Iceland: Geology & Natural History of a Young Island

GEO 180
Lafayette College
August 2-21, 2017

Instructors:
Drs. T. Carley, L. Malinconico & D. Sunderlin

Room/Lab: Lafayette campus & the landscapes of Iceland
Lecture & Lab: Full field days and evening discussions.

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*Courtesy of National Geographic

COURSE DESCRIPTION:
Iceland is a geologically new and unique island. The dynamic glacial environments, sub-polar climate, and thunderous river systems of the country sit atop an active volcanic system on a divergent plate boundary. This intensive field course explores the geological processes that shape the island’s landscape and the climate and life of a sub-polar biome. The course also addresses aspects of Iceland’s human ecology from its early settlement to modern issues of energy, agriculture, and sustainability.

COURSE LEARNING OUTCOMES:
Students will be able to:
1. understand the geologic setting of Iceland within the context of global plate tectonics.
2. describe the volcanic and earth surface processes that shape the unique landscape of Iceland and understand the interactions between the various processes.
3. discuss the numerous geologic hazards that result from the dynamic tectonic environment in Iceland including mitigation and preparation efforts.
4. explain the fundamentals of atmospheric and oceanographic processes that act on the region’s climate and life.
5. describe early and modern relationships of humans to the environment and ecology of Iceland in the context of energy, agriculture, and sustainability.
COURSE COMPONENTS

Texts
- *Volcanoes*, Decker & Decker, Freeman Press
- *The Dynamic Earth*, USGS (pdf & online text)
- *Chasing Ice*, documentary film
- Geologic map of Iceland

Readings Packet (to be provided by the instructors):
- Island ecology & biogeography articles
- Iceland volcanology, glaciology, & climate articles
- Selected Icelandic sagas & history readings
- John McPhee “Cooling the Lava”

Evaluation
This course will be evaluated in a fashion similar to 100-level on-campus geology courses. Evaluation will include:

- one Pre-Course Assignment
  - This pre-course assignment will focus on general geology and geography. It will be due upon your arrival on campus in August.

- one Pre-Departure Exam
  - This first exam will occur before departure in August and will cover material that is summarized during on-campus discussion both in the Spring of 2017 and in the day and a half of classes before departure to Iceland.

- one Mid-Course Exam
  - The mid-course examination will cover material from the field portions of the course in Southern Iceland.

- one Final Exam
  - The final exam will be comprehensive for the entire course but concentrate on the Northern Iceland field component.

- A detailed Field Journal (in the style & spirit of intrepid naturalists).

Taking field notes, recording field data, and writing reflection entries is all part of the Field Journal for the course.

You will need your journal (and a pencil) with you **constantly** and do all that you can to insure that it is not lost. The journal will be assessed periodically for completeness, depth of observations, and neatness. The journal is the primary means of studying for examinations as well.

**GRADING BREAKDOWN:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Pre-Course Assignment</td>
<td>10%</td>
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<tr>
<td>Pre-Departure Exam</td>
<td>20%</td>
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<tr>
<td>Mid Course Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Field Journal (evaluated at least 3 times)</td>
<td>15%</td>
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<tr>
<td>Participation</td>
<td>10%</td>
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</table>
College Policy on Academic Integrity

To maintain the scholarly standards of the College and, equally important, the personal ethical standards of our students, it is essential that written assignments be a student’s own work, just as is expected in examinations and class participation. A student who commits academic dishonesty is subject to a range of penalties, including suspension or expulsion. Finally, the underlying principle is one of intellectual honesty. If a person is to have the self-respect and the respect of others, all work must be his/her own.

Behavior

You are representing Lafayette College while you are on- and off-campus. All participants must comply with Lafayette’s rules, standards, and instructions for student behavior as defined in the College’s Code of Conduct and the office of International and Off-campus Education. Lafayette reserves the right to enforce culturally appropriate standards of conduct in another country and specifically reserves the right to terminate the participation of any student for failure to maintain these standards or for any actions of conduct which Lafayette considers to be incompatible with the interest, harmony, comfort, or welfare of other participants. Since we will be in conditions where alcohol can exacerbate already physiologically demanding situations, we will require that you adhere to a strict no-alcohol consumption policy while a participant in this course, even if you are of legal age. Actions and unacceptable behavior will not be tolerated and could result in you being returned to Lafayette. Should your participation in the program be terminated either by the host institution or by Lafayette College for reasons of misconduct, you will receive neither credit nor refund.

