COURSE OUTLINE : GEOL 101H
D Credit – Degree Applicable
COURSE ID 004022
Cyclical Review: November 2019

COURSE DISCIPLINE : GEOL

COURSE NUMBER : 101H

COURSE TITLE (FULL) : Honors Physical Geology

COURSE TITLE (SHORT) : Hnrs Physical Geology

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

CATALOG DESCRIPTION

GEOL 101H is an introduction to the principles of geology with emphasis on Earth processes. This course focuses on the internal structure and origin of the Earth and the processes that change and shape its surface. The honors course will be enhanced in one or more of the following ways: 1. Students do weekly quantitative problem sets in the geosciences; 2. Students prepare a research project and present it in the class; Relevant topics include: global geochemical cycles, planetary geology from remotely sensed data, problems in plate tectonic, climate change history, and interactions of man with the Earth.

CATALOG NOTES

Note: This course may not be taken for credit by students who have completed GEOL 110.

Total Lecture Units: 3.00

Total Laboratory Units: 0.00

Total Course Units: 3.00

Total Lecture Hours: 54.00

Total Laboratory Hours: 0.00

Total Laboratory Hours To Be Arranged: 0.00

Total Contact Hours: 54.00

Total Out-of-Class Hours: 108.00

Recommended Preparation: ENGL 100 or ENGL 191 or ESL 141 and MATH 100.

ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1	ENGL	100	Writing Workshop	Read, analyze, and evaluate contemporary articles and stories to identify topic, thesis, support, transitions, conclusion, audience, and tone;	Yes
2	ENGL	100	Writing Workshop	read, analyze, and evaluate contemporary articles and stories for the comprehension of difficult content and the identification of main ideas and (topic-based) evidence;	Yes
3	ENGL	191	* Writing Workshop II	organize and write an essay which addresses the topic and is directed by a thesis statement;	Yes
4	MATH	100	College Algebra	Analyze the following functions: polynomial, rational, radical, absolute value, exponential and logarithmic (including definitions, evaluation, and domain and range);	Yes
5	MATH	100	College Algebra	graph functions, including asymptotic behavior, intercepts, vertices and transformations;	Yes
6	MATH	100	College Algebra	perform operations on functions;	Yes
7	MATH	100	College Algebra	find inverses of functions;	Yes
8	MATH	100	College Algebra	solve equations including: linear, polynomial, radical, rational, absolute value, exponential and logarithmic;	Yes
9	MATH	100	College Algebra	solve linear, absolute value, and non-linear inequalities;	Yes
10	MATH	100	College Algebra	solve linear and non-linear systems of equations and inequalities;	Yes
11	MATH	100	College Algebra	apply the Fundamental Theorem of Algebra and related theorems to find the roots of a polynomial;	Yes
12	MATH	100	College Algebra	model and solve STEM application problems;	Yes
13	MATH	100	College Algebra	graph and algebraically analyze conic sections;	Yes
14	MATH	100	College Algebra	apply the binomial theorem and use formulas to find sums of finite and infinite series.	Yes

EXIT STANDARDS

1 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;

2 list and briefly discuss the evidence behind the theory of plate tectonics;

3 explain why melting occurs inside the Earth, its relationship to volcanoes, and geographic locations where volcanoes occur;

4 explain the paradigm of uniformitarianism in the context of a scientific view of Earth's history;

5 implement basic skills to interpret timing relationships between rock units;

6 explain the rock cycle and describe the classification of rocks in some detail;

7 describe processes that shape the Earth's surface;

8 discuss mineral and water resources;

9 demonstrate a conceptual understanding of fundamental concepts, principles, and interactions of Earth's systems applicable to the geological sciences;

10 demonstrate an understanding of how geological environments are formed, changed, and eroded through time;

11 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.

STUDENT LEARNING OUTCOMES

1 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
2 demonstrate an understanding of how geological environments are formed, changed, and eroded through time
3 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
4 list and briefly discuss the evidence behind the theory of plate tectonics
5 discuss why melting occurs inside the Earth, its relationship to volcanoes, and geographic locations where volcanoes occur
6 discuss uniformitarianism in the context of a scientific view of Earth's history
7 implement basic skills to interpret timing relationships between rock units
8 discuss the rock cycle and describe the classification of rocks in some detail
9 describe processes that shape the Earth's surface
10 discuss mineral and water resources
11 demonstrate a conceptual understanding of fundamental concepts, principles, and interactions of Earth's systems applicable to the geological sciences

COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Introduction • Solar system formation, planetary differentiation, and Earth's basic internal structure • Basic features of continents and ocean basins • Development of geology, the paradigm of uniformitarianism, and geology's relationship to other sciences • Evidence, hypothesis, and theory in science • Processes driven by internal heating • Overview of plate tectonic cycle, hydrologic cycle, and the rock cycle	5	0	5
2	Structural Geology • Lithostatic stress, differential stress, and strain • Brittle and ductile rock behavior • Identification of faults and folds and their relationship to stress	2	0	2
3	Seismology • Where earthquakes occur and their relationship to faults • Measuring earthquakes and earthquake magnitude scales • Locating earthquake epicenters • Relationship between focal depth, fault size, and earthquake magnitude • Local earthquake issues and global current events	4	0	4

4	Earth's Internal Structure • Compositional vs. mechanical layer models • Idea of indirect (circumstantial) vs. direct evidence in the understanding of Earth's interior • The asthenosphere, lithospheric plates, and isostasy • Rock evidence for near surface composition • Compositional proxies for Earth's interior • Seismological methods for modeling Earth's interior • The idea of the geodynamo creating the geomagnetic field	3	0	3
5	Plate tectonics • Drawing/describing plate boundaries in detail • Formation of the ocean floor • Ophiolite sequences • The evidence for plate tectonic theory • The history of the development of plate tectonic theory	2	0	2
6	Minerals • Atomic theory • Crystal structure and definition of a mineral • Types of minerals • Mineral properties	2	0	2
7	Igneous Rocks • Intrusive vs. extrusive igneous rocks • Rock names and characteristics • Intrusive igneous rock structures • Melting processes inside Earth • Processes that influence magma composition and their relationship to plate tectonics • Composition-dependent properties of magmas and their relationship to geographic location	4	0	4

8	Volcanology • Basic volcano types • Where volcanoes occur and why they occur in those locations • Eruptive styles and relationship to volcano type • Why there are different eruptive styles • Current global and local issues about volcanoes as well as notable historical eruptions	5	0	5
9	Mountain Belts and Cratons • Tectonic uplift, erosion, and isostatic uplift • Geographic locations Interpretation of mountain belts and the rocks they contain in light of plate tectonics	2	0	2
10	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 • Where metamorphic rocks are found	2	0	2
11	Weathering and Erosion • Physical vs. chemical weathering processes • Agents of transport • Soil development and soil types	2	0	2
12	Sedimentary Rocks • Classification • Characteristics • Depositional environment • Economic resources	3	0	3

13	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	6	0	6
14	Energy, Mineral, and Water Resources • The formation and development of fossil fuels • Other energy resources, renewable and nonrenewable • Overview of types of mineral deposits • Groundwater's use and pollution that occurs • Environmental issues associated with resource use	5	0	5
15	Surface Areas (at least one of the following) • Deserts and surface processes • Coasts and coastal processes • Glaciers and glacial environments	3	0	3
16	Global Climate Change • Carbon cycle • Milankovitch cycle and other parameters affecting global climate • Methods for determining temperature and climatic conditions in the past • Deep history, Pleistocene history, and recent history of climatic changes on Earth	3	0	3

17	Planetary Geology • Comparison of Earth with Venus, Mars, the moon, Mercury, and other large objects in the solar system • Relationship of surface age to crater density • Notable findings from planetary missions	1	0	1
				54

OUT OF CLASS ASSIGNMENTS

1 creation and analysis of graphs, figures, and data sets;
2 online assignments;
3 field trip reports;
4 creation and analysis of graphs, figures, and data sets the geosciences using skills expected of students who have completed MATH 100;
5 individual or group projects that create reports or other media (e.g., write a research paper or outline of a presentation using multiple sources or student-generated research related to a student selected topic in the field of earth sciences).

METHODS OF EVALUATION

1 instructor evaluation of attendance, participation in class, and participation in group work of any kind;
2 evaluation of student work by peers;
3 homework assignments;
4 creation and analysis of graphs, figures, and data sets;
5 quizzes
6 tests, with at least one midterm exam and one final exam—exams including essay style or short answer questions are strongly encouraged;
7 instructor evaluation of student-created reports or other media.

METHODS OF INSTRUCTION

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

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Earth: An Introduction to Physical Geology	Required	Pearson Prentice Hall	11	print	Tarbuck, Edward J	978032181 3930	2014