Maryland CTE Programs of Study

Horticulture Science I (2025)

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INTRODUCTION 2

A Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Agriculture Career Cluster is dedicated to careers involving the study and management of plant growth, soil health, and pest management, focusing on sustainable crop production for both food and goods. This Sub-Cluster includes careers in agronomy, horticulture, timber and plant fiber harvesting, and soil science that are aimed at enhancing crop yields, preserving soil resources, and developing advanced production practices. 2.B

C The Horticulture Science CTE Program of Study is designed to prepare students for successful careers in agriculture, specifically within the fields of horticulture, agronomy, soil science, integrated pest management, and sustainable crop production. Aligned with the Advance CTE Agriculture Career Cluster Framework, these courses provide a progressive learning experience that equips students with the foundational knowledge, practical skills, and technical competencies needed to excel in a rapidly evolving green industry. 2.C

D Horticulture Science I develops essential communication, critical thinking, and teamwork skills that support future success in horticulture careers. Upon completion, students are prepared to earn the OSHA 10-Hour General Industry (Agriculture) Safety Certification, ensuring a strong emphasis on workplace safety as they begin their horticulture studies and start building the foundation for advanced certifications, including the Commercial Pesticide Applicator Certification (CPAC). 2.D

E Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study. 2.E

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tudents are encouraged to participate in extended learning experiences through ligned Career and Technical Student Organizations (CTSOs). CTSOs are a

cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland. 2.F

KNOWLEDGE AND SKILLS 3

A The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to: 3.A

1. Identify and model the MNLGA CPH Code of Ethics (e.g., honesty in record-keeping, respect for IP rights), explain scenarios illustrating each ethical principle, and reflect on their own professional conduct. 3.A.1
2. Demonstrate positive work behaviors—recording attendance/punctuality, maintaining clean workspaces, wearing proper PPE—and evaluate how each behavior contributes to workplace safety. 3.A.2
3. Apply OSHA-10 safety standards by performing hazard assessments in greenhouse and field labs, correctly using lockout/tagout procedures on electrical equipment, and leading a safety briefing. 3.A.3
4. Produce technical lab reports that include a clear hypothesis, step-by-step methods, quantified results (with units), safety annotations, and a concise conclusion. 3.A.4
5. Diagnose at least three plant-health issues (e.g., iron chlorosis, powdery mildew, overwatering stress) by observing symptoms, comparing to diagnostic guides, and recommending corrective actions. 3.A.5
6. Demonstrate fundamental AIFD floral mechanics—wire poultry wire cage, tape wired roses, set kenzan in shallow dish—and apply basic design principles (line, form, color balance) to construct a hand-tied bouquet that meets professional staging guidelines (e.g., no exposed mechanics, even distribution of mass). 3.A.6

B The student identifies various career pathways in the horticulture science field. The student is expected to: 3.B

1. Research at least three horticulture and floral-design occupations (e.g., greenhouse technician, retail florist, landscape designer); prepare a one-page summary of education, certifications (OSHA-10, CPH, CFD), salary ranges, and career ladders. 3.B.1
2. Create a professional portfolio including copies of safety certificates, photos of propagation projects, and scanned images of floral designs; annotate each with context and outcomes. 3.B.2
3. Conduct a mock interview for an entry-level position, demonstrating clear descriptions of technical skills and portfolio highlights; receive peer feedback and revise responses. 3.B.3

C The student develops technology and digital literacy skills. The student is expected to: 3.C

1. Navigate and extract data from horticultural databases (e.g., USDA Plant Hardiness, cultivar trial results); import into a spreadsheet and create a chart showing zone suitability. 3.C.1

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2 Record greenhouse climate data (temperature, humidity, PAR light) over a week, calculate daily averages, and graph trends to identify correlations with plant growth rates. 3.C.2

3 Collaborate on a shared digital workspace (e.g., Google Docs or MS Teams): upload photos of floral designs, comment constructively on peers' work, and track revisions. 3.C.3

