

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, Summer. 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.

Plant growth and development. Interrelationship between cultural practice and plant performance. Plant classification, plant physiology and metabolism.

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. 2(2-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Community Sustainability. Administered by Crop and Soil Sciences. R: Open to undergraduate students or agricultural technology students.

Contemporary research and movements involving agricultural and food system sustainability. Socio-cultural factors influencing food and agriculture.

135 Crop Scouting and Investigation

Spring. 3(4-0) Interdepartmental with Crop and Soil Sciences. Administered by Crop and Soil Sciences. P: CSS 101 or HRT 203 RB: CSS 101L R: Open to undergraduate students or agricultural technology students.

Crop scouting and agricultural clientele interactions for improved crop management. 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.

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(0-2) 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.

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.

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.

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.

224 Sustainable Farm and Food Systems Field Studies

Fall. 1(0-4) Interdepartmental with Animal Science and Crop and Soil Sciences and Community Sustainability. Administered by Crop and Soil Sciences. P: CSS 124 R: Not open to freshmen or agricultural technology students.

Field visits to farm and food system operations that utilize sustainable practices in Michigan. Offered first half of semester.

231 Clerkship in Grape Harvesting and Processing

Fall of even years. 1(0-2) Fall: Northwestern Michigan College. R: Open to undergraduate students or agricultural technology students.

Hands-on skills in the management of grape harvest and processing; winery and cellar operations. Course meets on-farm. Field trips required.

232 Principles of Viticulture

Spring of even years. 3(3-0) Spring: Northwestern Michigan College. P: PLB 105 R: Open to undergraduate students or agricultural technology students. SA: HRT 432

Grapevine physiology, grape production, cultural practices and vineyard management. Field trip required.

233 Field Practices of Viticulture

Summer of even years. 3(2-2) P: HRT 232 R: Open to undergraduate students or agricultural technology students.

Cool climate grape production and vineyard management. Field trips required.

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- 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
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.
- 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**
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.
- 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.
- 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.
- 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 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, plant 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**
Fall. 3(2-2) 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.
- 336 Viticulture and Berry Production**
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.
- 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 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.
- 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.
- 405 Sustainable Practices for Horticultural Food Crop Production**
Spring. 1(1-0) P: HRT 203
Effects of horticultural practices on ecosystem services, integrated efficiency across perennial and annual food crop production systems. Impact of crops on the land and biodiversity. Management decision-making. Global forces impacting sustainability.
- 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.
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
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.

- 424 Sustainable Agriculture and Food Systems: Integration and Synthesis**
Fall. 3(3-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Community Sustainability. Administered by Crop and Soil Sciences. P: CSS 124 and (CSS 224 or concurrently) 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.
- 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 350 or concurrently) or (IBIO 341 or concurrently)
Plant improvement by genetic manipulation. History of plant breeding. Traditional and biotechnological means of improving plant cultivars by genetic manipulation. 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 IBIO 341 R: Open to juniors or seniors or graduate students.
Principles, concepts, and techniques of agricultural plant biotechnology. Recombinant DNA technology, plant molecular biology and transformation in relation to plant improvement.
- 460 Green Roofs and Walls**
Fall. 2(2-0) 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.
- 461 Seminar in Plant, Animal and Microbial Biotechnology**
Spring. 1(1-0) Interdepartmental with Animal Science and Biosystems Engineering and Crop and Soil Sciences. Administered by Horticulture. P: (ANS 425 or concurrently) or (BE 360 or concurrently) or (CSS 451 or concurrently) or (MMG 445 or concurrently)
Current applications of plant, animal and microbial biotechnology in agriculture and related industries. Technologies under development and factors associated with moving from laboratory to product development. Field trips required.
- 475 International Studies in Horticulture**
Spring of odd years, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: HRT 203 and HRT 204 R: Approval of department; application required.
Study and travel experience emphasizing contemporary problems, issues, and trends in horticulture.
- 477 Pesticides in Pest Management**
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Entomology. Administered by Entomology. RB: General chemistry, entomology, plant pathology, weed science. 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.
- 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.
- 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, CSUS 493, EEP 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, and PLP 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 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 constructs. Exploration of normative theories related to thesis or practicum.
- 817 Environmental Design Studio**
Fall, Spring. 3(0-6) 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
Genetic processes underlying variations in plant reproductive biology and polyploidy. Utilization of these characteristics in plant breeding.
- 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.
- 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.

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- 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.
- 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 36 credits in all enrollments for this course. R: Open to doctoral students in the Department of Horticulture.
Doctoral dissertation research.