GEOLOGY OF YELLOWSTONE AND GRAND TETON NATIONAL PARKS

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Figure 1. Students as they entered Grand Teton and Yellowstone National Parks.

✦ CLASS OVERVIEW

This was a 3 credit hour field course in geology offered through Laramie County Community College. The title of the course is Geology of Yellowstone National Park (GEOL 1035-60).

- Course Description: A study of Yellowstone's and the Grand Teton's earth materials and processes including rocks, minerals, streams, glacial history, geologic structures, earthquakes, and plate tectonics. Students acquired scientific knowledge about the formation of Yellowstone's landscape, geothermal features, soils, and geologic hazards. Students recorded observations and took notes in a field book that was be assessed as part of their grade.
- Course Objective: Students gained an understanding and appreciation of the geologic processes that form the Yellowstone and Teton landscapes. Participation in daily hikes, lectures, field note preparation and readings allowed students to comprehend the geology of the area.
- We had 12 students participate in the course this year. The maximum enrollment is 13.
- Students learned the basic geologic processes involved in the creation and continuous shaping of the Yellowstone and Grand Teton ecosystem. Participating students had at least an introductory geology, physical geography or other Earth science class; or, had a specific interest in geosciences. Through the use of the text, Windows into the Earth: The Geologic Story of Yellowstone and Grand Teton National Parks (Smith 2000); recording field notes and making sketches in their field books; and, by exploring and seeing geologic features and processes in the field during daily field trips, students got a front row seat to the show that is Earth in action.

✦ COURSE BACKGROUND

This is our fifth year to complete a successful geology field course in Yellowstone and the Grand Tetons; the first time coordinating and staying at the UW-NPS Research Station at the AMK Ranch. The course has typically run during our interim session between spring and summer semesters – generally in late May to early June.

✦ GRAND TETON NATIONAL PARK

The field trips began in Grand Teton National Park where students were introduced to the Teton and associated faults, glacial processes, and geologic hazards such as: earthquakes, landslides and floods.

Figure 2. Students taking field notes on top of the debris field from the Gros Ventre landslide.

- Students were introduced to the Teton fault and the resulting topography due to these geologic processes over the last 17 million years or so.
- Alpine glaciation extending from the Yellowstone plateau and from the Teton range was discussed, and glacial remnants – both from erosion and deposition were observed and contemplated by the students.
- We drove to the site of the Gros Ventre landslide where students hiked the debris field, conducted rock identification, and took extensive field notes and observations on this event.
- Stream processes were covered as we talked about meandering nature of the Snake River and its migration patterns through time; evidence left behind by stream terraces, oxbows and meander scars.
- As we covered the individual geologic processes in the area, our goal was to get students to think critically about how they have all acted in concert to create what we saw at the present time. A historical geology perspective was important throughout this endeavor.
- We finished up or Teton tour with a hike around Jenny Lake – up to Hidden Falls and then a bird's eye view from Inspiration Point.

Figure 3. Students observing and taking notes on the stream processes at Snake River overlook.

Figure 4. Cut bank on the Snake River as observed from Snake River overlook.

Figure 5. Students on hike above Jenny Lake .

✦ YELLOWSTONE NATIONAL PARK

(Including West Yellowstone and the Hebgen Lake Earthquake)

- The latter part of the trip focused on the geology of Yellowstone and surrounding areas.
- We started the Yellowstone tour off with a trip through the Park and then out the west entrance into West Yellowstone. Here we studied the processes and consequences involved in the Hebgen Lake earthquake event that took place in 1959.
- While studying the Hebgen Lake earthquake event we visited some "textbook" fault scarps, and toured through the Madison River canyon to observe the results of the magnitude 7.5 quake that struck the area on that fateful night in the summer of 1959.
- The Madison Canyon landslide at the end of the canyon provided a great compare and contrast analysis when looking back at the Gros Ventre slide we studied earlier in the Tetons. Students are pushed to put some critical thought into comparing these two events; which at the conclusion of the course, became one of their essays questions on the final exam.
- We also discuss how the Hebgen Lake event altered hydrothermal features in Yellowstone N.P.

Figure 6. Hiking along the Red Canyon fault scarp near Hebgen Lake.

- In previous years, we have had the privilege to meet with one of Yellowstone's Geologists and gain an inside perspective on the current events, research, and other projects going on within the Park.
- In 2012, we had the opportunity to meet with Cheryl Jaworowski, a full-time, Yellowstone National Park Geologist who is stationed at the Park Headquaters in Mammoth.
- Cheryl led us on a tour of the Mammoth terraces while also engaging our students in a mapping exercise. One of her current projects is to find an easy and scientifically repeatable method to map changing hydrothermal vents and pool boundaries at Mammoth.

Figure 7. Students observing the cabin destruction site along Hebgen Lake.

- Our students had an abundance of input on the possibilities of doing this, and also conducted the exercise with paper maps, pencils, cameras, FlipVideo recorders and GPS units. The results will be compiled and put into a GIS map this fall to be sent back to Cheryl with an accompanying report on the students' observations of this project.

Figure 8. Yellowstone N.P. Geologist, Cheryl Jaworowski, explaining the mapping exercise to our students at Mammoth.

Figure 9. Students using maps to sketch out current locations of hydrothermal vents and drainage areas.

- The trip concluded with the last two days observing hydrothermal features at Lower, Midway and Upper Geyser Basins.
- Students then completed a final essay exam before heading back to Cheyenne.
- 2012 resulted in another enjoyable and successful field course in geology. We look forward to future trips and collaborating with the UW-NPS Research Station at the AMK Ranch.

Figure 10 . Brilliant thermophiles give the illusion of a lava flow at Midway Geyser Basin..

Figure 11. Home Sweet Home at the AMK Ranch.