

# GG 211 FIELD GEOLOGY OF HAWAII

FALL 2012

FIELDTRIP DATES: NOV. 23 – 26

**Dr. Floyd W. McCoy**

**Office:** Hale 'Imiloa 115 telephone: 236-9115 *a message is recorded here with current information concerning this field trip*  
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**Home:** telephone: 230-8870

**GOAL:** To study the geology of Hawaii, the Big Island, by exploration and on-site observations during a supervised and guided fieldtrip, with focus on perception and appreciation of formative natural processes in landscape evolution, followed by a discussion and review session on campus.

**OBJECTIVES:** To spend 4 days on the Big Island to discuss, observe and study:

- the geologic structure, volcanology and history of its five subaerial volcanoes: Kohala, Mauna Kea, Hualalai, Mauna Loa, and Kilauea (with mention of its two underwater volcanoes, Mahukona and Loihi)
- the geologic effects of glacial activity such as in erosion, sediment accumulations, and landscape features
- landscape evolution
- detection and monitoring of volcanic activity and attendant phenomena
- the use of energy from volcanoes, and
- cultural, archaeological and political management/mitigation of volcanic risks.

**PREREQUISITE:** Completion or concurrent registration in GG 101, 103, or consent of instructor.

**REQUIRED PARTICIPATION:** For academic credit, attendance on all four days of the fieldtrip with participation at all field sites is mandatory, in addition to the satisfactory completion of the field exercise and/or a written final examination.

**RCOMMENDED READING:** *Volcanoes in the Sea*, Macdonald, Abbott and Peterson (3rd ed., UH Press), chapters 1, 2, 4, 7, 9, 13, 14 & 19; *Field Trip Guide: Kilauea*,  
([http://www.soest.hawaii.edu/asp/GG/resources/docs/Kilauea\\_fieldguide08.pdf](http://www.soest.hawaii.edu/asp/GG/resources/docs/Kilauea_fieldguide08.pdf)).

**TRAVEL ARRANGEMENTS TO/FROM THE BIG ISLAND:** This is your responsibility. Plan your itinerary to correspond to the field trip schedule. Arrivals after field-trip starting times cannot be accommodated, but we will wait for late arrivals due to delayed flights providing we know you are on the flight. Flight departures from Kona prior to the time scheduled for the end of the field trip, or at the time we arrive at the airport, cannot be accommodated.

**TRANSPORTATION ON THE BIG ISLAND:** Vans are booked. These are seven-passenger vans with four-wheel drive for the Mauna Kea road. All students must ride in these vans and contribute towards their rental cost. Additional instruction will occur within vans during transit between field sites. Vans are driven by drivers assigned and employed by the University of Hawaii; no others may drive vans. Anyone not registered for the course may not ride in the vans, excluding participants joining the class as professional contributors and participants with permission from Dr. McCoy (university faculty, graduate students, etc.). Other vehicles may not serve as transportation for registered students during official hours of the field trip.

**HOTEL:** The hotel serving as our headquarters is the Hilo Seaside Hotel near Reed's Bay in Hilo - Prof. McCoy can be contacted here. The first day of the field trip will begin at 0900 at the Hilo Airport (curbside), or at the hotel lobby at 0945 if you are already in Hilo. Thereafter each day's departure and finish will be at the Hilo Seaside hotel. A lecture each morning will precede departure. It is your responsibility to book and pay for your hotel accommodations – remember that the Thanksgiving holiday is busy in Hilo and rooms need to be reserved in advance. [The last night of this field trip may be booked at the hunting lodge at Pohakuloa (Mauna Kea State Park) off the Saddle Road, sleeping in dormitories containing 8 beds (linens are furnished) or in the lodge (bring a sleeping bag) by the fireplace; the lodge has been temporarily closed, however. Please check with the instructor about this year. If we do not stay here, then all nights will be in Hilo.]

