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

Learning that works for Colorado CTE®

Colorado CTE Course – Scope and Sequence

Course Name	**Principles of Natural Resource Management A**		**Course Details** **Course = 0.50 Carnegie Unit Credit**	Second level course in the Natural Resources / Environmental Science pathway course sequence. Content from this course could be inserted into courses in other pathways as part of the 40% unassigned instructional portion. First semester content	
Course Description	An introductory course for agriculture education students pursuing careers in Natural Resources and Environmental Sciences. This course expands student learning to the foundational principles of ecology including the fields of geology, meteorology, biology and chemistry related to the conservation, natural resources, and fish and wildlife management. Students will gain knowledge in career development, leadership, personal development, communications, and environmental science.				
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 #	18504	Schedule calculation based on 60% of the instructional time in a 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 % of Instructional Time	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Unit 1: the different components of the ecosystem and the interactions with in ecosystems.	8%	**NRS.01.** Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.	**NRS.01.01.** Apply methods of classification to examine natural resource availability and ecosystem function in a particular region. *ELA: RST.11-12.1* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.9* *WHST.11-12.9*	**NRS.01.01.01.a.** Summarize and classify the different kinds of natural resources using common classification schemes (e.g., living versus non-living, renewable versus nonrenewable, native versus introduced, etc.). **NRS.01.01.01.b**. Assess the characteristics of a natural resource to determine its classification. **NRS.01.01.02.a.** Summarize the components that comprise all ecosystems.	

				NRS.01.01.02.b. Analyze the interdependence of organisms within an ecosystem (e.g., food webs, niches, impact of keystone species, etc.) and assess the dependence of organisms on nonliving components (climate, geography, energy flow, nutrient cycling, etc.).	
Unit 2: Classifying species and analyzing biodiversity throughout a system	4%	**NRS.01** Plan and conduct natural resources management activities that apply, logical, reasoned, and scientifically based solutions to natural resource issues and goals.	**NRS.01.01**. Apply methods of classification to examine natural resource availability and ecosystem function in a particular region. *ELA: RST.11-12.1 RST.11-12.8 WHST.9-10.2 WHST.11-12.2 WHST.9-10.9 WHST.11-12.9*	**NRS.01.01.03.a.** Summarize and classify different kinds of living species based on evolutionary traits. **NRS.01.01.03.b.** Analyze how biodiversity develops through evolution, natural selection and adaptation; explain the importance of biodiversity to ecosystem function and availability of natural resources.	
Unit 3: Discuss the different environment cycles and their roles in Natural Resources, (water cycle, carbon cycle, ect.).	5%	NRS.01. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.	**NRS.01.03.** Apply ecological concepts and principles to atmospheric natural resource systems. *ELA: RST.11-12.1 RST.11-12.7 RST.11-12.8 MATH: MA.HS.N.Q.A MA.HS.S.ID.A MA.HS.S.IC.A. MA.HS.S.IC.B SCIENCE: SC.HS.3.12 SC.HS.3.11 SC.HS.3.4 SC.HS.3.7*	**NRS.01.03.01.a**. Classify different kinds of biogeochemical cycles and the role they play in natural resources systems. **NRS.01.03.01.b**. Assess the role that the atmosphere plays in the regulation of biogeochemical cycles.	
Unit 4: Evaluate the impacts of the climate to natural resources and human interactions	8%	**NRS.01.** Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions	**NRS.01.03.** Apply ecological concepts and principles to atmospheric natural resource systems. *ELA: RST.11-12.1*	**NRS.01.03.02.a.** Research and summarize how climate factors influence natural resource systems.	

