

ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

COMMON COURSE OUTLINE: Course discipline/number Earth Science 1101

**A. CATALOG DESCRIPTION (include prerequisites)**

**Course Title:** Earth Systems Science  
**Credits:** 3  
**Hours/Week:** 2 hours lecture and 2 hours lab per week  
**Semesters Offered:** Fall, Spring, sometimes Summer  
**Prerequisites:** None

This course will meet the requirements for the Minnesota Transfer Curriculum in CT (Critical Thinking), NS (Natural Sciences) and PN (People and the Environment).

A first course for students interested in Planet Earth. Earth Systems Science is a study of the whole Earth as a system of many interactive parts and focuses on the changes within and between the atmosphere, biosphere, hydrosphere and the solid earth. This course is interdisciplinary and draws on geology, astronomy, meteorology, and oceanography.

**B. DATE LAST REVISED:** August 1997

**C. RECOMMENDED ENTRY SKILLS/KNOWLEDGE:**

12th grade reading and writing skills. An understanding of elementary algebra will be helpful.

**D. OUTLINE OF MAJOR CONTENT AREAS:**

Lecture:

1. The Earth in Space
  - a. Earth's Place in the Solar System
  - b. The Sun
  
2. The Solid Earth
  - a. The Earth's Interior
  - b. Earthquakes
  - c. Rock and Minerals
  - d. Volcanoes
  - e. Plate Tectonics
  - f. Sedimentary Rocks
  - g. Geologic Time
  - h. Metamorphism
  
3. The Hydrosphere
  - a. The Ocean
  - b. Rivers
  - c. Ground Water
  - d. Glaciers
  - e. Weathering and Erosion

**D. OUTLINE OF MAJOR CONTENT AREAS (continued):**

4. The Atmosphere
  - a. The Atmosphere
  - b. Wind and Weather
  - c. Climate
  
5. The Biosphere
  - a. Origin of Life
  - b. Evolution
  
6. Man's Impact on Earth
  - a. Human's Impact on the Biosphere
  - b. Mineral Resources
  - c. Energy Resources
  - d. Global Change

The laboratory exercises are intended to correlate with and reinforce the lecture topics. The labs also demonstrate the methods used by professionals in the earth sciences. Error analysis is used when it is appropriate.

**Laboratory**

1. Introduction and the Metric System
2. The Earth is Space
3. Sunspots
4. Earthquakes
5. Measuring Tectonic Rates
6. Minerals and Rocks
7. Geologic Time
8. Plate Tectonics
9. Rivers
10. The Atmosphere and Hydrosphere
11. Weather
12. The Organic Earth
13. Mineral Resources
14. Air and Water Contamination

**E. LEARNING OUTCOMES (GENERAL):**

1. Demonstrate an understanding of scientific theories
2. Discuss and question theories in astronomy, geology, meteorology, and oceanography
3. Perform laboratory experiments in astronomy, geology, meteorology, and oceanography to develop in greater depth the students' experience in the collection and analysis of data and the sources of error
4. Evaluate societal issues from a natural science perspective and make informed judgments about science-related topics and policies
5. Become a more scientifically concerned informed citizen.

**F. LEARNING OUTCOMES (MNTC):**

## Critical Thinking

- a. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive and conscious of bias in the information selected.
- b. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meaning to a given problem.
- c. Analyze the logical connections between facts, goals and assumptions relevant to a problem; evaluate claims which may be said to follow from them.
- d. Describe and improve one's own critical thinking and problem solving procedures.

## Natural Sciences

- a. Demonstrate understanding of scientific theories and the ways in which scientists develop, express and question theories in the areas of the earth sciences.
- b. Formulate and test hypothesis by performing laboratory experiments, requiring collection of data, its statistical and/or graphical analysis and an appreciation of uncertainty and sources of error.
- c. Communicate their findings, analysis and interpretations with other students and/or instructor orally and in writing.

## People and the Environment

- a. Discern patterns and interrelationships of geo-physical and socio-cultural systems.
- b. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems and institutions.
- c. Propose and assess alternative solutions to environmental problems.
- d. Articulate and defend the actions they would take on various environmental issues.

**G. METHODS FOR EVALUATION OF STUDENT LEARNING:**

1. Laboratory reports and/or quizzes.
2. Three major tests including final exams.
3. Weekly homework assignments

**H. SPECIAL INFORMATION (fees, directives on hazardous materials, etc.):**

Included in the initial lab session is a discussion on general safety hazards and safety equipment. During the pre-lab instruction of labs involving hazardous materials or equipment, students are given information pertaining to the use, safety precautions, and disposal of these materials or equipment. The instructor directs all students to wear the necessary protective equipment while working with any hazardous chemicals. A copy of Material Safety Data Sheets for chemicals used is available in the lab.