hbs/viticulture-enology-option/>)

### Minors

- Entomology (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/entomology/entomology-minor/>)
- Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-minor/>)

- Turf and Landscape Management (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/turf-landscape-management-minor/>)

### Certificate

- Organic Farming Systems (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/organic-farming-systems-certificate/>)
- Urban Agriculture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/urban-agriculture-certificate/>)

## Graduate Programs

### Major

- Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-ms-phd/>)

#### Options:

- *Entomology*
- *Plant Breeding and Genetics*

### Minor

- Horticulture (<http://catalog.oregonstate.edu/college-departments/agricultural-sciences/horticulture/horticulture-graduate-minor/>)

#### Bill Braunworth, Department Head

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## Faculty

**Professors** Bell, Detweiler, Kaiser, Langellotto, Mehlenbacher, Myers, Skinkis, Strik, Walton

**Associate Professors** Andrews, Braunworth, Bubl, Castagnoli, Contreras, Deluc, Kowalewski, Lambrinos, W. Miller, Nonogaki, Peachey, Powell, Renquist, Sagili, Stone, Yang

**Assistant Professors** Adams, Bouska, Buckland, Chernoh, Coop, Edmunds, Formiga, Garrett, Hooven, Levin, Lightle, Lukas, Melathopoulos, Moretti, Nackley, Runkel, Sanchez, Selman, Stoven, Thompson, Vining, Wada, Warren, Wiman

**Senior Instructor** I Donegan, Millison, Shay, Stock

**Instructors** Bonady, Danler, Dixon, Lloyd, B. Miller, Nelson, Stephan

## Courtesy Faculty

Albert, Bassil, Bryla, Choi, Einhorn, Hummer, Lee, Martin, Rendon, Scagel, Schreiner, Zurn

## Adjunct Faculty

Bondi, Kennedy, Landgren, Stephenson

## HORT 112, INTRODUCTION TO HORTICULTURAL SYSTEMS, PRACTICES AND CAREERS, 2 Credits

Overview of horticultural systems and practices, with an emphasis on the Pacific Northwest. Exploration of career opportunities in horticulture. Includes viticulture, environmental landscaping, turf management, greenhouse and nursery production, farming, education, and research. Required field trips.

*Available via Ecampus*

## HORT 199, SPECIAL TOPICS, 1-16 Credits

**Equivalent to:** HORT 199H

*This course is repeatable for 16 credits.*

## HORT 199H, SPECIAL TOPICS, 1-16 Credits

**Attributes:** HNRS – Honors Course Designator

**Equivalent to:** HORT 199

*This course is repeatable for 16 credits.*

## HORT 212, INTRODUCTION TO ORGANIC AGRICULTURAL SYSTEMS, 4 Credits

An introduction to organic agricultural systems with a focus on history, regulations, principles and practices, performance, trends, and careers.

*Available via Ecampus*

## HORT 217, \*SOCIAL IMPACTS OF SCIENCE, 3 Credits

Contemporary societies provide funding for scientific research, at the same time they struggle with existing and emerging societal problems. This course will discuss how social problems can be addressed by science and technology, and how the impacts of research are quantified. (Bacc Core Course)

**Attributes:** CPSI – Core, Pers, Soc Proc & Inst

*Available via Ecampus*

## HORT 226, LANDSCAPE PLANT MATERIALS I: DECIDUOUS HARDWOODS AND CONIFERS, 4 Credits

Identification of trees, shrubs, vines, and ground covers used in landscape horticulture. Basic plant taxonomy, nomenclature, anatomy, and use of plants in the landscape. Diverse plant material covered with an emphasis on deciduous hardwoods and conifers.

*Available via Ecampus*

## HORT 228, LANDSCAPE PLANT MATERIALS II: SPRING FLOWERING TREES AND SHRUBS, 4 Credits

Identification of trees, shrubs, vines, and ground covers used in landscape horticulture. Basic plant taxonomy, nomenclature, anatomy, and use of plants in the landscape. Diverse plant material covered with an emphasis on spring flowering trees and shrubs. Lec/rec.

*Available via Ecampus*

## **HORT 251, TEMPERATE TREE FRUIT, BERRIES, GRAPES, AND NUTS, 2 Credits**

Covers fruit and nut crops for temperate zones. Emphasis placed on scientific and common names, plant adaptation, basic morphology, major cultivars, and markets. Offered alternate years.