Federal Credit Hour Compliance

The student work in this course is in full compliance with the federal definition of a four credit hour course. Please see the Registrar’s Office website (http://registrar.lafayette.edu/additional-resources/cep-course-proposal/) for the full policy and practice statement.
<table>
<thead>
<tr>
<th>Date</th>
<th>General Whereabouts</th>
<th>Academic Themes</th>
<th>Logistical Notes</th>
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<tbody>
<tr>
<td>Spring 2017</td>
<td>4 hours of planning and learning activities in preparation for the course</td>
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| 8/2 Wed | Van Winkle Hall              | Volcanism & Climate Lectures                                                    | Course begins at 9AM in VW 108  
Class from 9-12  
Lunch provided  
Class from 1-5  
Dinner provided  
Class from 6:30-9PM  
Overnight in LC dorms |
| 8/3 Thur | Van Winkle Hall & Fly from Newark to Reykjavik | Glaciology & Ecology/Evolution Lectures                                    | Breakfast provided  
Class from 8AM-12PM  
**Lunch on own**  
PRE-DEPARTURE EXAM in the afternoon  
**Dinner on own**  
Overnight flight to Iceland |
| 8/4 Fri  | Southwestern Iceland Reykjanes Peninsula | Tectonics, Volcanism, and Groundwater Hydrology                                | AM arrival into Iceland  
Breakfast included  
Bridge of 2 continents/ Gunnuhver Geothermal  
Field lunch included  
Transfer to Hotel  
Class Meeting  
**Dinner on own**  
Overnight in Reykjavik (Centerhotel Plaza) |
| 8/5 Sat  | Southwestern Iceland Reykjavik and surroundings | Volcanic Rocks & Geothermal Energy                                              | Breakfast included at Centerhotel Plaza  
Leidarendi lava tube excursion  
Field lunch included  
Reykjadalla geothermal hike  
**Dinner on own**  
Overnight in Reykjavik (Centerhotel Plaza) |
| 8/6 Sun  | Western Iceland               | Volcanic Stratigraphy, Geomorphology, & Archeology                            | Breakfast included at Centerhotel Plaza  
Field exercise - stacked lava flows  
Deldartunguhver thermal springs  
Hraunfossar River/pahoehoe flows  
Field lunch included  
Grabrok Crater & Vatnskalsholar landslide  
Dinner included  
Overnight at Gauksmyri |
| 8/7 Mon  | Northern Iceland Akureyri     | Structural Geology & Soil Science                                               | Breakfast included at Gauksmyri  
Hvitserkur Sea Stacks/glacial landscapes  
Fault field exercise  
Field lunch included  
Roadside geology stops into Akureyri  
**Dinner on own** in Akureyri  
Overnight near Akureyri (Sveinbjarnargarði) |
| 8/8 Tues | Northern Iceland Myvatn Area | Geomorphology & Phreato-magmatism                                               | Breakfast included at Sveinbjarnargarði  
Godafoss waterfall/Viti Crater/Krafla  
Field lunch included  
Hvirer Geothermal Field  
Hverfjall Maar- & rootless cones - Myvatn  
Dinner included  
Overnight in Myvatn (Hotel Sel) |
| 8/9 Wed | **Northern Iceland**  
|  | *Myvatn Area*  
|  | Volcanism, Hydrology, &  
|  | Geothermal Energy  
|  | Breakfast included at Hotel Sel  
|  | Excursion to 2015 eruption site  
|  | Field lunch included  
|  | Askja Caldera/Crater Hike  
|  | Nature Baths near Myvatn  
|  | Dinner included  
|  | Overnight in Myvatn (Hotel Sel)  
| 8/10 Thur | **Northern Iceland**  
|  | *Husavik Area*  
|  | Paleontology &  
|  | Geomorphology  
|  | Breakfast included at Hotel Sel  
|  | Husavik Fossils  
|  | Field lunch included  
|  | Asbyrgi/Dettifoss  
|  | Vesturdalr Hljadakettar Intrusives  
|  | Dinner included  
|  | Overnight in Myvatn (Hotel Sel)  
