

Course Syllabus

GSCI 1051- Earth's Dynamic Environment

2021-2022 School Year

INSTRUCTOR NAME
INSTRUCTOR CONTACT

Academy of Aerospace and Engineering
Room 124

This course is given in cooperation with UConn Early College Experience

www.ece.uconn.edu

UCONN COURSE DESCRIPTION

“Origin and history of planet Earth, emphasizing how rock, air, water, and life interact at different scales to produce the earth’s crust, landforms, life systems, natural resources, catastrophes, and climatic regimes. Provides a scientific context for human-induced global change.”

COURSE DESCRIPTION

Full year course that provides an in-depth tour of Planet Earth. This course will discuss Earth in four different aspects: *Earth as a Planet*, *Earth as a System*, *Earth as a Story*, and *Earth as a Home*. *Earth as a Planet* will cover the formation process of Earth and the Moon. *Earth as a System* will dive into the internal and external processes that shape our planet, discussing the role of geothermal and solar energy and how they shape and change our planet. *Earth as a Story* covers how scientists determine the history of an area based on geological evidence and discusses topics around evolution and fossils, climate change and life’s adaptations to it, plate tectonic movements and how they shaped the planet, and surface processes to create the different climates and environments around the globe. *Earth as a Home* discusses human interactions with the planet and how we use the planet as a resource, our impacts, and current events and planning. Students will investigate Earth’s processes through exploration and research of current events and relevant experiences while learning about the current field of geoscience.

LEARNING OBJECTIVES

By the end of the course, you (not the default anonymous you, but the living, breathing, personal you) should:

- **Know** that "geoscience" is the re-branded name for the historical discipline of geology, which has been updated by technology and broadened in scope to the planetary scale.
- **Realize** that geoscience plays an important role in human environmental affairs at all scales. This is particularly true with climate change, a subject that geologists invented several centuries ago. Climates may play themselves out at the surface, but they come from underground.
- **Grasp** the immensity of deep time, not as a big number, but in emotional, psychological, and philosophical terms.
- Be able to **imagine** yourself working either as a professional geologist, or working with one during your future career in business, engineering, law, medicine, the humanities, or in the home. If you have a sense of how doctors, lawyers, engineers, artists, and bankers "behave," when why not add "geologist" to that list?
- **Understand** that every landscape we see, whether intimate to sublime, results from the interaction between three earth-scale subsystems: tectonic, hydrologic, and organic.
- Have a much **better feel** for what science is, how its inquiry takes place, and how the game is played at all levels in all places.

COURSE MATERIALS

Textbooks:

Essentials of Geology, 7th Edition

Earth Science, 12th Edition

Folder

Laptop

Access to calculator

Notebook

Pen/Pencil

COURSE GRADING

Your grade for this course will be focused on assessing your mastery of content and skill application. Rubrics for skill performance will be provided and align with the Next Generation Science Standards Science and Engineering Practices.

GRADING AT AAE

The purpose of a course grade at AAE is to communicate a student's academic performance to stakeholders, including the student, family, staff, and any others involved in the student's education.

GRADING PHILOSOPHY: At AAE we believe...

1. that a student's grade in a course should accurately reflect their academic performance at the completion of the learning period.
2. that a student's grade should not be inflated or deflated due to behavioral or environmental factors that may be out of a student's control or based on the amount of time it takes for them to be successful.
3. that a student's grade should encourage hope and learning, rather than punitivity and point acquisition.
4. that every student should be given the opportunity to make mistakes and learn without fear or permanent penalty.
5. that practicing AAE's Academic Habits will help students be successful in their academic performance.

ACADEMIC PERFORMANCE GRADE

The academic grade a student receives in a course is known as the **Academic Performance Grade**. This grade must be an accurate representation of the student's progress toward the course-specific academic standards at the end of a learning period. This grade will be reported on progress reports and report cards, included when calculating a student's GPA, and reported on student transcripts.

ACADEMIC STANDARDS: SCIENCE AND ENGINEERING PRACTICES

- Asking Questions and Defining Problems
- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Using Mathematics and Computational Thinking
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

AAE ACADEMIC PERFORMANCE SCALE

All assignments and assessments throughout a learning period that count toward a student's Academic Performance Grade will be reported in PowerSchool on the AAE Academic Performance Scale shown below.