## **HORT 255, HERBACEOUS ORNAMENTAL PLANT MATERIALS, 3 Credits**

Identification and culture of herbaceous plants used in the landscape. Offered via Ecampus only.  
*Available via Ecampus*

## **HORT 260, ORGANIC FARMING AND GARDENING, 3 Credits**

Organic farming and gardening methods are discussed in class and practiced in the field. The philosophical background of organic farming as well as the biological, environmental and social factors involved in organic food production are covered. Emphasis is on hands-on application of scientific principles to create sustainable food production systems. Lec/lab.

*Available via Ecampus*

## **HORT 270, INTRODUCTION TO THERAPEUTIC HORTICULTURE, 2 Credits**

An introduction to the history, benefits, and methods of therapeutic horticulture. Surveys program models for vocational, social/recreational, wellness and therapeutic applications of horticulture.

## **HORT 271, TECHNIQUES AND ADAPTIVE STRATEGIES IN THERAPEUTIC HORTICULTURE, 2 Credits**

An introduction to the characteristics of therapeutic gardens. Survey of year-round, indoor and outdoor therapeutic horticultural programming adaptations, strategies and techniques for different special populations.

**Prerequisite:** HORT 270 with D- or better

## **HORT 272, BASIC THERAPEUTIC SKILLS I, 2 Credits**

The assessment and evaluation process in therapeutic horticulture. Development of communication strategies, helping skills, and horticultural skills for therapeutic situations.

**Prerequisite:** HORT 271 with D- or better

## **HORT 273, BASIC THERAPEUTIC SKILLS II, 2 Credits**

Assessment and documentation tools in therapeutic horticulture. Treatment issues related to different types of physical and mental issues. Conduct and evaluate therapeutic horticultural activity sessions.

**Prerequisite:** HORT 272 with D- or better

## **HORT 274, THERAPEUTIC HORTICULTURAL PROGRAMS FOR OLDER ADULTS/CHILDREN, 2 Credits**

Benefits and applications of therapeutic horticulture to older adults and special needs children.

**Prerequisite:** HORT 273 with D- or better

## **HORT 275, THERAPEUTIC GARDEN DESIGN, MAINTENANCE AND PROGRAMMING, 2 Credits**

The history, characteristics and design of the therapeutic garden. The use of the garden in therapeutic horticultural programming.

**Prerequisite:** HORT 274 with D- or better and HORT 280 [D-]

## **HORT 283, INTRODUCTION TO URBAN AGRICULTURE, 3 Credits**

Focuses on the adaption of agricultural principles to the urban environment, specifically the production of plant crops. Topics include: (I) urban environments and infrastructure, (II) urban crop production practices, (III) urban markets and farm management. Exposes students to the breadth of items that they should consider in order to be a successful urban grower.

**Recommended:** General background or previous coursework in agriculture

## **HORT 285, PERMACULTURE DESIGN AND THEORY: CERTIFICATE COURSE, 4 Credits**

Permaculture design course meets internationally recognized standards for certification. Lectures, hands-on activities, experiential learning, group discussions, readings, student projects and presentations. Two mandatory weekend days. Design intensive, utilizing graphic and verbal presentation skills. Research into other functioning permaculture systems through literature, websites, and as observed on field trips. Lec/lab.

*This course is repeatable for 8 credits.*

## **HORT 286, PERMACULTURE WATER MANAGEMENT, 4 Credits**

Teaches assessment, mapping, and site designs for installing water retention landscapes using integrated water management strategies. Introduces assessment and analysis of rainwater runoff patterns and calculation of runoff quantities and water usage amounts. Teaches principles of water harvesting used to create functional site designs. Examines rainwater harvesting systems case study designs and teaches to identify both water and solar site resources. Creates an integrated permaculture site design based on design principles, water flow and quantity analysis, and overall site condition assessment. Covers rainwater harvesting cisterns, water harvesting earthworks, their integration with greywater treatment, passive solar design, and planning for vegetation.

