Earth Science 23 – Historical Geology

Columbia College

Section Name: CESC-23-3303
Duration: Spring Semester 2019: Jan 14 – May 4, 2019
Units: 4 Units
Lecture: TTh 9:40 am – 11:05 am Sugar Pine 107
Lab: TTh 11:20 am – 12:45 pm Sugar Pine 107
Instructor: Mark Petersen

Email: petersenm@yosemite.edu
Phone: 209-588-5087 (messages)

Office Hrs: I will be happy to meet with students before or after class or by prior arrangement. I can also be reached by email. I am working to setup a Canvas site to post announcements, homework, lecture powerpoints/pdf and will provide details in class.

Course Description: This course will provide an introduction to the origin, development, and evolution of the earth and its inhabitants. It will cover the 4.5 billion year history of life on earth as interpreted from the geologic and fossil record. The course will emphasize the diversity of life through geological time, including the origin, evolution, and extinction of the major groups of animals and plants. Additionally, impacts of changing landscapes and geologic environments on the history of life will be assessed. Through the course, students will learn to think critically, as geologists and paleontologists do, to solve geologic, paleontologic and evolutionary problems. Topics include the study of fossils and rocks, evolution, continents and ocean basins, geologic time, plate tectonics, climate change, and mass extinctions.

Intended audience: This course is both a general education science class requirement for non-majors as well as one of the requirements for geology majors.

Not repeatable. Modesto Junior College equivalent: (GEOL 166)
Transfer: (CSU/UC) (CSU-GE: B1, B3) (IGETC: 5A, 5C) C-ID: (GEOL 111)

Textbook:

Required: "The Story of Earth – The First 4.5 Billion Years. From Stardust to Living Planet" by Robert Hazen; Penguin Books.

Recommended: "Historical Geology," by Reed Wicander and James Monroe, (Sixth Edition or later), Brooks/Cole, Cengage Learning

Materials: 3" X 5" index cards
Composition Book for Lab notebook)
Access to internet, word-processing, spreadsheet software, and printing capabilities;
A USB Flash Drive.
Calculator (bring to class).

Tentative Schedule V4.0

(subject to change)

Class	Day	Date	Topic	Chapters
1	Tu	Jan 15	Introductions; Course Overview; Tools of Science	
2	Th	Jan 17	A Scientific Origin Story – Nothing, then Something	1
3	Tu	Jan 22	Deep Time / Geologic Timescale	
4	Th	Jan 24	Geologic Fundamentals	
5	Tu	Jan 29	Hadean Eon – Black Earth: Moon and Basalt Crust	2, 3
6	Th	Jan 31	Hadean Eon – Blue Earth: Ocean and Atmosphere	4
7	Tu	Feb 5	SNOW DAY	5
8	Th	Feb 7	SNOW DAY	6
9	Tu	Feb 12	Archean Eon – Gray Earth: Plate Tectonics	
10	Th	Feb 14	Proterozoic Eon – Red Earth: Early Life; Great Oxygenation Event; Minerals; Supercontinents	7
11	Tu	Feb 19	Sedimentary Rock, Fossils, Record of Life	
12	Th	Feb 21	Project 1 Workshop	
13	Tu	Feb 26	Project 1 Presentation	
14	Th	Feb 28	Proterozoic Eon – White Earth: Snowball-Hothouse Cycles	9
15	Tu	Mar 5	Record of Life – Sedimentary rock and Fossils	
16	Th	Mar 7	Phanerozoic – Green Earth; The Cambrian Explosion	10
17	Tu	Mar 12	Paleozoic Era – Life Evolves	
18	Th	Mar 14	Evolution	
19	Tu	Mar 19	Mass Extinctions	
20	Th	Mar 21	Midterm	
21	Tu	Mar 26	Mesozoic Era – Rise of Reptiles	
22	Th	Mar 28	Mesozoic Earth	
23	Tu	Apr 2	Cenozoic Era – Rise of Mammals	
24	Th	Apr 4	Research Project 2 Workshop	
25	Tu	Apr 9	Research Project 2 Presentations	
26	Th	Apr 11	Cenozoic Earth	
27	Tu	Apr 16	Field Trip - TBD	
28	Th	Apr 18	The Anthropocene, Climate Change, Sustainability	11
29	Tu	Apr 23	The Future – Mankind and the Planet; submit Project 3	
30	Th	Apr 25	Final Review	
		April 29 – May 4	Final	

Course Goals: The goal of this course is to teach students to think critically and make defensible decisions based on evidence, logical analysis, and sound reasoning. Students will develop these skills in the context of learning about earth's environment as well as the interpersonal environment within the classroom and in the field. Specific objectives will include:

