

LAST REVIEW: 2010-11

NEXT REVIEW: 2015-16

STATUS: A

COURSE TITLE: Historical Geology

COMMON COURSE NUMBER: GLY - 1100

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN

CLOCK HOURS:

Lecture: 48 Lab:
Clinic: Other:

PREREQUISITE(S): MAT0024 with a grade of "C" or better

COREQUISITE(S): None

PRE/COREQUISITE(S):

COURSE DESCRIPTION:

A study of the origin and evolution of the Earth and the history of life on our planet. The course encompasses the causes and effects geologic change and the evolution of life, and the role of plate tectonics on the geologic and biologic evolution of Earth. Emphasis is placed on how and why past geologic and biologic changes occurred. Interpretations of Earth's past history are also used to help explain current events and predict future trends.

General Education Requirements - Associate of Arts Degree, meets Area: 4B

UNIT TITLES

1. Reading and Writing for Historical Geology
2. Introduction
3. The Significance of Sedimentary Rocks in Interpreting Earth History
4. Plate Tectonics: A Unifying Theory
5. Evolution
6. Time and Geology
7. Precambrian Earth and Life History
7. Paleozoic Era
9. Mesozoic Era
10. Cenozoic Era

*** Complete the following only if course is seeking general education status ***

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.0, 2.1-2.5, 3.1-3.4, 4.1-4.7, 5.1-5.9, 6.1-6.13, 7.1-7.8, 8.1-8.6, 9.1-9.7, 10.1-10.9
2. Write clearly and coherently**	1.0, 5.6, 5.7
3. Demonstrate literacy as appropriate within a given discipline**	a) 1.0 e) 4.2, 4.5, 5.6, 5.7, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 7.1, 8.1, 8.6, 9.1, 9.6, 10.1, 10.6, 10.8, 10.9 f) 1.0 - 10.0 g) 2.1, 2.2, 3.1, 4.3, 4.6, 4.7, 5.1, 5.6, 5.7, 7.2, 8.2, 9.2, 9.4, 9.7, 10.2, 10.4, 10.7, 10.9
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.5, 3.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.3, 6.7, 6.8, 6.12, 6.13, 10.9
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.1, 5.1, 5.2, 5.3, 5.4, 5.5, 9.7, 10.7, 10.8, 10.9
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	
8. Speak and listen effectively.	

**General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force*

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.

- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.
- f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.

g) Environmental literacy is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
3. Research Papers	1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0
4. Group projects	
5. Discussions (In class and online)	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
6. Multiple Choice tests	2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
10. Take-home tests	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
11. Summaries, critiques, and analyses	
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6-10, 6-11, 6-12, 6-13, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 8-1, 89-2, 8-3, 8-4, 8-5, 8-6, 01, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain)	

Unit 1: Reading and Writing for Historical Geology

General Outcome:

1.0 The student shall: be able to clearly communicate in writing, meaningful information derived from course related reading assignments, lectures and lecture demonstrations, and any other methods used to convey subject information (maps, charts, drawings, pictures, paintings, internet sources, graphs, databases, etc.) to meet the required course outcomes benchmarks outlined in Units 2 through 10 of this course outline.

Specific Measurable Learning Outcomes:

1.1 Demonstrate in writing the ability to recall knowledge, comprehend information, organize ideas, analyze and synthesize data, problem solve, and apply meaningful knowledge, relevant to the science of Geology from course related readings.

Common Course Number: GYL1100

UNITS

Unit 2 Introduction

General Outcome:

2.0 The students should be able to identify the major historical figures of geology, list the accomplishments of each, and define and correctly use the basic terms describing the materials and structure of planet Earth.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 List by name and date the major historical figures of geology and their contributions.**
- 2.2 List the common elements and compounds that make up the minerals and rocks of Earth**
- 2.3 Compare the physical subdivisions of the Earth's surface and interior structure to the subdivisions based on the chemical compositions of the surface and interior.**
- 2.4 Identify by physical and chemical properties the rock forming minerals and other significant minerals found on Earth.**
- 2.5 Identify and classify igneous, sedimentary and metamorphic rocks utilizing knowledge of the conditions of their formation, and of their mineral/chemical composition.**