## **HORT 299, SPECIAL TOPICS, 0-16 Credits**

**Equivalent to:** HORT 299H

*This course is repeatable for 16 credits.*

## **HORT 299H, SPECIAL TOPICS, 1-16 Credits**

**Attributes:** HNRS – Honors Course Designator

**Equivalent to:** HORT 299

*This course is repeatable for 16 credits.*

## **HORT 300, CROP PRODUCTION IN PACIFIC NORTHWEST AGROECOSYSTEMS, 4 Credits**

Relation of crop production to human culture and the natural environment. Origins of agriculture and the processes of agricultural change, and productivity and sustainability of specific crop production systems in the Pacific Northwest. History, geography, resource requirements, and key challenges faced are presented. Fundamental crop production practices in relation to productivity and sustainability. Lec/lab/rec. CROSSLISTED as CROP 300/HORT 300.

**Equivalent to:** CROP 300, CSS 300

**Recommended:** One year of general biology

*Available via Ecampus*

## **HORT 301, GROWTH AND DEVELOPMENT OF HORTICULTURAL CROPS, 3 Credits**

Gain fundamental knowledge of plant growth and development of horticultural crops from a micro- to macro-level starting at double fertilization through fruit growth—covering seed-to-seed. The last section specifically examines how environmental factors affect growth and development. Lec/lab.

**Recommended:** General biology or botany sequence.

*Available via Ecampus*

## **HORT 303, HORTICULTURAL PROJECTS, 2 Credits**

Student-managed crop production projects with emphasis on container grown, greenhouse crops. Crop scheduling, propagation and planting, selecting temperature and lighting regimes, specifying growth regulator applications, nutrient management, irrigation management, pest monitoring, and problem diagnosis and correction.

**Recommended:** HORT 301

## **HORT 306, INPUTS IN ORGANIC CROPPING SYSTEMS: SOURCING AND EFFICACY, 2 Credits**

Applied course focused on the regulation, sourcing, and efficacy of organic inputs including soil amendments, fertilizers, and pesticides. Gain experience using science-, practice-, and regulation-based information to source and determine effectiveness of inputs in certified organic cropping systems.

**Prerequisite:** HORT 212 with C- or better and CROP 355 [C-]

## **HORT 307, ORGANIC SYSTEM PREDICAMENTS, 3 Credits**

Analyze controversial organic agriculture and systems issues while developing critical- and systems-thinking skills. Synthesis of information from diverse sources and application of scientific knowledge will be required to recommend possible solutions to real world organic agriculture predicaments.

*Available via Ecampus*

## **HORT 308, WEED MANAGEMENT IN ORGANIC CROPPING SYSTEMS, 3 Credits**

Applied organic weed identification and management course. Learn real-world application of science-, practice-, and regulation-based weed management information while designing and evaluating organic weed management plans for certified organic farming systems.

*Available via Ecampus*

## **HORT 310, PRINCIPLES OF PLANT PROPAGATION, 3 Credits**

Plant propagation is the regeneration of plants using vegetative plant parts or seeds to maintain the desired genetic makeup. Theory and principles of horticultural and physiological concepts applicable for laboratory, greenhouse, nursery, field, and orchard propagators.

**Prerequisite:** HORT 301 with D- or better

## **HORT 311, PLANT PROPAGATION, 4 Credits**

The regeneration of plants from vegetative and reproductive tissue and organs. Horticultural and physiological principles, methods, and techniques for laboratory, greenhouse nursery, field, and orchard.

**Prerequisite:** HORT 301 with D- or better

## **HORT 314, PRINCIPLES OF TURFGRASS MAINTENANCE, 4 Credits**

Identification and adaptation of common turfgrasses. Physiology of turfgrass growth and response to cultural and environmental stresses. Cultural practices including establishment, general maintenance, and pest control. Field trips required.

**Recommended:** (CSS 205 or CSS 305 or SOIL 205)

*Available via Ecampus*

## **HORT 315, SUSTAINABLE LANDSCAPES: MAINTENANCE, CONSERVATION, RESTORE, 4 Credits**

Sustainable care and maintenance practices for non-turf landscape areas. Low input pruning, planting, fertilization, and pest control with an emphasis on IPM. Plant responses to stress, particularly those encountered in the urban environment. Outdoor labs required.

**Recommended:** Basic knowledge of plant physiology

*Available via Ecampus*

## **HORT 316, PLANT NUTRITION, 4 Credits**

Basic concepts and principles of plant mineral nutrition that provide a basis for solving practical nutritional problems in horticultural crops.

Areas covered include mineral nutrients, nutrient availability in the soil and plant uptake, nutrient deficiencies and toxicities and their causes and remedies, and plant and soil analysis. Lec/lab/rec.

**Prerequisite:** CSS 205 with D- or better or CSS 305 with D- or better or SOIL 205 with D- or better

*Available via Ecampus*



## HORT 318, ^APPLIED ECOLOGY OF MANAGED ECOSYSTEMS, 3 Credits

Survey of ecological processes in managed ecosystems emphasizing ecological management techniques. Ecosystem services; biodiversity management; weed dynamics; agroecology; urban ecology; restoration and mitigation; landscape management. Field trip required. (Writing Intensive Course)

**Attributes:** CWIC – Core, Skills, WIC

*Available via Ecampus*

## HORT 319, RESTORATION HORTICULTURE, 3 Credits

As world population increases to some 9 billion plus by 2044, the importance of ecologically sound horticultural practices becomes increasingly apparent. Integration of ecological concepts and theory in management and development of created landscapes is critical for the preservation of many ecological services currently provided by undeveloped areas. Offered via Ecampus only.

**Recommended:** WR 121 with proficiency in writing skills and ability to communicate through writing. Basic ecology course or practical experience providing understanding of ecological principals and concepts

## HORT 330, \*PLAGUES, PESTS, AND POLITICS, 3 Credits

Integration and interaction of agricultural and public health aspects of entomology in society and history. CROSSLISTED as ENT 300/HORT 330. (Bacc Core Course)

**Attributes:** CSST – Core, Synthesis, Science/Technology/Society

**Equivalent to:** BI 300, ENT 300

*Available via Ecampus*

## HORT 331, \*POLLINATORS IN PERIL, 3 Credits

Pollinators, human influences on pollination systems, and the potential consequences of pollinator decline. An introduction to the skills needed to investigate media reports and multidisciplinary scientific research. Effects of pesticides, habitat fragmentation, climate change, invasive species, pests, pathogens, and other threats to pollinators in critical natural and agricultural systems around the world. CROSSLISTED as ENT 331/HORT 331. (Bacc Core Course)

**Attributes:** CSGI – Core, Synth, Global Issues

**Equivalent to:** ENT 331

**Recommended:** Completion of a Baccalaureate Core biological science course.

*Available via Ecampus*

## HORT 344, INSECT AND DISEASE MANAGEMENT IN ORGANIC CROPPING SYSTEMS, 3 Credits

A skills-based course on the science, practice, and regulations related to insect and disease management in organic cropping systems.

**Prerequisite:** BOT 350 with C- or better and ENT 311 [C-]

*This course is repeatable for 3 credits.*

*Available via Ecampus*

## HORT 349, DIAGNOSING PLANT PROBLEMS, 3 Credits

Basic principles of problem diagnosis in crop, garden, and landscape plants are covered. Problems caused by cultural and environmental issues, plant diseases, insect pests, and other causes are addressed. Students will gain familiarity with resources for plant problem diagnosis. Offered via Ecampus only.

**Recommended:** Background in basic biology, plant pathology and/or entomology from a university or practical setting

## HORT 350, URBAN FORESTRY, 3 Credits

Introduction to principles and practices of planting and managing trees as a system of urban environment; understanding the economic, environmental, social aspects of urban forests, and an overview of contemporary land use issues and societal perspectives between people and plants. CROSSLISTED as FES 350/HORT 350.

**Equivalent to:** FES 350, FOR 350

**Recommended:** Foundational forestry and horticulture courses

*Available via Ecampus*

## HORT 351, FLORICULTURE AND GREENHOUSE SYSTEMS, 4 Credits

For students interested in growing plants in commercial or educational greenhouses. Actively explores the production and scheduling of floriculture crops for various markets. Combines the practical aspects of growing floral crops under environments created by traditional and technologically advanced greenhouses. Greenhouse structures and crop environment manipulation will be emphasized. Students actively manage a floriculture crop and are responsible for developing and implementing production schedules, and for making key decisions on the culture of diverse floral crops.

**Recommended:** HORT 301

## HORT 358, LANDSCAPE CONSTRUCTION TECHNIQUES, 4 Credits

Study of landscape construction process from initial site analysis to finished landscape. Techniques used in building hardscape and landscape areas. Field trips required. Lec/lab.