		to natural resource issues and goals.	*RST.11-12.7* *RST.11-12.8* *MATH: MA.HS.N.Q.A* *MA.HS.S.ID.A* *MA.HS.S.IC.A.* *MA.HS.S.IC.B* *SCIENCE: SC.HS.3.12* *SC.HS.3.11* *SC.HS.3.4* *SC.HS.3.7* **NRS.02.02.** Assess the impact of human activities on the availability of natural resources.	**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. **NRS.02.02.01.a.** Summarize the relationship between natural resources, ecosystems and human activity. **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.).	
Unit 5: Evaluate the importance of Range land management and livestock interaction with the ecosystem	5%	**NRS.01**. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals. **NRS.04.** Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.	**NRS.01.02.** Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.7* *WHST.11-12.7* *WHST.9-10.9* *WHST.11-12.9* *MATH: MA.HS.N.Q.A* *SCIENCE:SC.HS.3.9* **NRS.04.01.** Demonstrate natural resource protection, maintenance,	**NRS.01.02.02.a.** Research and examine the characteristics used to identify herbaceous plants. **NRS.01.02.02.b.** Apply identification techniques to determine the species of an herbaceous plant. **NRS.04.01.04.a.** Identify and categorize characteristics of healthy rangeland.	

			enhancement and improvement techniques. *ELA: RST.11-12.8* *RW.HS2.1.2* *SCIENCE: SC.HS.3.9* *SC.HS.3.11* **NRS.04.03.** Prevent or manage introduction of ecologically harmful species in a particular region. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.5* *WHST.11-12.5* *WHST.9-10.7* *WHST.11-12.7* *MATH: MA.HS.N.Q.A* *MA.HS.S.ID.A* *MA.HS.S.IC.A.* *MA.HS.S.IC.B* *SCIENCE: SC.HS.2.6* *SC.HS.2.13*	**NRS.04.01.04.b.** Assess and apply methods of rangeland improvement. **NRS.04.03.02.a.** Identify and classify invasive species common to a particular region.	
Unit 6: Identify soil types and properties to make ecological decisions	5%	**NRS.01**. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.	**NRS.01.02.** Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.7* *WHST.11-12.7* *WHST.9-10.9* *WHST.11-12.9*	**NRS.01.02.05.a.** Research and examine the characteristics used to identify non-living resources (e.g., soil types, climate, geography, etc.).	

			MATH: MA.HS.N.Q.A *SCIENCE:SC.HS.3.9* **NRS.01.05.** Apply ecological concepts and principles to terrestrial natural resource systems. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *MATH: MA.HS.S.ID.A* *MA.HS.S.IC.A* *MA.HS.S.IC.B* *SCIENCE: SC.HS.3.11* *SC.HS.3.9*	**NRS.01.05.04.a.** Compare and contrast techniques associated with soil management (e.g., soil survey and interpretation, erosion control, etc.). **NRS.01.05.04.b.** Analyze a plot of land in order to determine which soil management techniques would be most applicable.	
Unit 7: Determining the role of wildlife and insects and their key characteristics in an ecosystem	8%	**NRS.01.** Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.	**NRS.01.02.** Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.7* *WHST.11-12.7* *WHST.9-10.9* *WHST.11-12.9* *MATH: MA.HS.N.Q.A* *SCIENCE:SC.HS.3.9* **NRS.01.06.** Apply ecological concepts and principles to living organisms in natural resource systems.	**NRS.01.02.03.a**. Research and examine the characteristics used to identify wildlife and insects. **NRS.01.02.03.b.** Apply identification techniques to determine the species of wildlife or insect. **NRS.01.06.01.a.** Differentiate between population ecology, population density and population dispersion and describe the importance of	

			ELA: RST.11-12.1 RST.11-12.8 WHST.9-10.2 WHST.11-12.2 WHST.9-10.5 WHST.11-12.5 WHST.9-10.7 WHST.11-12.7 WHST.9-10.9 WHST.11-12.9 SCIENCE: SC.HS.2.12 SC.HS.2.13 SC.HS.3.11	these concepts to natural resource systems. **NRS.01.06.01.b.** Analyze the factors that influence population density and population dispersion in natural resource systems. **NRS.01.06.02.a.** Research and summarize examples of invasive species. **NRS.01.06.02.b.** Analyze factors that influence the establishment and spread of invasive species and determine the appropriate steps to prevent or minimize the impact of invasive species.	

