Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2009

Type of Action:

X New
_ Modification
_ Move to Inactive (Stop Out)
_ Cancellation

Course Alpha and Number: NS 140

Course Title: Earth and Environmental Science

Reason for initiating, revising, or canceling:

This course has been created to upgrade the subject matter of NS 100 Earth Science through changes in the Math Placement Level, the course outline, instructional goals, student learning outcomes, and assessment measures. This course replaces NS 100 Earth Science and BI 100 Environmental Science.

So Gu Kim _____ 08/14/2009
Proposer Date

Glenn D. Keaton _____ 8/14/09
Department Chair Date

Bruce Johnson _____ 9/1/09
English and Format Reviewer Date

Cynthia DLGuerrero _____ 09/02/09
Dean of Academic Programs and Services Date

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Course: NS 140 Earth and Environmental Science

1. Department

Sciences, Mathematics, Health & Athletics

2. Purpose

This course provides an overview of the fundamental concepts and theories of the earth sciences and environmental science. It introduces students to the integrated philosophies, mechanisms, and theories that allow scientists and individuals to explain and predict the natural processes of the Earth as a system and its place in the Universe. This course also helps develop the student's analytical and critical thinking skills through the application of the scientific method.

3. Description

A. Required/Recommended Textbook(s) and Related Materials

Required: Tarbuck, Edward J. and Frederick K. Lutgens, Earth Science, 11th ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2006.
Readability level: Grade 13

Tarbuck, Edward J., Frederick K. Lutgens, and Kenneth G. Pinzke, Applications and Investigations in Earth Science, 6th ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2009.
Readability level: Grade 13

A calculator is required.

B. Contact Hours

1. **Lecture:** 3 hours per week / 45 per semester
2. **Lab:** 3 hours per week / 45 per semester
3. **Other:**

C. Credits

1. **Number:** 4
2. **Type:** Regular degree units

D. Catalogue Course Description

This course is designed to be an introductory tour of the Earth, its physical environment, and its place in the Universe. This course will cover the foundations of geology, geophysics, oceanography, planetary science, and meteorology. This course will investigate the origins, physical properties, and dynamics of the Earth as an integrated system. Students

will participate in discussions and conduct hands-on investigations in the laboratory. Prerequisite: MA 132 with a grade of C or better, or concurrent enrollment, or placement at MA 161 on the NMC Math Placement Test. English Placement Level: EN 101. Math Placement Level: MA 132. (Offered Fall and Spring.)

E. Degree or Certificate Requirements Met by Course

This course fulfills the general education requirement in Physical Science for the Bachelor's Degree in Elementary Education, the Associate in Arts Degree in Liberal Arts, and the Associate in Arts Degree in Business. This course also fulfills the general education requirement in the Sciences for the A.A.S. degrees in Criminal Justice and in Business Administration: Accounting Emphasis, Business Management Emphasis, and Computer Applications Emphasis. This course also satisfies one of the science electives in the Associate in Science Degree in Natural Resource Management.

F. Course Activities and Design

Course activities include lectures, small group discussions, laboratory investigations and experimentation, assignments, computer and Internet activities, audiovisual presentations, maintaining a lab journal, tests and quizzes, field trips, projects, and reports.

4. Course Prerequisite(s); Concurrent Course Enrollment; Required English/Mathematics Placement Level(s)

Prerequisite: MA 132 with a grade of C or better, or concurrent enrollment, or placement at MA 161 on the NMC Math Placement Test.

English Placement Level: EN 101

Math Placement Level: MA 132

5. Estimated Cost of Course; Instructional Resources Needed

Cost to the Student: Tuition for a 4-credit course, cost of calculator, cost of the textbook, and cost of the lab manual.

Cost to the College: Instructor's salary

Instructional resources needed for this course include:
- Chalk and chalkboard or white board and markers
- Science laboratory/classroom

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- College level laboratory equipment
- Lab supplies
- TV/VCR, and applicable videotaped material
- Earth science charts
- Overhead projector and transparencies
- Library reference material, including periodicals related to earth science
- Access to computers and the Internet.

6. Method of Evaluation

Students' grades will be based on the regular letter grade system as described below:

A: Excellent – grade points: 4.0;
B: Above average – grade points: 3.0;
C: Average – grade points: 2.0;
D: Below average – grade points: 1.0;
F: Failure – grade points: 0.0.

NMC's grading and attendance policies will be followed.

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7. Course Outline

This is a topical outline and does not necessarily indicate the sequence in which the material will be presented.