## HORT 360, IRRIGATION AND DRAINAGE, 4 Credits

Familiarizes students with the principles and practices of irrigation and drainage systems. Optimum use of water, irrigation and drainage system design, installation, repairs, and troubleshooting are emphasized. Lec/lab.

**Prerequisite:** CSS 305 with D- or better or SOIL 205 with D- or better or (SOIL 205 with D- or better)

## HORT 361, PLANT NURSERY SYSTEMS, 4 Credits

Covers how to grow shrubs and trees, and herbaceous annuals and perennials in nurseries for use in urban landscapes and managed ecosystems such as forestry and restoration. Plant nursery systems are diverse and require intensive management involving a dynamic decision making process. This course actively explores field and container production systems as well as the marketing of plants, an overview of plant growth regulation and post-production handling, the influence of efficient production practices on plant quality, integrating pest management strategies, and natural resource utilization.

**Recommended:** HORT 301

## **HORT 380, SUSTAINABLE LANDSCAPE DESIGN, 3 Credits**

The assessment of design problems/situations, the development of solutions and the communication of those solutions to the client through the design. Specific topics include designing for ecosystem maintenance/enhancement, introduction to computer-aided design (CAD), using color in landscape designs and rendering section/elevation views.

## **HORT 399, SPECIAL TOPICS, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 401, RESEARCH, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 402, INDEPENDENT STUDY, 1-16 Credits**

*This course is repeatable for 16 credits.*

*Available via Ecampus*

## **HORT 403, THESIS, 1-16 Credits**

*This course is repeatable for 16 credits.*

*Available via Ecampus*

## **HORT 405, READING AND CONFERENCE, 1-16 Credits**

**Equivalent to:** HORT 405H

*This course is repeatable for 16 credits.*

## **HORT 405H, READING AND CONFERENCE, 1-16 Credits**

**Attributes:** HNRS – Honors Course Designator

**Equivalent to:** HORT 405

*This course is repeatable for 16 credits.*

## **HORT 406, PROJECTS: DATA PRESENTATIONS, 1 Credit**

For any student doing research, to learn to develop and evaluate poster and slide presentations containing scientific data. Students are exposed to a variety of scientific disciplines as they prepare and critique their own and other students' posters and oral presentations. Students improve written and oral communication skills. Letter grade is based on participation, improvement, and the quality of a final poster project and oral presentation. Offered winter term. CROSSLISTED as BRR 406/HORT 406.

**Equivalent to:** BRR 406

## **HORT 407, SEMINAR, 1 Credit**

**Equivalent to:** CROP 407, SOIL 407

*Available via Ecampus*

## **HORT 408, WORKSHOP, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 409, PRACTICUM, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 410, INTERNSHIP, 1-12 Credits**

Work internship to acquaint horticulture majors with the practices of the horticulture industry. Under direction of departmental internship committee. Requires approved statement of intent, submission of employer and employee evaluation forms and written report.

*This course is repeatable for 12 credits.*

*Available via Ecampus*

## **HORT 411, HORTICULTURE BOOK CLUB, 1 Credit**

Reading and discussion of noteworthy books and associated topics relating to agriculture, society and the environment.

*This course is repeatable for 2 credits.*

## **HORT 412, CAREER EXPLORATION: INTERNSHIPS AND RESEARCH PROJECTS, 1 Credit**

Provides orientation to the horticulture major internship and research project requirement. Covers procedures for selecting, performing, and reporting on an internship or research project. Includes guidance and skill development valuable in the pursuit of horticultural career goals, such as cover letter and resume preparation and interviewing experience.

## **HORT 414, PRECISION AGRICULTURE, 4 Credits**

Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS, soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab. CROSSLISTED as CROP 414/HORT 414.

**Equivalent to:** CROP 414

## **HORT 418, GOLF COURSE MAINTENANCE, 4 Credits**

Basic aspects of golf course maintenance under temperate zone conditions. Lec/lab.

**Recommended:** HORT 314

## **HORT 421, HERBS, SPICES, AND MEDICINAL PLANTS, 3 Credits**

Principles of crop ecology, morphology, chemistry and utilization of natural products of herbs, spices, and medicinal plants (HSMP). Examines the history and importance of HSMP, their historic and modern uses, current market trends, botany, collection in the wild, fundamentals of production systems for HSMP, harvesting, drying, and other postharvest operations, natural products and their uses, regulations and legal concerns of herbal products.