*[Please note – we are not staying at the Pohakuloa lodge on the 2012 field trip.]*

**ITINERARY/DATES:** An tentative itinerary of daily activities during the fieldtrip is attached – conditions on an active volcano like Kilauea frequently change, thus does our itinerary; important dates to remember are these:

- **FIELDTRIP STARTS: FRIDAY, NOV. 23, HILO AIRPORT, 0900 (CURBSIDE, ARRIVALS AREA), or HILO SEASIDE HOTEL, 0945 (LOBBY);**
- **FIELDTRIP ENDS: MONDAY, NOV. 26, KONA AIRPORT, 6:30 pm.**

*Note that you will miss one day of classes – please be sure to notify your instructors in advance of your absence from their class.*

**FOOD:** Breakfast and dinner sites are your choice – a listing of local restaurants is appended. Lunches will be in the field either as a picnic, purchased at a local store that morning or the night before, or at a restaurant – check the itinerary for the appropriate venue. Costs for food are the students' responsibility. [If we stay at Pohakuloa, we cook in the large kitchen at the lodge with food purchased at stores in Hilo (often a huge pot of chili and rice with salad, bread, etc. for dinner; eggs, toast, etc. for breakfast – costs for these items will be shared by all who stay at Pohakuloa).]

#### **FIELD CONDITIONS AND CLOTHING:**

**Lava flows:** If we have a long hike over lava flows, you must have sturdy socks, hiking boots/shoes and long pants – slippers and shorts will not be allowed. Should active lava flows be within reach, gloves and flashlights (the former should we attempt to sample the lava, the latter in case of a night hike to the flow fronts), with ample water, are required. If the hike is brief and no active flows are nearby, then these restrictions do not apply. The decision for a long or short hike will be made the day before the hike after consultation with scientists at the Hawaiian Volcanoes Observatory and rangers at the Hawaii Volcanoes National Park, as well as after Dr. McCoy has hiked out on the flows [on Thanksgiving Day] to check conditions. Be prepared for either a long or short hike. In either case, consider having respirators or cloth masks for filtering volcanic fumes (consult the appended Guide to Field Conditions for health considerations). This hike is optional and can be dangerous.

**Mauna Kea:** We spend a day at 4,200 m/13,800 ft. where the atmosphere contains half the oxygen present at sea level – expect shortness of breath, headaches, and very low humidity. It can be extremely cold with snow and ice at the summit of Mauna Kea - bring long pants, a warm sweater, shoes and socks, and a windbreaker (and maybe a hat, gloves, scarf). Be aware that on previous trips we have encountered deep snow and blizzards. A hike to Lake Waiau is scheduled, a 2 km/1.2 mi. walk that is difficult at this altitude - not a hike for smokers, those with respiratory problems, or pregnant women (consult the appended Guide to Field Conditions for health considerations). Bring water, snacks, chapsticks, fruit, etc. Those not hiking will remain with the cars [or return to Pohakuloa; note also that if we spend the evening on the third day at Pohakuloa, it will be cold (2,600 m/8,500 ft.)].

**Kilauea:** It can be warm and pleasant or windy and cold at the summit – be prepared for both. Here we do only short hikes, and shoes are recommended (pyroclastic deposits can be difficult with slippers). In Puna on the rift zone, it is usually warm and rainy; shoes for a short hike across the flows at Kaimu are easiest but after that slippers are fine. Be aware that high concentrations of sulfur gas occur at the summit crater [Halema'uma'u].

**EXPENSES/DEPOSIT:** Students are responsible for all expenses - estimated total costs (rental vans, gasoline, admission fees, airfare, food and hotel costs) could be in excess of \$350.

**Payment of \$200 must be made to the WCC Business Office by Oct. 31, 2012 – if not made, you will be dropped from the course; costs are estimated for vans, gasoline, and additional items (museum admission fees, access road to the lava flows, etc.), actual amounts made be slightly more, or less, depending upon expenses tallied at the end of the trip.**

**LEGAL AND MEDICAL FORMS:** These are attached and must be completed and signed. Please submit (in person or by mail) these to Dr. McCoy at Hale Imiloa room 115 (mail: WCC, 45-720 Kea'ahala Road, Kaneohe 96744), by Nov. 20, 2009. Understand that the medical forms provide background information should a health problem arise on the trip.

