Maryland CTE Programs of Study

Horticulture Science II (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 10-12, and Horticulture Science I is the prerequisite. 1

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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 In Horticulture Science II, students evaluate nutrient requirements, soil amendments, and greenhouse production methods, honing their analytical and problem-solving skills to make informed crop management decisions. 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

F Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a ocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO ctivities is an expectation for CTE programs in the state of Maryland. 2.F

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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. Draft and maintain a professional development portfolio, including updated résumé, certificates (OSHA-30, CPH exam prep), and reflective journal entries on project outcomes. 3.A.1
2. Exhibit leadership and teamwork by coordinating a propagation or design project, assigning roles, managing time, and conducting a post-project debrief. 3.A.2
3. Prepare and deliver a client-style presentation summarizing a greenhouse or floral installation project, incorporating visual aids and responding to stakeholder questions. 3.A.3
4. Conduct self- and peer-assessments using industry rubrics (e.g., AIFD criteria) to identify strengths, set SMART goals for skill growth, and demonstrate progress. 3.A.4
5. Apply professional ethics and workplace standards—dress code, punctuality, safety compliance—in daily lab activities and record adherence in a workplace log. 3.A.5

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

1. Research and compare at least five horticulture-related careers (e.g., greenhouse manager, floriculturist, turfgrass specialist, landscape designer, nursery sales consultant), detailing required credentials, daily duties, and salary ranges. 3.B.1
2. Interview or shadow a professional in one chosen pathway; summarize insights on education, certifications (CPH, CFD), and career progression in a reflective report. 3.B.2
3. Map local and regional employment opportunities—public gardens, nurseries, landscapers, event-floral businesses—using online job boards and industry directories. 3.B.3
4. Evaluate emerging niche pathways (urban farming, vertical-farm technician, botanical- garden curator) for alignment with personal interests and regional labor trends. 3.B.4

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

1. Collect and log environmental data (temperature, humidity, light intensity) using digital sensors and export to spreadsheet software; create charts tracking trends over a two-week period. 3.C.1
2. Build and query a simple relational database of plant cultivars, propagation methods, and performance metrics; generate filtered reports for decision making. 3.C.2
3. Use GIS or mapping software to plot on-site trial plots or client landscapes, layering soil-test results and sunlight-exposure data to guide planting plans. 3.C.3

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4 Create and manage a digital portfolio website or blog showcasing propagation experiments, design projects, and safety documentation, with embedded photos and captions. 3.C.4

5 Use technology tools—digital sensors, mobile apps, geographic-information systems (GIS), and cloud-based dashboards—to collect, visualize, and analyze horticultural production data. 3.C.5

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

1 Write a technical report on an IPM trial—including hypothesis, materials and methods (with units), results (tables/graphs), and a discussion that references scientific literature. 3.D.1

2 Solve quantitative problems: calculate fertilizer injection rates (PPM), soil-amendment weights for given area, and irrigation volumes needed per planting schedule. 3.D.2

3 Apply biological concepts by explaining photosynthesis and nutrient uptake in propagation exercises; relate pH and EC measurements to plant physiology. 3.D.3

4 Interpret financial data: develop a basic budget for a small-scale greenhouse project, compute cost per plant, and project return-on-investment scenarios. 3.D.4

5 Apply mathematical and scientific principles (e.g., unit conversions, statistical analysis) to solve horticultural production and management problems. 3.D.5

E The student designs, evaluates, and manages production systems—such as hydroponics, aquaponics, and organic rotations—that optimize resource use and environmental stewardship. The student is expected to: 3.E

1 Assemble a nutrient-film technique (NFT) bench: calculate flow rates, monitor nutrient solution composition, and troubleshoot pump or clogging issues. 3.E.1

2 Plan a six-crop rotation for greenhouse microgreens to prevent disease carryover and maintain substrate fertility; simulate yields and nutrient drawdown. 3.E.2

3 Conduct a life-cycle assessment (LCA) for a cut-flower crop: quantify water, energy, and carbon inputs; propose improvements to reduce footprint by ≥15%. 3.E.3

F The student hones industry-level communication—written, oral, and visual—and practices leadership skills to coordinate teams and liaise with clients or stakeholders. The student is expected to: 3.F

1 Write a grant proposal summary for a school greenhouse upgrade: articulate objectives, budget breakdown, timeline, and expected student learning outcomes. 3.F.1

2 Deliver client presentations for a landscape-floral project: employ professional visuals (CAD renderings, mood boards), handle Q&A, and document feedback. 3.F.2

3 Mentor Horticulture I students through biweekly design critiques and propagation workshops; maintain a reflective journal of mentorship strategies and outcomes. 3.F.3

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G **The student demonstrates knowledge of the regulatory frameworks, professional standards, and documentation practices required for the MNLGA Certified Professional Horticulturist credential and maintains accurate, exam-ready records. The student is expected to:** 3.G

1. Identify each of the MNLGA CPH content areas (e.g., plant biology, soils & media, production systems, IPM, business management, codes & regulations), summarize key competencies, and map them to course activities. 3.G.1
2. Create and follow a personalized CPH study timeline, compile authoritative resources (manual chapters, journal articles, practice quizzes), and conduct biweekly self-assessments to track readiness. 3.G.2
3. Produce and organize standard operating procedures (SOPs) for greenhouse or propagation labs, detailed IPM scouting logs, and business-management worksheets (budgets, inventory records) in a consolidated digital portfolio. 3.G.3
4. Locate and interpret Safety Data Sheets (SDS) for at least five common horticultural inputs, extract hazard statements and recommended PPE, and practice recording this information in a lab-safety register. 3.G.4
5. Describe Maryland Department of Agriculture nursery/greenhouse registration procedures, local zoning or water-use regulations, and continuing-education obligations for CPH recertification; draft a compliance checklist. 3.G.5
6. Participate in a simulated CPH oral panel or written case study: present solutions to a real- world scenario (e.g., disease outbreak response, business-plan critique), justify decisions using CPH standards, and incorporate peer/instructor feedback. 3.G.6

H **The student develops turf in production settings by practicing seeding, mowing, fertilizing, and diagnosing turf issues common to lawns, athletic fields, and ornamentals. The student is expected to:** 3.H

1. Select appropriate grass species based on USDA hardiness zone and intended use; prepare a seedbed, sow seed at recommended rates, and monitor germination and establishment over four weeks. 3.H.1
2. Compare cutting heights (e.g., 1.5″ vs. 2.5″) on turf density, color, and wear tolerance; record observations weekly and recommend best mowing practices. 3.H.2
3. Identify drought stress, thatch buildup, nutrient deficiencies, and common fungal pathogens; prescribe integrated cultural (aeration, topdressing) and corrective treatments. 3.H.3

I **The student refines design proficiency by creating complex arrangements, critiquing peers, and adhering to industry presentation and durability standards. The student is expected to:** 3.I

1. Construct advanced pieces (e.g., geodesic spheres, wall installations) using foam, cages, wiring, and fresh materials; document each step with annotated photographs for portfolio inclusion. 3.I.1

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2 Apply the AIFD evaluation rubric to peer work—assessing proportion, unity, scale, and technical workmanship—and provide written, actionable feedback. 3.I.2

3 Package and protect mechanical elements, verify structural stability in transport, and draft client care instructions to ensure post-installation longevity. 3.I.3