# ILLINOIS VALLEY COMMUNITY COLLEGE

## COURSE OUTLINE

**DIVISION: Natural Sciences & Business**

**COURSE: GEL 1007 Environmental 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 908L

**CATALOG DESCRIPTION:**
This is an introductory course in the study of the interactions between human activities and the earth and geologic processes. An overview of modern geologic concepts is followed by an in-depth examination of natural hazards, natural resources, waste management, environmental restoration and land-use planning. This course provides instruction in applied geology and scientific reasoning that is useful to all students.

## 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 environmental 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 environmental geology as an application of the science of geology to the interactions between humans and the Earth and Earth processes.

2. Understand hazardous geologic processes and the interactions between humans and those processes.
    - Competency 2.1: Identify, analyze, and evaluate the hazards presented by rivers, the natural and human causes of those hazards, and the human responses to those hazards.
    - Competency 2.2: Identify, analyze, and evaluate the hazards posed by unstable slopes, the natural and human contributions to those hazards, and the human responses to those hazards.
    - Competency 2.3: Identify, analyze, and evaluate the hazards posed by earthquakes, the natural causes of those hazards, and the human responses to those hazards.
    - Competency 2.4: Identify, analyze, and evaluate the hazards posed by volcanoes, the natural causes of those hazards, and the human responses to those hazards.
    - Competency 2.5: Identify, analyze, and evaluate the hazards found in coastal areas, the natural and human contributions to those hazards, and the human responses to those hazards.

3. Understand geologic resources and the interactions between humans and those processes.
    - Competency 3.1: Identify the properties of soils, describe the processes that contribute to the formation of soil, describe, analyze, and evaluate the impact humans have on soil development and quality.
    - Competency 3.2: Identify the primary sources of fresh water, describe how fresh water is used, describe, analyze, and evaluate the impact of humans on fresh water resources.
    - Competency 3.3: Identify the primary energy resources, describe where those resources are located and how they are extracted, describe, analyze, and evaluate the geological impact of human use of those resources.
    - Competency 3.4: Identify the primary mineral resources, describe where those resources are located and how they are extracted, describe, analyze, and evaluate the geological impact of human use of those resources.

4. Understand human impact on the environment and the environment's impact on human health.
    - Competency 4.1: Identify, analyze, and evaluate the primary sources and impacts of surface and ground-water pollution.
    - Competency 4.2: Identify, analyze, and evaluate the primary sources and impacts of land pollution.
    - Competency 4.3: Identify, analyze, and evaluate the primary sources and impacts of air pollution.
    - Competency 4.4: Describe the impact of natural, inorganic substances on human health.

5. Understand the resources available for the study of geologic processes.
    - Competency 5.1: Identify the features common to all maps and use maps to identify human and geologic phenomena.
    - Competency 5.2: Identify public information resources useful in geologic research and use those resources to identify geologic resources and hazards and human impacts.
    - Competency 5.3: Identify publications useful in geologic research and use those publications to identify geologic resources and hazards and human impacts.

6. Express insight and judgment with regard to future options that may resolve environmental concerns.
    - Competency 6.1: Discuss their personal relationship with the environment and value judgements they make of their actions
    - Competency 6.2: Describe and evaluate the processes by which humans can protect the environment, including politically.
    - Competency 6.3: Examine a designated area and identify, analyze, and evaluate resources and potential hazards.

## 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 environmental geology.<br>2. Understand hazardous geologic processes and the interactions between humans and those processes.<br>3. Understand geologic resources and the interactions between humans and those processes.<br>4. Understand human impact on the environment and the environment's impact on human health.<br>5. Understand the resources available for the study of geologic processes.<br>6. Express insight and judgment with regard to future options that may resolve environmental concerns. |
| Second Goal | |
| To communicate successfully, both orally and in writing, to a variety of audiences. | 1. Understand how science works and the characteristics of environmental geology.<br>2. Understand hazardous geologic processes and the interactions between humans and those processes.<br>3. Understand geologic resources and the interactions between humans and those processes.<br>4. Understand human impact on the environment and the environment's impact on human health.<br>5. Understand the resources available for the study of geologic processes.<br>6. Express insight and judgment with regard to future options that may resolve environmental concerns. |
| Third Goal | |
| To recognize what it means to act ethically and responsibly as an individual and as a member of society. | 2. Understand hazardous geologic processes and the interactions between humans and those processes.<br>3. Understand geologic resources and the interactions between humans and those processes.<br>4. Understand human impact on the environment and the environment's impact on human health.<br>6. Express insight and judgment with regard to future options that may resolve environmental concerns. |

**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. Hazardous Earth Processes
   Provides a discussion of hazardous earth processes, their causes, the impacts of the processes on humans, the impacts of humans on the processes, and the response of humans to the hazards.
   A. Rivers and Flooding

B. Landslides
C. Earthquakes
D. Volcanoes
E. Coastal Hazards

3. Earth Resources
Provides a description of earth resources, how they came to be, and the impact of human use on those resources.
A. Fresh Water
B. Mineral Resources
C. Energy Resources

4. Pollution and Human Health
Provides a description of various pollutants and what happens to them when they enter the environment. Describes the impact of natural and human-introduced substances on human health.
A. Water Pollution
B. Land Pollution
C. Air Pollution
D. Human Health and the Environment

5. Land Use Planning
Provides a description of the methods used when planning to the use of earth resources including a discussion of the scientific, economic, and political aspects of planning. Students plan the use of a square mile of land around their home.
A. Planning for Hazards
B. Resource Use Planning

**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
   A. Journals and periodicals
   B. Newspapers
   C. Books
   D. Pamphlets and brochures
   E. Internet sites

**INSTRUCTIONAL MATERIALS:**
Text: *Introduction to Environmental Geology*. Keller, E.A., (current ed.)
Lab text: *Investigations in Environmental Geology*. Foley, Duncan, et.al., (current ed.)
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. Written papers
   A. Term project: report on the environmental geology of a one-square mile area near the student's home.
   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. **TEXT**: *Introduction to Environmental Geology*. Keller, E.A., (current edition)
2. Journals such as: *Geology, Journal of Geoscience Education, Geotimes, GSA Today, Environment, Scientific American, EPA Journal, National Geographic,* and others.
3. Reference texts and books such as:
   *Environmental Geology* (5th edition), Montgomery, 1997
   *Flood Geomorphology*, Baker, Kochel, and Patton, 1988
   *The Urban Environment,* Arnold, 1983
   *Geology and Society,* Coates, 1985
   *Process Geomorphology,* Ritter, Kochel, and Miller, 2012
   *To Interpret the Earth: Ten Ways to be Wrong,* Schumm, 1991
   *Geology and Hazardous Waste Management,* Hasan, 1996
   *Groundwater,* Freeze and Cherry, 1979
   *Mine Subsidence in Illinois: Facts for Homeowners*, Bauer, Trent, and DuMontelle, 1993
   *The Great Flood of 1993: Geologic Perspectives on the Flooding along the Mississippi River and Its Tributaries in Illinois,* Chrzastowski, et.al., 1994
   *Groundwater contamination in Karst Terrain of Southwestern Illinois,* Panno, et.al., 1996
   *Seismicity of Illinois,* Heigold and Larson, 1990
   *Environmental Science: A Global Concern*. Cunningham and Saigo, 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.

Course Competency/Assessment Methods Matrix

| **GEL 1007 Environmental Geology** | **Assessment Options** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| For each competency/outcome place an "X" below the method of assessment to be used. | **Assessment of Student Learning** | Article Review | Case Studies | Group Projects | Lab Work | Oral Presentations | Pre-Post Tests | Quizzes | Written Exams | Artifact Self Reflection of Growth | Capstone Projects | Comprehensive Written Exit Exam | Course Embedded Questions | Multi-Media Projects | Observation | Writing Samples | Portfolio Evaluation | Real World Projects | Reflective Journals | Applied Application (skills) Test | Oral Exit Interviews | Accreditation Reviews/Reports | Advisory Council Feedback | Employer Surveys | Graduate Surveys | Internship/Practicum /Site Supervisor Evaluation | Licensing Exam | In Class Feedback | Simulation | Interview | Written Report | Assignment |
| Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below. | **Direct/ Indirect** | D | D | D | D | D | D | D | D | D | D | D | D | D | D | D | D | D | D | D | I | I | I | I | D | D | | | | | |
| 1.1 Identify the methodology of science. | | | | | X | | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 1.2 Critically evaluate datasets and infer valid conclusions from those datasets. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 1.3 Identify the basic concepts of geology as a method for the scientific study of the Earth. | | | | | X | | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 1.4 Recognize environmental geology as an application of the science of geology to the interactions between humans and the Earth and Earth processes. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |

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| 2.1 Identify, analyze, and evaluate the hazards presented by rivers, the natural and human causes of those hazards, and the human responses to those hazards. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 2.2 Identify, analyze, and evaluate the hazards posed by unstable slopes, the natural and human contributions to those hazards, and the human responses to those hazards. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 2.3 Identify, analyze, and evaluate the hazards posed by earthquakes, the natural causes of those hazards, and the human responses to those hazards. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 2.4 Identify, analyze, and evaluate the hazards posed by volcanoes, the natural causes of those hazards, and the human responses to those hazards. | | | | | X | | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 2.5 Identify, analyze, and evaluate the hazards found in coastal areas, the natural and human contributions to those hazards, and the human responses to those hazards. | | | | | X | | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 3.1 Identify the properties of soils, describe the processes that contribute to the formation of soil, describe, analyze, and evaluate the impact humans have on soil development and quality. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |

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| 3.2 Identify the primary sources of fresh water, describe how fresh water is used, describe, analyze, and evaluate the impact of humans on fresh water resources. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 3.3 Identify the primary energy resources, describe where those resources are located and how they are extracted, describe, analyze, and evaluate the geological impact of human use of those resources. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 3.4 Identify the primary mineral resources, describe where those resources are located and how they are extracted, describe, analyze, and evaluate the geological impact of human use of those resources. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 4.1 Identify, analyze, and evaluate the primary sources and impacts of surface and ground-water pollution. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 4.2 Identify, analyze, and evaluate the primary sources and impacts of land pollution. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 4.3 Identify, analyze, and evaluate the primary sources and impacts of air pollution. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 4.3 Describe the impact of natural, inorganic substances on human health. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |
| 5.1 Identify the features common to all maps, and use maps to identify human and geologic phenomena. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | X | | | X | |

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| 5.2 Identify public information resources useful in geologic research, and use those resources to identify geologic resources and hazards and human impacts. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | | X | | | X | |
| 5.3 Identify publications useful in geologic research, and use those publications to identify geologic resources and hazards and human impacts. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | | X | | | X | |
| 6.1 Discuss their personal relationship with the environment and value judgments they make of their actions | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | | X | | | X | |
| 6.2 Describe and evaluate the processes by which humans can protect the environment, including politically. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | | X | | | X | |
| 6.3 Examine a designated area and identify, analyze, and evaluate resources and potential hazards. | | | | | X | X | X | X | X | | X | | X | | | | | X | | | | | | | | | | X | | | X | |