AAE ACADEMIC PERFORMANCE SCALE		
EXEMPLARY	Student demonstrates in-depth inferences and/or extensive connections and applications , and communicates a high-level understanding of learning outcomes.	100%
PROFICIENT	Student demonstrates and communicates a clear understanding of targeted learning outcomes, including proficient application of significant concepts, knowledge and skills.	93%
APPROACHING	Student demonstrates progress towards meeting targeted learning outcomes but may require various degrees of additional instruction to show understanding and application of significant content, knowledge, and skills.	83%
DEVELOPING	Student demonstrates limited progress towards meeting targeted learning outcomes and requires various degrees of additional instruction to show understanding and application of significant content, knowledge, and skills.	73%
BEGINNING	Student demonstrates minimal progress towards meeting targeted learning outcomes and is in the earliest stages of communicating understanding or application of the learning goals.	63%
NOT PROGRESSING	Student was not able to demonstrate and communicate an understanding or application of the learning goals.	50%
INSUFFICIENT EVIDENCE	Insufficient evidence is available to accurately determine the student's progress toward attainment of the learning goals which may be due to late enrollment, attendance, or inconsistent completion of significant coursework.	MIS (50%)

FINAL GRADE DETERMINATION

- Each quarter will make up 25% of the final grade for the course.

QUARTER GRADE DETERMINATION

Each Quarter grade will be determined based on the most recent reliable evidence of performance.

- Average Summative Assessment performance - 100% of quarter grade
- Formative assessments will be graded and communicated through PowerSchool to provide information about progress to students and parents. However, these grades will be exempted from the grade calculation.
- Practice assignments, homework, and classwork will not be graded, but will be monitored and used as student self-reflection and to discuss student progress and responsibility.

RE-ASSESSMENT

- Students will have opportunities to re-take, re-do, and re-submit without penalty and with minimal "hoops to jump through."

ACADEMIC HABITS GRADE

Students will also be assigned an **ACADEMIC HABITS GRADE** for each course. This grade will be determined based on the Academic Habits Rubric shown below. This grade will be reported on progress reports and report cards, but will not be included in GPA calculations, nor reported on transcripts for the 2021-2022 school year.

Academic Habits	Indicators	Rating
inter-Act	<ul style="list-style-type: none">• I communicate and collaborate with all individuals in order to drive learning forward.• I use words and actions that are fair and kind to others.• I act as a leader or “team player.”• I seek out ways to help others learn.	<input type="checkbox"/> (4) Consistently <input type="checkbox"/> (3) Often <input type="checkbox"/> (2) Sometimes <input type="checkbox"/> (1) Rarely
Aspire	<ul style="list-style-type: none">• I challenge myself academically.• I seek, accept, and apply feedback.• I self-evaluate in order to determine my strengths and areas in need of improvement.• I strive to continuously improve.	<input type="checkbox"/> (4) Consistently <input type="checkbox"/> (3) Often <input type="checkbox"/> (2) Sometimes <input type="checkbox"/> (1) Rarely
Engage	<ul style="list-style-type: none">• I initiate tasks independently.• I am on task for the duration of class.• I complete my work on time.• I seek out and manage resources.	<input type="checkbox"/> (4) Consistently <input type="checkbox"/> (3) Often <input type="checkbox"/> (2) Sometimes <input type="checkbox"/> (1) Rarely

COURSE POLICIES

ABSENCES

- Coming to class is very important
 - You will miss things that you can't make up!
- Excused absences: make up work due equal to number of days out
- Check Schoology for work that you missed. Being absent does not excuse not being prepared.
- If you are absent, **you are responsible** for finding out what you missed.

ACCESSING COURSE MATERIAL

- It is necessary for you to have access to a laptop to complete your work for this class. You will be expected to bring your laptop to class and be ready to use it for assignments and notes.
- Schoology: A link to all of your assignments and submitted work folders will be available for you here. Any assignments, discussions, due dates, or notifications will be posted here.
- Google Drive: This requires you to have access to using Google Drive as well as an email address. We will be using Google Drive to work on group activities, take notes, write up lab reports, and to complete assignments as well as tests and quizzes.
- You should have a folder or small binder for any handouts or work done in class. Most of the assignments and work done in class will be completed and submitted online.

