

**College of Science and Health**  
**ENVIRONMENTAL SCIENCE & GEOGRAPHY**  
**Course Outline**

1. TITLE OF COURSE AND COURSE NUMBER: General Geology  
ENV 115, 4 credits
  
2. DESCRIPTION OF THE COURSE: Includes the study of the origin and evolution of the Earth, the rocks and minerals which compose it, the processes which are constantly changing it, the concepts of relative and absolute time, the risks associated with geologic hazards, and the role of geology in shaping man's environment. The course presents the tools, methods and approach employed by practicing geologists in the study of the Earth, and discusses various aspects of mankind's perspective on the Earth and Earth history. Laboratory exercises and field trips introduce rocks, minerals, fossils, maps, and landscape features.
  
3. COURSE PREREQUISITES: None
  
4. COURSE OBJECTIVES: To acquaint the student with the materials which make up the Earth's physical environment and the processes which act upon that environment.
  
5. STUDENT LEARNING OUTCOMES AND OBJECTIVES:

Upon completion of this course students should be able to:

1. Effectively express themselves in written and oral form, through the medium of lab reports and in class discussion of relevant topics.
2. Demonstrate the ability to think critically through written responses to essay exams and/or analysis of the results of laboratory investigations.
3. Locate and use information about Earth materials and processes and organize that information into standard-format reports.
4. Demonstrate the ability to integrate knowledge and ideas about geoscience topics in a coherent and meaningful manner as evidenced by either responses to exam questions or written or oral reports.
5. Work effectively with others toward the solution of laboratory or field investigations.
6. Identify selected minerals and rocks as evidenced through practical exams.
7. Critically assess geologic hazards associated with various regions of the Earth and competently demonstrate that knowledge in the form of reports or exams.
8. Describe and explain the processes which shape the Earth and how these have altered the Earth through time and be able to demonstrate such knowledge
9. Make quantitative measurements and draw conclusions from those data collected either in the field or in the laboratory.

## 6. TOPICAL OUTLINE OF THE COURSE CONTENT:

Lecture Outline (Instructors should feel free to modify the order of content presentation):

### I. Introduction

- Some historical notes about geology
- Geologic time and the geologic calendar
- Origin of the Earth as a Planet
- A view of the Earth as a Planet
- The dynamic Earth
- The rock cycle

### II. Matter and Minerals

- Rocks versus minerals
- The composition of matter
- The structure of minerals
- Physical properties of minerals
- Mineral groups

### III. Igneous Rocks

- Crystallization of magma
- Igneous textures
- Mineral composition
- Naming igneous rocks
- Occurrence of igneous rocks

### IV. Volcanic Activity

- The nature of volcanic activity
- Materials extruded during an eruption
- Volcanoes and volcanic eruptions
- Fissure eruptions and pyroclastic flow deposits
- Volcanism and Plate Tectonics

### V. Weathering and Soils

- Weathering
- Soils and soil conservation

### VI. Sediments and Sedimentary Rocks

- Types of sedimentary rocks
- Turning sediment into sedimentary rock
- Classification of sedimentary rocks
- Sedimentary structures
- Fossils

### VII. Metamorphism and Metamorphic Rocks

- Metamorphism
- Agents of metamorphism
- Textural and mineralogic changes
- Common metamorphic rocks
- Occurrences of metamorphic rocks
- Metamorphism and plate tectonics

### VIII. Mass Wasting

- Controls of mass wasting

- Classification of mass wasting processes
- IX. Running Water
  - The hydrologic cycle
  - Running water
  - Base level and grades streams
  - Stream erosion
  - Transport and deposition of sediment by streams
  - Stream valleys
  - Drainage networks
- X. Groundwater
  - Distribution of underground water
  - The water table
  - Porosity and permeability
  - Movement of groundwater
  - Springs, wells, and artesian wells
  - Groundwater pollution-current issues in New Jersey
- XI. Glaciers and Glaciation
  - Glaciers and the hydrologic cycle
  - Formation of glacial ice
  - Movement of a glacier
  - Glacial erosion
  - Glacial deposits
- XII. Deserts and Winds
  - Deserts
  - Geologic processes in arid climates
  - Transportation of sediment by wind
  - Wind erosion
  - Wind deposits
  - The evolution of a desert landscape
- XIII. Shorelines
  - Waves, wave erosion, and wave refraction
  - Beach drift and longshore currents
  - Human interference with shoreline processes
  - Shoreline features
  - Emergent and submergent coasts
  - Tides and the Earth's rotation
- XIV. Earthquakes
  - What is an Earthquake?
  - Seismology
  - Locating the sources of an Earthquake
  - Earthquake belts
  - Earthquake depths
  - Earthquake intensity, magnitude, and destruction
- XV. The Earth's Interior
  - The crust
  - The mantle

- The core
- XVI. Plate Tectonics
  - Continental drift and the great debate
  - Plate tectonics: a modern version of an old idea
  - Plate boundaries
  - The driving mechanism
- XVII. The Ocean Floor and Its Evolution
  - Continental margins
  - Submarine canyons and turbidity currents
  - Features of the deep-ocean basin
  - Sea-floor sediments
  - Mid-ocean ridges
- XVIII. Mountain Building and the Evolution of Continents
  - Rock Deformation
  - Mountain types and mountain building
  - Orogenesis at plate boundaries
  - The origin and evolution of continental crust
- XIX. Geologic Time
  - Relative dating and early methods of dating the Earth
  - Radioactivity and radiometric dating
  - The geologic time scale

Lab Outline:

- I. Planet Earth and the rock cycle
- II. Igneous rocks
- III. Sedimentary rocks
- IV. Metamorphic rocks
- V. Dating of rocks and geologic events
- VI. Topographic maps and aerial photos
- VII. Stream processes and landscapes
- VIII. Groundwater processes
- IX. Earthquakes
- X. Structural geology
- XI. Glacial processes
- XII. Dryland landforms
- XIII. Coastal processes

7. GUIDELINES/SUGGESTIONS FOR TEACHING METHODS AND STUDENT LEARNING ACTIVITIES:

Lecture: Lecture, class discussion

Lab: "Hands-on" laboratory exercises

Field Trips: Campus or local regional field trips

8. GUIDELINES/SUGGESTIONS FOR METHODS OF STUDENT ASSESSMENT (STUDENT LEARNING OUTCOMES):

Lecture: Three semester exams, one final exam

Lab: Lab practical exams, lab reports

Field: Field reports

9. SUGGESTED READINGS, TEXTS, OBJECTS OF STUDY:

Physical Geology: Exploring the Earth, 5<sup>th</sup> ed., James S. Monroe and Reed Wicander,  
Thomson Publishing, 2003, ISBN# 0-534-39987-8

AGI Laboratory Manual in Physical Geology, Busch, Richard M. (ed.), Prentice-  
Hall, Inc., 1997

10. BIBLIOGRAPHY OF SUPPORTIVE TEXTS AND OTHER MATERIALS:

Earth, Press F., and Siever, R., W.H. Freeman and Co., 3<sup>rd</sup> edition, 1981

The Geology of New York City and Its Environs, Schuberth, C.J., American Museum of  
Natural History Press, NY, 1961

Selected Areas in New Jersey and Eastern Pennsylvania, Subitzky, S. (editor), Rutgers  
Univ. Press, 1969

The Geology and Geography of New Jersey, Widmer, K., Van Norstrand and Co., New  
York, 1964

The Geology and Landscapes of New Jersey, Wolfe, Peter, Crane Russak, New York, 1977

11. PREPARER'S NAME AND DATE: Richard Pardi, January 2005

12. ORIGINAL DEPARTMENTAL APPROVAL DATE: Summer 1984

13. REVISER'S NAME AND DATE: Richard Pardi, Summer 1984; Joseph Morley, 1998;  
Karen Swanson, April 2000

14. DEPARTMENTAL REVISION APPROVAL DATE: January 2005