

# HORTICULTURE HRT

## Department of Horticulture College of Agriculture and Natural Resources

- 100 Horticulture: Plants and People**  
Spring. 3(2-2) R: Not open to juniors or seniors in the Department of Horticulture.  
Functional uses of plants: aesthetics, food, industry, recreation. Growing and using horticultural plants. Consumer and environmental issues related to horticulture in daily living.
- 102 Plants for Food, Fun, and Profit**  
Fall. 2(2-0)  
Introduction to the science and art of horticulture including plant breeding, ornamental plant and food production (organic and traditional), postharvest handling, horticultural industries and landscaping. Educate consumers about horticultural plants, products, and their relationship to environment.
- 109 Introduction to Applied Plant Science**  
Fall. 2(2-0) R: Open only to students in the Institute of Agricultural Technology.  
Plant growth and development. Interrelationship between cultural practice and plant performance. Plant classification, plant physiology and metabolism.
- 111 Landscape Design**  
Spring. 3(3-3) Not open to students with credit in HRT 072 or HRT 311.  
Functional uses of the landscape, landscape design process, drafting and graphic representation, plant selection and use, planting design principles, construction materials and specifications. Offered first ten weeks of semester.
- 124 Introduction to Sustainable Agriculture and Food Systems**  
Fall, Spring. 1(0-2) Interdepartmental with Crop and Soil Sciences and Environmental Studies and Agriscience. Administered by Crop and Soil Sciences. R: Open to undergraduate students or agricultural technology students.  
Impact of agricultural and social sciences on our food system. Contemporary research and movements involving agricultural and food system sustainability.
- 135 Crop Scouting and Investigation**  
Spring. 2(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Crop and Soil Sciences. P: CSS 101 or HRT 203 R: Open to undergraduate students or agricultural technology students.  
Crop production, pest scouting and other production problems, and field diagnoses. Interaction with agriculture clientele. Offered first ten weeks of semester.
- 203 Principles of Horticulture**  
Fall. 3(2-2) SA: HRT 201  
Basics of horticulture. Plant growth including crop selection and management, cultivar development, crop geography, environmental factors affecting plant growth and development, and reproductive development. Field trip required.
- 204 Plant Propagation**  
Spring. 2(2-3) SA: HRT 204L, HRT 104  
Asexual propagation including rooting of cuttings, micropropagation, grafting, layering, and underground structures. Sexual propagation including seed germination, storage, and production. Offered first 10 weeks of the semester.
- 205 Plant Mineral Nutrition**  
Spring. 1(3-0) P: CSS 210 RB: HRT 203  
Mineral elements required by plants. Essential elements, effect of soil and potting media on nutrient availability, absorption and function in plant physiology, and nutrient deficiency and toxicity symptoms. Methods of monitoring and managing plant nutrient levels. Class meets first five weeks of semester.
- 206 Training and Pruning Plants**  
Spring. 1(2-2)  
Principles and techniques of pruning for landscape and nursery ornamentals, Christmas tree production, tree fruits, and small fruits. Pruning practices, equipment, and basic large tree care techniques. Class meets last five weeks of the semester.
- 207 Horticulture Career Development**  
Fall. 1(1-0)  
Internship preparation and identification of employment opportunities. Career goal establishment, resume construction, correspondence development, personal budgeting, interview skills and strategies.
- 208 Pruning and Training Systems in Horticulture**  
Spring of odd years. 3(2-2) R: Open only to the Applied Plant Science major.  
Principles and practices of plant growth management. Plant biology. Crown and canopy development. Crop specific training systems. Pruning techniques.
- 211 Landscape Plants I**  
Fall. 3(2-2)  
Identification, adaptation, and evaluation of shade trees, narrow-leaved evergreens, shrubs, woody vines, herbs, ornamental grasses, and herbaceous perennials.
- 211A Landscape Plants I A**  
Fall. 2(2-0)  
Identification, adaptation, and evaluation of shade trees, narrow-leaved evergreens, shrubs, woody vines, herbs, ornamental grasses, and other herbaceous perennials.
- 212 Landscape Plants II**  
Spring. 3(2-2)  
Identification, adaptation, and evaluation of flowering trees and shrubs, broad-leaved evergreens, herbaceous vines, ground covers, bulbs, wildflowers, ferns, and aquatic plants.
- 213 Landscape Maintenance**  
Fall. 2(2-0) R: Open only to students in the Institute of Agricultural Technology.  
Ornamental plant management. Plant growth and development related to pruning, fertilization, irrigation, weed control, transplanting; development of landscape management specifications; integrated plant management and plant health care programs.
- 213L Landscape Maintenance Field Laboratory**  
Fall. 1(0-2) P: HRT 213 or concurrently R: Open only to students in the Institute of Agricultural Technology.  
Landscape maintenance. Site analysis. Pruning woody plants, transplanting by hand and mechanical tree spade, and planting techniques for ornamentals. Herbaceous perennial care, cutting back, dividing. Scouting as a component of integrated pest management and plant health care programs.
- 214 Landscape and Turfgrass Business Operations**  
Spring. 2(3-0) R: Open only to students in the Institute of Agricultural Technology. SA: AT 082 Not open to students with credit in AT 082.  
Organizing, marketing, and directing a business enterprise within the turf and landscape industry. Project estimating, bidding, payroll, equipment, and accounting. Offered first ten weeks of semester.
- 215 Landscape Industries Seminar**  
Fall. 1(0-2) RB: Interest or experience in the 'green industries'. R: Open only to students in the Institute of Agricultural Technology. SA: HRT 064 Not open to students with credit in HRT 207 or HRT 064.  
Landscape, nursery and related 'green industry' firms. Career opportunities. Horticulture operations, products, services and marketing practices. Personal and professional development.
- 216 Landscape Construction**  
Fall. 3(2-2) R: Open only to students in the Institute of Agricultural Technology. SA: HRT 076 Not open to students with credit in HRT 076.  
Construction installation techniques encountered in landscape development. Field installation of patios, retaining walls, ponds, and plant materials. Construction estimating and bidding procedures. Field Trip required.
- 218 Landscape Irrigation**  
Spring. 3(3-3) Not open to students with credit in HRT 078.  
Design, installation and maintenance of irrigation systems for turfgrass and landscape plants. Design hydraulics, equipment selection, pump stations, water features, water quality and conservation. Offered the first ten weeks of the semester.
- 219 Landscape Computer Aided Design**  
Spring of even years. 2(3-0) RB: CSE 101 or CSS 110  
Computer Aided Design (CAD) for landscape design. Calculations, take offs, perspective drawings using AutoCAD software. Offered first ten weeks of semester.
- 221 Greenhouse Structures and Management**  
Fall. 3(3-0)  
Planning and operation of a commercial greenhouse. Structures, coverings, heating, cooling, ventilation, irrigation, fertilization, root media, and pest control. Field Trips required.
- 222 Ornamental Grasses**  
Fall of even years. 1(3-0)  
Selection, propagation, production, garden design, and maintenance of ornamental grasses for landscape use. Invasive issues and responsible use of ornamental grasses in the landscape. Class meets first five weeks of semester.

## Horticulture—HRT

- 242 Passive Solar Greenhouses for Protected Cultivation**  
Fall, Spring. 1(1-0)  
Season extension and year-round vegetable, herb, flower, and fruit production in unheated, low cost passive solar greenhouses. Marketing options, site selection, site preparation, structures, and organic crop management methods. Field trip required.
- 243 Organic Transplant Production**  
Spring. 1(1-0)  
Seed ordering. Seed storage and seed germination. Vegetative propagation. Growing containers. Organic root media. Fertility, light, and temperature. Plant health. Hardening off. Considerations for organic certification. Field trip required.
- 244 Culinary and Medicinal Herbs**  
Summer. 1(1-0)  
Field and greenhouse species and variety selection. Planting, organic production, and harvesting methods and schedules. Postharvest storage and maintenance of quality. Herbal teas, salves, oils, and tinctures. Field trip required.
- 245 Specialty Cut Flowers**  
Summer. 1(1-0)  
Field and greenhouse cut flower species and variety selection. Planting, organic production methods, and harvesting and scheduling. Bouquet assembly. Postharvest handling and marketing. Value for biological diversity and farm scaping. Field trip required.
- 251 Organic Farming Principles and Practices**  
Spring. 3(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Horticulture.  
History and principles of organic farming. Farms as ecological systems. Certification process and agencies. Organic matter management, the soil food web, and nutrient availability. Biodiversity, crop rotations, plant competition, ground cover, and plant health. Integrating crops and animals. Organic animal husbandry. Field trip required.
- 252 Organic Certification and Farm Plans**  
Fall. 1(1-0) P: HRT 251  
Organic certification requirements as specified by the USDA National Organic Program and implemented by certifying agencies. Methods of record keeping and farm plans for specialty crop, field crop, perennial fruit, and livestock farms. Organic processing and marketing.