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Colorado CTE Course – Scope and Sequence

Course Name	**Principles of Natural Resource Management B**		**Course Details** **Course = 0.50 Carnegie Unit Credit**	Second level course in the Natural Resources / Environmental Science pathway course sequence. Content from this course could be inserted into courses in other pathways as part of the 40% unassigned instructional portion. Second semester content.	
Course Description	An introductory course for agriculture education students pursuing careers in Natural Resources and Environmental Sciences. This course expands student learning to the foundational principles of ecology including the fields of geology, meteorology, biology and chemistry related to the conservation, natural resources, and fish and wildlife management. Students will gain knowledge in career development, leadership, personal development, communications, and environmental science.				
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 #	18504	Schedule calculation based on 60% of the instructional time in a 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**					
Unit 1: Understanding the importance of the forest industry in Colorado.	5%	**NRS.01.** Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals. **NRS.03.** Develop plans to ensure sustainable production and processing of natural resources.	**NRS.01.02.** Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.7* *WHST.11-12.7* *WHST.9-10.9* *WHST.11-12.9* *MATH: MA.HS.N.Q.A* *SCIENCE:SC.HS.3.9*	**NRS.01.02.01.a**. Research and examine the characteristics used to identify trees and woody plants. **NRS.01.02.01.b**. Apply identification techniques to determine the species of a tree or woody plant.	

			NRS.03.01. Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.). *ELA. RST.11-12.8* *SCIENCE: SC.HS.3.9 SC.HS.3.11*	**NRS.03.01.01.a**. Summarize forest harvesting methods. **NRS.03.01.01.b.** Assess harvesting methods in regards to their economic value, environmental impact, and other factors.	
Unit 2: Discussing the importance of water in Colorado and the regulations associated with Natural Resources and Agriculture	8%	**NRS.01.** Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals. **NRS.02.** Analyze the interrelationships between natural resources and humans.	**NRS.01.04**. Apply ecological concepts and principles to aquatic natural resource systems. *ELA: RST.11-12.1 RST.11-12.7 RST.11-12.8 WHST.9-10.7 WHST.11-12.7* *MATH: MA.HS.N.Q.A MA.HS.S.ID.A MA.HS.S.IC.A MA.HS.S.IC.B* *SCIENCE: SC.HS.3.12* **NRS.02.01.** Examine and interpret the purpose, enforcement, impact and effectiveness of laws and agencies related to natural resource management, protection, enhancement and improvement (e.g., water regulations, game laws, historic preservation laws,	**NRS.01.04.01.a.** Summarize the roles and properties of watersheds. **NRS.01.04.01.b**. Assess the function of watersheds and their effect on natural resources. **NRS.01.04.02.a.** Examine and describe the importance of groundwater and surface water to natural resources. **NRS.01.04.02.b.** Analyze how different classifications of ground and surface water affect ecosystem function. **NRS.02.01.01.a**. Distinguish between the types of laws associated with natural resources systems. **NRS.02.01.01.b.** Analyze the structure of laws associated with natural resources systems.	

			environmental policy, etc.).	**NRS.02.01.01.c.** Evaluate the impact of laws associated with natural resources systems (e.g., mitigation, water regulations, carbon emissions, game limits, invasive species, etc.).	
Unit 3: Exploring human interactions on the impacts and availability on Natural Resources	8%	**NRS.02.** Analyze the interrelationships between natural resources and humans.	**NRS.02.02.** Assess the impact of human activities on the availability of natural resources. *ELA: RST.11-12.1* *RST.11-12.2* *RST.11-12.7* *RST.11-12.8* *WHST.9-10.2* *WHST.11-12.2* *WHST.9-10.7* *WHST.11-12.7* *MATH: MA.HS.N.Q.A* *SCIENCE: SC.HS.3.9* *SC.HS.3.11* *SC.HS.3.12* **NRS.02.03.** Analyze how modern perceptions of natural resource management, protection, enhancement and improvement change and develop over time.	**NRS.02.02.01.a.** Summarize the relationship between natural resources, ecosystems and human activity. **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.). **NRS.02.02.03.a**. Examine and describe the manner in which modern lifestyles are related to the depletion of natural resources. **NRS.02.02.03.b.** Identify solutions to improve the sustainability of modern lifestyles. **NRS.02.03.01.a.** Summarize and categorize the different social considerations in regards to the use of natural resources (e.g., public versus private, laws and regulations, economics, green technology, etc.).	
Unit 4: The economic	8%	**NRS.02**. Analyze the interrelationships between	**NRS.02.04**. Examine and explain how economics	**NRS.02.04.01.a**. Compare and contrast how the economic	

