CareerClusters® PATHWAYS TO COLLEGE & CAREER READINESS
Agriculture, Food & Natural Resources

Learning that works for Colorado CTE®

Colorado AFNR Course Scope and Sequence

Course Name	**Soil Science**		**Course Details** **Course = 0.50 Carnegie Unit Credit**	Level 3 course in the Plant Science pathway. This course could serve to either the Agronomy or Horticulture strand.	
Course Description	Focuses on formation, physical properties, chemical properties, land classification and management of soils emphasizing conditions that affect plant growth. 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 #		Schedule calculation based on 60% of a semester instructional time. 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**					
Unit Number, Title and Brief Description	Suggested % of Instructional Time	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Unit 1: Careers	3%	**CS.05.** Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources career pathways.	**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.05.01.02.a** Examine the educational, training, and experimental requirements to pursue a career in an AFNR pathway. (e.g. degrees, certifications, training, internships, etc)	
Unit 2: Formation & Morphology	6%	**PLSC.11.** Understand, evaluate and apply management practices for soils	**PLSC.11.01** Understand and relate the factors of soil formation	**PLSC.11.01.b** Describe the process of soil formation through the five soil forming factors time, topography, weathering, soil organisms, and climate	Land Evaluation CDE

				PLSC.11.01.c Differentiate soils based on soil horizons, parent material, Etc. **PLSC.11.01.d** Describe the soil classification system and relate it to geographic landforms, etc.	
Unit 3: Water Capacity	4%	**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.01.02.02.a.** Identify the categories of soil water. **PS.01.02.02.b**. Discuss how soil drainage and water-holding capacity can be improved.	
Unit 4: Structure, Infiltration, and Percolation	2%	**PS.01.** Develop and implement a crop management plan for a given production goal that accounts for environmental factors. **PLSC.11** Understand, evaluate and supply management practices for soils.	**PS.01.02.** Performance Indicator: Prepare and manage growing media for use in plant systems. **PLSC.11.02** Identify soil physical characteristics and relate to soil management	**PS.01.02.02.b**. Discuss how soil drainage and water-holding capacity can be improved. **PLSC.11.02.b** Explain how the physical qualities of the soil influence the infiltration and percolation of water	
Unit 5: Soil Color	4%	**PLSC.11.** Understand, evaluate and apply management practices for soils	**PLSC.11.05** Explain soil color and relate to soil management	**PLSC.11.05 a.** Identify factors that determine soil color such as hue, chroma, and value **PLSC.11.05.b** Utilize a Munsell color chart to determine soil color **PLSC.11.05.c** Determine how soil color is related to	

				subsurface drainage problems like glaying and mottling **PLSC.11.05.d** Prescribe treatments for soils lacking suitable characteristics for plant growth based on their soil color (i.e. glaying and mottling)	
Unit 6: Soil pH and Salinity • Impact • Measurement • Management	4%	**PS.01.** Develop and implement a crop management plan for a given production goal that accounts for environmental factors. **PLSC.11.** Understand, evaluate and apply management practices for soils	**PS.01.03.** Develop and implement a fertilization plan for specific plants or crops. *MATH: MA.HS.N.Q.A* **PLSC.11.11** Explain soil salinity, sodacity and their management	**PS.01.03.02.a.** Discuss the influence of pH and cation exchange capacity 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. **PLSC.11.11.b** Discuss the sources of soluble salts, the EC test and EC test values that limit plant growth	
Unit 7: Chemical Properties and Bulk Density • Impact on Production and non-production use	4%	**PLSC.11.** Understand, evaluate and apply management practices for soils	**PLSC.11.02** Identify soil physical characteristics and relate to soil management	**PLSC.11.02.a** Identify physical properties of soil (bulk density, aeration/drainage, water holding capacity, texture, structure)	
Unit 8: Erosion, Tillage, and Compaction	9%	**PS.01.** Develop and implement a crop management plan for a given production goal	**PS.01.03.** Develop and implement a fertilization plan for specific plants or crops. *MATH: MA.HS.N.Q.A*	**PS.01.03.05.a**. Research and summarize production methods focused on soil management (e.g., crop	

		that accounts for environmental factors.		rotation, companion planting, cover crops, etc.). **PS.01.03.05.b**. Assess and describe the short- and long- term effects production methods have on soil. **PS.01.03.05.c.** Devise a plan for soil management for a selected production method.	
Unit 9: Conservation & Soil Management • Historical Perspectives • NRCS & Soil Conservation Programs • Conservation Practices	9%	**PS.03.** Propagate, culture and harvest plants and plant products based on current industry standards.	**PS.03.04.** Apply principles and practices of sustainable agriculture to plant production	**PS.03.04.01.a.** Compare and contrast the alignment of different production systems (conventional and organic) with USDA sustainable practices criteria. **PS.03.04.01.b.** Analyze the alignment of modern technologies used in production systems (e.g., precision agriculture, GE crops, etc.) with USDA sustainable practices criteria. **PS.03.04.01.c**. Research, prepare and defend plans for a plant systems enterprise that aligns with USDA sustainable practices criteria.	
Unit 10: Regenerative Ag. • Definition • Promising Practices • Implications & Impact	4%	**PS.03.** Propagate, culture and harvest plants and plant products based on	**PS.03.04.** Apply principles and practices of sustainable agriculture to plant production.	**PS.03.04.02.a.** Summarize national/international and local/regional food production systems.	

		current industry standards.	SCIENCE: SC.HS.3.9	**PS.03.04.02.b.** Compare and contrast the impact on greenhouse gas, carbon footprint of the national/international production system with local/regional production system markets. **PS.03.04.02.c.** Select and defend the use of nationally/internationally grown or locally/regionally grown for a production operation system.	
Unit 11: Classification of Soils	4%	**PLSC.11.** Understand, evaluate and apply management practices for soils	**PLSC.11.16** Understand and apply soil surveys	**PLSC.11.16.c** Utilize soil survey to determine best land uses (crop land, homesite, etc.)	
Unit 12: Fertilizer Management	7%	**PS.01.** Develop and implement a crop management plan for a given production goal that accounts for environmental factors.	**PS.01.03.** Develop and implement a fertilization plan 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.01.03.04.b.** Calculate the amount of fertilizer to be applied based on nutrient recommendation and fertilizer analysis. **PS.01.03.04.c.** Calibrate application equipment to meet plant nutrient needs. **PS.01.03.06.c.** Devise a plan to meet plant nutrient needs based on	

				environmental factors present.	

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.3.9 – Resources availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.

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.

Community Member:

- Civic Engagement: The ability to develop and apply knowledge, skills, and habits gained from experiences – within communities of diverse perspectives – to address issues, affect change, and/or solve problems.

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.