

Colorado AFNR Course Scope and Sequence

Course Name	Irrigation & Water Management		Course Details	Level 4 course in the Plant Science pathway. This course could serve for either the Agronomy or Horticulture strand.		
			Course = 0.50 Carnegie Unit Credit			
Course Description	This course will focus on water law, irrigation systems, design and installation, transpiration and water use, irrigation scheduling, chemigation and fertigation, water quality. 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 #	18099	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 experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).		
Unit 2: Categories of Soil Water	3%	PS.01 Develop and implement a crop production 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		

<p>Unit 3: Holding Capacity, Availability, & Hydraulic Conductivity</p>	<p>4%</p>	<p>PS.01. Develop and implement a crop management plan for a given production goal that accounts for environmental factors.</p>	<p>PS.01.02. Prepare and manage growing media for use in plant systems</p>	<p>PS.01.02.02.a. Identify the categories of soil water.</p> <p>PS.01.02.02.b. Discuss how soil drainage and water-holding capacity can be improved.</p> <p>PS.01.02.02.c. Determine the hydraulic conductivity for soil and how the results influence irrigation practices.</p>	
<p>Unit 4: Water Conservation</p>	<p>6%</p>	<p>PLSC.05 Understand the history and management of water resources in plant systems</p>	<p>PLSC.05.07 Explain principles of water conservation</p>	<p>PLSC.05.07.a Define water conservation and why conservation is important in agriculture</p> <p>PLSC.05.07.b Describe how irrigation practice and plant/crop choice is related to water consumption/ water conservation</p> <p>PLSC.05.07.c Relate water conservation to common soil conservation practices (i.e. waterways, runoff, no till, minimum till)</p> <p>PLSC.05.07.d Develop a water conservation plan for a local enterprise</p>	
<p>Unit 5: Evapotranspiration & Use</p>	<p>3%</p>	<p>PS.02. Apply principles of classification, plant anatomy, and plant physiology to plant production and management.</p>	<p>PS.02.03. Apply knowledge of plant physiology and energy conversion to plant systems. SCIENCE:SC.HS.2.3 SC.HS.2.5</p>	<p>PS.02.03.05.a. Compare and contrast the effects of transpiration, translocation and assimilation on plants.</p> <p>PS.02.03.05.b. Identify and analyze the factors</p>	

				<p>affecting transpiration, translocation and assimilation rate and products.</p> <p>PS.02.03.05.c. Devise plans for plant management that applies knowledge of transpiration, translocation and assimilation on plant growth</p>	
<p>Unit 6: Irrigation Systems & Government's role Systems</p> <ul style="list-style-type: none"> Irrigation Districts Bureau of Reclamation 	2%	<p>NRES.05. Manage Human Interactions with Natural Resources</p>	<p>NRES.05.01 Identify and understand the role of governing agencies involved in natural resources</p>	<p>NRES.05.01.a Identify main governing agencies of natural resources, their history and the areas they manage</p> <p>NRES.05.01.b Determine how policy is made in regards to natural Resources</p> <p>NRES.05.01.c Determine how to utilize governing agencies</p> <p>NRES.05.01.d Evaluate public policy/governing agencies and form personal opinions</p>	
<p>Unit 7: Water Rights & Legal Considerations</p> <ul style="list-style-type: none"> Prior Appropriation vs. Riparian 	8%	<p>PLSC.05 Understand the history and management of water resources in plant systems</p>	<p>PLSC.05.01 Understand the history and background of water use in plant systems</p>	<p>PLSC.05.01.a Identify important historical events related to water use, pollution, and conservation</p> <p>PLSC.05.01.b Describe how past events have shaped current policy regarding Colorado Water Law</p>	

				PLSC.05.01.c Explain the major components of the current Colorado Water Law	
Unit 8: Compacts & Allocation	2%	NRES.05. Manage Human Interactions with Natural Resources	NRES.05.02 Become familiar with laws relating to water, air, land, and outdoor recreation	<p>NRES.05.02.a Recognize laws that impact local resources</p> <p>NRES.05.02.b Interpret the purpose of laws that relate to local resources</p> <p>NRES.05.02.c Analyze the impact laws have on local resources</p> <p>NRES.05.02.d Create a needs assessment for laws relating to natural resources</p>	
Unit 9: Water Quality	5%	PS.01. Develop and implement a crop management plan for a given production goal that accounts for environmental factors.	PS.01.01. Determine the influence of environmental factors on plant growth. SCIENCE: SC.HS.2.6	<p>PS.01.01.03.a. Identify and summarize the effects of water quality on plant growth, (e.g., pH, dissolved solids, etc.).</p> <p>PS.01.01.03.b. Analyze and describe plant responses to water conditions.</p> <p>PS.01.01.03.c. Analyze plant responses to water conditions and recommend modifications to water for desired plant growth.</p>	
Unit 10: Potable vs. Non-Potable Use and Applications	1%	PLSC.05. Manage Human Interactions with Natural Resources	PLSC.05.06 Determine factors influencing water quality	PLSC.05.06.d Evaluate the results of water tests and determine changes that need to be made to produce high quality water	

				for agriculture and municipal purposes	
Unit 11: Stream/Watershed Management	2%	PLSC.05 Manage Human Interactions with Natural Resource	PLSC.05.08 Describe the relationship of water shed, and water sources on plant systems	<p>PLSC.05.08.a Describe properties of watersheds and identify the boundaries of local watersheds</p> <p>PLSC.05.08.b Relate the function of watersheds to natural resources</p> <p>PLSC.05.08.c Analyze ecosystem functions of a watershed</p> <p>PLSC.05.08.d Locate and analyze local watersheds</p>	
Unit 12: Water Hydraulics – Pressure, Flow Rates, Grade	6%	PLSC.05. Manage Human Interactions with Natural Resources	PLSC.05.05 Understand the principles of soil/water hydraulics	<p>PLSC.05.05.a Define hydraulics and how it controls the movement of water through a system</p> <p>PLSC.05.05.b Calculate dynamic and static water pressure</p>	
Unit 13: System Management/Maintenance, Installation and Design	12%	PLSC.05 Manage Human Interactions with Natural Resources	PLSC.05.03 Understand irrigation methods, systems, and equipment	<p>PLSC.05.03.a Define irrigation and why it is needed in agriculture</p> <p>PLSC.05.03.b Identify common irrigation systems, methods and equipment and explain the main water users in agriculture</p> <p>PLSC.05.03.c Discuss the advantages and disadvantages of common types of irrigation systems</p>	

				PLSC.05.03.d Develop a model demonstrating common irrigation methods in Colorado	
Unit 14: Precision Ag. Applications in Irrigation	3%	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.03.04.01.b. Analyze the alignment of modern technologies used in production systems (e.g., precision agriculture, GE crops, etc.) with USDA sustainable practices criteria.	

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:

Science:

- 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.
- 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.
- Creativity and innovation: the ability to demonstrate curiosity and imagination through experimenting with new and emerging ideas.

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-Awareness: the ability to understand one's own emotions, thoughts, and values, and how personal actions and emotions influence behavior across contexts, including: the capacity to recognize one's strength and limitations with a well-grounded sense of confidence and purpose.
- 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.