Minnesota State University Moorhead

GEOS 302: Mineralogy

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 2

Lab Hours/Week: 3

OJT Hours/Week: *.*

Prerequisites:
GEOS 115 - Physical Geology

Corequisites: None

MnTC Goals: None

This course introduces students to the crystal structure, chemistry, physical properties, geological and chemical environments of formation, and natural occurrence of minerals. Understanding of minerals and mineralogy is foundational to geology and it is recommended that this course be taken prior to other upper level geology courses where possible. Lab included.

B. COURSE EFFECTIVE DATES: 08/15/2006 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Physical properties of minerals
2. Crystal chemistry and mineral composition and structure
3. Mineral Reactions, Stability
4. Crystal symmetry, point groups, space groups, Herman-Maugin and Miller Indices
5. Mineral groups: Oxides, Halides, Sulfides, Phosphates, Sulfates, Carbonates, Silicates
6. Minerals by rock type: Igneous, Sedimentary, Metamorphic
7. Interpretation and use of unary and binary phase diagrams
8. Identification of minerals in hand sample and by petrographic microscope

D. LEARNING OUTCOMES (General)

1. Students will be able to recognize key features of minerals and identify rock-forming minerals in hand sample.
2. Student can use key tools such as phase diagrams, miller indices, Herman-Maugin index, and the concept of space and point groups to discuss and explain the character and behavior of minerals.
3. Student can use phase diagrams to discuss and explain the behavior of minerals and melts and to predict mineral compositions and proportions given system composition and temperature.
4. Students understand and can explain how valence state and cation size influence the substitution of elements into various minerals, particularly pyroxenes and feldspars.
5. Students can explain the characteristics and occurrence in minerals of different types of bonds.
6. Students can explain energy levels, bonding, and valence in terms of a simple orbital-filling model for atoms.

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

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted