Blinn College

Master Course Syllabus

Geology 1404 – Historical Geology

CIP # 40.0601.5103

CIP Area: Physical Sciences

Fall, 2005

Prepared by:

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Bryan Campus / Date

Confirmed by:

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Division Chair, Brenham Campus / Date

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Vice President Academic Affairs / Date

GEOL 1404 HISTORICAL GEOLOGY

This course is in the core curriculum.

Purpose Statement

The purpose of the natural sciences component in the core curriculum is to enable the student to understand the basic concepts in the natural sciences and to apply that understanding to the analysis of current issues in society. In particular, the study of historical geology leads students to appreciate how the Earth and it's rock and fossil records have evolved.

Course Description

General principles of historical geology with emphasis on evolution of Earth and life through time. Topics include an overview of the rock cycle and plate tectonic theory, with emphasis on stratigraphic principles, the fossil record, evolutionary theory, and paleogeographic map interpretation. Laboratory work includes basic study of rocks, interpretation of depositional environments and tectonic settings, stratigraphic sequence analysis, and fossil interpretation. Prerequisites: None. It is recommended that GEOL 1403 (Physical Geology) be taken before this course. Three class hours and three laboratory hours per week. Credit: Four semester hours.

The major areas that will be covered in lecture are:

a. The Earth System
b. Rocks, Minerals, and Plate Tectonics
c. Introduction to Sedimentary Rocks
d. Sedimentary Environments
e. Correlation and Dating of the Rock Record
f. Sedimentary Tectonics
g. Evolution and the Fossil Record
h. Major Chemical Cycles
i. The Precambrian
j. The Paleozoic World
k. The Mesozoic World
l. The Cretaceous World
m. The Paleogene World
n. The Neogene World
o. The Holocene World

The major areas that will be covered in lab are:

a. Envisioning the Past
b. Plate Tectonics and Rock Cycle
c. Sedimentary Rocks: Siliciclastic, Carbonate and Chemical
d. Interpreting Depositional Environments
e. Reconstructing Geologic History
f. Transgressions and Regressions: Relative Sea-Level Curves
g. Stratigraphy
h. Radiometric Dating
i. Taphonomy and Taxonomy
j. Fossil Interpretation: Environments, Ranges and Zones

k. Precambrian Fossils
l. Paleozoic, Mesozoic, and Cenozoic Fossils and Communities
m. Dinosaurs
n. Recognizing Mass Extinctions - Cratering and Impacts
o. Marine Microfossils

1. Three lecture hours and three laboratory hours per week.
2. GEOL 1404 earns four credit hours.
3. Prerequisite: None.
4. This is a Core Course in the 42-hour Core of Blinn College; more can be found at http://www.blinn.edu/corecurriculum/. As such, students will develop proficiency in the appropriate Intellectual Competencies, Exemplary Educational Objectives, and Perspectives, as follows:
    a. Intellectual Competencies
        i. **Reading:** The ability to analyze and interpret a variety of printed materials, books, documents and articles – above the 12th grade level.
        ii. **Writing:** The ability to produce clear, correct and coherent prose adapted to purpose, occasion and audience - above the 12th grade level.
        iii. **Listening:** The ability to analyze and interpret various forms of spoken communication, possess sufficient literacy skills of writing, reading – above 12th grade level.
        iv. **Critical Thinking:** The ability to think and analyze at a critical level.
        v. **Computer Literacy:** The ability to understand our technological society, use computer-based technology in communications, solving problems, acquiring information.
    b. Exemplary Educational Objectives
        i. To understand and apply method and appropriate technology to the study of natural sciences.
        ii. To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
        iii. To identify and recognize the differences among competing scientific theories.
        iv. To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
        v. To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.
    c. Perspectives
        i. To develop a capacity to use knowledge of how science and technology affect their lives.
        ii. To use logical reasoning in problem solving.
        iii. To integrate knowledge and understand the interrelationships of the scholarly disciplines.

Course Objectives and Student Learning Outcomes

Upon completion of the course, the student will have an overall average of ≥ 60% of the combined lecture and laboratory components of the course. This includes at least 3 to 4 major exams and chapter/weekly quizzes given at the discretion of the Instructor. In the laboratory the student will successfully complete the exercises. The student will demonstrate in the laboratory an understanding of the exercises through analysis of materials presented in lab and being able to use these materials to solve problems and explain geological processes.

These learning outcomes will include the student showing competence in the course objectives that are listed below:

From Lecture:

1. Review topics from physical geology important to the study of Earth history (plate tectonics, rock cycle)
2. Understand the formation, classification and interpretation of sedimentary rocks
3. Learn how relative and absolute dating principles are applied to the study of rock sequences
4. Following the Wilson Cycle model, learn how tectonic events influence the nature and timing of sedimentary rock deposition
5. Discuss evolutionary theory
6. Understand the changes in the fossil record over time including the dominate flora and fauna for each era of the Earth's history
7. Learn how the chemical cycles of the Earth have affected the rock record
8. Discuss each time period with regard to life, the environment, and relation between them
9. Discuss the major mass extinction events in the Earth's history

From Lab:

1. Learn to identify the different rock types
2. Learn to recognize and interpret textural and compositional maturity of siliciclastic sedimentary rocks
3. Learn to identify and interpret carbonate and chemical sedimentary rocks
4. Learn to interpret geologic and facies maps to write geologic histories
5. Understand and interpret sea level changes in the rock record
6. Learn to recognize and identify the nature and mode of preservation of fossil remains
6. Use rock type, fossils and structures to interpret depositional environments
7. Use fossils to recognize age of rock sequences
8. Apply stratigraphic principles to the interpretation of the rock record
9. Apply concepts and techniques of radiometric dating to determine the numerical age of rocks and geologic events

Course Requirements

1. The student should do each of the following:
    a. Read the assigned chapters in the textbook and laboratory manual.
    b. Attend all lectures and laboratory classes.
    c. Take notes in class.
    d. Participate in class discussions.
    e. Complete assigned outside reading material and homework.

f. View audiovisual materials on selected topics.
g. Use the computer software in the lab and/or classroom as it is assigned.
h. Complete the exams on the assigned dates; the exams may include essay questions.

2. For laboratory the student should:
a. Read and comprehend each exercise assigned in the laboratory manual.
b. Successfully complete each exercise.
c. Learn to use and/or analyze geological material and maps as needed to complete the exercises.

Grading System

The following areas will be clearly outlined by the Instructor in the Course Information Sheet given to the students in the first week of the semester:

1. Major Exams: Three or four major exams covering the lecture material, evenly distributed throughout the semester.
2. Laboratory: May be included on major exams or the instructor may give quizzes covering lab material or a laboratory final exam. Represents a minimum of 25% of the grade for the class.
3. Minor Exams/Quizzes/Homework: Given at the discretion of the instructor.
4. Additional Reports or projects: Given at the discretion of the instructor.
5. Final Exam: Comprehensive exam covering the entire course required of all instructors.

Outcomes Inventory

GEOL 1404 will be evaluated through the following methods:

1. A pre and post test instrument is used to determine the extent of improvement the class has gained during the semester.

2. Each Intellectual Competency listed above will be evaluated to measure its attainment:
   a. To measure reading:
      1. Pre- and post-test or exam or quiz over assigned textbook readings AND
      2. Lab assignment or exam or quiz over lab book readings OR
      3. Written assignment or exam over assigned journal articles.
   b. To measure writing:
      1. Written assignment on internet or journal research OR
      2. Term paper AND
      3. Essay question(s) on exam.
   c. To measure listening:
      1. Pre- and post-test or exam or quiz over lecture material OR
      2. Quiz over audiovisual material presented in class.
   d. To measure critical thinking:
      1. Lab assignment or exam or quiz involving problem solving.
   e. To measure computer literacy:
      1. Quiz over Internet/CD-Rom/DVD activities OR
      2. Writing assignments submitted online

3. Grades of students completing the course will be compared with those who complete GEOL 1404 in the following semester.

Calendar

The instructor will ensure that the course content is covered in a manner that fulfills the course objectives. The instructor will also provide Course Information Sheets to the students and the administration during the first week of the semester. Important details including tentative examination dates and due dates for assignments are provided. The following is a suggested calendar of lecture and laboratory topics for the semester:

Week	Lecture Topic
1.	The Earth System
2.	Rocks, Minerals, and Plate Tectonics
3.	Introduction to Sedimentary Rocks
4.	Sedimentary Environments
5.	Correlation and Dating of the Rock Record
6.	Sedimentary Tectonics
7.	Evolution and the Fossil Record
8.	Major Chemical Cycles
9.	The Precambrian
10.	The Paleozoic World
11.	The Mesozoic World
12.	The Cretaceous World
13.	The Paleogene World
14.	The Neogene World
15.	The Holocene World

Week	Laboratory Topic
p.	Envisioning the Past
q.	Plate Tectonics and Rock Cycle
r.	Sedimentary Rocks: Siliciclastic, Carbonate and Chemical
s.	Interpreting Depositional Environments
t.	Reconstructing Geologic History
u.	Transgressions and Regressions: Relative Sea-Level Curves
v.	Stratigraphy
w.	Radiometric Dating
x.	Taphonomy and Taxonomy
y.	Fossil Interpretation: Environments, Ranges and Zones
z.	Precambrian Fossils
aa.	Paleozoic, Mesozoic, and Cenozoic Fossils and Communities
bb.	Dinosaurs
cc.	Recognizing Mass Extinctions - Cratering and Impacts
dd.	Marine Microfossils

Course Materials

Suggested Lecture Materials:

Historical Geology with Study Guide. 4th. Wicander. Thomson Co.

Suggested Laboratory Materials:

Field Guide to N Am Fossils. 8th. Audubon Soc. Random House