GG 212  FIELD GEOLOGY OF MAUI
3 Credits
March 21 – 24, 2010

INSTRUCTOR:  Dr. Floyd W. McCoy
OFFICE:  Hale Imiloa 115
OFFICE HOURS:  Mon. & Wed.: 1100-1230; Thur. 4:30-5:30
TELEPHONE:  236.9115
EFFECTIVE DATE:  Spring, 2005

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.

CATALOG DESCRIPTION

A four-day field course on the island of Maui. A survey of Hawaiian volcanology and geomorphology illustrated by field studies of Haleakala and West Maui volcanoes. Students are responsible for air and ground transportation, meals, and lodging.

Activities Required at Scheduled Times Other Than Class Times: None.

STUDENT LEARNING OUTCOMES

Student learning outcomes for this course are:

1. Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.

2. Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture(s).

3. Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.

4. Understand the vastness of geological time applied to Hawaii, and how time is measured and thus the time-scale known.

COURSE CONTENT

Concepts or Topics  
- Geography of Hawaiian volcanoes.
- Structure of Hawaiian volcanoes.
- Rocks and minerals.
- Extrusive and intrusive igneous rocks.
- Hawaiian-type eruptions.
- Stages of Hawaiian volcanism.
- Mechanical and chemical weathering.
- Landscape evolution; geomorphic cycle.
- Rock cycle.
- Absolute and relative dating.
- Geologic time.
- Volc. hazards and mitigation.

Skills or Competencies

1. Understand the scientific method, and how it is used and applied.
2. Understand the metric system.
3. Apply and demonstrate an understanding of physical, chemical, and biological processes to interpreting geological events and processes.
4. Distinguish and reject faux science and misrepresentations of science.
5. Appreciate the spectrum of science and engineering endeavours that underlie the study of the earth.
6. Comprehend the benefits and dangers of volcanism to society, and the mitigation of geological hazards.
COURSE TASKS/OBJECTIVES
We spend four days on Maui studying the geologic structure and history of this island through observations of landscapes and exposures in the field that portray (1) construction of Haleakala and West Maui volcanoes through their shield-building, pre-caldera, and post-caldera stages; (2) post-erosional (rejuvenated) volcanics; (3) processes of erosion and deposition; and (4) the future of the island in terms of geologic and anthropogenic processes. An additional objective is to present, discuss, and use the scientific method in application to understanding this geological history and evolution of Maui, and, by extrapolation, any Hawaiian island.

Course tasks include: full participation on all four days of the course, including all stops, hikes, and field exercises. The latter involves laboratory exercises collecting and recording data at rock and sediment exposures on irregular ground, in the sun, among bushes, then interpreting that data in a field report that must be submitted prior to the end of the semester.

ASSESSMENT TASKS AND GRADING
The course grade is partially determined by full participation (attendance and discussion) in all four days of the course, with one letter-grade reduction for each day, or any portion of a day, of missed-participation, and by a grade on the laboratory exercises. There are no examinations.

LEARNING RESOURCES
Prior to the field course, please read:


Also recommended for background understanding:

Hazlett and Hyndman, Roadside Geology of Hawaii; Mountain Press, 1996 [well written and understandable].


ADDITIONAL IMPORTANT INFORMATION

Schedule
For the first day - if you arrive on Sunday morning, March 21st - meet at Kahului Airport, arrivals area, 0900-0915. For the first day - if you are already on Maui, meet in the lobby of the Maui Seaside Hotel, in Kahului, 0930. All subsequent days – meet in the lobby of the Maui Seaside Hotel, at the time mentioned on the Itinerary. Every attempt will be made to arrive at the airport on the last day, at the time indicated on the itinerary, but this cannot be guaranteed.

Itinerary
Attached – it is tentative, expect changes due to weather conditions, permit/access restrictions and constraints, etc.

Organization, Constraints and Field Conditions

Four days are spent on West Maui and Haleakala volcanoes – four long days in the sun, rain, heat and cold. Be prepared for all of these conditions. Be prepared for hikes through brush, slippery soil, and loose rocks or sand – good hiking shoes are suggested.

Field exercises may be sited within rugged conditions with brush, Kiawe trees, loose boulders, slippery soils, and such. Be prepared for these conditions. Expect a field exercise to take anywhere from an hour to an entire afternoon. Equipment, forms, pencils, etc., needed for a field exercise will be provided.

Alternate field site for one day may be a hike into and out of Haleakala “crater”. You will be notified well in advance, before arrival on Maui, if this option will occur. This hike is difficult- about 12 miles long; down Sliding Sands trail [from 10,000 ft. (3000 m) down to 6000 ft (1820 m)]; across the “crater” floor of loose ash and cinders; then ascending Halema’u trail [to 8000 ft. (2430 m)] over lava flows and slippery soil. This is a wilderness area (no emergency facilities; everything taken in must be carried out including all wastes) in an awesome, dramatic,
geological setting. If you smoke, have respiratory problems (asthma, etc.), are pregnant, or have not hiked long distances, do not attempt the hike.

Safety and Health

These are outlined on the separate packet of information and waiver/medical forms. The medical form must be submitted before you may participate on the trip – if you arrive on Maui without this form, you may not participate in the course. With this form is a sheet outlining field conditions – show this to your physician.

Be aware that Dengue Fever has been reported on Maui, particularly in Hana, where we will spend a few hours during mid-day. Be aware that we will be near streams and still fresh water (lo’i) at many locations where Leptospirosis may be a contaminant (for more information, see the sheet incorporated into the packet of information sheets/forms). Swimming, where time permits, especially in the lava tubes at Wainapanapa State Park or Seven Sacred Pools, is at your own risk.

First aid kits will be available in the lead van, as well as at all field sites including Haleakala.

What to Expect/what to Bring

It should be sunny and warm. However expect cool weather especially on Haleakala, and rain in Hana. Bring a bathing suit for swimming if there is time during the field trip (or after returning). Most field sites are a short hike from the highway over easy terrain. One of the sites for the field exercise will be a longer hike through, and within grass, Kiawe, and loose boulders. Good hiking shoes are recommended.

If the Haleakala hike is done, bring: a small backpack for carrying cameras, sun screen, water (at least a quart), and food; comfortable and broken-in hiking shoes; a hat; bandages and/or moleskins in case of blisters; jackets and light rain-gear. It is also recommended to leave extra water and snacks in the van for consumption after the hike. A flashlight is recommended in case of darkness while hiking out, as well as for visiting the lava tube near Holua cabin.

Transportation on Maui

Vans are rented – all students must ride in these vans.

Travel, Expenses, Facilities and Food

It is your responsibility to book transportation to and from Maui, and accommodations on Maui. We meet every morning at the Maui Seaside hotel (Kahului) in the lobby (Dr. McCoy may be reached here). Lunches will be in the field, either as a picnic or at a local restaurant (see the Itinerary). Other meals are your choice.

If the Haleakala hike is done, lunch will be in the “crater”. Food and drink must be purchased the day before, then carried in during the hike, with all garbage taken out (it is a wilderness area) – there will not be time to purchase food the morning of the hike.

Students are responsible for all expenses. Estimated total costs for everything (travel, food, hotel, etc.) might be over $300. We share in the costs of the vans, gasoline, and admission fees, these covered by a deposit made to the WCC Business Office.

Deposit/Waiver Forms

A deposit of $150 is due to the WCC Business Office prior to the trip. Waiver and medical forms must be submitted to Dr. McCoy. You may not participate on the trip, nor receive a grade, unless the deposit has been made and the forms are submitted.

DISABILITIES ACCOMMODATION STATEMENT

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, lemke@hawaii.edu, or you may stop by Hale ‘Akoakoa 213 for more information.

PLEASE NOTE: ACCOMODATION FOR THOSE WITH PHYSICAL DISABILITIES IS DIFFICULT TO ARRANGE AND ADAPT FOR, DUE TO ARDUOUS AND REMOTE OUTDOOR CONDITIONS.
TENTATIVE ITINERARY - GG 212

Note: This schedule is tentative – these dates are fixed; however, times, locations and itineraries on those days may change depending upon weather conditions, permits, access restrictions, highway conditions, and such. Whenever possible any alterations will be announced on the day preceding the change.

Sunday March 21st
0900 those arriving this morning - meet at Kahului airport, curbside at the arrivals area; pick-up vans, leave for Maui Seaside Hotel in Kahului for storage of luggage and purchasing lunch
1015 those already on Maui, and those just arrived - assemble in the lobby of the Maui Seaside Hotel for a lecture
1045 depart from hotel for West Maui
1100 Waihe’e [possible field exercise]
  • ancient sand dunes [aolianites]
  • palaeoclimates
  • plant and reef fossils
  • sea level changes
1130 W. Maui volcano
  • post-caldera volcanic slopes
  • post-caldera weathering
1145 Road cut between Waihe’e and Makamaka’ole
  • spheroidal weathering
  • chemical weathering
  • unconformities
  • inferences for post-caldera stage eruption rates
1230 picnic lunch at Pu’u Koae and Pu’u Kahakulou
  • post-caldera eruptions and lavas
  • trachyte plugs and flow
  • chemical weathering and soil formation
  • chemical weathering and surface textures on trachytes
2:30 pm near Makaluapuna
  • dense post-caldera lavas - ancient Hawaiian bellstone
  • erosion of dense lavas – Dragon’s Teeth
  • formation of red soils and erosion
4:00 pm Ka’anapali and Lahaina
  • hot springs
  • postcaldera eruptions and shield shape
5:30 pm return to Maui Seaside Hotel

