

Minnesota State University Moorhead

CHEM 604: Modeling Environmental Geochemistry Systems

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 0

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

The chemistry of the Earth's air, soil and water and the impact on these systems by humanity will be explored using a modelling approach.

B. COURSE EFFECTIVE DATES: 02/01/2021 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Mathematical/computational modelling of natural systems
2. Chemistry of the atmosphere, hydrosphere and geosphere, focused on pollution
3. Chemistry of energy production, both traditional and alternative, from production to consequences
4. Analytical chemistry used in analyzing the above contexts

D. LEARNING OUTCOMES (General)

1. Create an appropriate Excel or computer (using R, Python, etc.) model of an environmental chemical system. Understanding an appropriate model includes such aspects as the tradeoffs made between complexity and accuracy as well as the limitations of the model.
2. Explain the chemistry behind topics of environmental concern, such as: the greenhouse effect, climate change, the ozone hole, acid rain and its remediation, photochemical smog, solar panels, fuel cells, hypoxia/eutrophication, heavy metal leaching.
3. Use chemistry to provide support for arguments regarding environmental impact of energy, including nuclear energy, solar energy, fuel cells and biofuels.
4. Become familiar with appropriate analytical chemistry techniques, such as radioisotopes dating, x-ray diffraction, and atomic absorption spectroscopy.

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

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted