

Colorado AFNR Course Scope and Sequence

Course Name	Soil Science		Course Details	Level 3 course in the Plant Science pathway. This course could serve to either the Agronomy or Horticulture strand.	
			Course = 0.50 Carnegie Unit Credit		
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. <u>MATH: MA.HS.N.Q.A</u> 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	PS.01.03. Develop and implement a fertilization	PS.01.03.05.a. Research and summarize	

		management plan for a given production goal that accounts for environmental factors.	plan for specific plants or crops. <u>MATH: MA.HS.N.Q.A</u>	production methods focused on soil management (e.g., crop 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 current industry standards.	PS.03.04. Apply principles and practices of sustainable agriculture to plant production. <u>SCIENCE: SC.HS.3.9</u>	PS.03.04.02.a. Summarize national/international and local/regional food production systems. 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.	
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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 soil formation, evaluate physical, chemical, and biological soil properties, conduct soil analyses, develop land management recommendations, and solve soil conservation challenges through laboratory activities, field investigations, 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 soil survey data, land capability classifications, soil test reports, conservation planning resources, nutrient management recommendations, and scientific literature to understand soil properties, land use, and sustainable soil management.

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 soil formation, soil morphology, soil texture, soil chemistry, soil fertility, erosion, conservation, nutrient cycling, and land capability to communicate effectively in soil science and agricultural settings.

Standard 3: Writing and Composition

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

Students evaluate soil management practices, conservation systems, fertility programs, erosion control methods, and land use decisions, defending recommendations using scientific evidence, soil test results, and field observations.

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

Students develop soil management plans, nutrient management recommendations, conservation plans, land evaluation reports, and technical documents explaining soil characteristics and sustainable management 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 soil formation processes, physical and chemical soil properties, land capability, nutrient management, soil conservation practices, and sustainable land management strategies to develop evidence-based solutions that improve soil health, agricultural productivity, and environmental stewardship.

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