

Colorado CTE Course – Scope and Sequence

Course Name	Principles of Horticulture A		Course Details	Level 2 course in the Plant Science Pathway. First course in the horticulture/green industry strand.		
			Course = 0.50 Carnegie Unit Credit			
Course Description	This course is designed to introduce students to the horticulture industry. Major units of instruction include horticulture research, horticultural careers, plant anatomy, seed germination, plant propagation, growing media, pest management, hydroponics, identifying horticultural plants, soil science, growing greenhouse crops. Improving industry standard workplace skills will be a focus. Participation in FFA student organization activities and Supervised Agricultural Experience (SAE) projects is an integral course component for leadership development, career exploration and reinforcement of academic concepts.					
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.					
SCED Identification #	18052	Schedule calculation based on 60 % of instructional time in the semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.				
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills						
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration	
Unit 1: Industry & Careers 1. Careers 6% 2. Areas/branches of Horticulture 4%	10%	CS.01 – Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Clusters. CS.05. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources career pathways.	CS.01.01 – Research, examine and discuss issues and trends that impact AFNR systems on local, state, national, and global levels CS.05.01. Evaluate and implement the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).	CS.01.01.01.a – Examine historical and current data to identify issues impacting AFNR systems. CS.01.01.02.a – Research and summarize trends impacting AFNR systems CS.05.01.01.a – Identify and summarize the steps to pursue a career in an AFNR pathway CS.05.01.02.a – Examine the educational training and experiential requirements to pursue a career in an AFNR pathway CS.05.01.03.a – Research		

			<p>CS.05.02 – Examine and choose career opportunities that are matched to personal skills, talents, and career goals in an AFNR pathway of interest</p>	<p>and summarize specific tools and processes needed to pursue a career in an AFNR pathway</p> <p>CS.05.02.01.a – Examine and categorize careers in each of the AFNR pathways CS.0502.02.a – Research and describe careers in each of the AFNR pathways and choose potential careers connecting to personal interests and skills.</p>	
<p>Unit 2: Anatomy and Physiology</p> <ol style="list-style-type: none"> 1. Plant parts & Anatomy – 10% 2. Physiological Plant processes – 10% 3. Environmental Factors – 10% 	30%	<p>PS.01 – Develop and implement a crop management plan for a given production goal that accounts for environmental factors</p> <p>PS.02 – Apply principles of classification, plant anatomy, and plant physiology to plant production and management.</p>	<p>PS.01.01 – Determine the influence of environmental factors on plant growth <u>SCIENCE: SC.HS.2.6</u></p> <p>PS.02.02 – Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems</p>	<p>PS.01.01.01.a – Identify and summarize the three measurements of light – color, intensity, and duration – that affect plant growth</p> <p>PS.01.01.02.a – Identify and summarize the effects of air and temperature on plant metabolism and growth</p> <p>PS.01.01.02.b – Determine the optimal air and temperature conditions for plant growth</p> <p>PS.01.01.03.a – Identify and summarize the effects of water quality on plant growth (eg. pH, dissolved solids, etc...)</p> <p>PS.02.02.01.a – Identify structures in a typical plant cell and summarize the function of plant cell organelles.</p>	

			<p><u>SCIENCE: SC.HS.2.2</u></p> <p>PS.02.03 – Apply knowledge of plant physiology and energy conversion to plant systems</p> <p><u>SCIENCE:SC.HS.2.3</u> <u>SC.HS.2.5</u></p>	<p>PS.02.02.02.a – Identify and summarize the components and the functions of plant roots</p> <p>PS.02.02.03.a – Identify and summarize the components and the functions of plant stems</p> <p>PS.02.02.04.a – Research and summarize leaf morphology and functions of leaves</p> <p>PS.02.02.04.b – Analyze how leaves capture light energy and summarize exchange of gasses</p> <p>PS.02.02.5.a – Identify and summarize the components of a flower, the functions of a flower, and the functions of flower components</p> <p>PS.02.02.6.a – Identify and summarize the functions and components of seeds and fruits</p> <p>PS.02.02.6.b – Analyze and categorize the major types of fruits and seeds</p> <p>PS.02.03.01.a – Summarize the importance of photosynthesis to plant life on earth and the process of photosynthesis, including the types, stages, its products and byproducts.</p>	
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				PS.02.03.02.a – Summarize the stages of cellular respiration including their products and byproducts	
Unit 3: Classification & Taxonomy 1. Plant Classification – 8% 2. Plant Taxonomy- 6% 3. Plant Identification – 6%	20%	PS.02. Apply principles of classification, plant anatomy, and plant physiology to plant production and management.	PS.02.01 – Classify plants according to taxonomic systems	PS.02.01.01.a – Identify and summarize systems used to classify plants based on specific characteristics PS.02.01.01.b – Compare and contrast the hierarchical classification of agricultural and ornamental plants PS.02.01.01.c – Classify agricultural and ornamental plants according to the hierarchical classification system PS.02.01.02.a – Describe the morphological characteristics used to identify agricultural and herbaceous plants (eg... life cycles, growth habit, plant use and as monocots, dicots, woody, herbaceous, etc....) PS.02.01.02.b – Identify and describe important plants to agricultural and ornamental systems by common names PS.02.01.02.c - Identify and describe important plants to agricultural and ornamental systems by scientific names	