1. Define and describe the basic principles of historical geology, including the laws of original horizontality, lateral continuity, superposition, cross-cutting relationships, biologic succession and familiarity with the geologic time scale.
2. Understand the scientific approach to answering questions and apply this to the study of earth's history.
3. Explain the geologic processes of plate tectonics, erosion, sedimentation and fossilization.
4. Understand and use basic geologic principles and processes to explain geologic events of the past as recorded in fossils and rocks.
5. Examine and analyze the evidence for plate tectonics and evolution.
6. Assess and critique competing ideas regarding the pattern, timing, and causes of evolution of life on Earth through time.
7. Identify the origin of sedimentary rocks, structures, and fossils.
8. Describe and categorize significant geological depositional environments and predict how rocks will form in these environments.
9. Construct geologic columns and stratigraphic cross-sections.
10. Interpret maps to develop geologic cross-sections.
11. Reconstruct and summarize major geologic events in the history of the earth.

Lab Goals:

1. Identify common minerals and rocks.
2. Identify common sedimentary rocks.
3. Identify and interpret different depositional environments.
4. Use the principles of relative age dating to determine the geologic history of an area.
5. Use absolute dating to interpret the geologic history of an area.
6. Use rock and fossil stratigraphic relationships and principles to interpret the geologic history of an area.
7. Use radiometric dating techniques to interpret sequences of geologic events.
8. Interpret and analyze stratigraphic sequences from geologic data.
9. Identify common fossil types.
10. Apply evolutionary principles to interpret geologic and biologic history of an area.

Student Learning Outcomes:

- Summarize and convey scientific concepts in a technical writing style.
- Collect, compile, organize, analyze, and interpret earth science evidence to draw reasoned and defensible conclusions.
- Design and present two earth science research projects to the class. Cooperative work and interaction with peers will be encouraged.

Grading: The grading is intended to reflect the student's mastery of course material and effort invested. Grades will be computed as follows (tentative):

- Homework/Lab Assignments 20%
- Quizzes 20%
- Midterm Exam 15%
- Projects 20%
- Final Exam 20%
- Classroom Contribution 5%

*Classroom contribution includes (among other elements): class participation (discussions, response to questions); attention in class; and punctuality.

L**aboratory and Class Activities**: Please bring note paper and a calculator to each class meeting. Laboratory assignments will be given in class. Problem or written assignments will often be submitted during the in-class sessions. **Phones are not to be used in classroom**.

W**ritten Assignments and Homework**: Except for in-class assignments, all writing assignments (including project reports and homework) should be typed. All work submitted for credit must be in your own words except you may use quotes and cite references that are clearly and explicitly acknowledged.

Collaboration on assignments is fine, but your submitted product must be in your own words and not a copy of the work of the collaboration. Cheating will result in "no credit" for the assignment.

Exams and Quizzes: Short, low-point quizzes will be given weekly (generally) with questions pertaining to the reading assignments and prior lectures. The lowest three quiz scores will not be counted for the final semester grading. There will be two exams during the semester: a midterm and a final exam. Guidelines for exams/quizzes will be announced in class in advance of each test. Cheating will result in "no credit" for the exam.

Under some circumstances (a legitimate family or personal emergency, serious illness, etc. to be evaluated by me on a case by case basis) arrangements can be made prior to a scheduled exam to take a make-up exam (or an optional project, at my discretion). Unless the make-up is pre-arranged, or a dire last-minute emergency can be demonstrated, the make-up exam or paper

may be offered (at my discretion) with a "late penalty." No make-up for the Final Exam will be offered.

Policy for Late Assignments: Unless pre-arranged and approved by me, late homework or lab assignments will be discounted by 10 percent. Each subsequent week the assignment value will be reduced an additional 10 percent. Once you have submitted three "late" assignments, no credit will be given for subsequent "late" assignments.

Policy for Attendance: Class and laboratory assignments, class announcements, and discussions are presented during class. I will consider more than 3 unexcused absences as grounds for dropping a student from class. If this is poses a problem, please contact me as soon as possible.

Projects: Three projects will be assigned during the semester. One project will be a Poster Session where you will research pertinent topic of interest and create a poster board to enlighten your peers (details to come). A second project will be in the form of a multimedia project where a Earth Science topic presentation is made using the media of your choice; video, talk (e.g. "TED talk"), slideshow/powerpoint presentation, blog, activity, etc. (details to come). Topics must be relevant to the class and be pre-approved by me. The third project involves creating a timeline of Earth's "Big History."

For students with handicaps (including physical, intellectual, emotional, social, spiritual, occupational, financial, etc.) who believe they may need special accommodations in the class, I encourage you to discuss options with me early in the semester.