204 Principles of Horticulture II Laboratory
Spring, 1(0-3) P/M: (HRT 204 or concurrently) SA: HRT 202L

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 students in the MSU-HMC IAT Applied Plant Science Program.

210 Nursery Management
Fall, 3(2-3) RB: (HRT 203 and HRT 203L and HRT 204 and HRT 204L) R: Not open to freshmen or sophomores. SA: HRT 071, HRT 310
Management of field and container grown nursery operations. Site selection and development, financing, legal restrictions, production practices, nutrition, irrigation, weed and pest control, modification of plant growth, storage, shipping, and marketing. Field trip required.

211 Landscape Plants I
Fall, 3(2-3)
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(2-3)
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.

214 Landscape and Turfgrass Business Operations
Spring, 2(2-0) 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.
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.

217 Landscape Plant Diagnostics
Fall of odd years. 3(2-2) RB: Ornamental plant identification (host plant); basic plant science R: Open only to students in the Institute of Agricultural Technology. SA: HRT 063 Not open to students with credit in HRT 063.
Problem diagnosis of insect pests, diseases and non-infectious disorders of woody and herbaceous ornamental plants. Plant and site inspection, sampling and testing techniques. Cultural, mechanical and chemical control strategies. Field trips 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 10 weeks of the semester.

219 Landscape Computer Aided Design
Spring, 2(0-4) R: (CSE 101) or (CSS 110)
Computer Aided Design (CAD) for landscape design. Calculations, take offs, perspective drawings, AutoCAD and LandCADD software.

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.

225A Basic Floral Design
Fall, Spring, 2(1-2)
Horticulture—HRT

225B Advanced Floral Design
Fall, Spring. 2(1-2) P.M. (HRT 225A or concurrently)
Marketing, selling, and designing flowers for weddings, funerals, and other special events. Identification, handling, and design use of fresh flowers and other materials. Laboratory fee required. Second half of semester.

290 Independent Study in Ornamental 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 only to students in the Institute of Agricultural Technology. SA: HRT 075 Not open to students with credit in HRT 075.
A planned learning experience developed by the student in cooperation with a faculty member.

291 Current Issues in Commercial Horticulture
Spring of even years. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to students in the MSU-NNC IAT Applied Plant Science Program.

311 Landscape Design and Management Specifications
Spring. 4(3-2) Interdepartmental with Landscape Architecture. P.M: (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.

322 Floriculture Production I: Potted Plants and Cut Flowers
Fall. 3(1-4) P.M. (HRT 203 and HRT 203L and HRT 204 and HRT 204L and HRT 221 or concurrently)
Commercial greenhouse and outdoor production of flowering and foliage potted plants and cut flowers. Plant identification, propagation, production, scheduling, and finishing procedures based on specific plant growth requirements. Field trips required.

333 Wine Judging
Fall. 3(3-0) R: Open only to students in the IAT Viticulture and Enology program. Approval of department: application 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 only to students in the IAT Viticulture and Enology program.

341 Vegetable Production and Management
Spring. 3(2-3) P.M: (HRT 203 and HRT 203L and HRT 204 or concurrently and HRT 204L or concurrently) SA: HRT 440, HRT 442, HRT 444 Field production of vegetable crops. Marketing systems, tillage practices, field establishment, cultural management, pest management, harvesting, and postharvest handling and storage. Field trip required.

394 Retail Florist Practicum
Fall, Spring. Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department; application required. Maximum of 6 credits may be earned in HRT 394 and HRT 493. SA: HRT 394A Customer relations. Floral design, flower buying, holiday planning, Advertising, display. Financial recordkeeping. Flower care and handling.

401 Physiology and Management of Herbaceous Plants
Fall. 3(3-0) P.M: (HRT 221 and BOT 301) R: Open to freshmen or sophomores. Physiological and flowers 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.M: (BOT 105 or BS 110) 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. Field trip required.

404 Horticulture Management (W)
Spring. 3(2-2) P.M: 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. Marketing 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. Field trip required.

432 Principles and Practices of Grape Production I
Spring. 3(3-0) P.M: (CEM 141 and CEM 161 and CSE 101) R: Open only to students in the IAT Viticulture and Enology program.
Grapevine physiology, structure, and function. Techniques for vineyard establishment. Cultivar and rootstock selection, influence of environmental factors on grape growth, pre-plant site selection and preparation, training and trellising systems, cultural practices for canopy management, and methods of crop control.

432L Principles and Practices of Grape Production I Laboratory
Spring. 2(0-4) P.M: (CEM 141 and CEM 161 and CSE 101) R: Open only to students in the IAT Viticulture and Enology program. C: HRT 432 concurrently.

433 Principles and Practices of Grape Production II
Spring. 3(3-0) P.M: (HRT 432 and HRT 432L) R: Open only to students in the IAT Viticulture and Enology program.
Canopy management, disease and pest control, and the influence of crop adjustment on vine physiology. Environmental effects on fruit maturation. Vineyard sampling techniques and harvesting practices for improved fruit quality.

