

Colorado AFNR Course Scope and Sequence

Course Name	Forestry Management		Course Details	Level 3 course in the Natural Resources/Environmental Science Pathway	
			Course = 0.50 Carnegie Unit Credit		
Course Description	A course for students pursuing careers in Natural Resources and Environmental Sciences. This course expands student learning to the principals of forestry. Students will gain knowledge in career development, leadership, personal development, communications, ecology, biology and temporal forest environments.				
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 #	18502	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: Analyze the different elements in an Ecosystem and the relationship of those interactions in relation to Forestry Management	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.01.01.02.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.). NRS.01.01.02.c. Conduct analyses of ecosystems and document the interactions of living species and non-living resources. 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. NRS.01.01.03.c. Evaluate biodiversity in ecosystems and devise strategies to enhance the function of an ecosystem and the availability of natural resources by increasing the level of biodiversity.	
Unit 2: Identifying different species and variety of plants and how the impact on forest health.	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	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.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.	<i>WHST.9-10.2</i> <i>WHST.11-12.2</i> <i>WHST.9-10.7</i> <i>WHST.11-12.7</i> <i>WHST.9-10.9</i> <i>WHST.11-12.9</i> <u><i>MATH: MA.HS.N.Q.A</i></u> <u><i>SCIENCE: SC.HS.3.9</i></u> NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement and improvement techniques. <u><i>ELA: RST.11-12.8</i></u> <u><i>RW.H2.1.2</i></u> <u><i>SCIENCE: SC.HS.3.9</i></u> <u><i>SC.HS.3.11</i></u>	NRS.04.01.02.a. Identify and categorize characteristics of a healthy forest. NRS.04.01.02.b. Assess and apply the methods used to improve a forest stand.	
Unit 3: Understand the relationship biogeochemical cycles impact on woodland areas.	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. <u><i>ELA: RST.11-12.1</i></u> <u><i>RST.11-12.7</i></u> <u><i>RST.11-12.8</i></u> <u><i>WHST.9-10.2</i></u> <u><i>WHST.9-10.7</i></u> <u><i>WHST.11-12.7</i></u> <u><i>WHST.9-10.9</i></u> <u><i>WHST.11-12.9</i></u> <u><i>MATH: MA.HS.N.Q.A</i></u> <u><i>SCIENCE: SC.HS.3.9</i></u>	NRS.01.02.05.a. Research and examine the characteristics used to identify non-living resources (e.g., soil types, climate, geography, etc.). NRS.01.02.05.b. Apply identification techniques to determine the types of non-living resources in an area. NRS.01.02.05.c. Evaluate the non-living resources present in an area to determine the best practices for improving, enhancing and protecting an ecosystem.	

			NRS.01.03. Apply ecological concepts and principles to atmospheric natural resource systems. <u>ELA:</u> <i>RST.11-12.1</i> <i>RST.11-12.7</i> <i>RST.11-12.8</i> <u>MATH:</u> <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.B</i> <u>SCIENCE:</u> <i>SC.HS.3.4</i> <i>SC.HS.3.7</i> <i>SC.HS.3.11</i> <i>SC.HS.3.12</i>	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. NRS.01.03.01.c. Evaluate and make recommendations to lessen the impact of human activity on the ability of the atmosphere to regulate biogeochemical cycles.	
Unit 4: Understanding the roles of resource inventories and populations in forestry	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. <u>ELA:</u> <i>RST.11-12.1</i> <i>RST.11-12.7</i> <i>RST.11-12.8</i> <i>WHST.9-10.2</i> <i>WHST.9-10.2</i> <i>WHST.9-10.7</i> <i>WHST.11-12.7</i> <i>WHST.9-10.9</i> <i>WHST.11-12.9</i>	NRS.01.02.06.a. Research the purpose and value of resource inventories and population studies. NRS.01.02.06.b. Apply procedures for conducting resource inventories and population studies. NRS.01.02.06.c. Conduct an assessment of the resource inventories or population in a given area.	
Unit 5: Understanding different harvesting methods in relationship to sustainable forestry	8%	NRS.01. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions	NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems. <u>ELA:</u> <i>RST.11-12.1</i> <i>RST.11-12.7</i>	NRS.01.05.03.a. Compare and contrast techniques associated with sustainable forestry (e.g., timber stand improvement, diversity	

		to natural resource issues and goals.	<i>RST.11-12.8</i> <i>MATH: MA.HS.S.ID.A</i> <i>MA.HS.S.IC.A</i> <i>MA.HS.S.IC.B</i> <i>SCIENCE: SC.HS.3.11</i> <i>SC.HS.3.9</i> 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.). <i>ELA: RST.11-12.8</i> <i>SCIENCE: SC.HS.3.9</i> <i>SC.HS3.11</i>	improvement, reforestation, etc.). NRS.01.05.03.b. Analyze a forest in order to determine which forestry techniques would improve that habitat. NRS.01.05.03.c. Devise a forest management plan that improves the habitat while sustainably maximizing the amount of timber that can be harvested. 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. NRS.03.01.01.c. Develop a forest harvesting plan that ensures economic, environmental and social sustainability.	
Unit 6: Exploring the relationship between Government Agencies, human interactions, and Forestry Management	8%	NRS.02. Analyze the interrelationships between natural resources and humans.	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, 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.).	

			NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.	NRS.02.03.02.a. Research and assess how historical figures played a prominent role in shaping how natural resources are viewed and used today (e.g., Aldo Leopold, Teddy Roosevelt, John Muir, Rachel Carson, Gaylord Nelson, etc.). NRS.02.03.02.b. Examine and describe the relationship between current trends in natural resource systems and historical figures that played a prominent role in shaping how natural resources are viewed and used today. NRS.02.03.02.c. Anticipate and predict how society's views and use of natural resources will continue to change as a result of historical figures and trends in modern society.	
Unit 7: Analyzing the Economic impact of Forestry	8%	NRS.02. Analyze the interrelationships between natural resources and humans.	NRS.02.04. Examine and explain how economics 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	NRS.02.04.01.a. Compare and contrast how the economic 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.	

			<u><i>SCIENCE: SC.HS.3.9</i></u>	NRS.02.04.01.c. Devise a plan to improve the conservation, protection, improvement and enhancement of natural resources based on economic value and practices. 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.02.04.02.c. Anticipate and predict how changes to the availability of natural resources because of human activity may impact a local, state and national economy. NRS.03.01.07.a. Research and summarize how recreational uses of natural resources can be changed to improve sustainability. NRS.03.01.07.b. Assess different options for improving the sustainability	
		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.).		

			ELA: RST.11-12.8 SCIENCE: SC.HS.3.9 SC.HS.3.11	of outdoor recreation based on its impact on natural resources and likelihood of acceptance. NRS.03.01.07.c. Evaluate an example of outdoor recreation and develop suggestions for how that activity can be made more sustainable in a manner that is acceptable to those who take part in that activity.	
Unit 8: Understand Plant Diseases and their impact on the ecosystem	8%	NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.	NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement and improvement techniques. ELA: RST.11-12.8 RW.H2.1.2 SCIENCE: SC.HS.3.9 SC.HS.3.11 NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread. ELA: RST.11-12.7 RST.11-12.8 WHST.11-12.2 WHST.11-12.7 WHST.11-12.8 WHST.11-12.9 MATH: MA.HS.N.Q.A SCIENCE: SC.HS.2.6	NRS.04.01.02.a. Identify and categorize characteristics of a healthy forest. NRS.04.01.02.b. Assess and apply the methods used to improve a forest stand. NRS.04.01.02.c. Create a timber stand improvement plan for a forest. NRS.04.02.01.a. Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported. NRS.04.02.01.b. Analyze a plant disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to.	

			NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region <u>ELA:</u> <i>RST.11-12.1</i> <i>RST.11-12.7</i> <i>RST.11-12.8</i> <i>WHST.9-10.5</i> <i>WHST.11-12.5</i> <i>WHST.9-10.7</i> <i>WHST.11-12.7</i> <u>MATH:</u> <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.B</i> <u>SCIENCE:</u> <i>SC.HS.2.6</i> <i>SC.HS.2.13</i>	NRS.04.02.01.c. Create a management plan to reduce infection and the spread of plant diseases in natural resource systems. NRS.04.03.01.a. Categorize harmful and beneficial insects, as well as signs of insect damage to natural resources. NRS.04.03.01.b. Analyze signs of insect infestation, identify if it needs to be reported to authorities and determine which authorities it should be reported to. NRS.04.03.01.c. Create a management plan to reduce spread of harmful insects in natural resource systems.	
Unit 9: Implement a fire mitigation plan	4%	NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.	NRS.04.04. Manage fires in natural resource systems.	NRS.04.04.01.a. Differentiate between desirable and undesirable fires and research the role fire plays in a healthy ecosystem. NRS.04.04.01.b. Assess and apply techniques used to fight wildfires, manage prescribed fires and ensure human safety. NRS.04.04.01.c. Develop a prevention plan for harmful fires for a particular region.	

				NRS.04.04.02.a. Research and summarize how fire management techniques have evolved. NRS.04.04.02.b. Assess the effectiveness of techniques previously and currently used to prevent harmful fires. NRS.04.04.02.c. Anticipate and predict how fire management techniques will evolve in the future.	
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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 assess forest ecosystems, develop forest management plans, evaluate wildfire mitigation strategies, identify invasive species and insect infestations, and solve forestry management challenges through 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 forestry management plans, scientific and technical texts, wildfire research, forest health reports, insect management resources, ecosystem studies, and environmental regulations to understand sustainable forest management practices.

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 silviculture, forest ecology, wildfire management, invasive species, insect infestations, forest health, biodiversity, prescribed fire, timber management, and ecosystem sustainability to communicate effectively in forestry settings.

Standard 3: Writing and Composition

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

Students evaluate forest management practices, wildfire mitigation strategies, pest management techniques, harvesting methods, and conservation practices, defending recommendations using scientific evidence, field observations, and environmental data.

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

Students develop forest management plans, wildfire prevention plans, insect management plans, and technical reports explaining forest ecology, conservation practices, and sustainable resource management 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 forest ecosystems, wildfire behavior, invasive species, insect infestations, forest health, conservation strategies, timber management, and sustainable forestry practices to develop evidence-based management plans that protect and enhance forest resources.

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