Common Course Number: GYL1100

Unit 3 The Significance of Sedimentary Rocks in Interpreting Earth History

General Outcome:

3.0 The students should be able to list and identify sedimentary rocks and interpret their mode of formation as they relate to the laws and principles governing the formation of sediments and the processes of sedimentation and lithification.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 3.1 Identify and describe basic sedimentary processes that create, transport, and deposit sediments.**
- 3.2 Identify and interpret primary sedimentary structures.**
- 3.3 List the major sedimentary environments and evaluate how each is recognized and interpreted in sediments and sedimentary rock**
- 3.4 Define and give examples of fossils and the types of fossilization.**

Common Course Number: GYL1100

Unit 4 Plate Tectonics: A Unifying Theory

General Outcome:

4.0 The student should recognize that plate tectonics is a unifying theory that has revolutionized geology

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 4.1 Identify and analyze the geologic, paleontologic and climatologic evidence supporting the continental drift hypothesis.**
- 4.2 Identify and analyze the geologic evidence supporting the seafloor spreading hypothesis, including thermal convection as a mechanism for plate movement**
- 4.3 Describe the 3 types of plate boundaries and evaluate the movement of the plates with respect to each other over the Earth's surface.**
- 4.4 Describe the 3 types of convergent plate boundaries and evaluate the movement of the plates with respect to each other.**
- 4.5 Calculate the rate of plate movement and direction of plate motion.**
- 4.6 Link plate tectonic activities to the distribution of natural resources.**
- 4.7 Link plate tectonics to evolution and the distribution of the world's biota**

Unit 5 Evolution

General Outcome:

2.0 The students should be able to understand and discuss how life has changed and diversified through time from ancestors that lived during the past.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Recognize the contributions of Lamarck, Darwin, Wallace, Mendel and other significant evolutionary scientists.**
- 5.2 Define “natural selection” and relate to the theory of evolution.**
- 5.3 Analyze how fossils support the theory of evolution.**
- 5.4 Define “missing link” and relate to theory of evolution and fossil evidence.**
- 5.5 Assess the biological evidence (5.5.1 – 5.5.6) that supports evolution**
 - 5.5.1 Linnaen, phylogentic, and cladistic classification**
 - 5.5.2 Comparative anatomy**
 - 5.5.3 Embryology**
 - 5.5.4 Biochemistry**
 - 5.5.5 Molecular biology**
 - 5.5.6 Modern microevolution**
- 5.6 Classify life using the Linnaen Classification Scheme**
- 5.7 Illustrate how scientists depict evolutionary relationships using phylogentic trees and cladograms.**
- 5.8 Distinguish between divergent, convergent, and parallel evolution**
- 5.9 Distinguish between allopatric speciation, phyletic gradualism, and punctuated equilibrium**

Unit 5 Time and Geology**General Outcome:**

6.0 The students should be able to understand and discuss the development of the Standard Geologic Time Scale and methods for determining absolute ages and relative ages.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1 Recognize the magnitude of geologic time and relate to an easier to visualize scale.**
- 6.2 Describe how the concept of geologic time and its measurement have changed through human history.**
- 6.3 Identify and apply the fundamental principles of relative age dating as a means of interpreting geologic history including:**
 - 6.3.1 Principle of superposition**
 - 6.3.2 Principle of original horizontality**
 - 6.3.3 Principle of cross cutting relationships**
 - 6.3.4 Principle of uniformitarianism**
 - 6.3.5 Principle of lateral continuity**
 - 6.3.6 Principle of inclusions.**
- 6.4 Identify how age is determined using relative dating principles and techniques and apply.**
- 6.5 Identify how age is determined using various absolute dating principles and techniques and apply.**
- 6.6 Discuss how the discovery of radioactivity provided geologists with a clock that could accurately measure Earth's age and validate that the Earth was very old.**
- 6.7 Using the ratio of parent to daughter radioactive isotopes, calculate the age and the number of half lives of a hypothetical sample.**

