



ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences & Business

COURSE: GEL 1009 Historical Geology

Date: Fall 2019

Credit Hours: 4

Prerequisite(s): None

Delivery Method: **Lecture** **3 Contact Hours** (1 contact = 1 credit hour)
 Seminar **0 Contact Hours** (1 contact = 1 credit hour)
 Lab **2 Contact Hours** (2-3 contact = 1 credit hour)
 Clinical **0 Contact Hours** (3 contact = 1 credit hour)
 Online
 Blended

Offered: **Fall** **Spring** **Summer**

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>: 91 907L

CATALOG DESCRIPTION:

This course is an introductory study into the origin and structure of the earth. Emphasis will be placed on North America, dealing with the growth of continents, and mountain building. The course includes a study of evolutionary changes occurring in plant and animal life as documented by fossil remains and the interpretation of geologic forces by means of topographic and geologic maps. Field trips are an integral part of the course.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

- To apply analytical and problem solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciation for diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals. See last page for more information.]

Upon completion of the course, the student will be able to:

1. Understand how science works and the characteristics of historical geology.
 - Competency 1.1: Identify the methodology of science.
 - Competency 1.2: Critically evaluate datasets and infer valid conclusions from those datasets.
 - Competency 1.3: Identify the basic concepts of geology as a method for the scientific study of the Earth.
 - Competency 1.4: Recognize historical geology as an application of the sciences of geology, biology, anthropology, and astronomy to the interpretation of the Earth's history.
2. Understand geologic processes and the impact of those processes on the geologic record.
 - Competency 2.1: Identify and differentiate the three rock types (igneous, metamorphic, and sedimentary) and the processes that form them.
 - Competency 2.2: Identify, analyze, and evaluate individual rocks and rock formations and describe their origin and significance in the context of the Earth's history
 - Competency 2.3: Describe the process of plate tectonics and the evidence that supports it.
 - Competency 2.4: Identify, analyze, and evaluate the features produced by tectonic activity, and describe their origin and significance in the context of the Earth's history.

3. Understand fossils and their impact on the geologic record.
 - Competency 3.1: Define fossils and be able to differentiate fossils from the rocks in which they occur.
 - Competency 3.2: Describe the various methods of fossilization and analyze fossils to determine the type of fossilization.
 - Competency 3.3: Identify the classification system used to biologically differentiate fossils and describe individual fossils and place them within the classification system.
 - Competency 3.4: Analyze and evaluate fossils to describe the environment in which they may have lived.
 - Competency 3.5: Describe, analyze, and evaluate the fossil record for evidence of the development of life through time including organic evolution and mass extinction.

4. Understand the structure, development, and use of the geologic time scale.
 - Competency 4.1: Describe the difference between rock units, time units, and time-rock units, and identify the methods used to describe each type of unit.
 - Competency 4.2: Identify the methods used to delineate the time units of the geologic time scale.
 - Competency 4.3: Identify the names and time spans of the eons, eras, and periods of the entire geologic time scale and the epochs of the Cenozoic Era.

5. Understand the methods used to interpret geologic history.
 - Competency 5.1: Describe, analyze, and evaluate the rock record using the principles of uniformitarianism, superposition, original horizontality, and cross-cutting relationships.
 - Competency 5.2: Identify unconformities and describe their significance.
 - Competency 5.3: Identify the methods used in correlation of rock units including sequence stratigraphy and fossil correlation. Describe, analyze, and correlate sequences of rocks.
 - Competency 5.4: Describe, analyze, and evaluate sedimentary rocks and fossils to determine the environment of deposition and the relative movement of sea level.
 - Competency 5.5: Describe the methods of radiometric dating, include the rock types in which the method is most useful, and the isotopes which are most commonly used.

6. Understand the evolution of the Earth's surface over time.
 - Competency 6.1: Describe the rocks of the Archeozoic, Proterozoic, and Phanerozoic, including the nature of the rocks and where they are found.
 - Competency 6.2: Describe the major global geologic events of the Archeozoic, Proterozoic, and Phanerozoic and explain how those events have been interpreted.
 - Competency 6.3: Describe the major North American geologic events of the Archeozoic, Proterozoic, and Phanerozoic and explain how those events have been interpreted.
 - Competency 6.4: Examine and analyze local geologic features and interpret their geologic significance and history.

MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
First Goal	
To apply analytical and problem-solving skills to personal, social and professional issues and situations.	1. Understand how science works and the characteristics of historical geology. 5. Understand the methods used to interpret geologic history.
Second Goal	
To communicate successfully, both orally and in writing, to a variety of audiences.	1. Understand how science works and the characteristics of historical geology. 2. Understand geologic processes and the impact of those processes on the geologic record. 3. Understand fossils and their impact on the geologic record. 4. Understand the structure, development, and use of the geologic time scale. 5. Understand the methods used to interpret geologic history. 6. Understand the evolution of the Earth's surface over time.
Third Goal	
To connect learning to life.	1. Understand how science works and the characteristics of historical geology. 2. Understand geologic processes and the impact of those processes on the geologic record. 5. Understand the methods used to interpret geologic history.

