

# HORTICULTURE (HORT)

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**Any experimental courses offered by HORT can be found at:**

registrar.iastate.edu/faculty-staff/courses/explistings/ (<http://www.registrar.iastate.edu/faculty-staff/courses/explistings/>)

**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**

(3-0) Cr. 3. F.S.

Growing plants in and around the home including requirements for growing indoor plants, plant propagation, landscape design, and maintaining trees, lawns, flower, fruit, and vegetable gardens. Recitation includes demonstrations and hands-on activities that illustrate principles of designing, growing and maintaining plants for both indoor and outdoor gardens.

## **HORT 131: Floral Design**

(1-2) Cr. 2. F.S.

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

## **HORT 132: Wedding and Event Floral Design**

(1-2) Cr. 2. F.S.

*Prereq: HORT 131*

Principles of design and proper mechanics for ceremony flowers, reception flowers, personal flowers, bridal bouquets, and event florals. Flower and plant materials that are commonly used in the event industry. Plan, design, cost, order, and create florals for a wedding, then present as the final project for implementation.

## **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: Credit or concurrent enrollment in BIOL 211*

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 233: House Plants and Interiorscaping**

(1-2) Cr. 2. F.S.

Basic introduction to indoor houseplants and interiorscapes. Understand plant selection, identification, maintenance, and problem solving. Learn current houseplant trends, commercial interior plant design, and installation. A beneficial course for students with an interest in house plants, retail plant sales, Interiorscaping, event design, or gardening.

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

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

A scientific introduction to viticulture (grape-growing) and enology (wine-making) and grape and wine chemistry. Topics include grape biology and cultivars, vineyard management, geography of wine, wine production, wine classification, grape and wine chemistry, wine sensory. 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 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 291: Horticulture Professional Development**

Cr. 1. Repeatable, maximum of 4 credits. F.S.

*Prereq: Permission of Instructor*

Intensive training in preparation for intercollegiate competition in turfgrass, planting, design, plant identification, installation, cost estimating, and other skills at national contests in horticulture. Students must compete in related national competition to earn credit. Offered on a satisfactory-fail basis only. Only one credit of HORT 291A, 291B, or 291C may count toward Horticulture credits for graduation. A maximum of four credits of any combination of HORT 291A, 291B, and 291C may count toward credits for graduation.

**HORT 291A: Horticulture Professional Development: Turfgrass Competition**

(0-2) Cr. 1. Repeatable, maximum of 4 credits. F.

*Prereq: Permission of Instructor*

Intensive training in preparation for intercollegiate competition in turfgrass, planting, design, plant identification, installation, cost estimating, and other skills at national contests in horticulture. Students must compete in related national competition to earn credit. Offered on a satisfactory-fail basis only. Only one credit of HORT 291A, 291B, or 291C may count toward Horticulture credits for graduation. A maximum of four credits of any combination of HORT 291A, 291B, and 291C may count toward credits for graduation.

**HORT 291B: Horticulture Professional Development: Landscape Competition**

(1-0) Cr. 1. Repeatable, maximum of 4 credits. S.

*Prereq: Permission of Instructor*

Intensive training in preparation for intercollegiate competition in planting, design, plant identification, installation, cost estimating, and other skills at national contests in horticulture. Students must compete in related national competition to earn credit. Offered on a satisfactory-fail basis only. Only one credit of HORT 291A, 291B, or 291C may count toward Horticulture credits for graduation. A maximum of four credits of any combination of HORT 291A, 291B, and 291C may count toward credits for graduation.

**HORT 291C: Horticulture Professional Development: Cross-Commodity**

(0-2) Cr. 1. Repeatable, maximum of 4 credits. F.S.

*Prereq: Permission of Instructor*

Intensive training in preparation for intercollegiate competition in planting, plant identification and other skills at national contests in horticulture. Students must compete in related national competition to earn credit. Offered on a satisfactory-fail basis only. Only one credit of HORT 291A, 291B, or 291C may count toward Horticulture credits for graduation. A maximum of four credits of any combination of HORT 291A, 291B, and 291C may count toward credits for graduation.

**HORT 321: Horticulture Physiology**

(3-0) Cr. 3. F.

*Prereq: BIOL 211 or HORT 221*

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: BIOL 211 or HORT 221*

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 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 Crop Production**

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

*Prereq: AGRON 181 or HORT 221 or 3 credits in Biological Sciences*

Principles and practices of hydroponic systems, crop production and culture, aquaponic systems, and new food and medicinal crops for hydroponic systems.