***It is your responsibility to obtain the forms from Dr. McCoy (they are available in the lobby of the Hale Imiloa bldg., across from room 115). If these forms are not completed, signed and submitted before the trip, you may not participate in the course and will be turned back at Hilo Airport should you arrive without the completed forms.***

**FINAL EXAMINATION AND GRADING:** A course grade will be determined by accomplishment on both the field exercise and a final written examination, which will be scheduled at a mutually convenient time. Grades assigned with: **A** = 90-100 points, **B** = 80-89 points, **C** = 70-79 points, **D** = 60-69 points; less than 60 points = fail (**F**). Under special conditions, with consent of the instructor, a grade for no credit (**NC**) could be given.

The final examination date is scheduled for the week following the field trip, to be taken in the WCC Learning Center (TLC) before the end of the fall semester (if you are at another UH campus, other arrangements for the examination may be made).

**ADDITIONAL NOTES AND CONSTRAINTS:** This is a University of Hawaii accredited course, thus no liquor or drugs are allowed during official activities. This is a one (1) credit course. No special preparation is required. Recommended basic skill-levels are college level reading capability. At WCC, this course partially satisfies AA degree requirements and counts as a laboratory course in physical science. At UHM, this course partially satisfies the requirement in the General Education Core, as well as in the College of Arts and Sciences. Portions of the trip involve hiking, sometimes over difficult terrain that can be physically demanding. Be aware that participation on such hikes requires appropriate physical prowess and conditioning (should this not be the case, you can wait in the vans for our return without penalty towards completing the course). Safety concerns are paramount, and will be discussed prior to departing on the field trip – it is your responsibility to read and understand the attached materials that describe potential difficulties, safety issues, and such, and by doing so you accept these conditions as documented by your signature on the waiver forms.

**TENTATIVE ITINERARY - GG 211 - FIELD GEOLOGY OF THE BIG ISLAND**  
**FALL, 2012**

**Friday, November 23**

- 0900 am Meet at Hilo airport terminal, curbside, at the arrivals area  
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0945 Meet at Sand and Seaside Hotel, lobby, for lecture  
1015 Depart for Lyman House museum in Hilo  
1020 Lyman House museum – minerals and rocks (a superb mineral collection)  
1100 depart for Hawaii Volcanoes National Park (HVNP), Headquarters and Museum (across from the Volcano House)  
1140 National Park Headquarters and Museum for lecture, films, displays, etc.  
1250 Steam vents area in HVNP for observations and discussions concerning chemical weathering and mineral deposits from hot volcanic gases
- 1:20 pm Lunch in Volcano village at Volcano Store or other restaurants nearby
- 2:30 Kilauea caldera; Jagger Museum for displays; Hawaiian Volcano Observatory for science exhibits and discussions with scientists  
4:15 Southwest rift zone - cracks, flows and ash deposits from the 1790 eruption  
4:30 Halema'uma'u crater  
5:00 Keanakako'i crater; southeast rift zone; 1972 lava channel  
5:30 Return to Hilo

**Saturday, November 24**

- 0900 am Lecture in the lobby at the Sand and Seaside Hotel  
0930 Tsunami Museum, Hilo – understanding tsunamis  
1145 Thurston lava tube – formation and importance of lava tubes  
1245 Purchase picnic lunch in Volcano village at Volcano store or other nearby stores
- 1:15 pm Lecture and picnic lunch at Bird Park/Kipuka Puauulu off of Mauna Loa road
- 2:30 Kilauea Iki crater; 1959 eruption; devastation trail with Pele's tears and tree molds  
3:45 Two options:
- Option 1 (if active flows are accessible by hiking or viewing from Natl. Park):**  
3:45 Ke Ala Komo overlook off of the Chain of Craters Road – Koae and Hilina Pali fault systems; collapse of Kilauea's south flank; 1975 Halape earthquake  
4:45 Park at the end of Chain of Craters Rd. at new lava flows; hike along coastline to (hopefully) see active lava-flows on land and/or entering the ocean; if no active flows are observable, then there will be a short hike onto older flows - lava flow structures, methane explosion pits, Pele's hair, limu-o-Pele, formation of black-sand beaches, etc.  
5:45 Two choices depending upon weather conditions and flow activity:  
(1) if active flows are accessible, hike to and remain at active-flow area for night viewing (must have flashlights!), return to Hilo about 8:30 pm;  
(2) if active flows are not accessible to hike to, return to Hilo after viewing.
- Option 2 (if active flows are accessible by hiking or viewing from Kalapana):**  
3:45 Drive to Kalapana, onto access road to/over active lava flows  
4:00 Hike along coastline to see active lava-flows on land and/or entering the ocean – lava flow structures, methane explosion pits, Pele's hair, limu-o-Pele, formation of black-sand beaches, etc.  
5:00 Two choices depending upon weather conditions and flow activity:  
(3) if active flows are accessible, hike to and remain at active-flow area for night viewing (must have flashlights!), return to Hilo about 8:30 pm;  
(2) if active flows are not accessible to hike to, return to Hilo after viewing.

