

Las Positas College
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Course Outline for GEOL 2
HISTORICAL GEOLOGY WITH LAB
Effective: Fall 2019

I. CATALOG DESCRIPTION:

GEOL 2 — HISTORICAL GEOLOGY WITH LAB — 4.00 units

An introduction to Earth's history and the life it supports with a laboratory. Subjects include geologic dating, plate tectonics, stratigraphy, fossils, biological evolution, the planet's origin and the processes that have influenced paleogeography during the past 4.6 billion years.

3.00 Units Lecture 1.00 Units Lab

Strongly Recommended

GEOL 1 - Physical Geology
with a minimum grade of C

Grading Methods:

Letter or P/NP

Discipline:

- Earth Science

	MIN
Lecture Hours:	54.00
Expected Outside of Class Hours:	108.00
Lab Hours:	54.00
Total Hours:	216.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering this course, it is strongly recommended that the student should be able to:

A. GEOL1

1. Explain the scientific method
2. In order to demonstrate conceptual understanding: explain, discuss, analyze, identify and/or interpret the fundamental concepts, principles, and interactions of Earth's systems applicable to the Geological Sciences.
3. Apply, explain, discuss, analyze, identify and/or interpret the internal and external processes that shape and form the Earth.
4. Apply, explain and/or discuss the rock cycle and identify and describe the basic properties of rocks and minerals.
5. Explain, discuss, analyze, identify and/or interpret the fundamentals, and ramifications, of plate tectonics and Earth's resources.
6. In order to demonstrate an understanding: explain, discuss, analyze, identify and/or interpret, how geological environments are formed, changed and eroded through geological time.
7. Communicate complex course concepts effectively in writing and diagrams and apply critical thinking and problem solving skills to make informed decisions in life.

IV. MEASURABLE OBJECTIVES:

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

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

V. CONTENT:

- A. Plate Tectonics

1. Formation and Origin of the Earth
2. Driving Mechanisms
3. Plate Boundaries
4. Hot Spots
5. Crustal Evolution and Deformation
6. Supercontinent Cycle
- B. Earth's Materials
 1. Minerals
 2. Igneous, Sedimentary and Metamorphic Rocks
 3. Rock Cycle
- C. Fossils
 1. Modes of Formation
 2. Classification
 3. Ecology, Evolution and Extinction
- D. Dating Methods
 1. Geologic Time
 2. Relative Dating
 3. Absolute Dating
- E. Stratigraphy
 1. Catastrophism and Uniformitarianism
 2. Interpretation of sedimentary rock sequences
- F. Paleogeography
 1. Archaean, Proterozoic and Ediacaran geologic and tectonic events
 2. Paleozoic geologic and tectonic events
 3. Mesozoic geologic and tectonic events
 4. Cenozoic geologic and tectonic events
 5. Recent geologic and tectonic events
- G. Laboratory Activities (must include at least 8 of the following activity topics)
 1. Basic introduction to identifying rocks and minerals
 2. Identify major groups of fossil organisms
 3. Examine modes of fossil preservation
 4. Constructing and interpreting cladograms
 5. Interpret geologic maps
 6. Interpret geologic cross sections
 7. Interpret stratigraphic columns
 8. Relative dating and interpreting sequences of geologic events
 9. Introduction to absolute dating
 10. Paleogeographic reconstructions
 11. Field Trips

VI. METHODS OF INSTRUCTION:

- A. **Audio-visual Activity** - online audio-visual recordings on relevant topics where available
- B. **Lab** - lab exercises/activities
- D. **Lecture** - may include (or consist of) audio-visual recordings on select topics
- E. **Discussion** - group discussions on course topics
- F. **Student Presentations** - at the instructor's discretion. May be posted to Class Discussion Boards, Class Wikis, etc.
- G. **Field Trips** - self-guided and/or virtual student field trips if and where they are appropriate and/or available
- H. **Classroom Activity** - e.g., through Class Discussion Boards and Class Wikis. etc.
 - I. **Directed Study** - are possible through select textbook sections, student projects and/or internet website materials
- J. **Projects** - e.g., through Class Discussion Boards, Class Wikis, etc. For either Group or Individual projects, as determined by the instructor.
- K. **Research** - e.g., for Group Projects and/or for term papers and/or for Discussion Board or Wiki projects.
- L. **Written exercises and case studies** - are possible in lab activities and exercises

VII. TYPICAL ASSIGNMENTS:

- A. Read Chapters 1 thru 4. Look up the vocabulary words in these chapters and complete online Vocabulary Quiz 1. Use the textbook glossary and index, the Geologic Dictionaries available in the Science Center, and Internet search engines such as Google.
- B. Memorize the Eons, Eras and Periods of the Geologic Time Scale
- C. Complete the Study Guide questions for Exam 2.
- D. Complete the homework assignment and problems on radiometric dating.
- E. Read Chapter 15 in the textbook. This topic will not be covered during class time.
 1. Look up all vocabulary for this chapter.
 2. Make sure that you understand the basic geologic processes discussed in this Chapter.
 3. Complete the questions in the Study Guide that refer to the topics in this chapter.
- F. Research Paper. Submit a 5-10 page 12-point paper on a geologic topic approved by the instructor.
- G. Presentation. Create and present a 5-10 minute presentation on a geologic topic approved by the instructor.
- H. Participate in the online class Discussion Board by posting information and links about unusual fossils.
- I. Contribute to the online class Wiki and send the instructor an email with the content of your Wiki contributions.
- J. Lab Exercises on Fossil identification; Construction of Geologic Cross-Sections; Deciphering Geologic Histories; Interpreting ancient environments; Deciphering phylogenetic trees; Lab activities; Field trips; Lab and/or field reports; Memorizing the Geologic Time Scale. etc.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Research Projects
4. Papers
5. Oral Presentation
6. Projects
7. Field Trips
8. Group Projects
9. Class Participation
10. Class Work
11. Home Work

B. **Frequency**

1. Homework can be assigned daily, weekly or all at the beginning of the term or only as needed, at the discretion of the

instructor

2. Quizzes will be given daily, weekly, bi-weekly or at the discretion of the instructor
3. Quizzes/Midterms/Final Exam/Term Paper – at least 3 or 4 total. For example, there may be 2 midterms, one final exam and one term paper. Or, there may be 4 on-line quizzes, 3 in-class midterms and one in-class final exam.
4. Research Projects, Papers, Oral Presentations, Projects, Field Trips, Group Projects, Class Participation, Class Work- at the instructor's discretion; could be one or more.
5. Laboratory
 - a. Laboratory exercises, assignments, and/or reports – weekly (at each lab meeting; at the instructor's discretion)
 - b. PreLabs and PreLab Quizzes; weekly – or at the instructor's discretion
 - c. Laboratory Practical Exams;
 - d. Field Trip – at the instructor's discretion

IX. TYPICAL TEXTS:

1. Levin, Harold, and David King, Jr.. *The Earth Through Time*. 11th ed., Wiley, 2017.
2. Stanley, Steven, and John Luczaj. *Earth Systems History*. 4th ed., W.H. Freeman & Company Publishers, 2015.
3. Wicander, Reed, and James Monroe. *Historical Geology*. 8th ed., Thomson Brooks Cole Publishers, 2016.
4. Poort, J.M. and Carlson, R.J. Historical Geology: Interpretations and Applications. Prentice-Hall , 2004.
5. Levin, Harold, and Michael Smith. Laboratory Studies in Earth History. McGraw Hill Publishers , 2014.
6. Ritter, S, and M Petersen. Interpreting Earth History: A Manual in Historical Geology. WCB McGraw-Hill , 2014.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Access to the Internet and computers, through the LPC Computer Center, or to a computer at a public library (or a similar institution), or access to a personal computer at home with an Internet connection