**HORT 332: Greenhouse and Nursery Operations and Management**

(3-3) Cr. 4. S.

*Prereq: HORT 221*

Operation and management of greenhouses, nurseries, and other controlled environment agriculture structures and facilities. Principle of site selection, facility design and 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 principles of production of both 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 HORT 221); 3 credits of BIOL*

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 Management**

(2-3) Cr. 3. S.

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

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

**HORT 351: Turfgrass Establishment and Management**

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

*Prereq: AGRON 181 or BIOL 211 or HORT 221*

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 concurrent 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; 3 credits of BIOL*

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; credit or concurrent 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: AGRON 181 or HORT 221*

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, design process, and design principles.

**HORT 381: Beginning Garden Composition Studio**

(0-4) Cr. 2. S.

*Prereq: HORT 281; (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; Department Permission*

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: Department Permission*

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: BIOL 313 or GEN 320*

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: Floriculture 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: Landscape Plant Production**

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

*Prereq: HORT 332*

Principles and practices of producing herbaceous and woody landscape plants for gardens, landscapes, restoration and other outdoor uses. Emphasis is placed on the production of: seedling plugs and rooted cuttings; container grown herbaceous annual and perennials; trees, shrubs, and vines; and native plants. An overnight class field trip outside scheduled class time is 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 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 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**

(Dual-listed with HORT 571). (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. Involves visits to growers fields to observe/experience their production enterprise.

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

(Dual-listed with HORT 571L). (0-3) Cr. 1. Alt. S., offered even-numbered years.

*Prereq: Junior or Senior classification; concurrent enrollment in HORT 471*

Hands-on training in the area of vegetable crop production. 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 BIOL*

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 476: Horticultural Postharvest Technology**

(Dual-listed with HORT 576). (2-3) Cr. 3. Alt. F., offered odd-numbered years.

*Prereq: HORT 221*

Study of pre- and post-harvest factors, procedures, and challenges that affect market quality of horticultural commodities. Emphasis on storage and handling technologies to preserve quality and extend storage life of edible and ornamental horticultural crops. Field trips outside scheduled class time required.

**HORT 481: Advanced Garden Composition**

(0-4) Cr. 2. F.

*Prereq: HORT 240; HORT 330; HORT 380; 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 credits 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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 HORT; 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; Permission of 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. Advanced approval and participation of employer and instructor required.

**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. Assessed service-learning component. A maximum of 4 credits of HORT 494 may be used toward the Horticulture credits required for graduation.

**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. Assessed service-learning component. A maximum of 4 credits of HORT 494 may be used toward the Horticulture credits required for graduation.

**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. Assessed service-learning component. A maximum of 4 credits of HORT 494 may be used toward the Horticulture credits required for graduation.

**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 plant reproductive systems, gene segregation and linkage analysis, molecular nature of genes and how genes confer phenotypes, mutation and biotechnology, quantitative inheritance and population genetics 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.

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 Graduate Program in Seed Technology and Business or approval of instructor must be obtained.*

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 571: Vegetable Production and Management**

(Dual-listed with HORT 471). (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. Involves visits to growers fields to observe/experience their production enterprise.



**HORT 571L: Vegetable Production and Management Lab**

(Dual-listed with HORT 471L). (0-3) Cr. 1. Alt. S., offered even-numbered years.

*Prereq: Junior or Senior classification; concurrent enrollment in HORT 471*

Hands-on training in the area of vegetable crop production. 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 576: Horticultural Postharvest Technology**

(Dual-listed with HORT 476). (2-3) Cr. 3. Alt. F., offered odd-numbered years.

*Prereq: HORT 221*

Study of pre- and post-harvest factors, procedures, and challenges that affect market quality of horticultural commodities. Emphasis on storage and handling technologies to preserve quality and extend storage life of edible and ornamental horticultural crops. Field trips outside scheduled class time required.

**HORT 581: Experience in Plant Science Extension and Outreach**

(Cross-listed with AGRON, ENT, PL P). Cr. 1. Alt. SS., offered odd-numbered years.

A supervised learning experience in several extension delivery methods used in the plant sciences. Participation in Iowa State University-based extension programs that may include field crop, horticulture, or Master Gardener programming.

**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 credits 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.