



University of Hawai`i at West O`ahu Department of Education  
Spring 2014

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**COURSE INFORMATION**

GEOL 122 – 1 Introduction to Earth Science  
Building E 133  
Monday and Wednesday 9:30AM – 10:50 AM

**INSTRUCTOR**

**Dr. Richard M. Jones**     [richard.jones@hawaii.edu](mailto:richard.jones@hawaii.edu)

**PHONE & OFFICE**     (808) 689-2340, Building E 215

**OFFICE HOURS**     Monday, Tuesday & Wednesday 11:30 PM – 1:30 PM or by appointment

**COURSE DESCRIPTION** This course designed to develop and build the concepts and principles of the Earth system with an emphasis on physical and historical geology. The objectives of the course are to aid students in developing meaningful and functional understanding of key Earth Science concepts and their interrelations; provide students with open-ended problem solving experiences that facilitate inquiry regarding the nature and content of science as an intellectual activity; explore alternate conceptions of scientific phenomena; help students develop more positive attitudes towards science and increase their confidence to both explain and apply Earth system theories and principles. Depending on scheduling there may be an optional local field trip. This course satisfies the General Education requirement for a physical science (**DP**)

**PREREQUISITES** Placement into ENG 100 or concurrent enrollment in ENG 22

**TEXT(S)**

Earth Science, 13<sup>th</sup> Ed., Tarbuck, Lutgens, and Tasa (required)  
Roadside Geology of Hawai`i, Hazlatt and Hyndman (optional)

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**COURSE RATIONALE** GEOL 122 was designed to provide an solid introduction to Earth Science for all students at the University of Hawai`i-West O`ahu (UHWO) as well as meet the accreditation guidelines for UHWO's elementary education program that requires future elementary teachers to teach science at the K-6 level. GEOL 122 is one of several content courses at UHWO designed to meet this need. While GEOL 122 meets the General Education requirement for Physical Science (DP), it has been specifically designed to prepare future teachers to teach earth science at the K-6 level with reference to state and national benchmarks for scientific literacy. Methods regarding how to teach science in the K-6 classroom are taught in a separate course, EDEE 434 Elementary Science Methods.

**UHWO Credit Hour Policy**

For a 3-credit hour course delivered during the normal 15 week semester a student should normally devote 9-hours of work each week. Of this, 2:40 will be spent in class and the remainder will be divided between reading in the text, completing homework, working online, reading and responding to articles focused on geology and the environment in popular media, working on the PowerPoint Presentation, and studying for and taking exams.

**What is Earth System Science?**

GEOL 122 will engage you in learning key concepts and principles of Earth System Science. What do we mean by the "Earth System?" Our planet can be thought of as having four basic components – the land surface and interior of the Earth (geosphere), water and ice (hydrosphere), air (atmosphere), and living creatures, including humans (biosphere). In order to understand how the earth works, we need to understand not only the processes that occur in each of these components, but how these components interact with each other. Additionally, we must consider the place of the earth in the solar system and universe, and how the earth and its inhabitants have changed through time. In short, Earth System Science considers our planet as a collection of systems through which matter and energy continuously cycle.

GEOL 122 provides an introduction to earth system science, addressing aspects of the sun-earth-moon system, the processes that occur in the earth's atmosphere and hydrosphere, how these processes create the earth's weather and climate, and how humans interact with weather and climate systems. We will also explore processes in the earth's interior, materials that make up the earth,

processes that sculpt the earth's surface, how the earth and its inhabitants have changed through time, and how humans interact with the solid and liquid earth. In addition to these key principles of earth system science, you will also be introduced to Earth and its place in the solar system and universe.

### **The Inquiry Approach**

In the inquiry approach to learning, you will engage in numerous hands-on activities, where you will “discover” the principles and concepts of earth science. You will then use these concepts to understand and explain much of the phenomena that you observe in Hawai'i and around the world. Work through each activity carefully and use the questions to help guide your thinking as you determine what is happening. Once you understand the processes involved, you can begin to synthesize the ideas into a general statement, which summarizes the principles and concepts. The next stage is to apply the information to explain new situations or data. An important part of this learning process is discussion. You and other students will exchange ideas and suggestions, with the intent of gaining a better understanding of earth science.

**Science is not only a noun, a list of facts and principles to learn,  
it is also a verb, a way of looking at the world and asking questions.**

Sometimes, students are apprehensive about getting into science. They worry about doing activities and experiments "correctly." But activities may not always work out as planned. That's okay! Practicing scientists experience failure far more often than success, and often learn more from ideas or experiments that fail. In this course, there is usually more than one way to do a given activity and often there is more than one possible result. The activities in this course will guide you towards the scientifically accepted ideas and concepts, but also allow you to learn about how science is done.

