

<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Scientific Basics &amp; Overview</b>	<b>Author/s:</b>	Stephen Shepherd

<b>NYS Next Gen Learning Standards</b>	<b>Essential Question/Big Ideas</b>
<p>MS-PS1-7. Use evidence to illustrate that density is a property that can be used to identify samples of matter.</p> <p>MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and phase (state) of a substance when thermal energy is added or removed.</p>	<p>What is this course comprised of?</p> <p>How do we measure density?</p> <p>How do we graph data, and how do we interpret graphs?</p>

<b>Brief Unit Summary</b>	<b>Content Vocabulary</b>
<p>We kick off the school year with reminders of some of the basics in any Jr/Sr High science class: density, graphing, observations &amp; inferences. We also look at what the bulk of this course is going to be about: an introductory look at geology &amp; meteorology that has an emphasis on natural hazards.</p>	<p>Quantitative, Qualitative, Observation, Inference, Sources of Error, Scientific Theory, Hypothesis, Direct Relationship, Indirect Relationship, Matter, Density, Mass, Volume, Independent Variable, Dependent Variable, Meteorology, Geology, Environment, Weather, Climate, Universe, Planet</p>

<b>Content Skills or Learning Targets</b>	<b>Assessments (Pre-Assessments, Formative, and Summative)</b>	<b>Timeframe</b>
<p>Analyzing graphs and other evidence, Applying formulas and knowledge to solve problems, Understanding what this course entails in the bigger picture</p>	<p>Pre-Assessment: Have them take (part of) an old Earth Science Regents</p> <p>Formative- bellringers, exit tickets</p> <p>Summative- labs, homework assignments, at least one quiz/test</p>	<p>2-3 weeks, September</p>

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<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Models &amp; Dimensions of the Earth</b>	<b>Author/s:</b>	Stephen Shepherd

<b>NYS Next Gen Learning Standards</b>	<b>Essential Question/Big Ideas</b>
4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.	How do we read a map or a globe? Why do we have time zones? How do we read and plot isolines?

<b>Brief Unit Summary</b>	<b>Content Vocabulary</b>
After brushing up on geography, we delve into how the Earth itself is modeled: through globes and maps, in particular contour maps and topographic profiles.	Latitude, Longitude, Oblate Spheroid, Altitude, Isoline, Isotherm, Contour Line, Topography, Contour Map, Elevation, Slope, Gradient, Time Zones, Profile

<b>Content Skills or Learning Targets</b>	<b>Assessments (Pre-Assessments, Formative, and Summative)</b>	<b>Timeframe</b>
Understanding how to read various maps, Analyzing contour maps, Creating isolines, contour maps, and profiles	Formative- bellringers, exit tickets  Summative- labs, homework assignments, at least one quiz/test	2-3 weeks, late September into mid-October

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<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Earth's Interior, Plate Tectonics, and Earthquakes</b>	<b>Author/s:</b>	Stephen Shepherd

NYS Next Gen Learning Standards	Essential Question/Big Ideas
<p>HS. ESS2-3. Develop a model based on evidence of Earth’s interior to describe the cycling of matter by thermal convection.</p> <p>HS-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.</p> <p>HS-ESS2-1. Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.</p> <p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p>	<p>What is the working mechanism behind the theory of plate tectonics?</p> <p>How do we obtain information about the interior of the Earth?</p> <p>How can we extrapolate seismic data to ascertain other information about earthquakes?</p>

Brief Unit Summary	Content Vocabulary
<p>We start to figure out how the Earth works at the ground level, as well as deep underground. A bulk of this learning happens to be in regards to earthquake activity &amp; volcanic activity.</p>	<p>Plate Tectonics, Divergent Boundary, Convergent Boundary, Transform Boundary, Fault, Hot Spot, Asthenosphere, Lithosphere, Earthquake, Tsunami, P-Wave, S-Wave, Seismograph, Seismogram, Richter Scale, Mercalli Scale, Convection Cells, Continental Crust, Oceanic Crust, Continental Drift</p>

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
<p>Applying given knowledge of Earth’s interior to figure out mechanisms and properties,</p> <p>Evaluating seismic data to find epicenters and related wave times,</p> <p>Understanding the theories of plate tectonics and continental drift</p>	<p>Formative- bellringers, exit tickets</p> <p>Summative- labs, homework assignments, at least one quiz, at least one test</p>	<p>5-6 weeks,</p> <p>late October through the beginning of December</p>

<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Surface Processes</b>	<b>Author/s:</b>	Stephen Shepherd

<b>NYS Next Gen Learning Standards</b>	<b>Essential Question/Big Ideas</b>
<p>HS-ESS2-1. Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.</p> <p>HS. ESS2-2. Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks that cause changes to Earth’s systems.</p> <p>HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</p> <p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p>	<p>How do the forces of weathering, erosion, and deposition shape the surface of the Earth?</p> <p>How does water interact with other parts of the lithosphere and troposphere?</p>

<b>Brief Unit Summary</b>	<b>Content Vocabulary</b>
<p>As we prepare to move into studying the atmosphere two units from now, we bridge the gap by talking about the processes of weathering, erosion, and deposition. One of the largest agents of weathering/erosion is water, and we break down various water-specific processes &amp; relevant landscape formations. This section will also cover drought &amp; wildfires.</p>	<p>River, Meander, Weathering, Erosion, Deposition, Channel, Capacity, Tributary, Delta, Competence, Discharge, Watershed, Drainage Basin, Continental Divide, Infiltration, Water Cycle, Evaporation, Transpiration, Condensation, Precipitation, Porosity, Permeability, Glacier, Sustainability</p>

<b>Content Skills or Learning Targets</b>	<b>Assessments (Pre-Assessments, Formative, and Summative)</b>	<b>Timeframe</b>
Understanding how surface processes work, Applying that knowledge to make predictions, Analyzing existing landscape features to figure out what processes led to them	Formative- bellringers, exit tickets  Summative- labs, homework assignments, at least one quiz, at least one test	7-9 weeks, December through the beginning of February  [Keep in mind that midterms are in mid-January.]