relationships within Natural Resources		natural resources and humans.	affects the use of natural resources. *ELA: RST.11-12.1* *RST.11-12.7* *RST.11-12.8* *WHST.11-12.2* *WHST.11-12.7* *WHST.11-12.8* *WHST.11-12.9* *RW.H2.1.2* *SCIENCE: SC.HS.3.9*	value of a natural resource affects its availability. **NRS.02.04.01.b.** Assess whether economic value increases or decreases the conservation, protection, improvement and enhancement of natural resources. **NRS.02.04.02.a.** Research the impact of the use of natural resources on local, state and national economies (e.g., outdoor recreation, energy production, preservation, etc.). **NRS.02.04.02.b.** Assess the importance of the use of natural resources on local, state and national economies. **NRS.02.04.03.a.** Compare and contrast the economic impact of green technology and alternative energy. **NRS.02.04.03.b.** Analyze and document how the adoption of green technology and/or alternative energy affected a local, state or national economy.	
Unit 5: Evaluate management practices to develop plans for Natural Resources and non-renewable resources.	8%	**NRS.03.** Develop plans to ensure sustainable production and processing of natural resources.	**NRS.03.01.** Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).	**NRS.03.01.03.a.** Compare and contrast the costs and benefits (e.g., impacts on environment, economic, wildlife, etc.) of mineral extraction to a local, state and/or national economy. **NRS.03.01.04.a**. Compare and contrast the costs and benefits	

			ELA: RST.11-12.8 SCIENCE: SC.HS.3.9 SC.HS3.11	(e.g., impacts on environment, economic, wildlife, etc.) of fossil fuels to a local, state and/or national economy. **NRS.03.01.05.a.** Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of shale oil from fracking to a local, state and/or national economy. **NRS.03.01.06.a.** Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of alternative sources of energy (e.g., hydroelectric, solar, wind, biofuels, geothermal, etc.).	
Unit 6: Understanding the importance of cartographic skills, tools in Natural Resource Management	5%	**NRS.03.** Develop plans to ensure sustainable production and processing of natural resources.	**NRS.03.02.** Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.	**NRS.03.02.01.a.** Summarize how to use maps and technologies to identify directions and land features, calculate actual distance and determine the elevations of points. **NRS.03.02.01.b.** Apply cartographic skills and tools and technologies (e.g., land surveys, geographic coordinate systems, etc.) to locate natural resources. **NRS.03.02.02.a**. Summarize how GIS can be used to manage, conserve, improve and enhance the natural resources of an area. **NRS.03.02.02.b.** Analyze an area's resources using GIS technologies.	

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:

- RW.HS2.1.2 – Integrate credible, accurate information into appropriate media and formats to meet an audience's needs.
- RST.11-12.1 – Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- 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.
- WHST.9-10.2 – Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- WHST.11-12.2 – Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- WHST.9-10.5 - 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.
- WHST.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.
- WHST.9-10.7 – 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.
- WHST.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.
- WHST.9-10.9 – Draw evidence from informational texts to support analysis, reflection, and research.
- WHST.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.

Science:

- SC.HS.2.12 – The environment influences survival and reproduction of organism over multiple generations.
- SC.HS.2.13 – Humans have complex interactions with ecosystems and have the ability to influence biodiversity on the planet.
- SC.HS.3.4 – Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes, and these effects occur on different time scales, from sudden to very long term tectonic cycles.
- SC.HS.3.7 – The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundational for the global climate system. Global climate models are used to predict future changes, including changes influences by human behavior and natural factors.
- SC.HS.3.9 – Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.
- SC.HS.3.11 – Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.
- SC.HS.3.12 – Global climate models used to predict future climate change continues to improve our understanding of the impact of human activities on the global climate system.

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.
- 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.

Empowered Individual:

- Self-Management: The ability to manager one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations, including: the capacity to delay gratification, manage stress, stay positive and accountable, and feel motivation & agency to accomplish personal/collective goals.