COURSEWORK

- Each unit will consist of the following major components in addition to regular classwork and activities
 - o End of Unit Assessment
 - o Current Events Research Project
 - o Lab Report with Write-Up
 - o Skill Assessment Checks

All coursework completed is eligible for redo/retakes. Coursework will be accepted as long as it is completed during the corresponding unit. If coursework is determined to be incomplete or insufficient to display content mastery and skill development, the assignment will be marked as Missing with the request of redoing the assignment or completing to demonstrate content knowledge and skill ability. This may require meeting outside of class time as needed for extra support.

Disclaimer: I reserve the right to change this syllabus at any time

COURSE GOALS/LEARNING OBJECTIVES

Course Alignment with Next Generation Science Standards

ESS1: EARTH'S PLACE IN THE UNIVERSE

- **HS-ESS1.A: The Universe and Its Stars**

- The star called the sun is changing and will burn out over a lifespan of approximately 10 billion years.
- The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth.
- The Big Bang theory is supported by observations of distant galaxies receding from our own, of the measured composition of stars and non-stellar gases, and of the maps of spectra of the primordial radiation (cosmic microwave background) that still fills the universe.
- Other than the hydrogen and helium formed at the time of the Big Bang, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy. Heavier elements are produced when certain massive stars achieve a supernova stage and explode.

- **ESS1.B: Earth and the Solar System**

- Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with other objects in the solar system.
- Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes.

ESS2: EARTH'S SYSTEMS

- **ESS2.A: Earth Materials and Systems**

- Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes.
- Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior.
- The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.

- **ESS2.B: Plate Tectonics and Large-Scale System Interactions**
 - The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection.
 - Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history.
- **ESS2.C: The Roles of Water in Earth's Surface**
 - The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics. These properties include water's exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks.
- **ESS2.D: Weather and Climate**
 - The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.
 - Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen.
 - Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.
 - Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere.
- **ESS2.E: Biogeology**
 - The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it.

ESS3: EARTH AND HUMAN ACTIVITY

- **ESS3.A: Natural Resources**
 - Resource availability has guided the development of human society.
 - All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.
- **ESS3.B: Natural Hazards**
 - Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations.
- **ESS3.C: Human Impacts on Earth Systems**
 - The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.
 - Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.
- **ESS3.D: Global Climate Change**
 - Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts.
 - Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities.

UNIT TOPICS AND COURSE TIMELINE

Week 1	Introduction to Course	
Weeks 2-10	Topics	Standards
<u>UNIT ONE:</u> <u>EARTH AS A</u> <u>PLANET</u>	<ul style="list-style-type: none"> - Big Bang Theory - Formation and development of elements - Stellar Evolution and Galaxy Formation - Solar System Formation and Planetary Motion 	ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System
Weeks 11-19	Topics	Standards
<u>UNIT TWO:</u> <u>EARTH AS A</u> <u>SYSTEM</u>	<ul style="list-style-type: none"> - Planetary Formation - Anatomy of Earth - Internal and External Processes that Shape Earth - Atmospheric Processes - Weather and Climate - Historic Overview and Data 	ESS2.A: Earth Materials and Systems ESS2.B: Plate Tectonics and Large-Scale System Interactions ESS2.C: The Roles of Water in Earth's Surface Processes ESS2.D: Weather and Climate
Week 20	Mid-Year Skill Check Assessment	
Weeks 21-29	Topics	Standards
<u>UNIT THREE:</u> <u>EARTH AS A</u> <u>STORY</u>	<ul style="list-style-type: none"> - Plate Tectonics - Formation and Properties of Surface Features - Rocks and Minerals - Understanding Geologic Records - Weather and Climate - Influences by Biological Processes 	ESS1.C: The History of Planet Earth ESS2.B: Plate Tectonics and Large-Scale System Interactions ESS2.D: Weather and Climate ESS2.E: Biogeology ESS3.D: Global Climate Change
Weeks 30-39	Topics	Standards
<u>UNIT FOUR:</u> <u>EARTH AS A</u> <u>HOME</u>	<ul style="list-style-type: none"> - Availability and Mining of Natural Resources - Energy Production and Impacts - Human Sustainability - Pollution Impacts - Natural Hazards and Disaster Prevention and Human Impact - Weather and Climate - Human Influences and Modern Trends 	ESS2.D: Weather and Climate ESS3.A: Natural Resources ESS3.B: Natural Hazards ESS3.C: Human Impacts on Earth Systems
Week 40	End-of-Year Skill Assessment	