<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Earth's History</b>	<b>Author/s:</b>	Stephen Shepherd

<b>NYS Next Gen Learning Standards</b>	<b>Essential Question/Big Ideas</b>
<p>HS-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.</p> <p>HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.</p> <p>HS-ESS2-7. Construct an argument based on evidence about the coevolution of Earth's systems and life on Earth.</p> <p>HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.</p>	<p>How can we tell the age of the Earth?</p> <p>How can we tell when certain events happened in Earth's history?</p> <p>How can we tell the ages of previously living organisms?</p>

<b>Brief Unit Summary</b>	<b>Content Vocabulary</b>
We hark back to the geology-based units and bring in a wider perspective of the history of Earth's surface, both the abiotic aspects and the biotic factors. We'll focus a lot on mass extinction events & impact craters.	Radioactive dating, relative age, absolute age, inclusion, half-life, geologic time, period, epoch, era, fossil, index fossil, geological event, supercontinent

<b>Content Skills or Learning Targets</b>	<b>Assessments (Pre-Assessments, Formative, and Summative)</b>	<b>Timeframe</b>
Analyzing timelines and diagrams to determine sequences of events, Understanding how scientists can determine the absolute age of something (not just the relative age)	Formative- bellringers, exit tickets  Summative- labs, homework assignments, at least one quiz/test	3-4 weeks, the rest of February

<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Weather &amp; Climate</b>	<b>Author/s:</b>	Stephen Shepherd

<b>NYS Next Gen Learning Standards</b>	<b>Essential Question/Big Ideas</b>
<p>HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's 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 systems.</p> <p>HS-ESS2-8. Evaluate data and communicate information to explain how the movement and interactions of air masses result in changes in weather conditions.</p> <p>HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to Earth's systems.</p> <p>HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.</p>	<p>How do we interpret meteorological data?</p> <p>How can we use weather data over a long period of time to analyze and forecast climate change?</p> <p>How are humans affecting the atmosphere?</p>

Brief Unit Summary	Content Vocabulary
Spring is arriving, and it's the perfect time to focus on studying the atmosphere, specifically the weather in the troposphere. We get into many sub-topics: some weather factors which meteorologists emphasize, and some that they breeze by without much explanation. We also look at the bigger atmospheric picture: climate & climate change. Storms of all kinds will be a major focus.	Weather, Climate, Pressure, Air Mass, Source Region, Temperature, Humidity, Dew Point, Relative Humidity, Jet Stream, Atmosphere, altitude, elevation, rain shadow, hurricane, tornado, Coriolis Effect

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
Understanding how certain weather events occur and how atmospheric factors affect the weather and climate, Analyzing & creating weather maps and station models	Formative- bellringers, exit tickets  Summative- labs, homework assignments, at least one quiz, at least one test	8-9 weeks, March & April

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<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Biological Outbreaks (Disease, Insects)</b>	<b>Author/s:</b>	Stephen Shepherd

NYS Next Gen Learning Standards	Essential Question/Big Ideas
<p>HS-LS2-1. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales.</p> <p>HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>	<p>What factors lead to a biological outbreak?</p> <p>How can biological outbreaks be prevented?</p>

Brief Unit Summary	Content Vocabulary
In light of the COVID-19 pandemic, it's hard to deny that biological outbreaks are natural disasters as well. We'll use this time to introduce subtopics that may pop up during Living Environment (for those who have not taken it yet). With the exception of weather events that happen this school year, this is likely the most "close to home / current events" topic of the course.	Pandemic, epidemic, endemic, disease, virus, pest, invasive species

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
Evaluate responses to previous outbreaks, Analyze preventative measures in place	Formative- bellringers, exit tickets  Summative- labs, homework assignments, at least one quiz, at least one test	3-4 weeks, May

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<b>Subject and Grade:</b>	<b>Natural Disasters, Grade 9 (&amp; also 10-12)</b>	<b>School Year:</b>	2023-2024
<b>Unit Title:</b>	<b>Emergency Management &amp; Engineering</b>	<b>Author/s:</b>	Stephen Shepherd

NYS Next Gen Learning Standards	Essential Question/Big Ideas
<p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of</p>	<p>How can we prepare our infrastructure, buildings, and lives for natural disasters?</p> <p>How should we respond during an emergency?</p> <p>What measures can we take to monitor and possibly prevent natural disasters?</p>



constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	
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Brief Unit Summary	Content Vocabulary
Throughout this course, in an exemplifying departure from what's seemingly been "Alternative Earth Science," we will discuss responses to natural disasters & see what we as a class can & should do to prepare for future emergencies (and prevent some too, if possible).	Natural hazard, preparation, precaution, safety, society, emergency, resources

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
Create guides to prepare for specific natural disasters, Create natural disaster & aftermath simulations, Evaluate past responses to specific natural disasters, Analyze emergency management measure in place	Formative- bellringers, exit tickets  Summative- labs/projects, homework assignments, at least one quiz, at least one test	Strewn throughout the units (especially during Earthquakes, Wildfires, Hurricanes, and Tornados), but especially mid-May through early June

**\* Topics, timeframes, and order of material are highly subject to change, since this is the first inception of this course at SCCS.**