Ohio Articulation Number (OAN)
Course Submission Form
2005-2006

College/University: Cuyahoga Community College

Course(s) Submitted: Historical Geology, ESCI – 1510
Ohio Articulation Number: OSC012

Date: June 7, 2006  Course: 1 of 2

Course OAN mapping:

Name and title of individual submitting on behalf of the college/university:

Name: Peter Ross  Title: District Director, Transfer and Alternative Credit

Address: 11000 Pleasant Valley Road
Parma, OH  44130

E-mail: peter.ross@tri-c.edu
Phone: (216) 987-5093
Fax: (216) 987-5075

Credit Hours: 3  qtr:  
Lecture Hours: 3
Laboratory Hours: 0 (if applicable)
Pre-Requisites(s) Course work (if applicable)
None

Placement Score (if applicable)
(Name of test)  (Score)
Catalog/Course Description (Includes Course Title and Course #)

Fall 2005- Summer 2007/Historical Geology, ESCI-1510
Geologic history of the earth and biota. Special emphasis on North America. Topics include plate tectonics, relative and absolute dating, rocks and their significance as indicators of environment, interpretation of geologic maps, evolution, fossilization, and major groups of fossils. To fulfill laboratory science requirement, students should also enroll in related laboratory course.

Texts/Outside Readings/Ancillary Materials
See Course Outline

Course Objectives and/or Plan of Work

CUYAHOGA COMMUNITY COLLEGE
OFFICIAL COURSE OUTLINE

SUBJECT AREA TITLE: Earth Science
COURSE TITLE: Historical Geology
SUBJECT AREA CODE-COURSE NUMBER: ESCI - 1510
COURSE CREDIT HOURS: 03

I. DESCRIPTION OF COURSE:
A. CATALOG DESCRIPTION:
Geologic history of the earth and biota. Special emphasis on North America. Topics include plate tectonics, relative and absolute dating, rocks and their significance as indicators of environment, interpretation of geologic maps, evolution, fossilization, and major groups of fossils. To fulfill laboratory science requirement, students should also enroll in related laboratory course.

B. LECTURE HOURS: 03
C. LABORATORY HOURS: 00

D. OTHER REQUIRED HOURS: 000

E. PREREQUISITE(S): None.

II. OUTCOMES/OBJECTIVES:

Upon successful completion of ESCI-1510 Historical Geology, the student should be able to:

A. Understand the principles used in interpreting the earth's history.
B. Comprehend the immensity of geologic time.
C. Understand the use of minerals and rocks to decipher earth history.
D. Present theories of the origin of the earth.
E. Appreciate the evolution of life and understand the concept of the constant change of living things.
F. Understand the structures and relationships of the major groups of animals and plants of each geologic time interval.
G. See the geological record as a result of the interplay between the biological and physical realms that existed during each time period.
H. Understanding the relationship between economic products and the geological structures with which they are associated.
I. Appreciate the contributions of astronomy, anthropology, biology, physics, and chemistry to the field of geology.
J. Visualize the physical geography of each time period and the relationship between physical geography and sedimentary facies.

III. COURSE CONTENT:

A. Historical perspectives
   1. Myths
   2. Catastrophism vs. uniformitarianism
   3. Neptunism vs. vulcanism
   4. Uniformitarianism vs. actualism
   5. Scientific method: uses of the scientific method; multiple working hypotheses
B. Geologic time
| 1. Geologic time scale: development of the scale; significance of names |
| 2. Relative dating |
| 3. Absolute dating |
| 4. Radiometric dating: isotopes; half-lives |
| 5. Dendrochronology |
| 6. Varves |
| 7. Fission track |

**C. Minerals and rocks**

1. Structure of matter: atomic structure; bonding; and molecules
2. Rock-forming minerals: silicates and economic minerals
3. Rock types (igneous, sedimentary, and metamorphic): their formation; their classification; and their
4. Structures: sedimentary and igneous
5. Types of geological structures: faults; folds; joints; unconformities
6. Grouping and naming of rock units
7. Use in interpretation of geological maps - principles of original horizontality, superposition, inclusions, and lateral continuity

**D. Rocks as indicators of paleoenvironments**

1. Sedimentary environments: terrestrial - glacial, aeolian, alluvial; fresh water - streams, lakes; transitional - deltas; marine - coastal, shallow, reef, abyssal; fossils associated with the environments
2. Physical correlation: facies; transgressions and regressions
3. Fossilization: methods of fossilization; fossil morphology; fossil classification
4. Biostratigraphic correlation

**E. Evolution**

1. Historical ideas of the sources of fossils
2. Theories of evolution: Lamarck; Darwin and Wallace; natural selection
3. Mendel - genes and chromosomes
4. The modern synthesis: sources of variation; speciation; patterns of evolution; extinctions
5. Cladistics
6. Evidence of evolution: experiments to produce organic molecules; embryology; chromosomal hybridization experiments; fossils

**F. Plate tectonics**

1. Earth's interior: seismic evidence; plate tectonics classification
2. Plate tectonics theory: continental drift; sea floor spreading; magnetic reversals; hot spots and mantle plumes; possible mechanisms
3. Present plate boundaries and their distinguishing features: volcanoes and earthquakes; mountain building; terranes; minerals associated with plate boundaries; fossil distribution and plate tectonics

**G. The beginning of the earth**

1. Origin of galaxies
2. Production of the elements
3. Origin of our solar system
4. Planet formation
5. Formation of the earth
6. Meteorites
7. Earth layering theories
8. Origin of the moon theories
9. Moon history
10. Evolution of the atmosphere
11. Origin of oceanic water

H. Archean events (4.55 to 2.50 billion years ago)
   1. Archean earth structure
   2. Early continental formation; shields; cratons
   3. Archean rocks: types; occurrences; significance of greenstone belts; structural provinces
   4. Kenoran/Algoman Orogeny
   5. Atmosphere: changes associated with photosynthesis; effects of the new atmosphere on rock type
   6. Mineral deposits

I. Biota of the Archean
   1. Chemical fossils and microorganisms
   2. Stromatolitic structures
   3. Beginning of aerobic respiration

J. Proterozoic events (2.5 to 0.6 billion years ago)
   1. Mobile belts/subduction zones: deposits; deformation
   2. Proterozoic rocks: Helikian rocks; Hadrynian rocks and glaciations; Beltian province
   3. Orogenies: Penokean and Hudsonian; Grenville; Grand Canyon Supergroup
   4. Shield areas found outside North America
   5. Atmospheric and climatic conditions
   6. Mineral deposits

K. Biota of the Proterozoic
   1. Fossil algae
   2. Eukaryotes
   3. Ediacaran fauna
   4. Beginning of sexual reproduction. Multicellular organisms

L. Geology of the early Paleozoic Era
   1. Paleogeography and climatology: Laurentia-Baltica; Gondwanaland
   2. Formation of the Iapetus Ocean
   3. Sauk Sequence: sediments of epeiric seas; transgression in the Grand Canyon area
   4. Cordilleran mobile belt
   5. Tippecanoe sequence: reefs; evaporites
   6. Franklinian mobile belt
   7. Taconic Orogeny: Appalachian mobile belt; Queenston Delta
   8. Caledonian Orogeny
   9. Ouachita mobile belt
   10. Climatology: Cambrian; Ordovician; Silurian
   11. Mineral deposits

M. Biota of the early Paleozoic Era
   1. Evolutionary radiation in the Cambrian
2. Protista
3. Invertebrates: Burgess Shale; hard parts; Porifera, Cnidaria; Brachiopoda; Bryozoa; Arthropoda; Mollusca; trilobite distribution and evolution; conodont alteration index
4. Chordate evolution

N. Evolution of vascular plants
1. Geology of the late Paleozoic Era
2. Paleogeography and climatology: Devonian; Mississippian; Pennsylvanian; Permian
3. North American events: Kaskaskia Sea; Antler Orogeny; Ellesmerian Orogeny; Acadian Orogeny and the Catskill Delta; Absaroka Sea; Colorado Mountains; Ouachita Orogeny; Alleghenian Orogeny
4. European and Asian events: Hercynian and Uralian orogenies; formation of Asia to complete the assembly of Pangaea
5. Glaciation in Gondwanaland and cyclothems
6. Mineral deposits

O. Biota of the late Paleozoic Era
1. Invertebrates: Porifera, Cnidaria; Brachiopoda; Bryozoa; Arthropoda; Mollusca; Conodonts
2. Vertebrates: major fish types; amphibian evolution; reptilian evolution; therapsid evolution
3. Plant evolution: land plants of the coal swamps; flora of different continents
4. Permian extinctions: species affected; possible causes

P. Geology of the Mesozoic Era
1. Paleogeography and climatology: Triassic; Jurassic; Cenozoic
2. Pangaea: evidence for Pangaea; break-up of Pangaea; East Coast sedimentary patterns
3. Western mobile belts: Nevadan Orogeny; Sevier Orogeny; Laramide Orogeny; exotic terranes
4. Prominent formations: Navajo Sandstone; Morrison Formation; calcareous ooze formations; Franciscan Formation; delta formation and deposits
5. Mineral deposits

Q. Biota of the Mesozoic Era
1. Invertebrates: ammonite evolution; reef organisms
2. Vertebrates: reptiles; evidence for endothermic dinosaurs; bird evolution; mammal evolution
3. Plant evolution
4. Cretaceous extinction events: species affected; causes; asteroid impact theory

R. Geology of the Tertiary Period of the Cenozoic Era
1. Paleogeography and climatology
2. North American events: continued activity in the Appalachians and Ouachitas; continuation of the Laramide Orogeny; deposits in the Green River Formation; Cascadian Orogeny; Columbia River and Snake River basalts; West Coast tectonics; Colorado Plateau; block faulting in the west
3. Formation of Central America: Pacific Ring of Fire; effects on animal migration
4. European-Asian events: closure of Tethys seaway; Alpian Orogeny; Himalayan
orogeny; Mediterranean Sea history
5. African rift valleys
6. Mineral deposits
S. Biota of the Tertiary Period of the Cenozoic Era
1. Invertebrates
2. Vertebrates: birds; mammals
3. Mammalian evolution: placentals; marsupials; horse and artiodactyl evolution; occurrences of fossil mammals
4. Plants: angiosperm evolution; role of gymnosperms
T. Geology of the Quaternary Period of the Cenozoic Era
1. Paleogeography and climatology
2. Glaciation
3. Erosional and depositional effects of glaciers
4. Location of ice sheets
5. Major glacial advances
6. Great Lakes formation
7. Lake Missoula and the Channeled Scablands
8. Ice margin lakes
9. Sea level changes and land bridges
10. Theories on causes of glaciation: Milankovitch; Ewing-Donn
11. Mineral deposits
U. Life of the Quaternary Period of the Cenozoic Era
1. Invertebrates
2. Vertebrates: mammalian extinction; primate evolution
3. Plants
4. Extinctions

IV. METHODS OF STUDENT EVALUATION MAY INCLUDE ANY OF THE FOLLOWING:

A. Quizzes
B. Lecture exams
C. Participation in class discussions
D. Reports on current literature or term paper
E. Worksheets on textbook comprehension

V. RESOURCES MAY INCLUDE ANY OF THE FOLLOWING:

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