Course Name	Principles of Horticulture B		Course Details	Level 2 course in the Plant Science pathway. First course in the horticulture/green industry strand.	
			Course = 0.50 Carnegie Unit Credit		
Course Description	This course continues to introduce students to the horticulture industry. Major units of instruction include horticulture research, horticultural careers, plant anatomy, seed germination, plant propagation, growing media, pest management, hydroponics, identifying horticultural plants, soil science, growing greenhouse crops. Improving industry standard workplace skills will be a focus. Participation in FFA student organization activities and Supervised Agricultural Experience (SAE) projects is an integral course component for leadership development, career exploration and reinforcement of academic concepts.				
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	18052	Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Unit 1: Reproduction & Propagation 1. Sexual Propagation & Genetics – 10% 2. Asexual Propagation – 10% 3. Micro-Propagation – 2%	22%	PS.03 – Propagate, culture and harvest plants and plant products based on current industry standards	PS.03.01 – Demonstrate plant propagation techniques in plant system activities	PS.03.01.01.a – Identify examples of and summarize pollination, cross-pollination and self-pollination of flowering plants PS.03.01.02.a – Demonstrate sowing techniques for providing favorable conditions to meet the factors of seed germination PS.03.01.03.a – Summarize optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation, layering, budding, and grafting	

					PS.03. 01.04.a – Define micro- propagation, discuss advantages associated with the main stages of the process
Unit 2: Soils, Nutrients, & Fertilizers <ol style="list-style-type: none"> 1. Soil profile & texture – 4% 2. Soilless Media – 4% 3. Nutrients – 7% 4. Fertilizers – 7% 5. Hydro/Aquaponics – 2% 	24%	PS.01 – Develop and implement a crop management plan for a given production goal that accounts for environmental factors.	PS.01.02 – Prepare and manage growing media for use in plant systems	PS.01.02.01.a – Identify the major components of growing media and describe how growing media support plant growth.	
			PS.01.03 – Develop and implement a fertilization plan for specific plants or crops <i>MATH: MA.HS.N.Q.A</i>		PS.01.02.01.b – Describe the physical and chemical characteristic of growing media and explain the influence they have on plant growth. PS.01.02.01.c – Formulate and prepare growing media for specific plants or crops. PS.01. 02.02.a – Identify the categories of soil wate PS.01.02.02.b – Discuss how soil drainage and water-holding capacity can be improved PS.01.03.01.a – Identify the essential nutrients for plant growth and development and their major functions (nitrogen, phosphorus, potassium, etc...) PS.01. 03.01.b – Analyze the effects of nutrient deficiencies and symptoms and recognize

				<p>environmental causes of nutrient deficiencies</p> <p>PS.01.03.02.a – Discuss the influence of pH and cation exchange on the availability of nutrients</p> <p>PS.01.03.02.b – Contrast pH and cation exchange capacity between mineral soil and soilless growing media</p> <p>PS.01.03.02.c – Adjust the pH of growing media for specific plants or crops</p> <p>PS.01.03.04.a – Identify fertilizer sources of essential plant nutrients; explain fertilizer formulations, including organic and inorganic; and describe different methods of fertilizer application</p> <p>PS.01.03.06.a – Summarize the impact of environmental factors on nutrient availability (moisture, temperature, pH, etc...)</p>	
<p>Unit 3: Integrated Pest Management</p> <ol style="list-style-type: none"> 1. Types of Pests (insects, weeds, diseases, etc) – 6% 2. Economic Threshold – 4% 3. Steps in IPM – 4% 	14%	<p>PS.03 Propagate, culture, and harvest plans and plant products based on current industry standards.</p>	<p>PS.03.03 Develop and implement a plan for integrated pest management for plant production.</p>	<p>PS.03.03.01.a Identify and categorize plant pests, diseases and disorders.</p> <p>PS.03.03.01.b Identify and analyze major local weeds, insect pests and infection and noninfectious plant diseases.</p>	

				<p>PS.03.03.02.a Diagram the life cycle of major plant pests and diseases.</p> <p>PS.03.03.03.a Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold.</p> <p>PS.03.03.04.a Distinguish between risks and benefits associated with the materials and methods used in plant pest management.</p> <p>PS.03.03.04.b Examine and apply procedures for the safe handling, use and storage of pesticides including personal protective equipment and reentry interval</p>	
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CAS Academic Standards Alignment: Online Version: <https://www.cde.state.co.us/apps/standards/>; Download version: <https://www.cde.state.co.us/apps/standards/>

Reading, Writing, and Communicating: (RST/WHST are Common Core Standards aligned; <http://www.corestandards.org/ELA-Literacy/RI/introduction-for-6-12/>)

Math:

- MA.HS.N-Q.A – Quantities: Reason quantitatively and use units to solve problems.

Science:

- SC.HS.2.2 – Growth and division of cells in complex organisms occurs by mitosis, which differentiates specific cell types.
- SC.HS.2.3 – Organisms use matter and energy to live and grow.
- SC.HS.2.5 – Matter and energy necessary for life are conserved as they move through ecosystems.
- SC.HS.2.6 – A complex set of interactions determine how ecosystems respond to disturbances.

Essential Skills:

Problem Solver:

- **Critical Thinking and Analysis:** The ability to apply a deliberate process of identifying problems, gathering information, and weighing possible solutions, including: making choices rooted in understanding patterns, cause-and-effect relationships, and the impacts that a decision can have on the individual and others.

Empowered Individual:

- **Self-Management:** The ability to manage one's emotions, thoughts and behaviors effectively in different situation and to achieve goals and aspirations, including: the capacity to delay gratification, manage stress, stay productive and accountable, and feel motivation & agency to accomplish personal/collective goals.
- **Career Awareness:** The ability to apply the knowledge and understanding of how one's dreams, experiences, and interests translate into career fulfillment and lifelong pursuits in local, regional, national, and global career pathways and opportunities.