Monday March 22nd
Alternate 1: Haleakala and Southwest Maui
0800 depart hotel for Haleakala summit (those wanting to see sunrise from Haleakala summit may leave earlier and meet us at the summit visitor’s center)
0845 lower visitor’s center (displays and rest stop)
0900 Haleakala crater rim at summit visitor’s center
  • formation of Haleakala “crater”
  • post-caldera volcanism
  • pyroclastic eruptions
  • formation of Ko’olau and Kaupo Gaps
  • shield collapse
1000 summit overlook
  • formation and evolution of Haleakala Volcano
1100 Ma’alaea Beach, Kealia Pond
  • nearshore/beach processes
  • formation of the Maui Isthmus
  • sea-level changes
  • anchialine ponds
1200 lunch in Lahaina
1:45pm Target Range Gulch - field exercise – mapping and interpreting a sedimentary deposit that represents either a former higher sea-level stand, or the result of deposition from a mega-tsunami (field data collection only; a field report, with your interpretation, is due by the last day of classes).
4:00pm return to Maui Seaside Hotel
Alternate 2: Haleakala Hike

0645 depart hotel for Haleakala summit (those wanting to see sunrise from Haleakala summit may leave earlier and meet us at the summit visitor’s center)

0730 lower visitor’s center (displays and rest stop)

0745 Haleakala crater rim at summit visitor's center
  • formation of Haleakala “crater”
  • formation of Ko’olau and Kaupo Gaps
  • post-caldera volcanism
  • pyroclastic eruptions
  • shield collapse

0800 start hike down Sliding Sands trail
  note: we will assemble at various sites along the way for discussions on geology and biology - sites will be announced during the hike)

1130 picnic lunch within Haleakala at Pele's Pig Pen or Bottomless Pit [we’ll see where we are about noon]

1:00 pm [possible field exercise in the vicinity of Pele’s Pig Pen or Bottomloss Pit]

3:00 pm Holua cabin
  • lava tube
  • formation of Ko’olau Gap

4:00 pm ascent out of Haleakala via Halemau'u trail to Hosmer Grove

6:30 pm meet at vans

7:30 pm return to Maui Seaside Hotel

Tuesday March 23rd

0830 lecture - assemble in the lobby of the Maui Seaside Hotel

0900 depart hotel for Hana

1000 Keanae peninsula
  • East Maui (Haleakala) shield building flows
  • late stage, post-erosional lava flows

1045 Hana highway road cut
  • late stage lava flows
  • ancient buried soils
  • unconformities

1100 Pua‘aka’a State Park
  • stream erosion
  • formation and lifetime of water falls

1130 Ka’eleku Caverns
  • lava tubes and their significance to constructing a Hawaiian volcano
  • lava stalactites and stalagmites

1245 Wainapanapa State Park
  • lava tubes filled with water [swimming at your own risk if there is time]
  • ground water
  • formation of black sand beaches

1:30 pm picnic lunch in Hana, food purchased from local stores

3:00 pm Ohe gulch and Seven Sacred Pools
  • stream erosion and significance of flash floods
  • formation of pot holes and water falls

4:30 pm Kipahulu, Kaupo, Kaupo Gap
  • formation of Kaupo Gap and collapse of volcano
  • debris flows

5:45 pm Hanamanioa-Kanaio-Lualā‘ilua Hills
  • East Maui Volcano (Haleakala) SW rift zone
  • cinder cones
  • current and future volcanic activity

7:30 pm return to Maui Seaside Hotel
**Wednesday March 24th**

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>0900</td>
<td>lecture - assemble in the lobby of the Maui Seaside Hotel</td>
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<tr>
<td>1000</td>
<td>Iao Needle and Stream</td>
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<td>- caldera of West Maui volcano</td>
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<td>- possible exposure of a magma chamber</td>
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<td>- altered rocks and cores of Hawaiian volcanoes (“moonstones”)</td>
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<td>- stream erosion and Iao valley formation</td>
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<td>- relative dating of landscapes by valley formation</td>
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<td>- alluvial deposits and sea level changes</td>
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<td>1115</td>
<td>Hawaii Nature Center</td>
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<td>1200</td>
<td>lunch in Wailuku</td>
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<td>1:30 pm</td>
<td>Pacific Disaster Center (Kihei)</td>
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<td>2:50 pm</td>
<td>Makena Beach and Pu’u Olai</td>
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<td></td>
<td>- SW rift zone volcanism</td>
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<td></td>
<td>- cinder cone and lava flow</td>
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<td>- formation of littoral cones and pyroclastics</td>
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<td>- nearshore and beach processes</td>
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<td>4:00 pm</td>
<td>La Perouse Bay</td>
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<td>- 1790 flow [?]</td>
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<td>- types of lava flows</td>
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<td>- SW rift zone and potential for geothermal energy</td>
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<td>- marine preserve</td>
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<td>5:30 pm</td>
<td>return to Maui Seaside Hotel; transportation to the airport</td>
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