



ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences & Business

COURSE: GEL 1008 Physical 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>: P1 907L

CATALOG DESCRIPTION:

An introduction to the study of the earth as it is carried on by geologists. Geological principles and processes dealing with mineral and rock identifications, plate tectonics, crustal deformation by folding, faulting, and volcanism, and landforms produced by erosional agents are some of the topics covered. Experience in aerial photo and topographic map interpretation is provided in laboratory exercises.

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 physical 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.
2. Understand the formation, distribution, and classification of rocks and minerals.
 - Competency 2.1: Describe the physical characteristics of minerals and identify minerals based on an analysis of those characteristics.
 - Competency 2.2: Describe the three rock types and their origins.
 - Competency 2.3: Describe the physical characteristics of rocks, and use those characteristics to identify rocks and evaluate their origin.
3. Understand the external physical processes that shape the surface of the earth.
 - Competency 3.1: Identify the processes of physical and chemical weathering and describe their effect on rocks and minerals.
 - Competency 3.2: Identify the properties of soils, describe the processes that contribute to the formation of soil.
 - Competency 3.3: Describe the geological processes associated with slopes and mass wasting and the landforms produced by those processes; analyze slope failures and describe the processes that created them.
 - Competency 3.4: Describe the geological processes associated with rivers and streams and the landforms produced by those processes; analyze fluvial landforms and describe the processes that created them.

- Competency 3.5: Describe the geological processes associated with waves and the coast and the landforms produced by those processes; analyze coastal landforms and describe the processes that created them.
- Competency 3.6: Describe the geologic processes associated with the deep ocean and the landforms produced by those processes; analyze the ocean floor and describe the processes that shaped it.
- Competency 3.7: Describe the geological processes associated with deserts and the wind and the landforms produced by those processes; analyze desert and eolian landforms and describe the processes that created them.
- Competency 3.8: Describe the geological processes associated groundwater and the landforms produced by those processes; analyze karst landforms and describe the processes that created them.
- Competency 3.9: Describe the geological processes associated with glaciers and the landforms produced by those processes; analyze glacial landforms and describe the processes that created them.
4. Understand the internal physical processes that shape the surface of the earth.
- Competency 4.1: Describe the types of stress to which rocks are subjected and describe the response of rocks to stress in terms of strain and structures.
- Competency 4.2: Describe the geological processes associated with folding and faulting and the landforms produced by those processes; analyze folds and faults and describe the processes (and stresses and strains) that created them.
- Competency 4.3: Describe the geological processes associated with earthquakes and the landforms produced by those processes; analyze seismic data, evaluate the earthquake that produced it and the geologic factors that influenced its effects.
- Competency 4.4: Describe the geological processes associated with igneous activity and the landforms produced by those processes; analyze igneous landforms (extrusive and intrusive) and describe the processes that created them
- Competency 4.5: Describe the process of plate tectonics and the evidence that supports it.
- Competency 4.6: Identify, analyze, and evaluate the features produced by tectonic activity, and describe their origin and significance.
5. Understand the importance of water as a resource and as a geologic agent.
- Competency 5.1: Describe the distribution of water and fresh water on the Earth's surface.
- Competency 5.2: Describe the hydrologic cycle and analyze and evaluate its impact on the distribution of water resources.
- Competency 5.3: Describe the distribution of surface water resources; analyze a drainage basin and evaluate the surface water resource.
- Competency 5.4: Describe the distribution of groundwater water resources; analyze groundwater characteristics and evaluate the groundwater resource.
6. Understand the internal structure of the earth.
- Competency 6.1: Describe the methods used to study the internal structure of the Earth.
- Competency 6.2: Describe the layers that form the internal structure of the earth.

Competency 6.3: Describe the principle of isostasy and analyze and evaluate its effects on the shape of the Earth's surface.

7. Understand the methods used to interpret geologic history.

Competency 7.1: Describe, analyze, and evaluate the rock record using the principles of uniformitarianism, superposition, original horizontality, and cross-cutting relationships.

Competency 7.2: Identify unconformities and describe their significance.

Competency 7.3: Describe the methods of radiometric dating, and analyze and interpret a radiometric sample data.

8. Understand the resources available for the study of geologic processes.

Competency 8.1: Identify the features common to all maps, and use maps to identify human and geologic phenomena.

Competency 8.2: Identify features common to topographic maps, and use maps to identify and analyze geologic phenomena.

Competency 8.3: Identify features common to remote sensing imagery, and use remote sensing imagery to identify and analyze geologic phenomena.

Competency 8.4: Identify publications useful in geologic research, and use those publications to study geologic features.

