

HORTICULTURE (HORT)

Courses primarily for undergraduates:

HORT 110: Professional and Educational Development in Horticulture.

(1-0) Cr. 1. F.

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

HORT 121: Home Horticulture

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

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

HORT 122: Hands-On Home Horticulture

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

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

HORT 131: Floral Design

(0-2) Cr. 1. S.

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

HORT 193: Topics in Horticulture

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

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

HORT 193A: Topics in Horticulture: Greenhouse Crops

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

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

HORT 193B: Topics in Horticulture: Nursery Crops

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

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

HORT 193C: Topics in Horticulture: Turfgrass

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

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

HORT 193D: Topics in Horticulture: Fruit Crops

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

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

HORT 193E: Topics in Horticulture: Vegetable Crops

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

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

HORT 193F: Topics in Horticulture: Cross-Commodity

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

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

HORT 193G: Topics in Horticulture: Landscape Horticulture

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

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

HORT 221: Principles of Horticulture Science

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

Prereq: Biol 211 or concurrent enrollment

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

HORT 225: Spanish for Horticulture

(3-0) Cr. 3. S.

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

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

(2-2) Cr. 3. F.

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

HORT 276: Understanding Grape and Wine Science

(Cross-listed with FS HN). (3-0) Cr. 3. Alt. S., offered even-numbered years.

Prereq: High school biology and chemistry.

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

HORT 281: Landscape Graphics

(0-4) Cr. 2. F.

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

HORT 282: Educating Youth Through Horticulture

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

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

HORT 283: Pesticide Application Certification

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

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

HORT 321: Horticulture Physiology

(3-0) Cr. 3. F.

Prereq: HORT 221 or BIOL 211

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

HORT 322: Plant Propagation

(2-2) Cr. 3. S.

Prereq: HORT 221 or BIOL 211

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

HORT 330: Herbaceous Ornamental Plants

(2-2) Cr. 3. F.

Prereq: HORT 221 or by permission of instructor

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

HORT 331: Hydroponic Food Crop Production

(2-2) Cr. 3. F.

Prereq: HORT 221 or AGRON 181 or 3 credits in biological sciences

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

HORT 332: Greenhouse Operation and Management

(3-3) Cr. 4. S.

Prereq: Hort 221

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

HORT 338: Seed Science and Technology

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

Prereq: AGRON 181 (or equivalent) or HORT 221; BIOL 212

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

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

(2-0) Cr. 2. S.

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

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

HORT 342: Landscape Plant Installation, Establishment, and Maintenance

(2-3) Cr. 3. F.

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

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

HORT 351: Turfgrass Establishment and Management

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

Prereq: HORT 221 or AGRON 181 (or equivalent) or BIOL 211

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

HORT 351L: Turfgrass Establishment and Management Laboratory

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

Prereq: Credit or enrollment in HORT 351

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

HORT 354: Soils and Plant Growth

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

Prereq: AGRON 182 or equivalent and BIOL 101

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

HORT 354L: Soils and Plant Growth Laboratory

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

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

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

HORT 376: Fundamentals of Field Production of Horticultural Food Crops

(3-0) Cr. 3. F.

Prereq: HORT 221 or AGRON 181

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

HORT 380: Principles of Garden Composition

(2-0) Cr. 2. S.

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

HORT 381: Beginning Garden Composition Studio

(0-4) Cr. 2. S.

Prereq: HORT 281 and HORT 240 or HORT 330, concurrent enrollment in HORT 380

Introduction to landscape design process. Intensive studio-based projects implementing principles of landscape design, concept development, and graphic communication.

HORT 391: Horticultural Management Experience

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

Prereq: HORT 221 or permission of instructor

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

HORT 398: Cooperative Education

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

Prereq: Permission of department resource and career center coordinator

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

HORT 421: Introduction to Plant Breeding

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

Prereq: GEN 320 or BIOL 313

Fundamental principles of plant breeding and cultivar development, breeding methods for self-pollinated, cross-pollinated and clonal crops.

HORT 424: Sustainable and Environmental Horticulture Systems

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

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

HORT 434: Fall Greenhouse Crop Production

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

Prereq: HORT 332

Principles and practices of flowering and ornamental greenhouse crop production. Emphasis is placed on production of flowering potted plants, cut flowers, and foliage crops produced in greenhouses and other controlled environments. An overnight class field trip outside scheduled class time is required.

HORT 435: Spring Greenhouse Crop Production

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

Prereq: HORT 330 and HORT 332

Principles and practices of containerized greenhouse production of crops for gardens and outdoor use. Emphasis is placed on the production of seedling plugs and rooted cuttings, annual and perennial bedding plants, and native plants. An overnight class field trip outside scheduled class time is required.

HORT 442: Nursery Production and Garden Center Management

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

Prereq: HORT 221

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

HORT 444: Landscape Construction Management

(2-3) Cr. 3. F.

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

HORT 445: Horticulture Management and Administration

(2-0) Cr. 2. F.

Prereq: HORT 221 and junior or senior classification

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

HORT 451: Professional Turfgrass Management

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

Prereq: HORT 351

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

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

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

Prereq: HORT 351

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

HORT 453: Sports Turf Management

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

Prereq: HORT 351

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

HORT 454: Turf & Landscape Irrigation

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

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

HORT 461: Fruit Crop Production and Management

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

Prereq: HORT 221

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

HORT 471: Vegetable Production and Management

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

Prereq: HORT 221

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

HORT 471L: Vegetable Production and Management Lab

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

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

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

HORT 475: Urban Forestry

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

Prereq: Junior or senior classification, 3 credits in biology

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

HORT 481: Advanced Garden Composition

(0-4) Cr. 2. F.

