GEOL A139: GEOLOGIC FIELD STUDIES - EASTERN SIERRA NEVADA

Item	Value
Curriculum Committee Approval Date	12/08/2021
Top Code	191400 - Geology
Units	2 Total Units
Hours	72 Total Hours (Lecture Hours 18; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

This course offers students an opportunity to explore fundamental geological concepts in a field-based setting. Pre-trip meetings will orient students to the faults, volcanoes, glaciers, mining and tectonic history of the Eastern Sierra Nevada Mountains. This course includes a multi-day field excursion to various locales of geological interest and may involve camping in primitive wilderness environments. ADVISORY: GEOL A105, GEOL A105H, or GEOL A110. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Investigate geologic features and processes in the field and synthesize them into a cohesive geologic and tectonic history of the region.
2. Summarize the geologic time scale and relate it to field observations.
3. Develop field-note taking skills and create a comprehensive field course note book.

Course Objectives

- 1. Demonstrate a mastery of the Universal Geologic Time Scale.
- 2. Distinguish between different fault types, and be able to identify fault types in the field
- 3. Identify, classify, and interpret the various rocks and minerals observed
- 4. Recognize and interpret fault geomorphology in the field
- 5. Apply the principles of geology to construct a geologic sequence of events for the Red Rock Canyon area
- 6. Differentiate between different volcanic rock types and landforms in the Sierra Nevada/ Owens Valley region and the Long Valley region, and be able to evaluate the processes responsible for them
- 7. Recognize and interpret glacial features and the processes responsible for them, as observed in the Sierra Nevada and Long Valley regions.
- 8. Demonstrate a knowledge of the hydrology and water use history of the area.
- 9. Compare and contrast physical and chemical weathering, and be able to recognize them in the field
- 10. Identify and interpret contact metamorphic rocks and their protoliths
- 11. Construct a geologic sequence of events for the Long Valley caldera
- 12. Relate the chemistry of Mono Lake to the origin of tufa towers
- 13. Demonstrate knowledge of the mineral resources and mining history of the area.
- 14. Apply the model of plate tectonics to the geologic evolution of the area.
- 15. Construct a geologic history of the area, using field evidence collected on the trip
- 16. Take accurate and comprehensive field notes on observations made in the area.

Lecture Content

Geologic time/timescale Types of faults (and causative forces) Features of the San Andreas Fault Volcanic rock types, processes, and resulting landforms of the region Principles of geology Hydrology and water use history of the Owens Valley region Physical and chemical weathering processes and results Plate tectonic processes and resulting features Glacial processes and features Roof pendants and contact metamorphism Geologic history of the Long Valley caldera Geology of Mono Lake Mineral resources and mining history of the Sierra/Owens Valley region Paleozoic geologic history of the region Mesozoic geologic history of the region Cenozoic geologic history of the region

Lab Content

Geologic time/time scale Types of faults (and causitive forces) Principles of geology Types of folds and their significance Types of unconformities and their significance Volcanic rock types, processess and resulting landforms of the region Plate tectonic processes and associated features Metamorphic rocks, processes and protoliths Field collection and interpretation of fossils

Method(s) of Instruction

- Lecture (02)
- Lab (04)
- Field Experience (90)

Instructional Techniques

A. Lecture and application of ideas B. Individual, paired and small group exercises C. Independent study

Reading Assignments

Students will spend approximately two hours per week on readings assigned from the assigned textbook along with journal articles that expose students to current ongoing research in the area.

Writing Assignments

Students will spend approximately 2 hours per week utilizing written field notebook from trips, this will include lecture material and field observations.

Out-of-class Assignments

Students will spend approxiamtely two hours per week on homework including textbook exercises. Field trips will be given. This may include the generation of a field notebook based on field observations and lecture material.

Demonstration of Critical Thinking

A. Regular participation in class discussions and question and answer sessions is required. B. Examinations and quizzes will be given which are designed to determine the students comprehension of materials presented in class. Question types may include but are not limited to: essay and short answer, fill-in-the-blank, multiple choice, true and false, matching, draw-and-label the diagram questions and the reading and interpretation of geologic maps. C. Class and individual projects (as outlined above) designed to help the students understand geological concepts will be collected for evaluation. The completeness and correctness of these assignments will provide a measure of the level of understanding each student has achieved and if the students are indeed moving toward the student learning outcomes. D. Tests, problem solving, final examination, field project/video essays and field trip notebook.

Required Writing, Problem Solving, Skills Demonstration

A. Produce a written synopsis of geologic principles as they apply to the Eastern Sierra Nevada Mountains. B. Computational or non-computational problem-solving demonstrations, including: homework problem(s) other (specify) : map work based on landscape identification C. Written reports may be assigned which are designed to allow the students to explore specific geology topics in greater depth. Completion of the reports will expose students to a greater breadth of information and will demonstrate to the instructor whether or not the students are able to utilize the materials covered in class to gain a broader understanding of a topic explored on their own. D. Compilation of the field notebook, generation of geologic map and stratigraphic column for the area(s) studied. Construction of a geologic history of the area.

Eligible Disciplines

Earth science: Master's degree in geology, geophysics, earth sciences, meteorology, oceanography, or paleontology OR bachelor's degree in geology AND master's degree in geography, physics, or geochemistry OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Hill, M., Faber, R. Pavlik, B.. Geology of the Sierra Nevada, 2nd ed. University of California Press, 2016