- 253 Compost Production and Use**  
Summer. 1(1-0)  
Process and methods of composting, maturity and quality analysis, and use of compost products at home and farm scale. Field trip required.
- 256 Organic Produce Direct Marketing**  
Fall. 1(1-0)  
Food chain and produce marketing; values added versus value added. Community supported agriculture (CSA). Multi-farm CSA, farmers' markets, roadside markets, u-pick, restaurants. Crop scheduling and rotation strategies. Estimating cost, income, profit, yield. Field trip required.
- 257 Organic Produce Wholesale Marketing**  
Fall. 1(1-0)  
Marketing options for high volume sales of organic produce. Farmer cooperatives. Produce suppliers handling organic produce; retailers handling exclusively organic. Retailers diversifying into organic. Requirements for storing, handling and displaying organic produce. Organic labeling requirements. Field trip required.
- 258 Study a Farm**  
Summer. 3(1-2) P: HRT 251  
Field trips to visit Michigan organic farms, farmers' markets, food distributors and retailers to observe farming and marketing methods and learn from farmers. Field trips required.
- 259A Student Organic Farm Practicum I**  
Spring. 3(0-9) R: Open to agricultural technology students. SA: HRT 259  
Intensive organic vegetable, fruit, herb, and flower farming by direct involvement in the weekly activities and operation of the MSU Student Organic Farm. Local food systems, farm operations, transplanting, community-supported agriculture management, winter hoop house, and edible forest gardening.
- 259B Student Organic Farm Practicum II**  
Summer. 4(0-12) P: HRT 259A R: Open to agricultural technology students. SA: HRT 259  
Intensive organic vegetable, fruit, herb, and flower farming by direct involvement in the weekly activities and operation of the MSU Student Organic Farm. Equipment basics, soil fertility, field cultivation, harvesting, post-harvest handling, summer hoop house, and farm stand operations.
- 259C Student Organic Farm Practicum III**  
Spring. 3(0-9) P: HRT 259B R: Open to agricultural technology students. SA: HRT 259  
Intensive organic vegetable, fruit, herb, and flower farming by direct involvement in the weekly activities and operation of the MSU Student Organic Farm. Harvest and post-harvest handling, crop storage, fall hoop houses, cover crops, crop specialty planting, organic farm plan, crop plan, farm stand, and community-supported agriculture.
- 290 Independent Study in Horticulture**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to students in the Institute of Agricultural Technology. SA: HRT 075  
A planned learning experience developed by the student in cooperation with a faculty member.
- 310 Nursery Management**  
Fall. 3(2-3) P: (HRT 203 or concurrently) and (HRT 204 or concurrently) SA: HRT 071, HRT 210  
Management and cultural practices of field and container grown nursery operations. Site selection and development, financing, legal restrictions, personnel management, production practices, nutrition, irrigation, weed and pest control, modification of plant growth, storage, shipping, and marketing.
- 311 Landscape Design and Management Specifications**  
Spring. 4(3-2) Interdepartmental with Landscape Architecture. Administered by Horticulture. P: HRT 211 and (HRT 212 or concurrently)  
Landscape design techniques, spatial organization, plant selection, plant and site interaction. Relationship between design, construction and maintenance. Preparation of planting and maintenance specifications.
- 323 Floriculture Production: Herbaceous Perennials and Annuals**  
Spring. 3(2-3) P: HRT 203 and (HRT 204 or concurrently) and HRT 221  
Commercial greenhouse and outdoor production of herbaceous perennials, annuals, and other plants typically sold in retail nurseries for outdoor gardens. Plant identification, propagation, production, scheduling, and finishing procedures based on specific plant growth requirements. Plant selection, marketing, and retailing issues.
- 332 Tree Fruit Production and Management**  
Fall. 2(1-3) P: HRT 203 or HRT 251  
Commercial apple, cherry, peach, and pear production. Cultural practices to manipulate growth and development and optimize fruit yields and quality. Field trips required.
- 334 Current Issues in Viticulture and Enology**  
Spring of even years. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to agricultural technology students and open to students in the Department of Horticulture.  
Grape, juice, and wine production. Current and new technologies. Wine sales and marketing. Vineyard and winery establishment and management. Presentations and discussions by MSU faculty and Michigan grape and wine industry professionals.
- 335 Berry Crop Production and Management**  
Spring. 1(2-1) P: HRT 203 or HRT 251  
Commercial production of blueberries, strawberries, raspberries, blackberries, cranberries, and minor fruit. Physiology, growth, and development of these species, and how cultural practices can be used to optimize fruit yields and quality. Field trip required.
