

# BUTTE COLLEGE

## COURSE OUTLINE

### I. CATALOG DESCRIPTION

**GEOL 34 - Historical Geology with Lab**

**4 Unit(s)**

**Prerequisite(s):** NONE

**Recommended Prep:** Reading Level IV; English Level IV; Math Level IV

**Transfer Status:** CSU/UC

51 hours Lecture

51 hours Lab

Historical geology with lab introduces students to Earth's geologic history and the history of life on Earth. Drawing on concepts from plate tectonics theory, evolution, geologic dating methods and stratigraphy, students explore the planet's origin and the processes that have repeatedly re-shaped the global environment during the past 4.6 billion years. It also covers the history of life on this planet and investigates the complementary roles played by natural selection and environmental change in shaping both modern and ancient ecosystems. These concepts as well as fossil identification, study of sedimentary rocks, and interpretation of geologic maps will be reinforced with an integrated laboratory program. (C-ID GEOL 111).

### II. OBJECTIVES

Upon successful completion of this course, the student will be able to:

- A. Explain and practically apply the principles of the scientific method.
- B. Demonstrate and practically apply a fundamental understanding of concepts and principles of Historical Geology including: Fossilization, The fossil record, Ecology, evolution and extinction, Plate tectonics, Geologic time and dating methods, and The Supercontinent Cycle and paleoclimate
- C. Identify and interpret representative fossil samples, rocks and minerals.
- D. Explain and practically apply knowledge of tectonic processes to interpret geologic events throughout geologic time.
- E. Interpret geologic maps, cross sections and stratigraphic columns.
- F. Practically apply the principles of relative dating to interpret sequences of geologic events.
- G. Communicate complex course concepts effectively in writing and using diagrams.

### III. COURSE CONTENT

#### A. Unit Titles/Suggested Time Schedule

		Lecture	
<u>Topics</u>			<u>Hours</u>
1. Plate Tectonics			8.00
• Formation and Origin of the Earth			
• Plate Boundaries			
• Hot Spots			
• Crustal Evolution and Deformation			
• Supercontinent Cycle			
2. Earth's Materials			9.00
• Minerals			
• Igneous, Sedimentary and Metamorphic Rocks			
• Rock Cycle			

3. Fossils	9.00
• Modes of Formation	
• Classification	
• Ecology, Evolution and Extinction	
4. Dating Methods	8.00
• Relative Dating	
• Absolute Dating	
• The Geologic Time Scale	
5. Stratigraphy and Correlation	8.00
• Catastrophism and Uniformitarianism	
• Interpretation of sedimentary rock sequences	
6. Paleogeography	9.00
• Hadean - Formation and Origin of the Earth	
• Archaean, Proterozoic and Ediacaran geologic and tectonic events	
• Paleozoic geologic and tectonic events	
• Mesozoic geologic and tectonic events	
• Cenozoic geologic and tectonic events	
• Recent geologic and tectonic events	
Total Hours	51.00

#### Lab

<u>Topics</u>	<u>Hours</u>
1. Plate Tectonics and the Scientific Method	4.00
2. Basic introduction to identifying rocks and minerals	4.00
3. Sedimentary Rocks and Structures: Paleoenvironmental Interpretation	6.00
4. Stratigraphy and Correlation	4.00
5. Fossils and Fossilization	4.00
6. Geologic Dating Methods	4.00
7. Geologic Structures	3.00
8. Interpreting geologic maps	3.00
9. Interpreting geologic cross sections	3.00
10. Phylogenetics/Cladistics/Evolution	4.00
11. Recognizing Major Phyla	3.00
12. Fossils through Time	3.00
13. Paleogeography through Time	3.00
14. Field Trips	3.00
Total Hours	51.00

#### IV. **METHODS OF INSTRUCTION**

- A. Lecture
- B. Collaborative Group Work
- C. Field Trips
- D. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- E. Demonstrations
- F. Problem-Solving Sessions

- G. Multimedia Presentations
- H. Laboratory Experiments
- I. The 2500-word writing requirement will be met through a combination of written quizzes and exams, the term project and written homework assignments.

## **V. METHODS OF EVALUATION**

- A. Homework
- B. Lab Projects
- C. Written Assignments
- D. Written examinations and quizzes
- E. Term project
- F. One final examination
- G. Class participation and in-class written assignments

## **VI. EXAMPLES OF ASSIGNMENTS**

- A. Reading Assignments
  - 1. Read the assigned chapter of Cordell Durrell's Geologic History of the Feather River Country, California and be prepared for an in-class discussion on the major rock units and dating methods covered in the chapter. Be able locate these rock units on the 1:250,000 scale geologic map.
  - 2. Read the chapter in your text on geologic time and complete the corresponding homework assignment provided. Be prepared for an in class discussion on the following:
    - a. Relative dating methods.
    - b. Radioactive decay, the half life and parent-daughter atoms.
    - c. Uranium-lead and potassium-argon dating methods.
- B. Writing Assignments
  - 1. Write a 3-5-page essay describing the extinction event at the end of the Cretaceous. Evaluate the competing hypothesis regarding the specific cause or causes of this extinction. Use in-class notes, your text and supplemental information available online including PBS's "What Killed the Dinosaurs."
  - 2. Write a 3-5-page essay describing the tectonic history of North America starting with the break up of Pangea. Compare and contrast east coast and west coast geology during this time. Carefully document the timing of significant events and cite all sources using MLA criteria.
- C. Out-of-Class Assignments
  - 1. Take 5 local photographs that exhibit relative dating methods such as inclusions, cross-cutting relationships and superposition. Write a 3-5 sentence informative, geologically correct explanation on how the dating method works for each photo. You must use your own photos (no photos from the internet or other students) and your project should be presented on a small poster board.
  - 2. Collect 2 rock samples from the Central Belt limestone blocks, the Tuscan formation or the Chico formation. Write a brief (one page) description of each sample and describe the depositional environment for each sample. Be sure to describe composition, sorting and grain size and shape when justifying your interpretation. Use the fieldtrip guidebooks available online to help you locate good collection sites.

## **VII. RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

- A. Wicander and Monroe. Historical Geology. 7th Edition. Cengage Learning, 2012.
- B. Poort and Carlson. Historical Geology: Interpretations and Applications. 7th Edition. Prentice Hall, 2012.

**Created/Revised by:** Colin Ferguson  
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