

Colorado Environmental Science Course Scope and Sequence

<b>Course Name</b>	<b>Human and Environmental Interactions</b>	<b>Course Details</b>	Level 3 course, recommended level 1 prerequisite of Intro to Agriculture and Environmental Science. Level 2 recommended prerequisite of System Interactions.	
		<b>Course = 0.50 Carnegie Unit Credit</b>		
<b>Course Description</b>	This course will examine the historical trends and present day impacts of human activity on the environment. Agricultural, ecological, social and regulatory influences will be studied to provide students with a comprehensive view of present strategies aimed at future natural resource sustainability.			
<b>Note:</b>	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 <a href="https://www.cde.state.co.us/standardsandinstruction/essentialskills">https://www.cde.state.co.us/standardsandinstruction/essentialskills</a>				
Unit Number, Title and Brief Description	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
<b>Government Agencies &amp; Regulations</b>	ESS.02 Evaluate the impact of public policies and regulations on environmental service systems.	ESS.02.01 Interpret and evaluate the impact of laws, agencies, policies, and practices affecting environmental service systems.	<p>ESS.02.01.01a Distinguish between the types of laws associated with environmental service systems.</p> <p>ESS.02.01.01.b Analyze the structure of laws associated with environmental service systems.</p> <p>ESS.02.01.02.a Distinguish between the types of government agencies (i.e. local, state, and federal) associated with environmental service systems.</p> <p>ESS.02.01.02.b Analyze the specific purpose of government agencies associated with environmental service systems.</p> <p>ESS.02.01.03.a Research policies, practices, and initiatives common in business and advocacy groups associated with environmental services systems (e.g.</p>	

	<p>NRS.02 Analyze the interrelationships between natural resources and humans.</p>	<p>NRS.02.01 Examine and interpret the purpose, enforcement, impact, and effectiveness of laws and agencies related to natural resources management, protection, enhancement, and improvement (e.g. water regulations, game laws, historic preservation laws, environmental policy, etc)</p>	<p>zero-waste, LEED-certified, locally-grown, etc)</p> <p>NRS.02.01.01.a Distinguish between the types of laws associated with natural resource systems.</p> <p>NRS.02.01.01.b Analyze the structure of laws associated with natural resource systems.</p> <p>NRS.02.01.02.a Distinguish between the types of agencies associated with natural resource systems.</p> <p>NRS.02.01.02.b Analyze the specific purposes of agencies associated with natural resource systems.</p>	
<p><b>Trends</b></p>	<p>ESS.02 Evaluate the impact of public policies and regulations on environmental service system operations.</p>	<p>ESS.02.02 Compare and contrast the impact of current trends on regulation of environmental service systems (e.g. climate change, population growth, international trade, etc)</p>	<p>ESS.02.02.01.a Research and categorize the purpose, implementation, and impact of greenhouse gas emission policies (e.g. cap and trade, emission offsetting, zero emissions, carbon-neutrality, carbon sequestration etc.)</p> <p>ESS.02.02.01.b Assess the effectiveness and impact of greenhouse gas emissions policies.</p> <p>ESS.02.02.02.a Research the impact of environmental service systems regulations on international trade.</p> <p>ESS.02.02.02.b Analyze how environmental service systems regulations can both negatively and positively affect international trade.</p> <p>ESS.02.02.03.a Examine and summarize the impact that population growth has on environmental service systems.</p> <p>ESS.02.02.03.b Analyze the correlation between increased population size and the</p>	

			<p>need for regulation on environmental service systems.</p> <p>ESS.02.02.04.a Research current policies related to fracking and shale oil gas.</p> <p>ESS.02.02.04.b Assess whether current policies related to fracking and shale oil gas sufficiently address the need of environmental service systems.</p>	
<b>Ecosystems &amp; Biomes</b>	<p>NRS.01 Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.</p> <p>HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p> <p>HS-LS2-6 Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.</p> <p>HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts on human activity on biodiversity</p>	<p>NRS.01.06 Apply ecological concepts and principles to living organisms in natural resource systems.  <a href="#">RST.11-12.1</a>  <a href="#">RST.11-12.8</a>  <a href="#">WHST.9-10.2</a>  <a href="#">WHST.11-12.2</a>  <a href="#">WHST.9-10.5</a>  <a href="#">WHST.11-12.5</a>  <a href="#">WHST.9-10.7</a>  <a href="#">WHST.11-12.7</a>  <a href="#">WHST.9-10.9</a>  <a href="#">WHST.11-12.9</a></p> <p>HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and population in ecosystems of different scales.</p> <p>HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.</p>	<p>NRS.01.06.01.c Create a management plan for a population of a species in a ecosystem given its population ecology, population density, and population dispersion in natural resource systems.</p>	
<b>Social Perspective</b>	<p>ESS.02 Evaluate the impact of public policies and regulations on environmental service system operations.</p>	<p>ESS.02.03 Examine and summarize the impact of public perceptions and social movements on the regulation of environmental service systems.</p>	<p>ESS.02.03.01.a Research and summarize how the perception and regulation of environmental service systems has changed over time.</p> <p>ESS.02.03.01.b Analyze and summarize specific changes to perceptions and</p>	