**Recommended:** CROP 200 or equivalent horticulture course

*Available via Ecampus*

## HORT 433, SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS, 4 Credits

Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Offered even years. CROSSLISTED as CROP 433/HORT 433 and CROP 533/HORT 533.

**Prerequisite:** BI 102 with D- or better or BI 213 with D- or better or BI 213H with D- or better or BI 223 with D- or better or BI 223H with D- or better or BI 311 with D- or better or BI 311H with D- or better or HORT 430 with D- or better or CSS 430 with D- or better or PBG 430 with D- or better or HORT 450 with D- or better or CSS 450 with D- or better or PBG 450 with D- or better

**Equivalent to:** CROP 433

## HORT 444, INSECT AGROECOLOGY, 3 Credits

Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems.

Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as ENT 444/HORT 444 and ENT 544/HORT 544.

**Equivalent to:** ENT 444

**Recommended:** General background or previous course work in entomology.

## HORT 447, ARBORICULTURE, 4 Credits

The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. CROSSLISTED as FES 447/HORT 447 and FES 547/HORT 547.

**Equivalent to:** FES 447, FOR 447

**Recommended:** (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)

*Available via Ecampus*

## HORT 451, TREE FRUIT PHYSIOLOGY AND CULTURE, 4 Credits

Plant growth and development in relation to tree fruit production; emphasis on canopy development and pruning theory, flowering and fruit set, and development, dormancy, and cold acclimation. Field trips required.

**Recommended:** Completion or concurrent enrollment in HORT 301 and BOT 331

## HORT 452, BERRY AND GRAPE PHYSIOLOGY AND CULTURE, 4 Credits

Production of wine grapes, caneberries, strawberries, blueberries, and other miscellaneous berry crops. Emphasis on plant growth and development; pruning and training systems; flower and fruit development and cultivars. Field trips required. Offered in alternate years.

**Recommended:** HORT 301

## HORT 453, GRAPEVINE GROWTH AND PHYSIOLOGY, 3 Credits

The physiological aspects of grapevine growth and development including dormancy, flowering and fruit set, vegetative growth, fruit development and water relations. Additional topics include taxonomy, morphology and physiological influences of vineyard mesoclimate and vine microclimate. Lec/lab.

**Prerequisite:** HORT 301 with C- or better

**Recommended:** HORT 301

## HORT 454, PRINCIPLES AND PRACTICES OF VINEYARD PRODUCTION, 3 Credits

The relationship of vineyard and canopy management to grapevine physiology and fruit quality. Nutrient/water relations within the soil/vine continuum. Vineyard microclimate, floor management, and pests will also be discussed. Lec/lab.

**Prerequisite:** HORT 301 with D- or better

**Recommended:** Completion or concurrent enrollment in HORT 453

## HORT 455, URBAN FOREST PLANNING, POLICY AND MANAGEMENT, 4 Credits

Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as FES 455/HORT 455 and FES 555/HORT 555.

**Prerequisite:** FES 350 with C- or better or HORT 350 with C- or better

**Equivalent to:** FES 455, FOR 455

*Available via Ecampus*

## HORT 456, PHYSIOLOGY AND PRODUCTION OF BERRY CROPS, 4 Credits

Physiology and production systems of blueberries, red and black raspberries, blackberries, and other berry crops. Emphasis on plant growth and development; flower and fruit development; cultivars; pruning and training systems; irrigation; harvesting; nutrient management; and conventional and organic production systems.

**Prerequisite:** HORT 301 with D- or better

*Available via Ecampus*

## HORT 463, SEED BIOLOGY, 3 Credits

Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. Lec/lab. CROSSLISTED as CROP 463/HORT 463 and CROP 563/HORT 563.

**Equivalent to:** CROP 463, HORT 363

## HORT 480, CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT, 4 Credits

Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as CROP 480/HORT 480 and CROP 580/HORT 580.

**Equivalent to:** CROP 480

**Recommended:** CROP 300 or HORT 300

*Available via Ecampus*

## HORT 481, HORTICULTURE PRODUCTION CASE STUDIES, 4 Credits

Field-based case studies investigate production issues encountered in horticultural crops; individual and group activities; discussion of processes for troubleshooting, decision-making and management recommendations; assessment of economic, practical and logistical feasibility. Prior knowledge of plant physiology, soils, entomology, and plant nutrition are required. Multiple field trips required. A field trip fee will be charged.