433L Principles and Practices of Grape Production II Laboratory
Summer. 2(0-4) P.M: (HRT 432 and HRT 432L) R: Open only to students in the IAT Viticulture and Enology program. C: HRT 433 concurrently.
Vineyard management, Climate, crop load and vine physiology. Effects of pre- and post-veraison practices on vine and fruit development. Disease and pest control strategies. Vineyard berry sampling techniques and laboratory methods to assess fruit quality for harvest.
441 Plant Breeding and Biotechnology
Spring of even years. 4(3-2) Interdepartmental with Crop and Soil Sciences; Forestry. Administered by Department of Crop and Soil Sciences. P:M: (CSS 250)
Plant improvement by genetic manipulation. Genetic variability in plants. Traditional and biotechnological means of creating and disseminating recombinant genotypes and cultivars.

451 Cellular and Molecular Principles and Techniques for Plant Sciences
Spring. 42(2-6) Interdepartmental with Crop and Soil Sciences; Forestry. Administered by Department of Crop and Soil Sciences. RB: (CSS 350 or ZOL 341)
Principles, concepts, and techniques of agricultural plant biotechnology. Recombinant DNA technology, plant molecular biology, transformation, cell tissue, and organ culture in relation to plant improvement.

477 Pest Management I: Pesticides in Management Systems
Fall. 3(3-0) Interdepartmental with Entomology; Crop and Soil Sciences; Fisheries and Wildlife. Administered by Department of Entomology. RB: (CEM 143 or CEM 251) and (BOT 405 and CSS 402) and (ENT 404 or ENT 470 or FW 328) and completion of Tier I writing requirement. Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

480 Woody Plant Physiology
Spring. 3(3-0) Interdepartmental with Forestry. P:M: (BOT 301) 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; Forestry; Philosophy. P:M: (BOT 105 or BS 111) 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:M: (HRT 203 and HRT 203L and HRT 204 and HRT 204L) 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:M: (HRT 203 and HRT 203L and HRT 204 and HRT 204L) RB: (HRT 202) R: Not open to freshmen or sophomores. Selected topics in horticulture of current interest and importance.

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:M: (HRT 203 and HRT 203L and HRT 204 and HRT 204L) R: Open only to juniors and seniors in the IAT Viticulture and Enology program. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, APS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.
Professional career related work experience supervised by a professional horticulturist. Requires 40 hrs per week for 12 to 14 weeks. Must enroll semester prior to completing work experience.

494 Industry Master's Apprenticeship
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (HRT 433 and HRT 433L) or (HRT 435 and HRT 435L) R: Open only to students in the IAT Viticulture and Enology program. Approval of department; application required. A focused and supervised work experience with a grape or wine industry master. Intensive training in vineyard or winery techniques, operations and management.

801 Research Procedures in Plant Science
Spring. 3(2-2) RB: (STT 422)
Applications of epistemology and logic in plant science research. Classical research methods. Hypotheses. Analysis of laboratory, storage, greenhouse, and field experiments.

802 Growth and Development of Horticultural Crops
Spring of odd years. 3(2-2) RB: (BOT 301)
Molecular biology of growth and development including dormancy, germination, leaf development, flowering, fruiting, sexual reproduction, and senescence in horticultural crops.

803 Postharvest Physiology
Spring of odd years. 3(3-0)
Physiology, biochemistry and molecular biology of maturation, ripening and senescence of harvested horticultural crops.

811 Plant Developmental Genetics
Fall. 3(2-2) Interdepartmental with Plant Biology. RB: (ZOL 341 and CSS 350) and (PLB 415 and ZOL 320)
Genetic mechanisms controlling plant development. Model systems and internal, nonenvironmental factors. Methods for the study of plant development. The plant genome. Genetics underlying developmental diversity in higher plants.

816 Environmental Design Theory
Fall. 3(3-0) Interdepartmental with Landscape Architecture; Park, Recreation and Tourism Resources; Human Environment and Design. Administered by Department of Geography. 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
Spring, 3(0-6) Interdepartmental with Landscape Architecture; Park, Recreation and Tourism Resources; Human Environment and Design. Administered by Department of Geography. P.M. (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, 3(3-0) Interdepartmental with Crop and Soil Sciences; Forestry. RB: (CSS 450 and STT 422).

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, 1 credit. Interdepartmental with Crop and Soil Sciences; Forestry; Plant Pathology; Plant Biology. RB: Introductory Genetics and Plant Biology.

Genetic processes underlying variations in plant reproductive biology and polyploidy and the utilization of these characteristics in plant breeding.

821 Crop Evolution
Spring of odd years. 1 credit. Interdepartmental with Crop and Soil Sciences; Forestry; Plant Pathology; Plant Biology. 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; Forestry; Plant Pathology; Plant Biology. RB: Introductory Genetics and Plant Biology.

Development and spread of the major crop species.

827 Techniques in Cytogenetics
Fall of odd years. 10(0-3) Interdepartmental with Crop and Soil Sciences; Forestry. Administered by Department of Crop and Soil Sciences.

Preparation of chromosomes from commercially important plants for cytogenetic analysis.

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


863 Environmental Plant Physiology
Spring of odd years. 3(3-0) Interdepartmental with Plant Biology. Administered by Department of 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.