BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

GEOL 32 - Physical 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

Physical Geology with Lab will introduce students to the internal and external processes that are at work changing the earth today. Within the context of modern plate tectonics theory, students will explore the origins of rocks and minerals and dynamic earth processes such as volcanism, seismicity and mountain building that are driven by the release of Earth's internal heat. It also examines how wind, running water, and glaciers move in response to gravity and energy from the sun and the sculpting of Earth's surface by erosion. These concepts as well as the interpretation of topographic and geologic maps will be reinforced with an integrated laboratory program. (C-ID GEOL 101).

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 as it relates to understanding Earth processes.
B. Demonstrate an understanding of plate tectonics and explain how it relates to geologic processes and features including igneous activity, seismicity, mountain building and seafloor features.
C. Explain the rock cycle and identify and describe the basic properties of rocks and minerals.
D. Demonstrate an understanding of the Earth through the identification and interpretation of common minerals and igneous, sedimentary and metamorphic rocks.
E. Demonstrate an understanding of how geological environments are formed, changed, weathered and eroded through time.
F. Demonstrate the ability to read and interpret topographic and geologic maps in order to answer questions pertaining to geologic processes.
G. Determine the ages of rocks and geologic structures using both relative and absolute geologic dating techniques.
H. Demonstrate an ability to communicate complex course concepts effectively both in writing and through the use of labeled diagrams.
I. Apply critical thinking and problem solving skills to evaluate geologic problems.

III. **COURSE CONTENT**

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

Lecture

Topics	Hours
1. Introduction to Geology a. The Scientific Method b. History of Geology	8.50
2. Earth Materials a. Minerals b. Igneous, Sedimentary and Metamorphic Rocks c. Soils	8.50

3.	Geologic Time and Earth History a. Geologic Time b. Relative and Absolute Dating c. Fossils and Fossilization	8.50
4.	Earth's Internal Forces a. Plate Tectonics b. Earthquakes c. Vulcanism and Igneous Rocks d. Mountain Building e. Geological Structures f. Metamorphism and Metamorphic Rocks	8.50
5.	Earth's External Processes a. Weathering, Mass Wasting and Erosion b. Sediment and Sedimentary Rocks c. Surface Water Processes d. Groundwater Processes e. Oceans and Coastal Processes f. Desert Processes g. Glacial Processes	8.50
6.	Earth Resources a. Renewable and Non-Renewable Resources b. Metallogenic Provinces	8.50
Total Hours		51.00

Lab

Topics		Hours
1.	Introduction to Laboratory Methods	2.00
2.	Application of the Scientific Method	3.00
3.	Plate Tectonics	4.00
4.	Identification and Interpretation of Minerals	3.00
5.	Identification and Interpretation of Igneous Rocks	3.00
6.	Identification and Interpretation of Sedimentary Rocks	3.00
7.	Identifying rocks in the field (Tuscan Formation Field Trip)	3.00
8.	Identification and Interpretation of Metamorphic Rocks	3.00
9.	Relative and Absolute Dating Techniques	2.00
10.	Geologic Time	2.00
11.	Topographic Maps	4.00
12.	Geologic Structures	4.00
13.	Geologic Maps and Cross Sections	4.00
14.	Earthquakes and Seismology	4.00
15.	Groundwater Processes	3.00
16.	Regional Geology (Field Trip)	4.00
Total Hours		51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Instructor Demonstrations
C. Class Activities
D. Field Trips
E. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
F. Discussion
G. Reading Assignments
H. Multimedia Presentations
I. Laboratory Experiments

V. **METHODS OF EVALUATION**

A. Exams/Tests
B. Quizzes
C. Projects
D. Homework
E. Class participation
F. Lab Projects
G. Written Assignments
H. Mid-term and final examinations

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
1. Read Chapter 2 of your text (Earth: An Introduction to Physical Geology) on plate tectonics and complete the corresponding homework assignment provided on Blackboard. Be prepared for an in class discussion on the following:
a. Evidence for plate tectonics theory including contributions from Alfred Wegener and Harry Hess.
b. Continental and oceanic crust and the lithosphere.
c. The 3 main types of plate margins and physical features/geologic phenomena associated with these margins.
2. Read about a current event in geology such as a recent earthquake, volcanic eruption, new fossil discovery etc… published either in the news or a geologic journal and verbally present your findings to the class.

B. Writing Assignments
1. Write a short 2-page essay on a significant historical earthquake of your choice. Describe the location, time, approximate magnitude and damage caused by the earthquake. Also include information regarding the tectonic setting responsible for the earthquake. Properly cite all sources.
2. Write a short 3-5-page essay describing the tectonic origin of a mountain range of your choice. Be sure to describe the timeline for events both before and after the orogenic event, and cite at least 2 sources from peer-reviewed journals (for example, journals available on the Geological Society of America website).

C. Out-of-Class Assignments
1. Collect 3 rock samples from the field: one igneous rock, one sedimentary and one metamorphic rock. Use the "Rock Project" forms provided in the lab manual to list the minerals present in each sample and describe the texture or features used to justify the rock names. Make sure you look at a freshly broken surface rather than a weathered surface when identifying your sample.
2. Take 15 photographs of local geologic features and write a 3-5 sentence informative,

geologically correct explanation 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 poster board. Grading will be based on the accuracy of your descriptions and the clarity of your photos.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Mattison, G.D., & Ferguson, C.B.. Physical Geology Laboratory Manual. Butte College, 2011.
B. Tarbuck, E., & Lutgens, F.. Earth: An Introduction to Physical Geology. 11th Edition. Prentice Hall, 2014.

Created/Revised by: Colin Ferguson
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