

Syllabus: EARTH 333: Earth Materials and Structures
 Scott Rowland, POST 617A, 956-3150, scott@hawaii.edu

This lecture-laboratory-field course (ERTH 333) is designed for upper-division students in either of the Earth Sciences Dept. BA tracks. The first 1/3 of the course will cover structural geology, and the next 2/3 will cover minerals and rocks as well as a few other topics. Lectures will cover key concepts of mineral and rock formation, the information they carry about the past processes and environments, formation mechanisms of various features such as faults, folds, and landslides, and how these can be used to piece together the geologic history of a particular location. The labs will cover identifying minerals and rocks in hand-sample and in thin-section, and will include field trips to measure and record the orientation of rocks and faults, as well as the signs of landslides.

ERTH 333 SYLLABUS

Date	Topic(s)	SLOs
Week 1	Course Introduction, Geologic laws, Relative ages Strikes, dips, and stereonet <i>Strike, dip, and stereonet exercise</i>	1, 2, 3, 4, 5
Week 2	Plate Tectonics I Plate Tectonics II <i>Topographic cross section lab</i>	1, 2, 3, 4, 5
Week 3	Faults: types and identification Folds: types and identification <i>Geologic map and cross section lab I</i>	1, 2, 3, 4, 5
Week 4	Structures and tectonism I: earthquakes Structures and tectonism II: regional scale <i>Geologic map and cross section lab II, mapping exercise</i>	1, 2, 3, 4, 5
Week 5	Chemical bonding and properties Mineral families <i>Hand-sample mineral identification</i>	1, 3, 4, 5
Week 6	Magma compositions Cooling and igneous textures <i>Petrographic microscope intro.</i>	1, 2, 3, 4, 5
Week 7	Types of volcanic activity Types of volcanoes <i>Volcanic rock identification</i>	1, 3, 4, 5
Week 8	Types of intrusive rocks Tectonic setting of intrusive rocks <i>Intrusive rock identification</i>	1, 3, 4, 5
Week 9	Hawaiian volcanism Products of Hawaiian volcanism <i>Volcanic rock field trip</i>	1, 3, 4, 5
Week 10	MIDTERM Marine and terrestrial sedimentary environments <i>Sedimentary rock identification</i>	1, 3, 4, 5
Week 11	Metamorphic rocks Metamorphic grade <i>Metamorphic rock identification</i>	1, 3, 4, 5
Week 12	Chemical weathering processes Clays, oxides, hydroxides, precipitates Veterans' Day	1, 3, 4, 5
Week 13	Soils: basic concepts	1, 3, 4, 5

	Hawaiian soils <i>Hawaiian soils ID and field trip</i>	
Week 14	Rock and soil strength, slope stability THANKSGIVING THANKSGIVING	1, 3, 4, 5
Week 15	Landslide case studies I Landslide case studies II <i>Landslide field trip</i>	1, 3, 4, 5
Week 16	Group presentations I Group presentations II	1, 3, 4, 5

The final exam will be a 1-day mapping project on the Saturday after classes are pau

Your grade will be based on lab assignments, the midterm, group presentations, and the final map.

***Student Learning Objectives (SLOs)**

The Earth Sciences Dept. adopted the following SLOs, and below each one we detail how it will be addressed by the proposed EARTH 333 course:

1. Students can explain the relevance of geology and geophysics to human needs, including those appropriate to Hawai'i, and be able to discuss issues related to geology and its impact on society and planet Earth.
ERTH 333 will address the formation and occurrence of various Earth materials, and will give students a background on where particular resources are and aren't, and why these resources have this distribution.
2. Students can apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
ERTH 333 will give students extensive hands-on experience at identifying minerals and rocks using both simple and complex tools (hand lenses and petrographic microscopes, respectively). In the structural geology portion of the class they will use compasses to determine the orientation of structures in the field, and gain experience plotting these data using a variety of graphical techniques. They will learn how their rock identifications and lab measurements can and cannot be extrapolated to real-world situations.
3. Students use the scientific method to define, critically analyze, and solve a problem in earth science.
ERTH 333 will give students the opportunity to compare, and explain differences between, theoretical treatments of mineral, rock, and structural geology concepts to those encountered in the real world.
4. Students can reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
ERTH 333 students will be required to turn in written lab assignments that address practical Earth Science problems.
5. Students can evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.
Both in the workforce and when dealing with the public (or students in a class), an earth scientist is expected to be able to identify common minerals and rocks. Earth scientists are also expected to be able to read topographic maps and to identify structural features such as faults and landslides in field settings.

Course Learning Objectives – CLOs: The purpose of this course is to reinforce basic geologic concepts that were covered in introductory-level courses and prepare students to use these concepts in future courses and in the field. They will learn how to identify minerals and rocks using hand samples and thin sections, and they will learn how to identify structural features such as faults, folds, and landslides in the field and from geologic maps.

Institutional Learning Objectives – ILOs: Students will gain a *broad knowledge* of geologic materials and structures, as well as why and where they occur in the natural world. They will learn about *Hawaiian geological materials*, how to identify them in the field, and *Hawaiian geological processes*. They will learn to *think critically* when plotting rocks and structures on maps in order to piece together geologic histories.

If you have a disability and related access needs the Department will make every effort to assist and support you. For confidential services, students are encouraged to contact the Office for Students with Disabilities (known as Kōkua) located on the ground floor (Room 013) of the Queen Lili'uokalani Center for Student Services.

Title IX: The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options: **As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator.** Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the **confidential resources available here:**
<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono, Title IX Coordinator (808) 956-299 t9uhm@hawaii.edu