**GEL 113**
**Historical Geology**

## COURSE DESCRIPTION:

Prerequisites: GEL 111
Corequisites: None

This course covers the geological history of the earth and its life forms. Emphasis is placed on the study of rock strata, fossil groups, and geological time. Upon completion, students should be able to identify major fossil groups and associated rock strata and approximate ages of geological formations. They should also be familiar with important time periods associated with the evolution of the earth and its life forms. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in natural sciences/mathematics*. Course Hours Per Week: Class, 3. Lab, 2. Semester Hours Credit, 4.

## LEARNING OUTCOMES:

Upon completion of this course, the student will demonstrate basic knowledge of the following:

a. Demonstrate knowledge of the basic geologic history of the earth.
b. Understand the relationship between fossil groups and rock strata.
c. Demonstrate the use of geo-physical principles through lab experiments.

## OUTLINE OF INSTRUCTION:

I. Introduction
   A. Historical geology and the formulation of theories.
   B. Origin of the universe and the solar system.
   C. Why the Earth is a dynamic and evolving planet.
   D. Organic evolution and the history of life.
   E. Geologic time and uniformitarianism.
   F. How the study of historical geology benefits us.

II. Review of minerals and rocks.
   A. Matter and its composition.
   B. Minerals – The building blocks of rocks.
      a.) Silicate
      b.) Other rocks
   C. Rock forming minerals and the rock cycle.
   D. Igneous rocks.
      a.) Texture and composition.
      b.) Classification.
   E. Sedimentary rocks
      a.) Sediment transport, deposition and lithification.

F. Metamorphic rocks.
    a. Agents of metamorphism.
    b. Types of metamorphism.
    c. Classification.

III. Continental Drift.
A. Evidence for continental drift.
    a.) Paleomagnetism and polar wandering.
    b.) Magnetic reversals and seafloor spreading.
    c.) Plate Tectonics and plate boundaries.
    d.) Hot spots and mantle plumes.
    e.) How plate movement and motion is determined.
B. The driving mechanism of plate tectonics.
C. Plate tectonics and mountain building.
D. Plate tectonics and the distribution of life and natural resources.

IV. Geologic time: Concepts and principles.
A. How the concept of geologic time and Earth's age changed.
B. Relative dating.
C. Uniformitarianism vs. Neptunism/Catastrophism.
D. Lord Kelvin.
E. Absolute dating.

V. Rocks, fossils and time.
A. Stratigraphy.
B. Fossilization and fossils.
C. Relative geologic time scale.
D. Stratigraphic terminology.
E. Correlation.
F. Absolute dating and the relative geologic time scale.

VI. Sedimentary Rocks as Archives.
A. Sedimentary rock properties.
    a.) Composition and texture.
    b.) Sedimentary structures.
    c.) Fossils.
B. Depositional environments.
C. Environmental interpretations and historical geology.
D. Paleogeography.

VII. Evolution
A. Definition of evolution.
B. Mendel.
C. Modern view of evolution.
D. Evidence.

VIII. The Precambrian- The Hadean and Archean.
- A. The Hadean.
- B. Continental foundation - Shields, platforms and cratons.
- C. Archean plate tectonics and the origin of cratons.
- D. The atmosphere and hydrosphere.
- E. The first organisms.

IX. Precambrian Earth and life history- The Proterozoic Eon.
- A. Evolution of Proterozoic continents.
- B. Proterozoic Supercontinents.
- C. Ancient glaciers.
- D. The evolving atmosphere.
- E. Important events in life history.

X. Early Paleozoic Earth history
- A. Continental architecture: Cratons and mobile belts.
- B. Paleozoic Paleogeography.
- C. Early Paleozoic evolution of North America.
- D. The Sauk sequence.
- E. The Tippecanoe sequence.
- F. The Appalachian mobile belt and the Taconic Orogeny.
- G. Early Paleozoic Mineral Resources.

XI. Late Paleozoic Earth history.
- A. Late Paleozoic Paleogeography.
- B. Late Paleozoic evolution of North America.
- C. The Kaskaskia sequence.
- D. The Absaroka sequence.
- E. The History of the Late Paleozoic mobile belts.
- F. The role of microplates and terranes in the formation of Pangaea.

XII. Paleozoic life history.
- A. The Cambrian explosion.
- B. The emergence of a shelly fauna.
- C. Paleozoic invertebrate marine life.
- D. The Absaroka sequence.

XIII. Paleozoic life history: Vertebrates and plants.
- A. Vertebrate evolution.
- B. Fish.
- C. Amphibians.
- D. Reptiles.
- E. Plants.

XIV. Mesozoic Earth history.
- A. The breakup of Pangaea.
- B. Mesozoic history of North America.
- C. Continental interior.
- D. Eastern coastal region.
- E. Gulf coastal region.
- F. Western region.
- G. Mesozoic mineral resources

XV. Life of the Mesozoic era.
- A. Marine invertebrates and phytoplankton.
- B. Aquatic and semiaquatic vertebrates.
- C. Plants
- D. Diversification of reptiles.
- E. Reptiles to birds.
- F. Origin and evolution of mammals.
- G. Climate
- H. Mass extinctions.

XVI. Cenozoic Geology History: The Tertiary.
- A. Cenozoic Plate Tectonics.
- B. Cenozoic orogenies.
- C. The North American Cordillera.
- D. The continental interior.
- E. History of the Appalachian Mountains.
- F. The Southern and Eastern continental margins.

XVII. Cenozoic Geology History: The Quaternary.
- A. Pleistocene and Holocene tectonism and volcanism.
- B. Pleistocene stratigraphy.
- C. The Ice Age.
- D. Glaciation.
- E. Causes of glaciation.
- F. Mineral resources.

XVIII. Life of the Cenozoic era.
- A. Marine invertebrates and phytoplankton.
- B. Vegetation and climate.
- C. Birds.
- D. The age of mammals.
- E. Diversification of placental mammals.
- F. Mammals of the Tertiary.
- G. Pleistocene faunas.
- H. Intercontinental migrations.

XIX. Primate and Human Evolution.
   A. Primates.
   B. Prosimians.
   C. Anthropoids.
   D. hominids.

**REQUIRED TEXTBOOKS:**

Bryson, B. Short History of Nearly Everything. Random House, 2003

**STATEMENT OF STUDENTS WITH DISABILITIES:**

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 536-7207, ext 1418 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.