COURSE OUTLINE : GEOL 111H
D Credit – Degree Applicable
COURSE ID 004028
Cyclical Review: November 2019

COURSE DISCIPLINE : GEOL

COURSE NUMBER : 111H

COURSE TITLE (FULL) : Honors Physical Geology Laboratory

COURSE TITLE (SHORT) : Hnrs Physical Geology Lab

CALIFORNIA STATE UNIVERSITY SYSTEM C-ID : GEOL 100L – Physical Geology Laboratory

CATALOG DESCRIPTION

GEOL 111H is an introduction to common laboratory practices and exercises in physical geology, such as identifying common minerals and rocks and understanding simple topographic and geological sections and maps. The honors course will be enhanced in one or more of the following ways: 1. Lab exercises will regularly involve exercises utilizing skills expected of students who are eligible for Math 110. 2. Students will perform lab exercises in which they will: a.) Learn how to read a geological map at an advanced level b.) Manipulate geophysical and/or geochemical datasets using a computer. c.) Identify a larger number of rocks and minerals than non-honors students

Total Lecture Units: 0.00

Total Laboratory Units: 1.00

Total Course Units: 1.00

Total Lecture Hours: 0.00

Total Laboratory Hours: 54.00

Total Laboratory Hours To Be Arranged: 0.00

Total Contact Hours: 54.00 Total Out-of-Class Hours: 0.00

Prerequisite: GEOL 101 or GEOL 101H. (GEOL 101 or GEOL 101H may be taken concurrently.)

ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1	GEOL	101	Physical Geology	discuss current basic understanding of earthquakes, including how they are measured, local issues concerning earthquake risk, and the relationship of seismic activity to faults and tectonic plate boundaries;	Yes
2	GEOL	101	Physical Geology	list and briefly discuss the evidence behind the theory of plate tectonics;	Yes
3	GEOL	101	Physical Geology	explain why melting occurs inside the Earth, its relationship to volcanoes, and geographic locations where volcanoes occur;	Yes
4	GEOL	101	Physical Geology	explain the paradigm of uniformitarianism in the context of a scientific view of Earth's history;	Yes
5	GEOL	101	Physical Geology	implement basic skills to interpret timing relationships between rock units;	Yes
6	GEOL	101	Physical Geology	explain the rock cycle and describe the classification of rocks in some detail;	Yes
7	GEOL	101	Physical Geology	describe processes that shape the Earth's surface	Yes
8	GEOL	101	Physical Geology	discuss mineral and water resources;	Yes
9	GEOL	101	Physical Geology	demonstrate a conceptual understanding of fundamental concepts, principles, and interactions of Earth's systems applicable to the geological sciences;	Yes
10	GEOL	101	Physical Geology	demonstrate an understanding of how geological environments are formed, changed, and eroded through time;	Yes
11	GEOL	101	Physical Geology	demonstrate an ability to communicate complex course concepts effectively in writing and diagrams and apply critical thinking and problem solving to make informed decisions in life.	Yes

EXIT STANDARDS

1 apply the scientific method to measure or describe the physical properties of unknown minerals and determine their identity;
2 identify visually common minerals and rocks;
3 infer the basic geologic history of an area from rocks, geologic structures, and landforms present in the landscape and develop multiple working hypotheses about the history;
4 discuss recurrence intervals of earthquakes on particular faults from calculated slip rates and other data and/or use data to locate the epicenter of an earthquake and determine its magnitude;
5 discuss some of the scientific methods used to infer properties of Earth’s interior and evaluate the accuracy of the results;
6 evaluate the result of a calculation from a data set and discuss its accuracy;
7 interpret timing relationships between rock units by applying observations of rock relationships and knowledge of scientific laws;
8 read and interpret simple topographic and geologic maps;
9 demonstrate an ability to communicate complex course concepts effectively in writing and diagrams and apply critical thinking and problem solving skills to make informed decisions in life.

STUDENT LEARNING OUTCOMES

1 apply the scientific method to measure or describe the physical properties of unknown minerals and determine their identity
2 identify visually common minerals and rocks
3 infer the basic geologic history of an area from the rocks, geologic structures, and landforms present in the landscape and develop multiple working hypotheses about the history
4 discuss recurrence intervals of earthquakes on particular faults from calculated slip rates and other data and/or use data to locate the epicenter of an earthquake and determine its magnitude
5 discuss some of the scientific methods used to infer properties of Earth’s interior and evaluate the accuracy of the results
6 evaluate the result of a calculation from a data set and discuss its accuracy
7 interpret timing relationships between rock units by applying observations of rock relationships and knowledge of scientific laws
8 demonstrate an ability to communicate complex course concepts effectively in writing and diagrams and apply critical thinking and problem solving skills to make informed decisions in life
9 read and interpret simple topographic and geologic maps

COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Structural Geology • Lithostatic stress, differential stress, and strain • Brittle and ductile rock behavior • Identification of faults and folds and their relationship to stress	0	2	2
2	Seismology • Depth of earthquake foci and relationship to brittle-ductile transition in the crust • Measuring earthquakes and earthquake magnitude scales • Locating earthquake epicenters • Relationships between focal depth, fault size, and earthquake magnitude • Fault slip rates and recurrence intervals of earthquakes	0	3	3
3	Earth's Internal Structure • Use of s-wave shadow zone to determine the size of Earth's core and evaluate results • Use of earthquake foci data to visualize the Wadati -Benioff zone and contrast these data to data showing the brittle-ductile transition in the crust	0	4	4
4	Plate Tectonics • Relationships between types of differential stress, types of faults, and types of plate boundaries • Relationships between depth of earthquake foci, volcano types, and plate boundaries • Speeds of plate motion and history of plate motion	0	2	2

5	Minerals • Physical properties of minerals • Testing unknown minerals' physical properties and using a dichotomous key to identify them	0	3	3
6	Igneous Rocks • Intrusive vs. extrusive igneous rocks • Rock names and characteristics • Intrusive igneous rock structures • Using the scientific method to interpret the geologic history of an area that contains igneous rocks	0	4	4
7	Volcanology • Basic volcano types and their eruptive styles • Where volcanoes occur and why they occur in those locations • Eruptive styles and relationship to volcano type and to geographic location • Why there are different eruptive styles • Visual identification of basic volcano types and intrusive igneous structures in the landscape	0	5	5
8	Sedimentary Rocks • Identifying sedimentary rocks from their visual characteristics Use of scientific methods to interpret the depositional environment of sedimentary rocks • Identification and interpretation of contacts (structural, depositional, and erosional) with special emphasis on unconformities • Use the scientific method to interpret the geologic history of an area that contains sedimentary rocks	0	3	3

9	Metamorphic Rocks • Types of metamorphism and how metamorphism occurs • Index minerals and metamorphic grade • Identifying metamorphic rocks and a few basic types of metamorphic rocks, including foliated and non-foliated examples • Using the scientific method to interpret the geologic history of an area that contains metamorphic rocks	0	3	3
10	Geologic Time • Relative age dating and its implementation • Absolute age dating processes • The geologic time scale • Basic overview of the big events in Earth's history that determine the boundaries on the geologic time scale • Rocks, contacts, and laws of relative dating in analyzing complex rock unit relationships in a cross section and interpreting the geologic history of that area	0	7	7
11	Map Reading • Finding latitude and longitude points on a map • Finding the distance between two points using the scale • Finding the elevation of a point using topographic contour lines • Finding the type of rock or rock structure using layered geologic data • Using the stratigraphic information given on geologic maps to interpret geologic cross sections Remotely sensed data	0	7	7

12	Field Geology • Using maps in the field • Basic field observations and measurements that include the use of global positioning systems (GPS), Brunton compass, or other tools • Interpreting geologic elements of the landscape and developing simple geologic histories using multiple working hypotheses	0	7	7
13	Surface Environments (at least one of the following) • Visual identification of key desert features and surface processes that create them • Visual identification of key coastal features and surface processes that create them • Visual identification of key glacial landscape features and surface processes that create them	0	2	2
14	And either	0	0	0
15	Global Climate Change • Using proxy data to interpret climate • Evaluating data over time	0	1	1
16	Or	0	0	0
17	Planetary Geology • Using remotely sensed data sets, such as cratering density, to infer history or other properties of other planetary bodies	0	1	1
				54

OUT OF CLASS ASSIGNMENTS

1 field trips and field trip reports (e.g. write a report which analyzes elements of an area's geologic history);
2 data collection (e.g. collect data to make a map or data set);
3 laboratory reports.

METHODS OF EVALUATION

1 lab attendance and performance of assigned work;
2 quizzes
3 midterm exam including essay or short answer questions;
4 final exam including essay or short answer questions ;
5 instructor directed student projects for evaluation by peers and/or the instructor.

METHODS OF INSTRUCTION

- [ ] Lecture
- [x] Laboratory
- [ ] Studio
- [x] Discussion
- [x] Multimedia
- [ ] Tutorial
- [ ] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [ ] Field Activities (Trips)
- [ ] Guest Speakers
- [ ] Presentations

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Laboratory Manual in Physical Geology	Required	Prentice Hall	10	print	Richard M. Busch	978-0321944511	2014
Laboratory Manual for Introductory Geology	Required	W. W. Norton	3	print	Ludman, Allan	978-0393937916	2011