D The student integrates core academic skills into horticulture science practices. The student is expected to: 3.D

1 Write a summary of plant anatomical structures (roots, stems, leaves, flowers, fruits, seeds) and physiological processes (photosynthesis, respiration) using proper scientific terminology. 3.D.1

2 Convert soil mix ratios (e.g., 2:1:1 peat:sand:perlite) to percentages and calculate the mass of each component needed for a 20-liter batch. 3.D.2

3 Explain how photosynthesis and transpiration rates change under different light intensities by designing and interpreting a simple classroom experiment. 3.D.3

E The student investigates plant form and function by dissecting specimens, measuring physiological responses, and relating structures to environmental adaptations and stress responses.. The student is expected to: 3.E

1 Identify basic plant structures (roots, stems, leaves, flowers, fruits, seeds) and describe each function (e.g., roots for water/nutrient uptake, leaves for gas exchange), then explain plant responses to abiotic stresses (drought, salinity, temperature extremes). 3.E.1

2 Dissect monocot and dicot flowers; label parts (sepals, petals, stamens, pistils), photograph differences, and submit a comparative report. 3.E.2

3 Conduct a stomatal-density experiment: peel leaf epidermis, count stomata per mm^2 under a microscope, record data, and graph density vs. humidity. 3.E.3

F The student analyzes soil properties, interprets test data, and selects optimal growing media—including soilless options—for horticultural and floral applications based on water- holding, aeration, and structural needs. The student is expected to: 3.F

1 Describe soil texture triangle components (sand, silt, clay), perform a hand texturing test, classify a soil sample, and relate texture to drainage and aeration. 3.F.1

2 Interpret a full soil-test report (pH, N, P, K), calculate amendment rates (e.g., pounds of lime per 1,000 ft^2), and justify recommendations in writing. 3.F.2

3 Compare soilless media (peat moss, perlite, floral foam) for cut-flower support: measure water retention and structural integrity; defend your selection for a vase arrangement. 3.F.3

C The student implements an IPM program by identifying pests and diseases, monitoring populations, and applying cultural, biological, and mechanical

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controls in compliance with safety and label-reading protocols. The student is expected to: 3.G

1. Identify common greenhouse pests (aphids, whiteflies), diseases (botrytis, powdery mildew), and weeds; document life cycles with diagrams. 3.G.1
2. Develop and implement a weekly scouting plan—use yellow sticky cards, quadrat sampling; record pest counts and determine if thresholds are met. 3.G.2
3. Select and apply cultural (sanitation, resistant cultivars), biological (predatory mites), and mechanical (hand-removal) controls; read and interpret pesticide labels, calculate application rates, and demonstrate safe handling. 3.G.3

H The student plans and evaluates sustainable horticultural systems—such as composting, crop rotations, and local sourcing—to minimize environmental impact and promote long- term resource stewardship. The student is expected to: 3.H

1. Design and build a three-bin compost system; monitor temperature, moisture, and C:N ratio weekly; present findings in a lab journal. 3.H.1
2. Plan a four-year crop rotation schedule to minimize soilborne disease and nutrient depletion; simulate it in a plot map. 3.H.2
3. Incorporate locally sourced, seasonal cut flowers into three different floral designs; calculate each design's carbon footprint and propose ways to reduce it. 3.H.3

I The student masters essential post-harvest handling and mechanics to create professional-quality floral designs that meet industry standards for aesthetics, durability, and vase life. The student is expected to: 3.I

1. Condition fresh stems: recut at 45°, remove foliage below waterline, hydrate in preservative solutions; document changes in turgidity. 3.I.1
2. Construct a hand-tied bouquet using proper mechanics: hold stems at correct angle, wrap tape with uniform tension, and finish with decorative ribbon. 3.I.2
3. Evaluate vase-life: store designs at 4 °C, record daily freshness indicators (stem firmness, petal turgidity), and adjust hydration techniques as needed. 3.I.3