Horticulture

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.

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 to students in the Institute of Agricultural Technology.

111 Landscape Design
Spring. 3(3-3) SA: HRT 072 Not open to students with credit in 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 Animal Science and 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.

211 Landscape Plants I
Fall. 3(2-2) R: Open to undergraduate students or agricultural technology students.
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
Fall, Spring. 3(2-2) R: Open to undergraduate students or agricultural technology students.
Identification, adaptation, and evaluation of flowering trees and shrubs, evergreen trees and shrubs, ground covers and bulbs.

213 Landscape Maintenance
Fall, Spring of odd years. 2(2-0) R: Open to undergraduate students or agricultural technology students.
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(2-2) P: HRT 213 or concurrently R: Open to undergraduate students or agricultural technology students.
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 to undergraduate students or agricultural technology students. SA: 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 Horticulture Industries Seminar
Fall. 1(1-2) R: Interest or experience in the ‘green industries’. R: Open to students in the Institute of Agricultural Technology. SA: HRT 064 Not open to students with credit in HRT 207.
Horticulture operations, products, services and marketing practices. Personal and professional development, career opportunities.

218 Irrigation Systems for Horticulture
Spring. 3(2-2) R: Open to undergraduate students or agricultural technology students.
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) R: CSS 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.

220 Annual and Aquatic Landscape Plants
Fall. 3(2-2) R: Open to undergraduate students or agricultural technology students.
Identification and evaluation of annuals, biennials and aquatic plants used in landscapes and for other horticultural purposes.

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.

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.

232 Principles and Practices of Grape Production
Spring of even years. 3(3-0) R: Northwestern Michigan College. P: PLB 105 R: Open to undergraduate students or agricultural technology students. SA: HRT 432
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.
Horticulture—HRT

234  Current Issues in Viticulture and Enology  
Spring of even years. 1(1-0) Spring: Northwestern Michigan College. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to undergraduate students or agricultural technology students. SA: HRT 334


242  Passive Solar Greenhouses for Protected Cultivation  
Spring. 1(1-0) R: Open to undergraduate students or agricultural technology students. 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  

244  Culinary and Medicinal Herbs  
Summer. 1(1-0) R: Open to undergraduate students or agricultural technology students. SA: HRT 334


245  Specialty Cut Flowers  
Summer. 1(1-0) R: Open to undergraduate students or agricultural technology students. SA: HRT 334


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  
Spring. 1(1-0) R: Open to undergraduate students or agricultural technology students. 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) R: Open to undergraduate students or agricultural technology students. SA: HRT 334


257  Organic Produce Wholesale Marketing  
Fall. 1(1-0) R: Open to undergraduate students or agricultural technology students. SA: HRT 334


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 hoophouse, 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 hoophouse, 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, composting, winter hoophouses, 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 259

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 HRT 109 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. Field trip required.

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, and site interaction. Relationship between design, construction and maintenance. Preparation of planting and maintenance specifications.

323  Floriculture Production: Herbaceous Perennials and Annuals  
Spring of even years. 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  
Spring. 2(1-2) P: HRT 203 or HRT 251 SA: HRT 335

Commercial production of grapes, blueberries, strawberries, raspberries, blackberries, cranberries and minor fruit. Physiology, growth and development of these species. Cultural practices used to optimize fruit yields and quality. Field trip required.

336  Viticulture and Berry Production  
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 or BS 161 or BS 171 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.

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  Advanced Horticultural Crop Physiology  
Spring. 3(3-0) P: HRT 361 or PLB 301 R: Not open to freshmen or sophomores. SA: HRT 480

Physiological and flowering responses of horticultural crop plants to environmental variables. Adaptive responses of plants to environmental stress. 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: (HRT 203) and completion of Tier I writing requirement RB: EC 201 or EC 202 R: Open 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: EC 201 or EC 202 R: Open to juniors or seniors or graduate students in the College of Agriculture and Natural Resources. SA: HRT 488

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) P: HRT 311 RB: HRT 311


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. 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 Animal Science and 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 250 or EEP 260 or ESA 343) or (ESA 444 or GEO 410) R: Open to juniors or seniors or graduate students.


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.

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. P: CSS 350 or ZOL 341 R: Open to juniors or seniors or graduate students.

Principles, concepts, and techniques of agricultural biotechnology. Recombinant DNA technology, plant molecular biology and transformation in relation to plant improvement.

460 Green Roofs and Walls
Fall of even years. 1(1-0) Interdepartmental with Fisheries and Wildlife and Geography and Planning, Design and Construction. Administered by Horticulture. P: HRT 203 or FW 101 or GEO 206 or PDC 120 or EGR 100 R: Open to juniors or seniors or graduate students.

Green roof and wall design and installation practices including plant species and substrates. Environmental impact, ecosystem services, integration with other environmental practices. Influence of economics, public policy, and industry organizations on the implementation of green roofs on a wide scale. Multidisciplinary nature of planning and implementation of successful green roof and wall projects.

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.

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, 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: 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.

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. P: HRT 203 and HRT 204 R: 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 Community Sustainability and Interior Design and Landscape Architecture. Administered by Landscape Architecture. RB: Undergraduate design degree recommended.

Differences between normative theories, scientific theories, models, and concepts. Exploration of normative theories related to thesis or practicum.
817 Environmental Design Studio
Fall, Spring. 3(0-3) Interdepartmental with Landscape Architecture. Administered by Landscape Architecture.
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
Germinative 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.

840 Agroforestry Systems
Fall. 3(2-3) Interdepartmental with Forestry. Administered by Forestry.
Agroforestry systems with a local and global perspectives, abbreviate biological and chemical processes in agroforestry ecosystems, effects and potential of agroforestry on forest dependent communities, climate change and ecosystem sustainability. Field trips required.

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

853 Plant Mineral Nutrition
Fall of odd years. 3(3-0) Interdepartmental with Crop and Soil Sciences. Administered by Horticulture. RB: PLB 301

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 molecular biology of development in higher plants as influenced by genes and environment. Biosynthesis, action and signal transduction of phytohormones and other signaling molecules. Initiation, formation and patterning of plant organs and cell types. 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.