

# Minnesota State University Moorhead

## GEOS 340: Economic and Environmental Geology

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: \*.\*

OJT Hours/Week: \*.\*

Prerequisites:

GEOS 302 - Mineralogy; OR

GEOS 115 - Physical Geology

Corequisites: None

MnTC Goals: None

This course introduces students to aspects of geology important in understanding earth's energy and mineral resources and how human activities in extracting and using those resources affect our environment. Key topics covered include an introduction to water movements on and in the ground (hydrology), how pollutants move in that water, the geochemical interactions among earth, water, and air, ore-forming and oil-forming processes, economic considerations important in the use of natural resources, and environmental laws.

**B. COURSE EFFECTIVE DATES:** 12/31/2001 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Overview of earth processes that produce resources
2. Energy for fossil fuel, nuclear, and other alternative sources
3. Geological economics, economics of natural resources
4. Formation of iron-ore deposits
5. Formation of Cu-ore deposits
6. Formation of other metal and mineral resources, fence diagrams,
7. Surface water processes (drainage basins, stream velocity, discharge, flood prediction etc)
8. Ground water (including permeability, porosity, and aquifers)
9. Basics of equilibria, redox equilibria, fence diagrams
10. Understanding pollutant transformations and migrations
11. Environmental Law, including CAA, CWA, NEPA, RCRA, CERCLA

#### **D. LEARNING OUTCOMES (General)**

1. Student will be able to explain basic processes of ore formation, including concepts of oxidation-reduction, solubility-precipitation, etc.
2. Student can engage in critical thinking and reasoning as applied to a variety of environmental and ore-forming problems
3. Student can identify a suite of common ore-forming oxides and sulfides.
4. Student can use a phase diagram and chemical reactions to understand and explain key processes in the earth
5. Student can predict how composition of fluids (magma, hydrothermal, or surface waters) will change given information about elemental partitioning and crystallization from those fluids.
6. Student can explain in written and oral forms examples of how pollutants will change in the environment due to interaction with air, water, sediment, and living things.
7. Student can describe the basic areas of coverage of important environmental laws

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

None

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted