

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.05.02 – Examine and choose career opportunities that are matched to personal skills, talents, and career goals in an AFNR pathway of interest	CS.05.01.03.a – Research and summarize specific tools and processes needed to pursue a career in an AFNR pathway 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.	
Unit 2: Anatomy and Physiology 1. Plant parts & Anatomy – 10% 2. Physiological Plant processes – 10% 3. Environmental Factors – 10%	30%	PS.01 – Develop and implement a crop management plan for a given production goal that accounts for environmental factors PS.02 – Apply principles of classification, plant anatomy, and plant physiology to plant	PS.01.01 – Determine the influence of environmental factors on plant growth SCIENCE: SC.HS.2.6 PS.02.02 – Apply knowledge of plant anatomy and the functions of plant	PS.01.01.01.a – Identify and summarize the three measurements of light – color, intensity, and duration – that affect plant growth PS.01.01.02.a – Identify and summarize the effects of air and temperature on plant metabolism and growth PS.01.01.02.b – Determine the optimal air and temperature conditions for plant growth PS.01.01.03.a – Identify and summarize the effects of water quality on plant growth (eg. pH, dissolved solids, etc...) PS.02.02.01.a – Identify structures in a typical plant	Leaf Structure Notes Describing Leaves Activity Roots & Stems Notes Monocot & Dicot Notes Seed Dissection Lab Flower Anatomy Notes Pollination and Types of Inflorescences Notes

		production and management.	structures to activities associated with plant systems <u>SCIENCE: SC.HS.2.2</u> PS.02.03 – Apply knowledge of plant physiology and energy conversion to plant systems <u>SCIENCE: SC.HS.2.3</u> <u>SC.HS.2.5</u>	cell and summarize the function of plant cell organelles. PS.02.02.02.a – Identify and summarize the components and the functions of plant roots PS.02.02.03.a – Identify and summarize the components and the functions of plant stems PS.02.02.04.a – Research and summarize leaf morphology and functions of leaves PS.02.02.04.b – Analyze how leaves capture light energy and summarize exchange of gasses PS.02. 02.5.a – Identify and summarize the components of a flower, the functions of a flower, and the functions of flower components PS.02. 02.6.a – Identify and summarize the functions and components of seeds and fruits PS.02.02.6.b – Analyze and categorize the major types of fruits and seeds PS.02.03.01.a – Summarize the importance of photosynthesis to plant life on earth and the process of photosynthesis, including the	Flower Dissection Lab
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				types, stages, its products and byproducts.	
				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	Plant Classification Notes Dicotomous Key Activity

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	Asexual Propagation Slides Asexual Propagation Scenarios Hydroponics Design Challenge

				PS.03. 01.04.a – Define micro- propagation, discuss advantages associated with the main stages of the process	
Unit 2: Soils, Nutrients, & Fertilizers 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.01.03 – Develop and implement a fertilization plan for specific plants or crops <u>MATH: MA.HS.N.Q.A</u>	PS.01.02.01.a – Identify the major components of growing media and describe how growing media support plant growth. 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 water 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 environmental causes of nutrient deficiencies	Soil Properties Notes Soil Texture Testing Lab Soil Texture Testing Lab Worksheet Soil Nutrient & pH Lab Composting Notes

				PS.01.03.02.a – Discuss the influence of pH and cation exchange on the availability of nutrients PS.01.03.02.b – Contrast pH and cation exchange capacity between mineral soil and soilless growing media PS.01.03.02.c – Adjust the pH of growing media for specific plants or crops 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 PS.01.03.06.a – Summarize the impact of environmental factors on nutrient availability (moisture, temperature, pH, etc...)	
Unit 3: Integrated Pest Management - Types of Pests (insects, weeds, diseases, etc) – 6% - Economic Threshold – 4% - Steps in IPM – 4%	14%	PS.03 Propagate, culture, and harvest plans and plant products based on current industry standards.	PS.03.03 Develop and implement a plan for integrated pest management for plant production.	PS.03.03.01.a Identify and categorize plant pests, diseases and disorders. PS.03.03.01.b Identify and analyze major local weeds, insect pests and infection and noninfectious plant diseases. PS.03.03.02.a Diagram the life cycle of major plant pests and diseases.	IPM Slides Plant Pest Tombstone Project

				PS.03.03.03.a Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold. PS.03.03.04.a Distinguish between risks and benefits associated with the materials and methods used in plant pest management. 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	
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Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc)

[CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Standard 1: Oral Expression and Listening

Prepared Graduate 1: *Collaborate effectively as group members or leaders who listen actively and respectfully; pose thoughtful questions, acknowledge the ideas of others; and contribute ideas to further the group's attainment of an objective.*

Students collaborate to investigate plant growth, evaluate propagation methods, diagnose plant health issues, develop greenhouse production plans, and solve horticultural production challenges through laboratory activities and project-based learning.

Standard 2: Reading for All Purposes

Prepared Graduate 4: *Read a wide range of informational texts to build knowledge and to better understand the human experience.*

Students analyze horticultural research, plant identification guides, soil science resources, greenhouse production manuals, integrated pest management recommendations, hydroponic systems information, and industry publications to understand horticultural production practices.

Prepared Graduate 5: *Understand how language functions in different contexts, command a variety of word-learning strategies to assist comprehension, and make effective choices for meaning or style when writing and speaking.*

Students develop and apply specialized vocabulary related to plant anatomy, seed germination, propagation, soil science, growing media, hydroponics, integrated pest management, greenhouse production, plant nutrition, and horticultural careers to communicate effectively in horticulture settings.

Standard 3: Writing and Composition

Prepared Graduate 6: *Craft arguments using techniques specific to the genre.*

Students evaluate propagation techniques, greenhouse management practices, pest management strategies, growing media, and hydroponic production systems, defending recommendations using scientific evidence, observations, and horticultural data.

Prepared Graduate 7: *Craft informational/explanatory texts using techniques specific to the genre.*

Students develop greenhouse production plans, plant propagation procedures, pest management plans, plant care guides, and technical reports explaining plant growth, soil management, and horticultural production practices using scientific evidence.

Standard 4: Research Inquiry and Design

Prepared Graduate 10: *Gather information from a variety of sources; analyze and evaluate its quality and relevance; and use it ethically to answer complex questions.*

Students research plant species, propagation methods, soil and growing media, greenhouse technologies, hydroponic systems, pest management strategies, and horticultural careers to develop evidence-based solutions that improve plant production, health, and sustainability.

Note: *Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.*

