SYLLABUS FOR GEOS 393
Volcanism and Active Geology of the island of Hawai’i (2 credits)

A field-based course introducing students to the volcanism and active geology of the island of Hawai’i, and by extension, other oceanic islands. Topics include physical features of the volcanoes, plate tectonics and the origin of volcanism, and the development and “life cycle” of oceanic islands.

INSTRUCTORS

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Overview

There is no substitute for field-based instruction in the geosciences. Students can learn a tremendous amount even from just a few days in the field, seeing features and processes with their own eyes, and this results not only in greater knowledge and insights but also enhanced enthusiasm and motivation. Our local climate handicaps us in our field-based offerings, but a winter field course in Hawai’i gets around that limitation. There is probably no better place in the world to introduce students to the basic physical features of volcanoes than the island of Hawai’i, with its active Kilauea and Mauna Loa volcanoes, and we can also make basic features of plate tectonics and a physical understanding of plate tectonics, erosion, the age and development of the ocean basins, and a host of other problems come to life vividly in this setting.

The volcanoes of the Big Island of Hawaii are one of the premier examples of active hotspot volcanism in the world, and are by far the most accessible. A wide variety of volcanic and geologic features are easily accessible, and do not require long drives to reach. A relatively short field trip can cover a wide range of topics, and will provide a memorable and highly educational experience for the students. Cooperation with the Hawaii Volcano Observatory will allow students to see volcanic monitoring in action and learn about the public safety aspects of that task; depending on eruption conditions, this may also allow us to see some features in areas closed to the general public.

This course is offered at the 300-level in order to provide students with a background in rocks/minerals and geospatial sciences with the opportunity to apply skills and concepts in the field. The course is stacked with GEOS 293 in order to take advantage of the potential for peer instruction during projects and presentations. Students enrolled in this course will be expected to read and discuss geological literature and tutor students enrolled in GEOS 293 in field and computer methods necessary for completion of team projects.
The number of instructors will depend on the number of students signed up. With 7 or fewer students, there will be one instructor, and two instructors for more than 7 students.

**Prerequisites**

GEOS 222 or GEOS 225 or any 300-level GEOS course, or permission of instructor

**Textbook**

There is no textbook, but students will be steered toward reference materials available in the library. A field guide, handouts and lecture slides will be provided, and we will guide you to some of the many reference sources available on the web.

**Key Concepts Addressed**

- Hotspot volcanism, hotspot tracks as an indication of plate motions
- Physical Volcanology and volcanic features/landforms
- Hilina Pali, faulting and rifting and the gravitational collapse of the islands
- Petrology of basaltic rocks
- Measuring changes of the volcano: earthquakes, deformation, gas, chemistry
- Volcano monitoring and public safety
- The “life cycle” of volcanic islands

**Student Learning Outcomes**

By actively participating in this course you will gain a new understanding of:

- Hotspot volcanism and its relationship to plate tectonics
- Physical volcanic features, landforms and processes
- The growth, evolution and eventual destruction through erosion and collapse of oceanic islands

Students in this course will directly participate in (learn by doing):

- Collecting and analyzing real data for volcano monitoring
- Examining volcanic rocks and features
- Locating themselves on a map, and documenting their observations through the use of an annotated map and fieldbook.
- Giving short presentations and providing peer instruction to lower division students involved in the field trip.

**Grading**

Students will be given a field notebook and a map or maps of the region. All students will be expected to annotate their maps, locate themselves on the maps, and make observations and take notes in the field. Before the trip, all students will be given assigned reading material. GEOS 393 students will prepare short presentations on one or two topics assigned to them (reading materials provided) and deliver these presentations to their fellow students in evening sessions. These will be augmented by instructor presentations. Each morning,
students will be given short quizzes related to the reading material and presentations of the previous evening. At the end of the trip, GEOS 393 students will revise and update their presentations based on what they have learned, and summarize their experiences in a short report.

Grades will be based on their annotated maps, field notebooks, presentations, quizzes and reports, weighted equally.

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<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Grade</th>
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<tbody>
<tr>
<td>Annotated field map</td>
<td>20</td>
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<tr>
<td>Field notebook</td>
<td>20</td>
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<tr>
<td>Student presentations</td>
<td>20</td>
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<tr>
<td>Quizzes</td>
<td>20</td>
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<td>Report</td>
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Policies

You are subject to the UAF Student Code of Conduct (http://www.uaf.edu/catalog/current/academics/regs3.html). We will work with the Office of Disabilities Services (203 WHIT, 474-5655) to provide reasonable accommodation to student with disabilities. However, all students must be able to walk moderate distances over irregular terrain to be able to participate in the course.

Schedule

The course will begin and end in Hilo, Hawaii. Students will be expected to arrive in Hilo on January 5, and will be free to leave Hilo on January 13 in the evening/late night. We will need to know the arrival and departure times and flights for all students in advance.

January 5    Students gather in Hilo, introduction
January 6    Tree molds, lower East Rift Zone, Overview of Kilauea caldera
January 7    Visit Hawaii Volcano Observatory, Thurston Lava Tube, Kilauea Iki
January 8    Hilina Pali, Southwest Rift Zone, South flank of Kilauea
January 9    Collect monitoring data with HVO staff
January 10   Mauna Ulu hike, Mauna Loa, kipukas
January 11   Ka’u Desert, travel to South Point and green sand beach, olivine,
January 12   Xenoliths, Hualalai volcano (Kona side), Pololu Valley
January 13   Waipio Valley and eroded, north side of the island return to Hilo, students may fly home late night or the next morning

Field Trip Stops Include:

- Hawaii Volcano Observatory
- Kilauea caldera, Halemaumau crater
- Kilauea Iki crater and lava lake
- Mauna Ulu
Lava tubes, pit craters, rift zones, tree molds, etc on Kilauea
Lava vs. the built environment
Active lava flows (depending on eruptive activity and safety)
Monitoring sites in the field