- 6.8 Compare and contrast relative and absolute geologic age determination, including the limitations of each.**
- 6.9 Define and list the range of each the various time units used in geology (Eon, Era, Period, Epoch).**
- 6.10 Reproduce the relative Geologic Time Scale with included Eons, Eras, Periods, and Epochs (only for the Cenozoic Era)**
- 6.11 Describe the major principles of stratigraphy.**
- 6.12 Utilize geologic block diagrams and maps to determine sequence of events, identify geologic structures, and assist in interpreting the geologic history represented.**
- 6.13 Discuss geological age dating utilizing the Earth's paleomagnetic record and the marine oxygen isotope astronomical time scale.**

Common Course Number: GYL1100

Unit 7 Precambrian Earth and Life History

General Outcome:

7.0 The students should be able to list and describe the major geologic and biologic events and processes, geography, lifeforms, and global environments of the Precambrian Earth.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 7.1 Identify the eons that comprise the Precambrian and correlate to absolute time**
- 7.2 List the major geologic and biologic events that occurred during the Precambrian Era and discuss their impacts on the environment.**
- 7.3 Discuss the origins of the Earth, its atmosphere, and its oceans.**
- 7.4 Discuss the origins of life on planet Earth.**
- 7.5 List the dominant life-forms that existed during the Precambrian.**
- 7.6 Name the major rock formations of during the Precambrian.**
- 7.7 Describe the paleogeography, paleoclimate, and geology of the Precambrian.**
- 7.8 Assess the significance of banded iron formations, stromatolites, cyanobacteria**

Common Course Number: GYL1100

Unit 8 Paleozoic Era

General Outcome:

8.0 The students should be able to list and describe the major geologic and biologic events and processes, geography, lifeforms, and global environments of the Paleozoic Earth.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 8.1 List the periods of the Paleozoic Era according in order of their ages.**
- 8.2 List the major events that occurred during the Paleozoic Era, especially those that occurred at the beginning and end of each period.**
- 8.3 Name the dominant life forms that were significant for each period in the Paleozoic.**
- 8.4 Identify the periods in which the first abundant life with hard parts appeared, as well as the periods in which the fishes, amphibians, arthropods and insects, and reptiles first appeared.**
- 8.5 Describe the paleogeography, paleoclimate and geology for each period of the Paleozoic.**
- 8.6 Locate the major rock formations that formed during the Paleozoic, and categorize them according to the age of the period in which the formed.**

Common Course Number: GYL1100

Unit 9 Mesozoic Era

General Outcome:

- 9.0 The students should be able to list and describe the major geologic and biologic events and processes, geography, lifeforms, and global environment of the Mesozoic Earth.**

- 9.1 List the periods of the Mesozoic Era according in order of their ages.**

- 9.2 List the major geologic and biologic events that occurred during the Mesozoic Era, especially those that occurred at the beginning and end of each period.**

- 9.3 Name the life forms that were significant for each period in the Mesozoic including dominant and/or otherwise important species.**

- 9.4 Assess the importance of the dinosaurs and mammals during the Mesozoic**

- 9.5 Describe the paleogeography, paleoclimate and geology for each period of the Mesozoic**

- 9.6 Locate the major rock formations that formed during the Paleozoic, and categorize them according to the age of the period in which the formed.**

- 9.7 Describe the K/T boundary event and assess its significance.**

Common Course Number: GYL1100

Unit 10 Cenozoic Era

General Outcome:

- 10.0 The students should be able to list and describe the major geologic and biologic events and processes, geography, lifeforms, and global environment of the Cenozoic Earth.**

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 10.1 List the periods and epochs of the Cenozoic Era according in order of their ages.**
- 10.2 List the major geologic and biologic events that occurred during the Cenozoic Era, especially those that occurred at the beginning and end of each period.**
- 10.3 Name the life forms that were significant for each period and each epoch in the Cenozoic**
- 10.4 Describe the origin and evolution of primates and man.**
- 10.5 Describe the paleogeography, paleoclimate and geology for each period and epoch of the Cenozoic**
- 10.6 Locate the major rock formations that formed during the Cenozoic, and categorize them according to the age of the period in which they formed.**
- 10.7 Describe the “ice ages” and evaluate their significance.**
- 10.8 Comprehend the Milankovitch cycles and how they are the pacemakers of the ice ages.**
- 10.9 Assess the role of greenhouse gases in relation to Pleistocene climate change.**