- 341 Vegetable Production and Management**  
Spring. 3(2-3) P: HRT 203 or (HRT 251 or concurrently) SA: HRT 440, HRT 442  
Field production of vegetable crops. Marketing systems, tillage practices, field establishment, cultural management, pest management, harvesting, and postharvest handling and storage.
- 361 Applied Plant Physiology**  
Fall. 3(3-0) P: PLB 105 and (PLB 106 or concurrently) RB: HRT 203 and HRT 204  
Whole plant physiological and growth responses of plants to light, temperature, and gases during commercial plant production. Coordination and management of growth for optimum production and quality.
- 362 Applied Crop Improvement**  
Spring. 1(3-0) P: HRT 203 and PLB 105  
History of plant improvement. Basic genetic principles of crop breeding and biotechnology. Class meets weeks 6 to 10 of the semester.
- 382 Turfgrass Physiology**  
Spring. 2(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Crop and Soil Sciences. P: (CSS 232) Completion of Tier I writing requirement. RB: PLB 105 SA: CSS 282, CSS 068, CSS 332  
Physiological principles of turfgrass growth and development. Water relations, light, temperature, respiration, photosynthesis, mineral nutrition, and hormone action. Impact of mowing, cultivation, and traffic on turfgrass growth. Offered first ten weeks of semester.

- 391 Special Topics**  
Fall, Spring. 1 to 2 credits. A student may earn a maximum of 9 credits in all enrollments for this course.  
Specific topics in horticulture of current interest and importance. Possible field trips. Offered half of semester.
- 401 Physiology and Management of Herbaceous Plants**  
Fall. 3(3-0) P: HRT 361 or PLB 301 R: Not open to freshmen or sophomores.  
Physiological and flowering responses of herbaceous plants to light, temperature, nutrients, and gases. Management of these factors for optimum production.
- 403 Handling and Storage of Horticultural Crops**  
Fall. 3(2-3) P: BS 161 or PLB 105 R: Not open to freshmen or sophomores. SA: HRT 482  
Biological principles involved in quality maintenance of horticultural products. Control of deterioration during harvesting, handling, transport, and storage.
- 404 Horticulture Management (W)**  
Spring. 3(2-2) P: Completion of Tier I writing requirement. RB: (EC 201 or EC 202) and (HRT 203 and HRT 204) or (CSS 370 or FOR 404) R: Open only to seniors in the College of Agriculture and Natural Resources. SA: HRT 488  
Integration of management, economic, marketing, and horticultural production principles to develop personnel, financial, and resource strategies. Horticultural business plan development in a team situation. Effects of business decisions on people and profits.
- 407 Horticulture Marketing**  
Fall. 3(2-2) RB: (HRT 203 and HRT 204) and (EC 201 and EC 202) and ((HRT 210 or concurrently) or (HRT 322 or concurrently) or (HRT 323 or concurrently) or (HRT 331 or concurrently) or (HRT 341 or concurrently))  
Demographic and purchase trends of perishable horticultural commodities including landscape and floral crops, and fruits and vegetables. Market segmentation and product targeting, distribution, branding and packaging, and advertising and promotion. Services as a critical component of strategic business planning.
- 411 Landscape Contract Management**  
Fall. 3(2-2) RB: HRT 311  
Management of landscape construction and maintenance operations. Working drawing, contracts, bonds, and insurance. Estimating and bidding procedures. Installation techniques for hardscapes and plant material.
- 415 Natural Landscapes, Native Plants and Landscape Restoration**  
Fall of even years. 3(3-0) P: HRT 211 or HRT 212 or BS 162 or LB 144 R: Not open to freshmen.  
Natural landscapes, native plants and landscape restoration options for natural and built environments. Planning and design approaches, site engineering, construction practices, and management guidelines. Case studies, regulatory policies, contract services, resources and issues. Field trip required.
- 417 Sustainable Sites and Environmental Landscape Practices**  
Fall of odd years. 3(3-0) P: HRT 211 or HRT 212 R: Not open to freshmen.  
Sustainable sites and environmental landscape practices integrated into the built environment. Planning and design approaches, site engineering, construction practices, and management guidelines. Case studies, specifications, certification programs.
- 419 Landscape Design Practicum**  
Fall, Spring. 2 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: HRT 111 or HRT 311 R: Approval of department; application required.  
Application of landscape design theory and practice to landscape development projects. Client interaction, site visits and design, plan development, and construction and management specifications. Residential, commercial and public landscape projects.
- 424 Sustainable Agriculture and Food Systems: Integration and Synthesis**  
Fall. 3(3-0) Interdepartmental with Crop and Soil Sciences and Environmental Studies and Agriscience. Administered by Crop and Soil Sciences. P: CSS 124 RB: (CSS 101 or CSS 360 or CSS 431 or ENT 479 or HRT 203 or HRT 251 or HRT 341 or EEP 255 or EEP 260 or ESA 343) or (ESA 444 or GEO 410) R: Open to juniors or seniors or graduate students.  
Biogeochemical and socio-economic aspects of food, fiber, and fuel production. Environmental impacts and social context. Experiential learning projects.
- 430 Exploring Wines and Vines**  
Fall. 3(3-0) RB: Must be 21 years of age. R: Approval of department.  
Consumer-oriented study of wine history, production methods, climatic influences, cultural impacts, social responsibility, and economic impact of wine industry as part of modern agriculture. Sensory evaluation and its relationship to food pairings. Field trip required.
- 432 Principles and Practices of Grape Production**  
Spring of even years. 3(3-0) P: CEM 141 and CEM 161 and CSE 101 R: Open to agricultural technology students and open to students in the Department of Horticulture.  
Grapevine physiology, structure, and function. Techniques for vineyard establishment. Cultivar and rootstock selection, influence of environmental factors on vine growth, pre-plant site selection and preparation, training and trellising systems, cultural practices for canopy management, and methods of crop control.
- 441 Plant Breeding and Biotechnology**  
Spring of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Crop and Soil Sciences. P: CSS 101  
Plant improvement by genetic manipulation. Genetic variability in plants. Traditional and biotechnological means of creating and disseminating recombinant genotypes and cultivars. Importance of plant breeding to our food system, economy, and environment.
- 451 Biotechnology Applications for Plant Breeding and Genetics**  
Spring. 3(2-2) Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Crop and Soil Sciences. RB: (CSS 350 or ZOL 341) and CSS 441  
Principles, concepts, and techniques of agricultural plant biotechnology. Recombinant DNA technology, plant molecular biology and transformation in relation to plant improvement.
- 477 Pesticides in Pest Management**  
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Entomology. Administered by Entomology. P: PLP 405 or CSS 302 or ENT 404 or ENT 470 RB: CEM 143 or CEM 251 R: Open to juniors or seniors or graduate students.  
Chemistry, modes of action, product development and regulation of pesticides. Environmental and social aspects of pesticide use.
- 478 Integrated Pest Management (W)**  
Spring of odd years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Entomology and Forestry. Administered by Entomology. P: (ENT 404 or ENT 470 or PLP 405 or CSS 302) and completion of Tier I writing requirement  
Theory, philosophy and application of pest management focusing on agricultural and natural systems.
- 480 Woody Plant Physiology**  
Spring. 3(3-0) Interdepartmental with Forestry. Administered by Horticulture. P: BS 162 or PLB 105 R: Not open to freshmen or sophomores.  
Physiology of carbon utilization. Effects of water, temperature, nutrition, and light on apical, vegetative, and reproductive growth of woody plants.
- 486 Biotechnology in Agriculture: Applications and Ethical Issues**  
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Forestry and Philosophy. Administered by Horticulture. P: BS 161 or PLB 105 RB: CSS 350 or ZOL 341 R: Not open to freshmen or sophomores.  
Current and future roles of biotechnology in agriculture: scientific basis, applications. Environmental, social, and ethical concerns.
- 490 Independent Study**  
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: HRT 203 and HRT 204 R: Approval of department; application required.  
Independent study of horticulture on a field, laboratory, or library research program of special interest to the student.
- 491 Selected Topics in Horticulture**  
Fall, Spring. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: HRT 203 and HRT 204 R: Not open to freshmen or sophomores.  
Selected topics in horticulture of current interest and importance.
- 492 Undergraduate Research**  
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 3 credits in all enrollments for this course. P: HRT 203 and HRT 204 R: Approval of department; application required.  
Mentored field or laboratory research experience.

## Horticulture—HRT

- 493 Professional Internship in Horticulture**  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, ESA 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PLP 493, and PRR 493. P: HRT 203 and HRT 204 R: Open to seniors. Approval of department; application required.  
Professional career-related work experience supervised by a professional horticulturist.
- 812 Laboratory Research Techniques**  
Fall. 2(1-3) R: Open to graduate students in the Department of Horticulture.  
Demonstration and experience using various research techniques.
- 816 Environmental Design Theory**  
Fall. 3(3-0) Interdepartmental with Human Environment and Design and Landscape Architecture and Park, Recreation and Tourism Resources. Administered by Landscape Architecture. RB: Undergraduate design degree recommended.  
Differences between normative theories, scientific theories, models, and constructs. Exploration of normative theories related to thesis or practicum.
- 817 Environmental Design Studio**  
Fall, Spring. 3(0-6) Interdepartmental with Human Environment and Design and Landscape Architecture and Park, Recreation and Tourism Resources. Administered by Landscape Architecture. P: (LA 816 and LA 883) RB: Undergraduate design degree.  
Development of a student-selected environmental design project in a collaborative setting.
- 819 Advanced Plant Breeding**  
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Horticulture. RB: STT 422 and ZOL 341  
Genetic expectations resulting from breeding strategies with cross- and self-pollinated crop plants. Germplasm collections, mapping populations, and modifications of reproductive biology useful for crop improvement.
- 820 Plant Reproductive Biology and Polyploidy**  
Spring of odd years. 1(3-0) Interdepartmental with Crop and Soil Sciences and Forestry and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology  
Genetic processes underlying variations in plant reproductive biology and polyploidy. Utilization of these characteristics in plant breeding.
- 821 Crop Evolution**  
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Forestry and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology  
Cultural and biological aspects of the evolution of domestic plants.
- 822 Historical Geography of Crop Plants**  
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences and Forestry and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology  
Development and spread of the major crop species.
- 842 Population Genetics, Genealogy and Genomics**  
Fall. 3(3-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Forestry and Fisheries and Wildlife and Genetics. Administered by Forestry. RB: Pre-calculus, basic genetics  
Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.
- 853 Plant Mineral Nutrition**  
Fall of odd years. 3(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Horticulture. RB: PLB 301  
Inorganic ion transport in plant cells and tissues. Physiological responses and adaptation to problem soils. Genetic diversity in nutrient uptake and use by plants. Physiological roles of elemental nutrients in crop growth.
- 863 Environmental Plant Physiology**  
Spring of odd years. 3(3-0) Interdepartmental with Plant Biology. Administered by Plant Biology. RB: PLB 301 or PLB 414 or PLB 415 SA: BOT 863  
Interaction of plant and environment. Photobiology, thermophysiology, and plant-water relations.
- 865 Plant Growth and Development**  
Fall of even years. 3(3-0) Interdepartmental with Plant Biology. Administered by Plant Biology. RB: PLB 415 SA: BOT 865  
Genetics and biochemistry of development in higher plants as influenced by genes and environment. Biosynthesis, action and signal transduction of phytohormones and other signaling molecules. Patterning, meristem organization and formation of tissues and organs. Genetic mechanisms underlying developmental diversity.
- 883 Environmental Design Seminar**  
Fall, Spring. 3(3-0) Interdepartmental with Human Environment and Design and Landscape Architecture and Park, Recreation and Tourism Resources. Administered by Horticulture. RB: Undergraduate design degree.  
Examination of the breadth of environmental design projects. Literature review of focused projects. Development of practicum or thesis proposals.
- 890 Independent Study**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.  
Individual study of problems of special interest.
- 891A Selected Topics in Horticulture**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in the Department of Horticulture. Approval of department.  
Horticultural science topics of current interest and importance.
- 891B Selected Topics in Plant Breeding and Genetics**  
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Horticulture. R: Open only to graduate students in the Plant Breeding and Genetics major or Genetics major. Approval of department.  
Selected topics in plant breeding.
- 892 Plant Breeding and Genetics Seminar**  
Fall, Spring, Summer. 1(1-0) A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Horticulture.  
Experience in review, organization, oral presentation, and analysis of research.
- 894 Horticulture Seminar**  
Fall, Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course.  
Experience in review, organization, oral presentation and analysis of research.
- 898 Master's Research**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.  
Master's degree Plan B project.
- 899 Master's Thesis Research**  
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to graduate students in the Department of Horticulture.  
Master's thesis research.
- 941 Quantitative Genetics in Plant Breeding**  
Spring of even years. 3(2-2) Interdepartmental with Crop and Soil Sciences and Forestry. Administered by Crop and Soil Sciences. RB: CSS 819 and STT 464  
Theoretical and genetic basis of statistical analysis of quantitative traits using genetic markers. Computational tools for the study of quantitative traits.
- 999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Horticulture.  
Doctoral dissertation research.