	<p>NRS.02 Analyze the interrelationships between natural resources and humans.</p>	<p>NRS.02.03 Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.</p> <p>NRS.02.05 Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources.</p>	<p>regulations of environmental service systems and their impact on reducing the ecological, economical, and sociological impact.</p> <p>ESS.02.03.02.a Examine how social views and movements (e.g. zero-waste philosophy, carbon footprint, recycling, etc) have affected the implementation and need for regulation on environmental service systems.</p> <p>ESS.02.03.02.b Assess the effectiveness of specific social movements related to regulation of environmental service systems.</p> <p>NRS.02.03.01.a Summarize and categorize the different social considerations in regards to the use of natural resources (e.g. public vs. private, laws and regulations, economic, green technology, etc)</p> <p>NRS.02.03.01.b Analyze how social considerations can affect the use and sustainability of natural resources.</p> <p>NRS.02.03.03.a Research how technology has affected the use and views of natural resources.</p> <p>NRS.02.03.03.b Analyze and document how some technological advancements changed how natural resources were used and viewed (e.g. Industrial Revolution, fossil fuels, green technology, etc)</p> <p>NRS.02.05.01.a Examine and describe ways in which a message regarding natural resources should be communicated to the public through standard media sources (e.g. press, radio, TV, public appearances, etc)</p>	
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		<p>HS-ESS3-3 Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p>	<p>NRS.02.05.01.b Assess the effectiveness of different methods for communicating natural resource messages.</p> <p>NRS.02.05.02.a Research and summarize how social media and the Internet have changed how people perceive and utilize natural resources (e.g. greater awareness of conservation issues, calls to action, etc)</p> <p>NRS.02.05.02.b Assess how to most effectively communicate a message about the conservation, management, enhancement, and improvement of natural resources via social media and the internet.</p> <p>NRS.02.05.03.a Examine and describe how communication can be used to influence behavior, call people to action, and instill a sense of civic behavior related to conservation, management, enhancement, and improvement of natural resources.</p> <p>NRS.02.05.03.b Analyze and summarize examples of how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement, and improvement of natural resources.</p>	
<p><b>Energy Consumption</b></p>	<p>ESS.04 Demonstrate the operation of environmental service systems (e.g. pollution control, water treatment, wastewater treatment, solid waste management, and energy conservation).</p>	<p>ESS.04.04 Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental service systems.</p> <p><a href="#">RST.11-12.1</a>  <a href="#">RST.11-12.8</a>  <a href="#">WHST.9-10.5</a>  <a href="#">WHST.11-12.5</a>  <a href="#">WHST.9-10.7</a>  <a href="#">WHST.11-12.7</a>  <a href="#">RST.11-12.2</a>  <a href="#">RST.11-12.9</a>  <a href="#">WHST.11-12.9</a></p>	<p>ESS.04.04.04.a Research the impact on environmental service systems that occur because of energy consumption.</p> <p>ESS.04.04.04.b Analyze and document the most significant impacts that energy consumption has on environmental monitoring.</p> <p>ESS.04.04.04.c Devise a strategy for improving future energy consumption in a manner consistent with the intents of environmental service systems.</p>	

		<i>MA.HS.N.Q.A</i>	<p>ESS.04.04.05.a Examine and explain how energy consumption and the carbon cycle relate to environmental monitoring.</p> <p>ESS.04.04.05.b Calculate the impact of the carbon cycle imbalance (due to energy consumption) and assess how this imbalance affects environmental service systems.</p>	
<b>Climate Change</b>	<p>NRS.01 Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.</p> <p>ESS.03 Develop proposed solutions to environmental issues, problems, and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry, and ecology.</p>	<p>NRS.01.03 Apply ecological concepts and principles to atmospheric natural resource systems. <i>RST.11-12.1</i> <i>RST.11-12.7</i> <i>RST.11-12.8</i></p> <p><i>MA.HS.N.Q.A</i> <i>MA.HS.S.ID.A</i> <i>MA.HS.S.IC.A</i> <i>MA.HS.S.IC.A</i></p> <p>ESS.03.01 Apply meteorology principles to environmental service systems. <i>RST.11-12.1</i> <i>RST.11-12.2</i> <i>RST.11-12.7</i> <i>WHST.9-12.7</i></p> <p><i>MA.HS.N.Q.A</i></p> <p>HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's</p>	<p>NRS.01.03.01.a Classify different kinds of biogeochemical cycles and the role they play in natural resource systems.</p> <p>NRS.01.03.01.b Assess the role that the atmosphere plays in the regulation of biogeochemical cycles.</p> <p>NRS.01.03.02.a research and summarize how climate factors influence natural resource systems.</p> <p>NRS.01.03.02.b Analyze the impact that climate has on natural resources and debate how this impact has changed due to human activity.</p> <p>ESS.03.01.02.a Analyze how meteorological conditions influence air quality.</p> <p>ESS.03.01.02.b Analyze and articulate the relationship between meteorological conditions, air quality, and air pollutants.</p> <p>ESS.03.01.03.a Research climate change and summarize evidence that climate change is occurring.</p> <p>ESS.03.01.03.b Assess the environmental economic and social consequences of climate change.</p> <p>ESS.03.01.04.a Examine and summarize factors that affect the earth's balance of energy.</p>	