**Prerequisite:** HORT 301 with D- or better

## HORT 482, DESIGN AND MANAGEMENT OF ORGANIC CROPPING SYSTEMS, 3 Credits

This capstone course is the final stage of the Organic Farming Systems Certificate Program. Iteratively design and evaluate organic farming system management plans. Apply real-world science-, practice-, and regulation-based information to the design and management of organic farming systems.

**Prerequisite:** HORT 212 with C- or better and CROP 355 [C-] and HORT 306 (may be taken concurrently) [C-] and HORT 307 (may be taken concurrently) [C-] and HORT 308 (may be taken concurrently) [C-] and HORT 344 (may be taken concurrently) [C-] and SOIL 360 (may be taken concurrently) [C-]

## HORT 483, CASE STUDIES IN URBAN AGRICULTURE, 3 Credits

Provides an overview of the diversity of endeavors that are available to potential urban agriculturists. These include urban and peri-urban farms (for profit and non-profit), community and school gardens, controlled climate facilities, rooftop farms and gardens, and more. For each case study, we will specifically examine: (1) the market where the farmer sells goods, (2) methods of achieving growth, particularly while avoiding debt, (3) increasing livelihood reliance upon on-farm income.

**Recommended:** General background or previous coursework in agriculture

*Available via Ecampus*

## HORT 485, ADVANCED PERMACULTURE DESIGN TOOLS FOR CLIMATE RESILIENCE, 3 Credits

Understand how permaculture as a design system can create sustainable human habitation that is beneficial to the natural world. Use tools specific to permaculture designers to assess, analyze, and project future climate scenarios and respond to them with appropriate design. Climate analogue identification and climate change forecasting provide the basis for a student assessment project that addresses current and future climatic conditions. Assessment and mapping assignments utilize Google Earth Pro, Google Docs, and Google Sheets.

**Prerequisite:** HORT 285 with B or better

*Available via Ecampus*

## HORT 495, HORTICULTURAL MANAGEMENT PLANS, 3 Credits

Develop an integrated management plan for a horticultural enterprise.

*This course is repeatable for 6 credits.*

## HORT 499, SPECIAL TOPICS, 1-16 Credits

**Equivalent to:** HORT 499H

*This course is repeatable for 16 credits.*

## HORT 499H, SPECIAL TOPICS, 1-16 Credits

**Attributes:** HNRS – Honors Course Designator

**Equivalent to:** HORT 499

*This course is repeatable for 16 credits.*

## HORT 501, RESEARCH, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 503, THESIS, 1-16 Credits

*This course is repeatable for 999 credits.*

## HORT 505, READING AND CONFERENCE, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 506, PROJECTS, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 507, SEMINAR, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 508, WORKSHOP, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 509, PRACTICUM, 1-16 Credits

*This course is repeatable for 16 credits.*

## HORT 510, INTERNSHIP, 1-12 Credits

Offered via Ecampus only.

*This course is repeatable for 12 credits.*



## **HORT 511, RESEARCH AND EDUCATIONAL PERSPECTIVES IN HORTICULTURE, 2 Credits**

Introduces beginning graduate students to the faculty in horticulture and provides an in-depth discussion of their research and education programs.

## **HORT 518, CURRENT TOPICS IN ENTOMOLOGY, 2 Credits**

A core course of the Horticulture graduate program. Provides an advanced understanding of entomology and its relationship to other disciplines through critical analysis of the scientific literature. Practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term.

CROSSLISTED as ENT 518/HORT 518.

**Equivalent to:** ENT 518

*This course is repeatable for 12 credits.*

## **HORT 519, CURRENT TOPICS IN PLANT BREEDING AND GENETICS, 2 Credits**

Provides an advanced understanding of plant breeding and genetics and their relationship to other disciplines through critical analysis of the scientific literature. Practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as HORT 519/PBG 519.

**Equivalent to:** PBG 519

*This course is repeatable for 12 credits.*

## **HORT 520, CURRENT TOPICS IN HORTICULTURAL RESEARCH, 2 Credits**

This is a core course in the horticulture graduate program. Students gain an advanced understanding of horticulture science and its relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to their peers. Instructors, topics and specific learning objectives vary from term to term.

