Colorado Environmental Science Course Scope and Sequence

Course Name	**GIS/Geotechnologies**	**Course Details**	Level 3 course
		Course = 0.50 Carnegie Unit Credit	
Course Description	This course will review the basics of Geological Information Systems, including analysis and development of sustainability plans based on learned GIS skills. This level 3 course could be utilized as a semester course or provide further depth of content and application through a full year course.		
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	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Basics of global navigation	NRS.03 Develop plans to ensure sustainable production and processing of natural resources. Development of basic maps. Coordinate systems, projecting 3d model on 2d model (projections)	NRS.03.02. Demonstrate cartographic skills, tools, and technologies to aid in developing, implementing, and evaluating natural resource management plans.	NRS.03.02.02.a Summarize how GIS can be used to manage, conserve, improve, and enhance natural resources of an area. NRS.03.02.02.b Analyze an area's resources using GIS technologies. NRS.03.02.02.c Use GIS data for a given area to devise a management plan for the management, conservation, and enhancement of its natural resources.	
Points, Lines and Polygons	Shape files to map resources. Contracting portion for raster file in creating pixels vs shape files? Understanding when to utilize various shape files.		Describe how location can be described (geographic & projected coordinate systems, range & township, survey plats). Describe the value of location-based information.	

Cartography	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 survey, geographic coordinate systems, etc) to locate natural resources. NRS.03.02.01.c Evaluate the availability of and threats to natural resources using cartographic skills, tools, and technologies (e.g. spread of invasive species, movement of wildlife populations, changes to biodiversity of edge of habitat vs. interior, ect)	
GIS/Land Use Tools (resources surveys, planning for land use)	SS.HS.2.1 Use geographic tools and resources to analyze Earth's human systems and physical features to investigate and address geographic issues. SS.HS.2.3 The interconnected nature of the world, its people, and places.		SS.HS.2.1.a analyze variations of spatial patterns of cultural and environmental characteristics at multiple scales while gathering geographic data from a variety of sources (e.x maps, GIS graphs, charts) SS.HS.2.1.b Create and interpret maps to display and explain the spatial patterns of cultural and environmental characteristics using geospatial and related technologies. SS.HS.2.2.e. Research and interpret multiple viewpoints on issues that shape policies and programs for resource use and sustainability. SS.HS.2.3.a Explain how the uneven distribution of resources in the world can lead to conflict, competition, or cooperation among nations, regions, and cultural groups. SS.HS.2.3.b Explain that the world's population is increasingly connected to	

			and dependent upon other people for both human and natural resources.	
GIS	NRS.03 Develop plans to ensure sustainable production and processing of natural resources. ESS.05 Use tools, equipment, machinery, and technology common to tasks in environmental service systems.	NRS.03.02. Demonstrate cartographic skills, tools, and technologies to aid in developing, implementing, and evaluating natural resource management plans. ESS.05.01. Use technological and mathematical tools to map land, facilities, and infrastructure for environmental service systems.	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 NRS.03.02.02.c Use GIS data for a given area to devise a management plan for the management, conservation, improvement, and enhancement of its natural resources. ESS.05.01.02.a Research the methods in which GIS can be used in environmental service systems (e.g. tracing of point pollution, control of the spread of invasive species, etc). ESS.05.01.02.b Apply GIS Skills to a situation specific to environmental service systems. ESS.05.01.02.c Interpret and evaluate GIS data to come to a conclusion about a scenario specific to environmental service systems.	
Technology	ESS.05 Use tools, equipment, machinery, and technology common to tasks in environmental service systems. Application of GIS Platforms through statistics and other data pulls.	ESS.05.01. Use technological and mathematical tools to map land, facilities, and infrastructure for environmental service systems.	ESS.05.01.03.a Research how advancements in technology (e.g. unmanned aerial vehicles and drones, genetic modification, fracking, alternative energy has changed environmental systems. ESS.05.01.03.b Analyze and document examples of utilization of breaking technology in environmental service systems. ESS.05.01.03.c Evaluate trends in technology and develop predictions	

		ESS.05.02 Perform assessments of environmental conditions using equipment, machinery, and technology.	about how these advancements will change environmental service systems. ESS.05.02.01.c Evaluate a sample of water to determine its quality and if it has been contaminated. ESS.05.02.02.c Evaluate a sample of soil to determine its quality and if it has been contaminated. ESS.05.02.03.c Perform an evaluation of air quality to determine and assess its impact on human and ecological populations.	
Sustainability plan for specific resources - Conservation & Resource Planning	ESS.05 Use tools, equipment, machinery, and technology common to tasks in environmental service systems.	ESS.05.02 Perform assessments of environmental conditions using equipment, machinery, and technology.	ESS.05.02.04.a Research and summarize methods used to determine ecological health and determine if an ecosystem is threatened (e.g. quadrat analysis, bioindicators, mark-re-capture, etc). ESS.05.02.04.b Assess different measurements of assessing ecological health (e.g. quadrat biodiversity assessments, transect surveys, population counts, detection of disease, and invasive species, etc) to determine their effectiveness and limitations. ESS.05.02.04. c Evaluate a habitat to determine its ecological quality and if it is threatened. Recommendation: Esri based Resources	

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.