*Hiking on lava flows and getting close to active lava flows requires special dress, equipment (gloves and flashlights), and safety concerns – see syllabus and attached documents for details. Additional concerns and restrictions will be outlined prior to the hike in connection with current conditions.*

*Please also be aware of dangerously high levels of sulfur dioxide gas from the vent at Halemaumau as well as from ocean entries.*

## **Sunday, November 25**

- 0900 am Lecture in the lobby at the Sand and Seaside Hotel  
0915 Rainbow Falls, Hilo – stream erosion, waterfalls, post-caldera lava flows  
1000 Park at the end of Kalapana beach road at new lava flows in Kaimu, then hike onto and over flows – field exercises 1 (lava flows) & 2 (black sand beach)
- 1:45 pm Lunch in Pahoa
- 2:45 pm Puna Ventures Geothermal facility – use of geothermal heat; feasibility of extracting geothermal energy in Hawaii and its future; technology of geothermal drilling  
3:45 Lava Trees State Park outside of Pahoa – formation of lava tree-molds; ground cracks  
4:45 1960 Kapoho lava flow at Cape Kumukahi lighthouse – diversion of flows and feasibility for hazard mitigation; burial of Kapoho village; hazard zoning  
5:15 Littoral cones (Sand Hills) at 1842 eruption; Green Lake and tuff cone (depending upon time and access)  
6:00 return to Hilo, purchase snacks and lunch for tomorrow

## **Monday, November 26**

- 0745 am Lecture in the lobby of the Sand and Seaside Hotel  
0830 Depart with baggage for Mauna Kea summit – see cautionary notes in syllabus and attached sheets concerning problems at high altitudes  
0915 Hunter check-in station at intersection of Saddle Road and Mauna Kea Access Road – recent flows, glacial morphology of Mauna Kea, shield morphology of Mauna Kea and Mauna Loa, diversion of lava flows; rest stop for altitude adjustment [elev. = 1500m/5000ft.]  
1015 Hale Pohaku and Onizuka Museum – exhibits; rest stop for altitude adjustment [elev. = 3,000m/10,000ft.]; meet with park rangers  
1130 Keck Observatory [elev. = 4250m/14,000ft]  
1215 Hike to Lake Waiau and ancient Hawaiian adze quarry – glacial features, deposits and history; subglacial eruptions with glass-rich lavas and use by ancient Hawaiians as tools; volcanic bombs; post-caldera eruptions; pyroclastic cones; Lake Waiau; alpine dwarfed plants; stratospheric dust (*weather permitting and trail not buried in snow; sun-screen recommended, UV radiation is intense at this elevation*)  
1:45 pm Depart for Pohakuloa State Park  
2:00 lunch at Pohakuloa State Park  
4:00 Pu'u Wa'awa'a trachyte cone and block flow at quarry on Pu'u Wa'awa'a ranch  
5:30 1800-1801 Hualalai lava flow - a'a lava channel; large nodules of olivine; contemporary hazards and dangers from Hualalai volcano  
6:30 Keahole airport in Kona

*This itinerary is tentative, and likely to change depending upon weather conditions (snow on Mauna Kea, rain elsewhere), lava flow activity, as well as health issues with volcanic gas particularly at the summit of Kilauea.*