ERTH 103 Geology of the Hawaiian Islands

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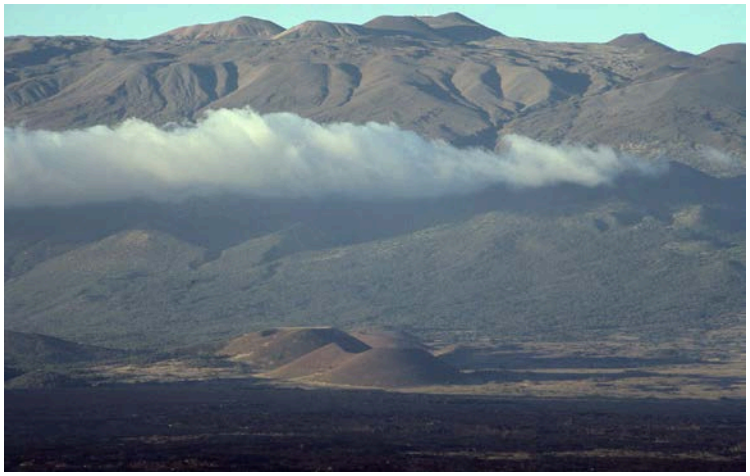
Office Hours: W 12:00-2:00 or by appointment

text: Roadside Geology of Hawai‘i (Hazlett, Gansecki, & Lundblad)



ERTH 103: Every person living in Hawai‘i, whether you grew up here or are visiting only for a semester, should know how the mountains, valleys, beaches, reefs, etc. formed, what processes shaped them to what they are today, what processes provide for, and threaten, our resources and our safety, and how Hawaiians in olden days managed to use these resources without modern materials. ERTH103 is a start to your understanding of these things. To complete your knowledge you should also take OCN201, BOT105, MET101, HWST107, and many others.

ERTH103 covers geological and geophysical processes (earthquakes, erosion, eruptions, etc.) as well as the geology of specific places (Hawai‘i nei). In the past the processes have come first because it made sense for students to have this understanding before applying it to specific Hawaiian islands, volcanoes, valleys, etc. In this version of ERTH103, however, we will interleave processes and places, starting from Lō‘ihi (the youngest Hawaiian volcano) and moving NW along the chain to finish at Meiji seamount (the oldest Hawaiian volcano). We will cover processes along the way as we need them. For example, Lō‘ihi is an active volcano so while there we'll have to cover how magma is produced. However, erosion only becomes a major geological process once a volcano starts to die off so we won't cover it until we get to Mauna Kea and Kohala, and so on. The goal is that by the end of the semester you will be able to look at the entire Hawaiian-Emperor volcanic chain and understand how it got there, why it is not the same all along the chain, and what the geologic future may hold.

In ERTH103, as in all your classes, the important thing is not what I teach you, but what you learn. Learning is an active process – you have to do something to learn. The knowledge doesn't just flow into your brain – you have to pull it in. The best way to pull it in is to take notes during class and to take notes while you do the reading. The reading is key because there is no way we can cover every topic in class. Instead, class should be where the more difficult concepts are discussed and explained. I don't expect that 5 years from now you will remember every single fact that gets covered in the class. But I do want you to remember that you did know those facts at one time so that if you ever need to know them again, you'll have the resources to get the answers.

The goal is to tour Hawai‘i Nei geologically, from SE to NW, following this tentative schedule:

date	**topic(s)**	**pages in book/handout**	**SLOs***
Week 1	Intro. to Geology, Earth Layers	Tectonics handout pp. 1-21	1, 3, 5
	Plate Tectonics	Tectonics handout pp. 1-21	1, 3, 5
	Partial Melting, Volcano Evolution	1-7, demo	3, 5
Week 2	***HOLIDAY***		
	Minerals, Igneous Rocks	7-17	3, 5
	Lō‘ihi	1-7	3, 5
Week 3	Hawaiian Eruption Styles	18-24, 73-74	1, 3, 5
	Lava flows and dikes	24-30, 57-61, 85-88	1, 3, 5
	‘A‘ā and Pāhoehoe lava flows	24-30, 57-61, 85-88	1, 3, 5
Week 4	Kīlauea	50-64, 96-105, 117-124	1, 3, 5
	Current activity at Kīlauea		1, 3, 5

	Mauna Loa	50-64, 96-105, 117-124	1, 3, 5
Week 5	Calderas	17-18, 22-24, 65-97	3, 5
	Rift Zones	17-18, 22-24, 65-97	3, 5
	Earthquakes	97-101	1, 3, 5
Week 6	Hawai‘i Earathquakes		
	Tsunami	57-62, handout	1, 3, 5
	Midterm review		
Week 7	***Midterm I***		
	Hualālai, Magmatic Differentiation	53, 106-111	3, 5
	Mauna Kea	53-55, 114-122, 124-127	3, 5
Week 8	Glaciers and Climate Change	53, 106-111	3, 5
	Kohala	36-41, 111-114	1, 3, 5
	Soils and Soil Formation (talk topics due)	36-41, 111-114	1, 3, 5
Week 9	Streams, Water Erosion	38-41, 55-56	3, 5
	East Maui	128-173	3, 5
	West Maui	128-173	3, 5
Week 10	Rejuvenation	14	3, 5
	Lāna‘i	174-188	3, 5
	Kaho‘olawe	174-188	3, 5
Week 11	***HOLIDAY***		
	East and West Moloka‘i	45-49, 190-207	3, 5
	Midterm review		
Week 12	***Midterm II***		
	Ko‘olau	208-252	3,5
	Wai‘anae	208-252 3,5	
Week 13	Giant Avalanches	33-35, 179-181, 192-193	3, 5
	Kaua‘i	254-289	3, 5
	HOLIDAY		
Week 14	Ni‘ihau	handout	3, 5
	Papahānaumokuākea	handout	3, 5
	Shorelines and Sea Level Change	31-33, 41-45, handout	1, 3, 5
Week 15	Groundwater Hydrology (talk slides due)	handout	1, 3, 5
	Student Presentations I		3, 4, 5
	Student Presentations II		3, 4, 5
Week 16	Student Presentations III		3, 4, 5
	Final review		
	Final Exam, (Monday of finals' week), 9:45-11:45 am		

Course work will include:

-reading assignments
-class lectures and activities
-a field trip (you must complete 1 of 2)
-2 mid-terms and a final
-an oral presentation

Grades will be based on:

-2 mid-terms (20% each)
-1 non-cumulative final (20%)
-1 field trip (15%)
-your presentation (15%)
-weekly sketches (10%)

There is a web site for this class where powerpoint presentations, exam reviews, and field trip photos can be found: ***http://www.soest.hawaii.edu/GG/FACULTY/ROWLAND/GG103/GG103_web.htm***

There is one term project, a 2-slide, 2-minute oral presentation that discusses a place in Hawai‘i. You will compare the Hawaiian explanation of how that place formed (or a legend about the place) to the western geological explanation of how that place formed. There are deadlines during the semester so that you can't save it all up until the last minute. Note that the presentations will take place on April 28 and 30, and May 3 (if necessary).

Geology is best learned in the field and in past semesters we have gone on all-day O‘ahu trips as well as weekend-long neighbor island trips to Kaua‘i, Maui, and Hawai‘i. Unfortunately, this semester that isn't possible, so our field trips will be virtual. You need to complete the assignment of one virtual field trip this semester, and more information will be available once the semester starts.

There are photos of previous field trips on the web at:
http://www.soest.hawaii.edu/GG/FACULTY/ROWLAND/GG103/GG103Field_trips_web.htm

Please do the reading before coming to class. The book is meant to be used as you drive or hike around Hawai‘i Nei, and doesn't contain much in the way of process explanations. However, it is cheap, and will probably be much more useful to you in the future than a typical geology textbook. There will be additional reading assignments for topics not covered by the book.

There is no lab for this class, however, you are encouraged to sign up for the Dynamic Earth laboratory (ERTH 101L). It is a separate class and will give you lots of good hands-on experience. You are also encouraged also to attend department seminars (Fridays at 3:30 in this same room), read and bring in news articles related to Earth science, and look around at your natural surroundings wherever you go. BECOME A GEO-NERD!

Course Learning Objectives (CLOs): In ERTH 103, students will learn how the Hawaiian islands formed and how they are currently changing due to geologic processes and events. We cover plate tectonics and Hawai‘i's place in the world, volcanism, and geophysical processes such as earthquakes and tsunami. We also cover the processes shaping the islands today, including erosion, coastal retreat, and landsliding.

***SLOs - Student Learning Objectives**

Earth Sciences undergraduate courses have to consider how they address a number of SLOs, which the Department has decided are key attributes and/or abilities of any Earth Sciences student. They are (in no particular order):

1. Students can explain the relevance of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
2. Students can apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
3. Students use the scientific method to define, critically analyze, and solve a problem in earth science.
4. Students can reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
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.

Institutional Learning Objectives (ILOs): Students in ERTH 103 will *apply and broaden their knowledge* of the physical and natural world, with specific emphasis on geological processes, products, and features. They will make field observations requiring *critical thinking* so that their descriptions and interpretations are geologically plausible, and they will *communicate* their results via an oral presentation.

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.

CHEATING (ON EXAMS, FOR EXAMPLE), IS TOTALLY UN-COOL AND VIOLATES THE UHM STUDENT CODE OF CONDUCT (SEE http://www.catalog.hawaii.edu/about-uh/campus-policies1.htm#integrity IN THE ON-LINE UH CATALOG). CHEATING WILL NOT BE TOLERATED, AND WILL RESULT IN A GRADE OF F FOR THE COURSE AND A LETTER SENT TO YOUR ACADEMIC DEAN EXPLAINING THE REASON FOR THE F.

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