Revised 7/2018

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
GOL 106 – HISTORICAL GEOLOGY (4 CR.)

Course Description

Traces the evolution of the earth and life through time. Presents scientific theories of the origin of the earth and life and interprets rock and fossil record. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

General Course Purpose

This introductory course in geology is intended to meet the needs of the student pursuing a career in Earth or natural sciences or the student seeking to fulfill a laboratory science requirement for other majors. The course covers the origins of the solar system and evolution of Earth's structure, the relationship between life and surface conditions, and the types of life that have inhabited Earth in the past.

Course Prerequisites/Corequisites

Strongly recommended to have completed GOL 105.

Course Objectives

Upon completing the course, the student will be able to:

a) discuss theories of formation of Earth, the Moon, and other worlds in our Solar System;
b) describe the origins of Earth's internal structure, crust and crustal processes, atmosphere, and oceans;
c) trace the events leading to the origins of life and distinguish between their forms;
d) understand the formation of continental crust and the tectonic processes that modify it;
e) understand the growth and movement of continents and the cycle of supercontinent formation and dispersal;
f) describe and date the formation and breakup of the supercontinent Pangaea;
g) distinguish between common types of fossilization, including the origins of fossil fuels;
h) describe the traits of major groups of Phanerozoic multi-cellular life;
i) explain the basic concepts in macroevolution and relate evidence from the fossil record to them;
j) describe the patterns and extremes of climate change in Earth's past.

Major Topics to be Included

Earth Origins
- Processes in accretion—nebula to planet, bombardment, formation of Moon
- Processes in interior—differentiation, origins of magnetic field and tectonic engine
- Formation of hydrologic cycle—atmosphere, oceans
- Modification of early crust—subduction, partial melting, production of granitic crust

Geologic Time and Processes
- Relative Geologic Dating—Principles of stratigraphy, construction of geologic time scale
- Radiometric Dating—radioisotopes, half-life, carbon dating
- Fossilization—types of fossils, materials

Precambrian Events
- Formation of continents and supercontinents—Wilson Cycle

Appearance of photosynthesis, Banded Iron Formations, and the oxygenation crisis
Snowball Earth concept—evidence for planetary deep freeze, agents of recovery
Ediacaran Period—early multi-cellular community
Start of the Evolutionary Arms Race—animal movement, sight, and hard parts

Phanerozoic Events

Early Paleozoic seafloor ecology and life forms
Mid Paleozoic swimmers and expansion into freshwater
Mid Paleozoic spread of plants and animals onto land
Late Paleozoic radiation of reptiles
Late Paleozoic expansion of forests, CO_2 drawdown, and the Great Dying
Early Mesozoic reptiles and the appearance of dinosaurs
Mid Mesozoic heyday of archosaurs, appearance of birds, and breakup of Pangaea
Late Mesozoic third wave of dinosaurs and the K/T Impact
Early Cenozoic first wave of mammals and dispersal of Pangaea
Late Cenozoic second wave of mammals and global cooling toward Holocene glaciations
Emergence of Man

Fossil Groups

Early microbes—prokaryotes and eukaryotes
Algae and Stromatolites
Foraminifera and other single-celled animals
Sponges
Cnidaria—jellies, corals
Bryozoans
Arthropods—trilobites, eurypterids, crustaceans, insects, arachnids
Brachiopods
Molluscs—gastropods, bivalves, ammonoids, nautiloids, belemnites
Echinoderms—crinoids, echinoids, starfish
Vertebrates—primitive chordates, fish, amphibians, reptiles, dinosaurs, birds, mammals
Plants—bryophytes, tracheophytes, grasses