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CTE Standards Unpacking
Advanced Horticulture

Course: Advanced Horticulture
Course Description: Advanced Horticulture is designed for instructors to customize the curriculum to local industry needs. Standards can be met by utilizing one or more of the following horticulture sectors: Landscape Design, Floriculture and/or Greenhouse Management. Topics include identification, use and management of equipment and materials, as well as managing plant growth and maintaining plants and equipment. Employment skills are an additional emphasis. All three of these industry sectors require skilled, educated employees. Classroom and laboratory content will be enhanced by utilizing appropriate equipment and technology. Mathematics, (geometry), science (physical science, biology, Chemistry), English and human relations skills will be reinforced in the course. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conference and skills competitions. Each student will be expected to maintain a Supervised Agricultural Experience (SAE) program.
Career Cluster: Agriculture, Food and Natural Resources
Prerequisites: Recommended Intro to AFNR, Fundamental Plant Science AND/OR Fundamental Horticulture
Program of Study Application: Advanced Horticulture is a second pathway course in the Agriculture, Food and Natural Resources Program of Study, Plant Systems pathway. Advanced Horticulture is preceded by a Fundamental Horticulture and would be followed by Ag Biotechnology.

<table>
<tr><td colspan="3">INDICATOR #ADVH 1: Identify plants, equipment and materials utilized in the horticulture industry.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.1 (Webb Level: 2 Skill/Concept): Identify and categorize plants by their purpose.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.2 (Webb Level: 1 Recall): Identify tools and equipment used in horticultural industries.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.3 (Webb Level: 1 Recall): Identify supplies and materials used in horticulture.</td></tr>
<tr><td>Knowledge (Factual):
-Identify floral plants

-Identify landscape plants

-Identify house plants

-Identify bedding plants

-Identify floral tools</td><td>Understand (Conceptual):
-Understand the proper uses of floral and house plants

-Understand the proper uses of greenhouse systems, landscape supplies and materials, and tools</td><td>Do (Application):
-Design a floral arrangement using appropriate tools

-Develop a greenhouse management plan

-Develop a landscape design</td></tr>
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-Identify landscaping tools and equipment -Identify greenhouse systems, benches, lights, etc. -Identify floriculture materials & containers -Identify hardscapes -Identify growing media, containers -Identify landscape supplies and materials (e.g. retaining wall brick, landscape fabric, etc).		

Benchmarks:

Students will be assessed on their ability to:

- Create a center piece floral arrangement.
- Draw a landscape design for a specific location in the community which is used for a purpose of choice. (ex. Handicap accessible park, daycare center, etc.)
- Design a greenhouse management plan for a spring plant sale.
- Compete in the Nursery Landscape Career Development Event.
- Compete in the Floriculture Career Development Event.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: 1) HSG.MG.A.1 - Use geometric shapes, their measures, and their properties to describe objects 2) HSG.CO.D.12 - Make formal geometric constructions with a variety of tools and methods	-Using geometric techniques, draw a landscape design with an attached legend. -Plan a symmetrical centerpiece floral arrangement using geometric constructions.

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INDICATOR #ADVH 2: **Develop and implement a crop management plan.**		
SUB-INDICATOR 2.1 (Webb Level: 4 Extended Thinking): Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.		
SUB-INDICATOR 2.2 (Webb Level: 3 Strategic Thinking): Determine the influence of environmental factors on plants.		
SUB-INDICATOR 2.3 (Webb Level: 3 Strategic Thinking): Develop and implement a plan for meeting plant nutrient needs.		
SUB-INDICATOR 2.4 (Webb Level: 4 Extended Thinking): Apply plant management practices.		
SUB-INDICATOR 2.5 (Webb Level: 2 Skill/Concept): Explain principles of specialized growing techniques.		
Knowledge (Factual): -Identify functions of different plant parts -Identify the effect of air temperature and water quantity on plant growth -Identify leaf types and arrangement patterns -Identify nutrient deficiencies in plants -Identify and discuss sustainable methods for growing plants -Identify and demonstrate different types of propagation -Identify different types of growing media -Discuss Genetically Modified Organisms (GMO) vs. naturally grown plants -Discuss the effect of growth hormones on plants	**Understand (Conceptual):** -Understand how environmental factors influence plants -Understand the relationship of plant structures to plant systems -Understand plant management practices -Understand the principles which impact growing techniques	**Do (Application):** -Dissect and label the parts of a flower -Measure and record the effect of air temperature and water quantity on plant growth -Conduct an experiment to test photosynthetic activity in plants -Compare and contrast the effect of light quality, intensity, and duration on plants -Develop a fertilizer plan for flower production -Develop a fertilizer application schedule for turf grass -Develop a fertilizer application schedule for bedding plants -Demonstrate the effect of drainage and water runoff in a landscape design

