GEOL A138: GEOLOGIC FIELD STUDIES - YOSEMITE NATIONAL PARK

Item	Value
Curriculum Committee Approval Date	12/08/2021
Top Code	191400 - Geology
Units	2 Total Units
Hours	90 Total Hours (Lecture Hours 9; Lab Hours 81)
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 tectonic, petrologic, historical and geomorphological setting of the Sierra Nevada mountains with an emphasis on the geologic origin and evolution of Yosemite National Park, California. Introductory lectures complement direct field observations, field data collection, analyses and interpretation. 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. Identify the minerals and rocks using the appropriate classification scheme.
2. Discuss and explain the basic geologic history of the field location, including the age relationships of the rocks, to any geologic structures, or other landforms (ie. rivers, glacial deposits).
3. Identify, describe and evaluate faults as indicators of modern and past tectonic settings.
4. Identify and discuss erosional products resulting from physical weathering processes (ie. landslides, exfoliation).
5. Identify interpret and analyze the hydrology of the area, including river transport and resultant erosional and depositional features.
6. Identify, interpret and analyze the glacial landforms present.
7. Analyze and interpret geologic and topographic maps.
8. Demonstrate the appropriate use of field instrumentation to collect field data.

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. Recognize and interpret fault geomorphology in the field
- 4. Identify, classify and interpret the various rocks, minerals and fossils observed in the field.
- 5. Apply the principles of geology to construct a geologic sequence of events for the region
- 6. Distinguish between the various types of folds and unconformities and be able to interpret their causes and significance
- 7. Differentiate between different batholithic rock types and landforms in the Yosemite region and be able to evaluate the processes responsible for them
- 8. Recognize the results of hydrologic processes in the field including both present processes and past ones
- 9. Identify and interpret metamorphic rocks and their protoliths
- 10. Apply the theory of plate tectonics to the geologic evolution of the area
- 11. Take accurate and comprehensive field notes on observations made in the area

Lecture Content

Minerals and rocks present Relative and absolute dating techniques of rocks, faults or other geologic features present Geologic Processes Weathering and erosion processes Mechanical weathering processes Mass wasting Plate Tectonic History Current tectonic setting Past tectonic setting Structural Features (faults) and seismic history Hydrology and river processes Pleistocene Glacial Processes and Resultant Landforms Geologic history of the area Paleozoic Era Mesozoic Era Cenozoic Era

Lab Content

Mineral identification using classification charts Identification of igneous, sedimentary and metamorphic rocks using classification charts Identification and anlysis of the relative sequence of events from observable rock layers, faults, and other geologic landforms Locate, identify and analyze landforms associated with physical weathering processes (ie. exfoiation domes, river deposits and erosional features, landslides). Locate. identify and analyze landforms (ie. batholithic igneous rocks, faults) in the field, as indicators of modern and past tectonic settings Locate, identify and analyze glacial landforms in the field Analyze and interpret topographic amd geologic maps

Method(s) of Instruction

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

Instructional Techniques

Instructor evaluation for the field notebook/journal content, which should include: explanaton of the natural history and basic geology of the area document field trip activities and exercises (data collection) written synopsis of geologic principles as they apply to the Yosemite National Park Instructor evaluation of in-field participation that demonstrates the student's ability to: analyze geologic processes in the field identify basic rocks and minerals analyze and interpret topographic and geologic maps collect field information and data by accurately using field equipment and instrumentation participate in discussion and cooperative group activities

Reading Assignments

Students will spend approximately two hours per week on: 1. Readings assigned from textbook(s) and handouts. 2. Readings of scientific reports and journal articles that emphasize the geology to be studied in the field

Writing Assignments

Students will spend approximately two hours per week on the following: 1. Written assignments that analyze and critically evaluate field geology in different regimes 2. Individual note-taking field notebooks for each field problem 3. Recording of field data and information correctly in field notebooks/journals. 4. Analyze and interpret field data, and provide accurate summaries of the geologic history.

Out-of-class Assignments

Students will spend approximately two hours per week on: 1. Readings assigned from textbook(s) 2. Complete various field exercises and problem solving exercises 3. Sketches of the geologic structures within the rocks. 4. Measurements of glacial striations for example.

Demonstration of Critical Thinking

Regular participation in class discussions and question and answer sessions is required. 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. 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.

Required Writing, Problem Solving, Skills Demonstration

Produce a written synopsis of geologic principles as they apply to the Yosemite National Park Computational or non-computational problem-solving demonstrations, including: homework problem(s) other (specify) : map work based on landscape identification 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.

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 Glazner, A. F. Stock, G.. Geology Underfoot in Yosemite National Park, 1st ed. Mountain Press Publishing Company, 2010 Rationale: . 2. Required Huber, N. K.. The Geologic Story of Yosemite National Park, 1st ed. Yosemite Conservancy, 1989 Rationale: .