*This course is repeatable for 12 credits.*

## **HORT 521, HERBS, SPICES, AND MEDICINAL PLANTS, 3 Credits**

Principles of crop ecology, morphology, chemistry and utilization of natural products of herbs, spices, and medicinal plants (HSMP). Examines the history and importance of HSMP, their historic and modern uses, current market trends, botany, collection in the wild, fundamentals of production systems for HSMP, harvesting, drying, and other postharvest operations, natural products and their uses, regulations and legal concerns of herbal products.

**Recommended:** CROP 200 or equivalent course in HORT.

*Available via Ecampus*

## **HORT 533, SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS, 4 Credits**

Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. Offered even years. CROSSLISTED as CROP 433/HORT 433 and CROP 533/HORT 533.

**Equivalent to:** CROP 533

**Recommended:** BI 102 or BI 213 or BI 311 or HORT 430 or CSS 430 or HORT 450 or CSS 450

## **HORT 540, ORGANIC VEGETABLE PRODUCTION SYSTEMS: DESIGN AND MANAGEMENT, 3 Credits**

Design, management, and troubleshooting in organic vegetable production systems. Students learn to integrate knowledge from various technical disciplines and explore the social, economic, and environmental dimensions of vegetable production to analyze and evaluate organic vegetable farm enterprises.

**Recommended:** CROP/SOIL 530 and ENT 548

*Available via Ecampus*

## **HORT 544, INSECT AGROECOLOGY, 3 Credits**

Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems. Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as ENT 444/HORT 444 and ENT 544/HORT 544.

**Equivalent to:** ENT 544

**Recommended:** General background or previous course work in entomology.

## **HORT 547, ARBORICULTURE, 4 Credits**

The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. CROSSLISTED as FES 447/HORT 447 and FES 547/HORT 547.

**Equivalent to:** FES 547

*Available via Ecampus*

## **HORT 552, BERRY AND GRAPE PHYSIOLOGY AND CULTURE, 4 Credits**

Production of wine grapes, caneberrries, strawberries, blueberries, and other miscellaneous berry crops. Emphasis on plant growth and development; pruning and training systems; flower and fruit development and cultivars. Field trips required. Offered in alternate years.

**Recommended:** HORT 301

## **HORT 555, URBAN FOREST PLANNING, POLICY AND MANAGEMENT, 4 Credits**

Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as FES 455/HORT 455 and FES 555/HORT 555.

**Equivalent to:** FES 555, FOR 555

**Recommended:** FOR 350 or FES 350 or HORT 350

*Available via Ecampus*

## **HORT 556, PHYSIOLOGY AND PRODUCTION OF BERRY CROPS, 4 Credits**

Physiology and production systems of blueberries, red and black raspberries, blackberries, and other berry crops. Emphasis on plant growth and development; flower and fruit development; cultivars; pruning and training systems; irrigation; harvesting; nutrient management; and conventional and organic production systems.

*Available via Ecampus*

## **HORT 563, SEED BIOLOGY, 3 Credits**

Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. Lec/lab. CROSSLISTED as CROP 463/HORT 463 and CROP 563/HORT 563.

**Equivalent to:** CROP 563, HORT 363

## **HORT 580, CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT, 4 Credits**

Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as CROP 480/HORT 480 and CROP 580/HORT 580.

**Equivalent to:** CROP 580

**Recommended:** CROP 300 or HORT 300

*Available via Ecampus*

## **HORT 581, HORTICULTURE PRODUCTION CASE STUDIES, 4 Credits**

Field-based case studies investigate production issues encountered in horticultural crops; individual and group activities; discussion of processes for troubleshooting, decision-making and management recommendations; assessment of economic, practical and logistical feasibility. Prior knowledge of plant physiology, soils, entomology, and plant nutrition are required. Multiple field trips required. A field trip fee will be charged.

**Recommended:** HORT 301

## **HORT 599, SPECIAL TOPICS, 0-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 601, RESEARCH, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 603, DISSERTATION, 1-16 Credits**

*This course is repeatable for 999 credits.*

## **HORT 605, READING & CONFERENCE, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 606, PROJECTS, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 607, SEMINAR, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 608, WORKSHOP, 1-16 Credits**

*This course is repeatable for 16 credits.*

## **HORT 699, SPECIAL TOPICS, 1-16 Credits**

*This course is repeatable for 16 credits.*