		-Measure water loss from transpiration -Analyze soil test to determine nutrient availability -Demonstrate care and handling of cut flowers -Critique landscape designs in your area

Benchmarks:
Students will be assessed on their ability to:

- Conduct an experiment on germination rates of plants.
- Perform pruning techniques used on a landscaping shrub.
- Prune trees and shrubs.
- Design an Integrated Pest Management plan and implement it in the greenhouse or on landscape plants.
- Conduct an experiment to determine effect of natural vs. mechanical pollination of plants.
- Observe effectiveness of various growing media to provide nutrients to plants.
- Research and build a hydroponics system.
- Utilize aquaponics to grow plants.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: 1) HSN.Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	-Compare and contrast the effect of light quality and intensity with a photometer.
2) HSG.CO.D.12 - Make formal geometric constructions with a variety of tools and methods	-Plan a landscape design using geometric methods.
English: 9-12 W.6 – Use technology, including the internet, to produce an individual writing product.	-Research and develop a plan to build a hydroponics system.

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INDICATOR #ADVH 3: **Apply principles of design in plant systems to enhance an environment.**		
SUB-INDICATOR 3.1 (Webb Level: 3 Strategic Thinking): Select plants based on quality and function.		
SUB-INDICATOR 3.2 (Webb Level: 4 Extended Thinking): Create designs using plants.		
SUB-INDICATOR 3.3 (Webb Level: 4 Extended Thinking): Demonstrate proper use of plants in their environment.		
SUB-INDICATOR 3.4 (Webb Level: 2 Skill/Concept): Evaluate a design and provide feedback and suggestions for improvement.		
Knowledge (Factual): -Identify the basic color schemes used in a floral design -Identify a greenhouse design for effectiveness and use for hobby farms as well as large and small commercial operations -Plant hardiness zones	**Understand (Conceptual):** -Understand how to select plants based on quality and function -Understand proper uses of floral designs and how designs are affected by regional availability due to climate -Understand the common landscape designs used in the region and how they are affected by local climate -Understand proper use of plants within their environments	**Do (Application):** -Develop a plan for the installation and maintenance of turf grass -Select flowers for their use in a given landscape -Utilize focal and filler plants in a floral design -Evaluate a floral arrangement -Evaluate a floral or Christmas wreath design -Judge photographs of floral arrangements showing balance, proportion, scale, focal point, emphasis, rhythm, harmony, and unity -Evaluate a landscape or landscape plan
Benchmarks: *Students will be assessed on their ability to:* • Create a commercial display for a greenhouse. • Create floral arrangements. • Create a landscape design.		

- Propose suitable replacement plants for a given landscape that takes into account heat tolerance and proper sunlight.
- Compete in Floriculture Career Development Event.
- Compete in the Nursery Landscape Career Development Event.

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard): English: 9-12 W.6 – Use technology, including the internet, to produce an individual writing product and to give feedback.	**Sample Performance Task Aligned to the Academic Standard(s):** -Research and present the maintenance of turf grass systems.

INDICATOR #ADVH 4: **Develop employability skills related to the Plant Systems Pathway.**

SUB-INDICATOR 4.1 (Webb Level: 2 Skill/Concept): Develop soft skills to enhance employability.

Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Identify plant science related careers -Recognize non-verbal communication. signals -Identify ways to handle conflict	-Understand plant system Career pathways -Understand plant system career educational requirements	-Demonstrate proper communication skills -Compose a cover letter, resume, and follow-up letter -Fill out a job application -Complete a job interview

Benchmarks:
Students will be assessed on their ability to:

- Create an SAE project.
- Work as a team to solve problems.
- Compete in the Job Interview CDE.
- Write a thank you/follow up letter after job interview.

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Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
English: 1) 9-12 SL.1 - Participate in collaborative discussion	-Complete a job interview with local business representatives.
2) 9-12 W.2 – Write to inform	-Compose a cover letter, resume, and follow-up letter.

Additional Resources

- Plant Science lessons (Middle School Food and Agricultural Literacy Curriculum: Educators Resources in ffa.org)
- Agricultural Science and Technology lessons (Middle School Food and Agricultural Literacy Curriculum: Educators Resources in ffa.org)
- MyCAERT Curriculum
- Plant & Soil Science: Fundamentals and Applications by Rick Parker (Delmar Cengage Learning)
- Principles of Agriculture, Food, and Natural Resources by Rayfield, Smith, Park, and Croom (Goodheart-Wilcox Publisher)
- Curriculum for Agricultural Science Education: Principles of Agricultural Science-Plant
- Communities of Practice: Horticulture/Greenhouse Management (https://communities.naae.org/community/instruction/horticulture)