### **NOTES:**

1. Periodically you will participate in groups to facilitate study and to implement cooperative activities. The structure of these groups will vary during the course to provide opportunities for you to work with a variety of individuals in the class. Several of the group projects will include a peer evaluation as part of the overall assessment of the group activity. An evaluation rubric specific to the project will be provided at the conclusion of activities including peer evaluation.
2. **Regular participation in, and completion of class activities is required.** You are entitled to **one (1) excused absence.** Additional absences (**without adequate medical documentation**) will result in **3.4%** reduction per absence of your total grade. **It is important to note that simply telling the instructor that you will be absent does not excuse you from this grade reduction.**
3. **Penalties will be imposed for assigned work, which is submitted late at 3.4% per day after the class session. Assignments are due on the date specified regardless of whether or not you are in class.**
4. While you may need to have access to your phone for emergency calls, please **turn cell phones to vibrate** during the class period. **Texting, Tweeting, gaming, and/or engaging in online activities not directly related to the class are considered unacceptable** and as such have a negative bearing on your grade.
5. Students who require assistance with writing or mathematics are encouraged to seek assistance from the **No'eau Center** ( [www.uhwo.hawaii.edu/wlcenter](http://www.uhwo.hawaii.edu/wlcenter) ). The Center also provides workshops on other topics that may be of use to you: for example, how to take notes in class, how to read a textbook, and how to prepare for exams.
6. Course materials and announcements will be posted on **Laulima**.
7. **This syllabus is a living document and the instructor reserves the right to alter, edit, or modify activities and/or assignments based on the learning needs of the individuals in the course.**
8. No “extra-credit” projects, reports etc., are possible in this course. Please do not ask!

### **COURSE GOALS**

01. Ability to analyze and the use web based resources in science learning.
02. Utilize scientific methodology as a problem solving techniques to learn key concepts of earth science.
03. Use the vocabulary and concepts of Earth Science to describe local issues within a global context.
04. Be able to relate the study of earth science to contemporary, historical, technological, and societal issues in the context of Hawai'i.
05. Reflect upon the nature and practice of earth science as a process rather than a body of disconnected facts to be memorized.

<b>Student Learning Outcomes</b>
<ol style="list-style-type: none"><li>1. By the end of this course students will be able to demonstrate content mastery as described within the Hawai'i Content and Performance Standards for Earth Science Standards 6, 7 and 8 Physical, Earth, and Space Sciences. GELO 7 (Social and Natural Science Literacy), ILO 4 (Disciplinary Knowledge), Humanities DLO 3 (Analyze research questions, problems, and issues in Humanities subjects), Education DLO 5 (Demonstrate knowledge of content)</li></ol>

2. By the end of this course students will be familiar with key concepts, developments, and reasoning strategies used in earth science such that they are able to successfully solve problems in open-ended, inquiry environments using materials, maps, data collection tools, models and computer simulations, other class activities and discussions, and background readings. GELO 8 (Contemporary Ethical Issues), ILO 3 (Critical Thinking), Humanities DLO 2 (Analyze contemporary issues from multiple cultural perspectives of global regions and indigenous traditions including Native Hawaiian), Humanities DLO 6 (Analyze research questions, problems, and issues in Humanities subjects), Education DLO 4 (Foster effective communication in the learning environment), Education DLO 7 (Use active learning strategies)

3. By the end of this course students will be able to clearly articulate through writing and or presentation media the study of earth science to contemporary, historical, technological, and societal issues globally and in Hawaii), GELO 1 (Effective Communication), GELO 4 (Global and Multicultural Perspectives), ILO 2 (Cultural Awareness), Humanities DLO 2 (Analyze contemporary issues from multiple cultural perspectives of global regions and indigenous traditions including Native Hawaiian), Education DLO 4 (Foster effective communication in the learning environment)

### **COURSE POLICIES:**

**Student Conduct:** For information on what is expected of UH-West O`ahu students, please refer to the Campus Policies sections (pp. 38-39) of the UHWO 2013 – 2014 Catalog ([http://westoahu.hawaii.edu/pdfs/UHWOcatalog\\_2013-14.pdf](http://westoahu.hawaii.edu/pdfs/UHWOcatalog_2013-14.pdf)).

**Accommodations:** Students with disabilities, whether physical, learning, or psychological, who believe that they may need accommodations in this class are encouraged to contact a counselor in Student Services or your instructor as soon as possible to ensure that accommodations can be arranged for you to fully participate in all components of this course. If you question the appropriateness of an accommodation or wish to discuss the nature of a disability directly or exclusively a counselor in Student Services is available to answer any questions and to consult on access, disability and universal design. The instructor strongly encourages you to seek any help that might be needed to support your success.