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 physical geology. 3. Understand the external physical processes that shape the surface of the earth. 4. Understand the internal physical processes that shape the surface of the earth. 7. 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 physical geology. 2. Understand the formation, distribution, and classification of rocks and minerals. 3. Understand the external physical processes that shape the surface of the earth. 4. Understand the internal physical processes that shape the surface of the earth. 5. Understand the importance of water as a resource and as a geologic agent. 6. Understand the internal structure of the earth. 7. Understand the methods used to interpret geologic history.

	8. Understand the resources available for the study of geologic processes.
Third Goal	
To connect learning to life.	1. Understand how science works and the characteristics of physical geology. 7. Understand the methods used to interpret geologic history. 8. Understand the resources available for the study of geologic processes.

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 a discussion on the features and use of maps and remote sensing.
 - A. Introduction to Geology
 - B. Introduction to Scientific Investigation
 - C. The Rock Cycle
 - D. Maps
 - E. Remote Sensing Imagery

2. Minerals and Rocks
Provides a discussion of the minerals including their formation and identification. Describes the three rock types, the rock forming processes (placed in the context of the rock cycle), and the identification of rocks.
 - A. Matter and Minerals
 - B. Igneous Rocks and Processes
 - C. Sedimentary Rocks and Processes
 - D. Metamorphic Rocks and Processes

3. External Geologic Processes
Provides a discussion of external geologic processes and the landforms they produce. Includes a discussion of the importance of water as a geologic agent and its distribution as a resource.
 - A. Weathering and Soils
 - B. Rivers
 - C. The Ocean and Coast
 - D. Deserts and the Wind
 - E. Mass Wasting and Slopes
 - F. Groundwater
 - G. Glaciers

4. Internal Geologic Processes
Provides a description of the structure of the earth's interior and geologic structures. Includes a discussion of the internal processes including stress and strain and plate tectonics.
 - A. Structural Geology
 - B. Earthquakes
 - C. The Earth's Interior
 - D. Plate Tectonics

5. The Earth's History
Provides a brief description of the methods used to interpret the Earth's history and a discussion of the age of the Earth.
 - A. Relative Dating
 - B. Absolute (Actual) Dating

INSTRUCTIONAL METHODS:

1. Lectures
2. Discussions - may include individual oral presentations on specified topics
3. Demonstrations
4. Audio-visual Aids - films, video tapes, filmstrips, transparencies with overhead projector, slides, charts, and maps
5. Supplemental Reading - Journals and periodicals, Newspapers, Books, Pamphlets and brochures, Internet sites

INSTRUCTIONAL MATERIALS:

Text: *exploring Geology*, Reynolds, Stephen, et.al. McGraw Hill (current edition)

Lab text: Laboratory Manual for Physical Geology. Jones, N.W., McGraw Hill (current edition).

Course Web site

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. Laboratory exercises
5. Exams
6. Quizzes
7. Classroom Assessment (non grade-based)

Grading scale:

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

OTHER REFERENCES:

1. **TEXT:** *Exploring Geology*, Reynolds, Stephen, et.al. McGraw Hill (current edition)
2. Journals such as: *Geology*, *Journal of Geoscience Education*, *EOS*, *GSA Today*, *Environment*, *Scientific American*, *EPA Journal*, *National Geographic*, and others.
3. Reference texts and books such as:
 - Earth: An Introduction to Physical Geology*, Tarbuck & Lutgens, 2004
 - Oceanography: An Invitation to Marine Science*, Garrison, 2005
 - Geology and Society*, Coates, 1985
 - Geology Underfoot in Illinois*, Wiggers, R., 1997
 - Geologic Maps*, Spencer, E.W., 1993
 - Oceanography*, Garrison, T., 1999
 - Understanding Earth*, Press and Seiver, 1997
 - Earth's Dynamic Systems*, Hamblin, W.K., Christensen, E.H., 1998
 - The Dynamic Earth*, Skinner, B.J. and Porter, S.C., 1992
 - Process Geomorphology*, Ritter, Kochel, and Miller, 1995
 - To Interpret the Earth: Ten Ways to be Wrong*, Schumm, 1991
 - Structural Geology*, Davis, 1984
 - The Inaccessible Earth*, Brown, G.C. and Mussett, A.E., 1981
 - Textbook of Lithology*, Jackson, K.C., 1970
 - Beach Processes and Sedimentation*, Komar, P.D., 1976
 - Igneous and Metamorphic Petrology*, Best, M.G., 1982
 - Groundwater*, Freeze and Cherry, 1979
 - Seismicity of Illinois*, Heigold and Larson, 1990
4. Numerous other books, pamphlets, and journals on a wide variety of environmental topics published by the government are available in the Federal Depository section of our library.