		<p>systems result in changes in climate.</p> <p>HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.</p>	<p>ESS.03.01.04.b Analyze the basics of the greenhouse effect and describe how the greenhouse effect alters the earth's balance of energy.</p>	
<b>Human Activity</b>	<p>NRS.02 Analyze the interrelationships between natural resources and humans.</p>	<p>NRS.02.02 Assess the impact of human activities on the availability of natural resources.</p> <p><a href="#">RST.11-12.1</a>  <a href="#">RST.11-12.2</a>  <a href="#">RST.11-12.7</a>  <a href="#">RST.11-12.8</a>  <a href="#">WHST.9-10.2</a>  <a href="#">WHST.11-12.2</a>  <a href="#">WHST.9-10.7</a>  <a href="#">WHST.11-12.7</a></p> <p><a href="#">MA.HS.N.Q.A</a></p> <p>HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrences of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts on human activities on natural systems.</p>	<p>NRS.02.02.01.b Assess and explain how different kinds of human activity affect the use and availability of natural resources (i.e. agriculture, industry, transportation,etc)</p> <p>NRS.02.02.01.c Evaluate how the availability of natural resources can be improved through changes to human activity.</p> <p>NRS.02.02.02.b Assess causes of extinction and describe how those causes related to loss of biodiversity.</p> <p>NRS.02.02.02.c Devise a strategy for preventing the loss of species and biodiversity that take into account the primary causes of species extinction from human activity.</p> <p>NRS.02.02.03.b Identify solutions to improve the sustainability of modern lifestyles.</p> <p>NRS.02.02.03.c Evaluate how modern lifestyles affect resource consumption and energy use and devise a strategy to prevent and complete loss of a natural resource.</p>	
<b>Agriculture</b>	<p>PS.03 Propagate, cultivate, and harvest plants and plant products based on current industry standards.</p>	<p>PS.03.04 Apply principles and practices of sustainable agriculture to plant production.</p>	<p>PS.03.04.01.a Compare and contrast the alignment of different production systems (conventional, regenerative, and organic) with USDA sustainable practices criteria.</p> <p>PS.03.04.01.b analyze the alignment of modern technologies used in production</p>	

			<p>systems (e.g. precision agriculture, GE crops, etc) with USDA sustainable practices criteria.</p> <p>PS.03.04.01.c Research, prepare, and defend plans for a plan systems enterprise that aligns with USDA sustainable practices criteria.</p> <p>PS.03.04.02.a Summarize national/international and local/regional food production systems.</p> <p>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.</p> <p>PS.03.04.02.c Select and defend the use of nationally/internationally grown or locally/regionally grown for a production operation system.</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: Science & Technical Subjects**

- RST11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinction the author makes and to any gaps or inconsistencies in the account.
- RST11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.
- RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- RST11-12.9 Synthesize information from a range of sources (e.g. texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
- WHST9-10.2/11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- WHST9-10.5/11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

- WHST9-10.7/11-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- WHST9-10.9/11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.

**Math:**

- MA.HS.S.ID.A Interpreting Categorical & Quantitative Data: Summarize, represent, and interpret data on a single count or measurement variable.
- MA.HS.S.IC.A Making Inferences & Justifying Conclusions; Understand and evaluate random processes underlying statistical experiments.
- MA.HS.S.IC.B Making Inferences & Justifying Conclusions: Make inferences and justify conclusions from sample surveys, experiments, and observational studies.
- MA.HS.N-Q.A – Quantities: Reason quantitatively and use units to solve problems..

**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:

- Social Awareness: the ability to understand the perspectives of, empathize with, feel compassion for, and recognize strengths in others, including those from diverse backgrounds, cultures, and contexts and how they affect social interactions.
- 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.
- Global and cultural awareness: the ability to collaborate with individuals from diverse backgrounds and/or cultures to address national and global issues, and to develop complex, appropriate, and workable solutions.

Communicator:

- Interpersonal communication: the ability to establish and maintain healthy and supportive relationships, including: the capacity to communicate clearly by successfully conveying information and feelings, listening actively, setting boundaries, negotiating conflict constructively, and seeking or offering support and help when needed.

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.