### **ASSIGNMENTS/LAB REQUIREMENTS**

#### **A. Homework/Daily Activities and Class Participation: (25%)**

Each class period you will be involved in many varied activities and will be assigned some homework. These activities will include presentation of projects to the peers in your class. Come to class prepared, on time, and be able to collaborate with individuals inside and outside the classroom. Remember that **3.4% of your grade will be deducted for each absence beyond the one 'freebie', and a 1% penalty will be assessed for each tardy.** (SLO 1-3)

#### **B. Laboratory/Investigation Activities: (25%)**

Earth Science lends itself to hands-one, minds-on inquiry and there will be a variety of laboratories or investigations that will help the student conceptualize the often, abstract concepts covered in the course. Laboratory/Investigations may be online, involve manipulatives, be paper based, or contain a combination of learning modes. (SLO 1-3)

#### **C. Earth Science Website Project/ Geology of Hawai'i Project: (15%)**

As part of this course you will find one internet resource specific to a branch of Earth Science (Astronomy, Oceanography, Geology, Meteorology, etc.) or a concept from one of these areas. Once you select your resource you will develop a short presentation for your peers that summarizes the key parts of the site and describes why you selected this site. An alternative to the Earth Science Website Project is the Geology of Hawai'i Project, a short presentation for your peers that showcases the unique geology of Hawai'i. (SLO 3)

#### **D. Geology and the Environment in the News: (10%)**

There will be 2 Geology and the Environment assignments during the term. You may select any article from local newspapers or popular magazines (such as Scientific American or Newsweek). The assignment will consist of a written summary (no more than ½ page) of the topic and a discussion of the relationship of the topic to what you have learned from your textbook. A guide to writing these short papers will be provided. (SLO 3)

#### **E. Assessments: (25%)**

There will be a final in this course as well as quizzes and other assessments that be given periodically throughout the semester. Assessments may cover content from previous classes, extensions of activities, and/or materials from assigned readings. (SLO 1-2)

The course grade is based on the sum of the scores obtained on the above requirements.

*Note that late assignments will not be accepted.*

A: 90-100	B: 80-89	C: 70-79	D: 60-69	F: 0-59
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### **ACKNOWLEDGEMENTS**

The development of this earth science course is the result of work done by Dr. Heather Petcovic and faculty at Western Michigan University, who have graciously provided their expertise and materials to UHWO.

#### **Tentative Outline of Classes:**

Week 1: Class 1: Introduction to course/Our place in the Solar System. Class 2: Continue Introduction and begin Astronomy: Telescopes and Observing Celestial Bodies.

Week 2: Class 1: Moon Journal/Finish Introduction/ Parallax: How far is far? Class 2: Planet Teams begin Virtual Field Trip of the Solar System.

Week 3: Class 1: Constructing Scale Models of the Solar System. Class 2: The Moon – Earth’s Nearest Neighbor/Modeling the Phases of the Moon

Week 4: Class 1: Retrograde Motion, Planetary Dynamics and understanding Earth’s Seasons. Class 2: Our Sun and Average Star/ The Hertzsprung and Russell Diagram Revealed

Week 5: Class 1: Satellites and measuring the Atmosphere from Space. Class 2: Air Pressure, Winds, and Planetary Circulation

Week 6: Class 1: Understanding Weather Station Models. Class 2: Weather/Climate Part I (El Nino/La Nina).

Week 7: Class 1: Weather and Climate Part II. Class 2: Hawai’ian Weather and Climate/ Politics of Climate

Week 8: Class 1: Weathering and Erosion the Interface between the Atmosphere and the Geosphere. Class 2: The Hydrologic Cycle/Water and Politics.

Week 9: Class 1: Common Elements, Minerals and Identification of Common Minerals. Class 2: Introduction to the Rock Cycle/ Igneous Rocks (general)/ Hawai’ian Specific.

Week 10: Class 1: Sedimentary Rocks (general)/ Hawai’ian Specific. Class 2: Metamorphic Rocks/ The Earth’s Interior/Plate Tectonics.

Week 11: Class 1: Measuring the motion of the Pacific Plate/Hawai’ian Islands Age and Distances/Earthquakes/Seismic Hazards in Hawai’i. Class 2: Volcanoes/Volcanic Hazards in Hawai’i.

Week 12: Class 1: Geologic History/Understanding Relative Age and Relative Dating, Class 2: Radiometric Dating (online dating)/Absolute Age.

Week 13: Class 1: The Beach Environment the interface between the Geosphere and the Hydrosphere. Class 2: Earth’s Global Ocean.

Week 14: Class 1: Measuring Sea Level and Ocean Floor Topography. Class 2: Ocean Circulation/Upwelling and Ocean Productivity

Week 15: Class 1: Thermal Expansion, Hawai’i and the Economy. Class 2: Oceania/Politics of the Ocean

#### **Please Note:**

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