

**Course Outline for GEOL 3L  
HISTORICAL GEOLOGY LABORATORY**

**Effective: Fall**

**I. CATALOG DESCRIPTION:**

GEOL 3L — HISTORICAL GEOLOGY LABORATORY — 0.06 units

Laboratory exercises to support and reinforce the Historical Geology lecture course. Includes lab exercises in relative and absolute age-dating, biostratigraphy, radiometric dating, the construction of geologic histories from geologic map data, types of fossil preservation, fossil identification and morphology of the common and important fossils throughout the Geologic Time Scale. Formation and development of the earth, its oceans, atmosphere and life through time.

0.06 Units Lab

**Corequisite**

GEOL 3 - Historical Geology

**Grading Methods:**

Pass/No Pass

**Discipline:**

	<b>MIN</b>
<b>Lab Hours:</b>	3.00
<b>Total Hours:</b>	3.00

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

**III. PREREQUISITE AND/OR ADVISORY SKILLS:**

**IV. MEASURABLE OBJECTIVES:**

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

1. apply the methods of radiometric dating to the calculation of geologic ages;
2. apply the methods of relative age-dating to the unraveling and deciphering of geologic sequences and histories;
3. identify and explain the various types of fossilization;
4. recognize and identify the common or important fossils from the basic time periods;
5. decipher biostratigraphy problems;
6. interpret geologic histories from geologic map data;
7. construct the geologic time scale; including the Eons, Eras and Periods;
8. interpret the history of the earth through analysis and correlation of ancient sediments with current sedimentary environments.

**V. CONTENT:**

Includes lab exercises in relative and absolute age-dating, biostratigraphy, radiometric dating, the construction of geologic histories from geologic map data, types of fossil preservation, fossil identification and morphology of the common and important fossils throughout the Geologic Time Scale. Formation and development of the earth, its oceans, atmosphere and life through time.

**A. Relative Dating**

1. Interpreting the geologic order of events
  - a. Law of Horizontality
  - b. Law of Superposition
  - c. Cross-cutting relationships

**B. Absolute Age Dating**

1. Half-life calculations and exercises
  - a. Principles of radioactive decay
  - b. Half-lives
- c. Common types of radiometric elements used to date geologic fossils and strata
  1.  $^{40}\text{K}/^{40}\text{Ar}$
  2.  $^{87}\text{Rb}/^{87}\text{Sr}$
  3.  $^{238}\text{U}/^{206}\text{Pb}$
  4.  $^{235}\text{U}/^{207}\text{Pb}$
  5.  $^{14}\text{C}/^{14}\text{N}$
  6. And other radiometric elements as deemed appropriate by the instructor

- d. Calculation of radiometric ages
  - e. Understanding the errors inherent with radiometric dating
- C. Types of Fossilization
  - 1. Trace fossils, molds and casts
  - 2. Dessication
  - 3. Recrystallization
  - 4. Permineralization
  - 5. Replacement
  - 6. Carbonization
  - 7. Coprolites
  - 8. Gastroliths
- D. Identification and familiarization with representative fossils from throughout the geologic time scale
  - 1. Ediacaran fauna
  - 2. Stromatolites
  - 3. Trilobites
  - 4. Brachiopods
  - 5. Rugose corals
  - 6. Belemnites
  - 7. Ammonites
  - 8. Sponges
  - 9. Bryzoans
  - 10. Stemmed crinoids
  - 11. Conodonts
  - 12. Shark's teeth
  - 13. Graptolites
  - 14. Eurypterids
  - 15. And other fossils as deemed appropriate by the instructor
- E. Biostratigraphy exercises
- F. Geologic Histories from Geologic Map Data\
- G. Other appropriate historical geology exercises at the instructor's discretion

#### VI. METHODS OF INSTRUCTION:

- A. Specimens (e.g., fossils)
- B. **Lab** - exercises
- C. **Field Trips** - at the instructor's discretion
- D. Instructor presentations 1. Cd-rom/dvd images and animations 2. 35mm and power-point slides 3. Demonstrations 4. Video clips 5. Internet and online materials, websites, quizzes, bulletin boards, etc.
- E. **Lab** - manual and cd-rom (if available)
- F. **Discussion** -

#### VII. TYPICAL ASSIGNMENTS:

- A. Complete the laboratory exercise in relative dating. B. Memorize the Eons, Eras and Periods of the Geologic Time Scale
- C. Complete the laboratory exercise on Types of Fossilization. D. Presentation. Create and present a 5-10 minute presentation on a geologic topic approved by the instructor. E. Field Reports

#### VIII. EVALUATION:

- A. **Methods**
  - 1. Field Trips
  - 2. Lab Activities
- B. **Frequency**
  - 1. Frequency
    - a. Laboratory exercises, assignments, reports – weekly (at each lab meeting)
    - b. PreLabs and PreLab Quizzes; weekly – or at the instructor's discretion
    - c. Laboratory Practical Exams; at least two, which may include the final
    - d. In-Lab Practice Quizzes; weekly – or at the instructor's discretion
    - e. Field Trip – at the instructor's discretion

#### IX. TYPICAL TEXTS:

- 1. Poort, J.M., and Carlson, R.J.. *Historical Geology; Interpretations and Applications*. 6th ed., Prentice-Hall, 2004.
- 2. Smith, J.C. Levin, H.L. and Smith, M.S *Earth History; Laboratory Studies* . 9th ed., McGraw Hill Publishers, 2008.
- 3. Peterson, M.S, and Rigby, J.K *Interpreting Earth History; A Manual in Historical Geology*. 6th ed., WCB McGraw-Hill, 1999.

#### X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Access to the Internet and computers, through the LPC Computer Center, or access to a personal computer at home with an Internet connection
- B. A small booklight
- C. A set of colored pencils
- D. A calculator that can calculate logarithms
- E. Study guides/instructions/lab exercises as made available by the instructor