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

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

HORT 484: Organic Agricultural Theory and Practice

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

Prereq: 9 cr. in biological or physical sciences

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

HORT 490: Independent Study

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490A: Independent Study: Greenhouse Crops

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490B: Independent Study: Nursery Crops

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490C: Independent Study: Turfgrass

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490D: Independent Study: Fruit Crops

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490E: Independent Study: Vegetable Crops

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490F: Independent Study: Cross-Commodity

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490G: Independent Study: Landscape Horticulture

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490H: Independent Study: Honors

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490I: Independent Study: International Study

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 490J: Independent Study: Entrepreneurship

Cr. arr. Repeatable.

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

Investigation of topic holding special interest to the student. Comprehensive report required. Election of course and topic must be approved by department head. A maximum of 4 credits of Hort 490 and an additional 2 credits of 490 from outside Horticulture may be used toward the total of 129 credits required for graduation.

HORT 491: Seed Science Internship Experience

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

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

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

HORT 493: Workshop in Horticulture

Cr. arr. Repeatable.

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

HORT 494: Service Learning

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

Prereq: Permission of instructor

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

HORT 494A: Service Learning: International

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

Prereq: Permission of instructor

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

HORT 494B: Service Learning: Domestic

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

Prereq: Permission of instructor

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

HORT 495: Horticulture Travel Course Preparation

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

Prereq: Permission of instructor

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

HORT 496: Horticulture Travel Course

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

Prereq: Permission of instructor

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

Meets International Perspectives Requirement.

Courses primarily for graduate students, open to qualified undergraduates:

HORT 506: Crop Genetics

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

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

HORT 511: Integrated Management of Tropical Crops

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

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

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

Meets International Perspectives Requirement.

HORT 524: Sustainable and Environmental Horticulture Systems

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

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

HORT 530: Research Orientation

(1-3) Cr. 2. F.

Instruction in scientific methods and communication skills.

HORT 538: Seed Physiology and the Environment

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

Prereq: AGRON 316; CHEM 231 or CHEM 331

Physiological aspects of seed development, maturation, longevity, dormancy, and germination of agronomic and horticultural crops and their interactions with field and storage environments. Emphasis on current literature and advanced methodology.

HORT 542: Introduction to Molecular Biology Techniques

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

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

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

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

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

HORT 542B: Introduction to Molecular Biology Techniques: Protein

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

Prereq: Graduate classification

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

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

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

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

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

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

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

HORT 542E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.

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

HORT 542F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.

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

HORT 542G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.

Offered on a satisfactory-fail basis only.

HORT 543: Seed Physiology

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

Prereq: Admission to the Seed Technology and Business Master's Degree Program or approval of the instructor

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

HORT 546: Strategies for Diversified Farming Systems

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

Prereq: SusAg 509

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

HORT 551: Growth and Development of Perennial Grasses

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

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

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

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

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

Prereq: HORT 351

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

HORT 584: Organic Agricultural Theory and Practice

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

Prereq: 9 cr. in biological or physical sciences

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

HORT 590: Special Topics

Cr. arr. Repeatable.

Prereq: a major or minor in horticulture

HORT 593: Workshop in Horticulture

Cr. arr. Repeatable.

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

HORT 593A: Workshop in Horticulture: Greenhouse Crops

Cr. arr. Repeatable.

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

HORT 593B: Workshop in Horticulture: Nursery Crops

Cr. arr. Repeatable.

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

HORT 593C: Workshop in Horticulture: Turfgrass

Cr. arr. Repeatable.

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

HORT 593D: Workshop in Horticulture: Fruit Crops

Cr. arr. Repeatable.

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

HORT 593E: Workshop in Horticulture: Vegetable Crops

Cr. arr. Repeatable.

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

HORT 593F: Workshop in Horticulture: Cross-Commodity

Cr. arr. Repeatable.

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

HORT 593G: Workshop in Horticulture: Landscape Horticulture

Cr. arr. Repeatable.

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

HORT 599: Creative Component

Cr. arr. Repeatable.

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

Cr. 1. Repeatable. F.S.

Offered on a satisfactory-fail basis only.

HORT 690: Advanced Topics

Cr. arr. Repeatable.

HORT 696: Research Seminar

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

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

HORT 698: Horticulture Teaching Practicum

(1-0) Cr. 1. S.

Prereq: Graduate student classification

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

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

HORT 699: Thesis and Dissertation Research

Cr. arr. Repeatable.

HORT 699A: Thesis and Dissertation Research: Greenhouse Crops

Cr. arr. Repeatable.

HORT 699B: Thesis and Dissertation Research: Nursery Crops

Cr. arr. Repeatable.

HORT 699C: Thesis and Dissertation Research: Turfgrass

Cr. arr. Repeatable.

HORT 699D: Thesis and Dissertation Research: Fruit Crops

Cr. arr. Repeatable.

HORT 699E: Thesis and Dissertation Research: Vegetable Crops

Cr. arr. Repeatable.

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

Cr. arr. Repeatable.

HORT 699G: Thesis and Dissertation Research: Landscape Horticulture

Cr. arr. Repeatable.

HORT 699I: Thesis and Dissertation Research: Biotechnology

Cr. arr. Repeatable.