| 8/11 Fri | **Northeast Iceland**  
|  | *Highland Traverse*  
|  | Mountain Climatology &  
|  | Glacial Erosion  
|  | Breakfast included at Hotel Sel  
|  | Glacial geology on way to Egilsstadir  
|  | Field lunch included  
|  | **Exam**  
|  | Dinner included  
|  | Overnight at Guesthouse Egilsstadir  
| 8/12 Sat | **Eastern Iceland**  
|  | *Fjordlands*  
|  | Intrusive Processes &  
|  | Products  
|  | Breakfast included at Guesthouse Egilsstadir  
|  | Dikes at Djupivogur  
|  | Lunch included  
|  | Xenoliths/Rhyolites/Granites/Magma Mixing at  
|  | Eystrahorn  
|  | Dinner included  
|  | Overnight in Hofn (Smyrlaborg)  
| 8/13 Sun | **Southeastern Iceland**  
|  | *Skaftafell National Park*  
|  | Glaciology & Ecology  
|  | Breakfast included at Smyrlaborg  
|  | Jokulsarlon & Hike at Svinafellsjokul  
|  | Field lunch included  
|  | Glacial products study  
|  | Dinner included  
|  | Overnight in Skaftafell area (Hof 1)  
| 8/14 Mon | **Southern Iceland**  
|  | *Skaftafell National Park*  
|  | Glaciology & Biogeography  
|  | Breakfast included at Hof 1  
|  | Skaftafellsjokul  
|  | Field mapping of glacial moraines  
|  | Field lunch included  
|  | Svartifoss  
|  | Dinner included  
|  | Overnight in Skaftafell area (Hof 1)  
| 8/15 Tues | **Southern Iceland**  
|  | *Lakagigar*  
|  | Recent Volcanism  
|  | Breakfast included at Hof 1  
|  | Lakagigar excursion all day - type location for  
|  | Icelandic fissure eruptions  
|  | Field lunch included  
|  | Dinner included  
|  | Overnight in Laki area (Fosshotel Nupar)  
| 8/16 Wed | **Southern Iceland**  
|  | *South Coast*  
|  | Sedimentology, Agriculture,  
|  | & Oceanography  
|  | Breakfast included at Fosshotel Nupar  
|  | Dverghamrar & Kirkjugolf  
|  | Columnar jointing, top, bottom & sides  
|  | Black sand beach & field exercise  
|  | Field lunch included  
|  | Eyafjallajokull eruption museum  
|  | Skogafoss  
|  | Dinner included  
|  | Overnight at Hotel Skogafoss  

Draft Syllabus (TENTATIVE) (subject to change)
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Activities</th>
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<tbody>
<tr>
<td>8/17</td>
<td><strong>Southern Iceland</strong></td>
<td><strong>Thorsmork National Park</strong></td>
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<td></td>
<td></td>
<td><strong>Glaciology, Geomorphology, &amp; Ecology</strong></td>
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<td>8/18</td>
<td><strong>Westman Islands</strong></td>
<td><strong>Heimaey &amp; surroundings</strong></td>
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<td><strong>Volcanism, Ornithology, &amp; Biogeography</strong></td>
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<td>8/19</td>
<td><strong>Southwestern Iceland</strong></td>
<td><strong>Thingvellir Area</strong></td>
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<td><strong>Icelandic History, Culture, and Tectonics</strong></td>
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<td>8/20</td>
<td><strong>Southwestern Iceland</strong></td>
<td><strong>Reykjavik City</strong></td>
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<td><strong>Study Day</strong></td>
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<td>8/21</td>
<td><strong>Southwestern Iceland</strong></td>
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The schedule of activities above is subject to change due to weather, traffic, road conditions, and other logistical concerns. Please remain flexible as we attempt to provide the best educational experience while keeping safety first.