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Foundations of Geology
 Provides a description of the basic concepts of geology including scientific analysis, plate tectonics, the rock cycle, and the hydrologic cycle. Provides information on the basic types of earth materials including minerals, rocks, sediments, and soils.
 - A. Introduction to Geology
 - B. Earth Materials

2. The Historical Significance of Sedimentary Rocks
 Provides a discussion of sedimentary rocks, their formation and occurrence, and their use in the interpretation of geologic history.
 - A. Lithology
 - B. Color, texture and sorting
 - C. Sedimentary structures
 - D. Time, time-rock, and rock stratigraphic units

- E. Geologic mapping
3. The Fossil Record
Provides a description of life, fossilization, evolution, and the use of fossils to interpret geologic history
 - A. Definition of a fossil and methods of fossilization
 - B. Classification of fossils
 - C. Fossils and stratigraphy
 - D. Evolution
 4. Plate Tectonics
Provides a description of the process of plate tectonics, the evidence that supports plate tectonics, and the geologic features produced by the interactions of the plates.
 - A. The structure of the inner earth
 - B. Crustal structures
 - C. Evidence for plate tectonics
 - D. Plate tectonic features
 5. Time and Geology
Provides a description of the methods used to interpret geologic history and a description of the geologic time scale.
 - A. The standard geologic time scale
 - B. Methods of relative dating
 - C. Methods of absolute dating
 6. The Early History of the Earth
Provides a description of the Archeozoic & Proterozoic rocks and structures found worldwide and the interpretation of those rocks and structures.
 - A. The formation of the solar system and the Earth
 - B. Development of the early Earth
 - C. Development of life
 7. The Recent History of the Earth
Provides a description of the Phanerozoic rocks and structures found worldwide and the interpretation of those rocks and structures.
 - A. Paleozoic rocks & tectonics
 - B. Paleozoic life
 - C. Mesozoic & Cenozoic rocks & tectonics
 - D. Mesozoic & Cenozoic life

INSTRUCTIONAL METHODS:

1. Lectures
2. Discussions - may include individual oral presentations on specified topics
3. Demonstrations
4. Lab assignments
5. Student Presentations
6. Audio-visual Aids - films, video tapes, filmstrips, transparencies with overhead projector, slides, charts, and maps
7. Supplemental Reading

- A. Journals and periodicals
- B. Books
- C. Pamphlets and brochures
- D. Internet sites

INSTRUCTIONAL MATERIALS:

Text: *Historical Geology*. Wicander, R, and Monroe, J.S., (current edition)

Lab text: *Historical Geology: Interpretations and Applications*. Poort, J.M. and Carlson, R.J., (current edition)

Supplements: Transparencies, charts, maps, slides, publications, www sites

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

- 1. Textbook reading
- 2. Other assigned reading
- 3. Regular attendance and participation in discussion
- 4. Field trips
- 5. Laboratory exercises
- 6. Written papers/presentations
 - A. Term project: report on the historical geology of a portion of the geologic time scale.
 - B. Opportunity for optional (independent) additional library research reports.

Grading scale:

90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
< 60%	F

OTHER REFERENCES:

- 1. Journals such as: *Geology*, *Journal of Geoscience Education*, *EOS*, *GSA Today*, *Scientific American*, *EPA Journal*, *National Geographic*, and others.
- 2. Reference texts and books such as:
 - Handbook of Illinois Stratigraphy*, Willman, et.al, 1975
 - Wedron and Mason Groups: Lithostratigraphic Reclassification of Deposits of the Wisconsin Episode, Lake Michigan Lobe Area*, Hansel and Johnson, 1996
 - Guidebook for the 60th Annual Tri-State Geological Field Conference: "Stratigraphy and Economic Geology of the LaSalle-Ottawa, Illinois Area,"* Kirchner, et.al., 1997
 - Guide to the Geology of Buffalo Rock and Matthiessen State Parks Area, LaSalle County, Illinois*, Nelson, et.al., 1996
 - No Stone Unturned: Reasoning About Rocks and Fossils*, Peters, 1991
 - Geologic Maps: A Practical Guide to the Interpretation and Preparation of Geologic Maps*, Spencer, 1993
 - Evolution of the Earth* (3rd edition), Dott and Batten, 1981
 - Structural Geology of Rocks and Regions*, Davis, 1984
 - Invertebrate Paleontology and Evolution*, Clarkson, 1979
 - Textbook of Lithology*, Jackson, 1970

Dynamic Stratigraphy: An Introduction to Sedimentation and Stratigraphy,
Matthews, 1984
Dictionary of Geological Terms, American Geological Institute
Fossils, Paleontology, and Evolution, Clark, 1978
Introduction to Historical Geology, G. Moore
Exploring Earth and Life Through Time, S. Stanley, 1993
Earth: Then and Now, Montgomery and Dathe, 1991
Historical Geology: Evolution of the Earth and Life Through Time, Wicander and
Monroe, 1993
Historical Geology, Macmillan, 1991
Fundamentals of Historical Geology, D. Dathe, 1993
A Trip Through Time: Principles of Historical Geology, Merrill, 1990

3. Numerous other books, pamphlets, and maps on a wide variety of geological and historical geology topics published by the State of Illinois, other states and the federal government are available in the IVCC library and in the Biology Lab.