0.0 Introduction
- 0.1 What is Earth Science
- 0.2 Scientific Method
- 0.3 Measurements

1.0 Earth History
- 1.1 Creation
- 1.2 Geologic Time
- 1.3 Fossil Records
- 1.4 Evolution of the Earth

2.0 Hydrosphere
- 2.1 Running Water
- 2.2 Ground Water
- 2.3 Water Cycle (Hydrologic Cycle)

3.0 Earth Dynamics
- 3.1 Earthquakes and the Earth's Interior
- 3.2 Plate Tectonics
- 3.3 Seafloor Spreading
- 3.4 Volcanism and other Igneous activity

4.0 Mountain Building
- 4.1 Rock Deformation
- 4.2 Folds
- 4.3 Faults
- 4.4 Joints
- 4.5 Mountain Building at Subduction Zones
- 4.6 Vertical Movement of the Earth's Crust

5.0 Minerals
- 5.1 Definition
- 5.2 Mineral Groups
- 5.3 Mineral Properties
- 5.4 Mineral Resources

6.0 Rocks
- 6.1 Igneous Rocks
- 6.2 Sedimentary Rocks

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6.3 Metamorphic Rocks

7.0 Earth External Processes
- 7.1 Weathering
- 7.2 Erosion
- 7.3 Deposition
- 7.4 Mass Wasting

8.0 Global Ocean
- 8.1 Ocean Floor
- 8.2 Oceanic Ridge (Mid-ocean Ridge)
- 8.3 Currents and Water Mass

9.0 Dynamic Ocean
- 9.1 Surface Circulation
- 9.2 Deep-ocean Circulation
- 9.3 Waves
- 9.4 Tides

10.0 Earth's Dynamic Atmosphere
- 10.1 Weather and Climate
- 10.2 Energy, Heat, and Temperature
- 10.3 Mechanisms of Heat Transfer: Conduction, Convection, and Radiation
- 10.4 Fate of Incoming Solar Radiation

11.0 Earth's Place in the Universe
- 11.1 Origins of Modern Astronomy
- 11.2 Touring Our Solar System
- 11.3 Light, and the Sun
- 11.4 Beyond Our Solar System

8. Instructional Goals

This course will introduce students to:

1.0 The fundamental processes involved in the global Earth system;

2.0 The scientific method and its practices;

3.0 The analytical tools and laboratory techniques used in investigating the earth sciences;

4.0 The history of the Earth and the principles used in determining its age;

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5.0 Interactions, called "cycles", between the solid Earth, its oceans, atmosphere, and biosphere;

6.0 Physical models of the Earth and the physical forces that form and shape the Earth;

7.0 The dynamics of earthquakes, volcanic eruptions, tidal waves, and ground water contamination;

8.0 The principles of plate tectonics;

9.0 The scope of geology, the different rock types based on how they were formed, and the processes used in determining these rock types;

10.0 The processes of weathering, erosion, deposition, and mass wasting;

11.0 The composition and dynamics of the Earth's oceans;

12.0 The composition of the Earth's atmosphere and the dynamics of weather and climate;

13.0 The composition of the Earth and other celestial bodies in the Universe;

14.0 The dynamics and components of the Universe and the Earth's place in it;

15.0 The processes of using problem-solving techniques and applications; and

16.0 Techniques of envisioning earth science from an integrated global perspective.

9. Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1.0 Explain the fundamental processes involved in the global earth system;

2.0 Use the scientific method;

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3.0 Apply analytical tools and laboratory techniques in investigating earth science phenomena;

4.0 Describe the history of the Earth and explain the principles used in determining its age;

5.0 Describe the natural interactions, called "cycles", between the solid Earth, its oceans, atmosphere, and biosphere;

6.0 Use physical models of the Earth to describe the physical forces that form and shape the Earth;

7.0 Explain the dynamics of earthquakes, volcanic eruptions, tidal waves, and ground water contamination;

8.0 Explain the principles of plate tectonics:

9.0 State the definition and scope of geology, describe the three types of rocks based on how they were formed, and identify and explain the processes used in determining rock types based on how they were formed;

10.0 Explain the processes of weathering, erosion, deposition, and mass wasting;

11.0 Describe the composition and dynamics of the Earth's oceans;

12.0 Describe the composition of Earth's atmosphere and illustrate and differentiate between the dynamics of weather and climate;

13.0 Describe the composition of the Earth and other celestial bodies in the Universe;

14.0 Explain the dynamics and components of the Universe and the Earth's place in it;

15.0 Use problem-solving techniques and applications; and

16.0 Apply techniques of envisioning earth science from an integrated global perspective.

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10. Assessment Measures

Assessment of student learning may include, but not be limited to, the following:

1.0 Periodic testing and a comprehensive final examination to evaluate the student's knowledge and abilities in cognitive reasoning and the identification, interpretation, comprehension, calculation and application of the basic concepts in the earth sciences and in environmental science;

2.0 Class participation in discussions/questions;

3.0 Laboratory investigations and lab reports;

4.0 Homework assignments;

5.0 A research project investigating and involving the basic principles and concepts of a particular topic discussed in the classroom or laboratory that demonstrates an understanding of those concepts and principles, and may include graphs; and

6.0 A student's presentation that illustrates an understanding of a relationship between topics in earth sciences and environmental science and real-life practical applications.