

# GEOLOGY 420 / 620 -- MINERALOGY 2009

DEPARTMENT OF GEOSCIENCES, NORTH DAKOTA STATE UNIVERSITY

## COURSE INFORMATION AND TENTATIVE SCHEDULE

<b>Time:</b>	Tuesday and Thursday, 9:00 am — 10:45
<b>Instructor:</b>	B. Saini-Eidukat, office 129 Stevens Hall, ext. 1-8785 email: bse@geosci.ndsu.edu
<b>Office hours:</b>	Tuesday, 2:00 – 4:00 pm or by appointment
<b>Text:</b>	C. Klein and B. Dutrow, <i>Manual of Mineral Science</i> , 23rd Edition, John Wiley & Sons; [enrichment: T. Zoltai and J. Stout (Z&S), <i>Mineralogy: Concepts and Principles</i> (copies available in 134 Stevens)]
<b>Web Site:</b>	<a href="http://www.ndsu.edu/instruct/sainieid/min/">www.ndsu.edu/instruct/sainieid/min/</a>

This course provides an introduction to mineralogy. The prerequisites are Chemistry 121 or 150. We will examine minerals from crystallographic, chemical, physical and thermodynamic points of view. We will learn how to identify and classify minerals, and how to measure their properties using morphology, X-ray diffraction, and optical microscopy. We will learn from a combination of lectures, in-class exercises and discussion, guest speakers, homework assignments, term papers and field experiences.

### COURSE SCHEDULE:

Aug. 25	[T]	Introduction; Physical Properties of Minerals
Aug. 27	[R]	Symmetry Operations, Crystal Systems, Bravais Lattices

### Crystallography and X-Ray Diffraction Methods in Mineralogy

Sep. 1	[T]	Crystal Morphology, Principal Directions, Point Groups
Sep. 3	[R]	Stereographic Projection, Cubic Point Groups
Sep. 8	[T]	Miller Indices; Crystal Forms
Sep. 10	[R]	Translational Symmetry; Plane Groups; Space Groups
Sep. 15	[T]	Lake Superior Field Course
Sep. 17	[R]	Lake Superior Field Course
Sep. 22	[T]	Symmetry in Crystal Structures; Crystal Growth and Defects; Twinning
Sep. 24	[R]	Elements of X-Ray Diffraction
Sep. 29	[T]	Exam 1
Oct. 1	[R]	X-Ray Diffraction

### Crystal and Mineral Chemistry

Oct. 6	[T]	Bonding; Coordination
Oct. 8	[R]	Structure Types
Oct. 13	[T]	Chemical Compositions of Minerals, Analytical Techniques
Oct. 15	[R]	Compatibility Diagrams; Mineral Recalculation
Oct. 20	[T]	Graphical Representation; Substitution
Oct. 22	[R]	Exam 2

### Systematic Mineralogy

Oct. 27	[T]	Non-silicates; Economic Mineralogy
Oct. 29	[R]	Intro to Silicate Mineralogy; Nesosilicates

Nov. 3 [T] Sorosilicates, Cyclosilicates  
 Nov. 5 [R] Inosilicates - single chain  
 Nov. 10 [T] Inosilicates - double chain; asbestos  
 Nov. 12 [R] Phyllosilicates  
 Nov. 17 [T] Clay Mineralogy  
 Nov. 19 [R] Exam 3  
 Nov. 24 [T] Tectosilicates; Silica Minerals  
 Nov. 26 [R] No Class - Thanksgiving Day Holiday  
 Dec. 1 [T] Feldspathoids; Feldspars; literature report due  
 Dec. 3 [R] Feldspars  
 Dec. 8 [T] Zeolites  
 Dec. 10 [R] Review  
 (Schedule and Exam dates subject to change)

**FINAL EXAM** Friday, Dec. 18, 8:00 a.m. - 10:00 a.m.

**Intended Student Outcomes:**

- To be able to identify common rock forming minerals
- To understand the Earth processes that form minerals
- To understand chemical, physical, and crystallographic properties of minerals
- To understand mineral classification schemes
- To be familiar with analytical tools such as X-ray diffraction and electron microprobe analysis

**Examinations and Grading:**

Grading will be based on four exams (short answer, problem solving), several quizzes, a few homework assignments, a field trip, and a short literature report. Graduate students will be required to submit a 10-page paper based on a short independent research project.

Exams 1-3	50%
Final exam	20%
Quizzes, homework, field trip	20%
Literature report	10%

The final letter grade will be assigned based on the following table, unless the class average deviates significantly from 75%. In the latter case, a "curve" will be applied.

A = 90-100; B = 80-89; C = 70 - 79; D = 60-69; F = <60

"Borderline" cases will be judged individually, based on grade improvement, demonstrated effort, class participation, etc.

**Special Needs:** Students who need special accommodations for learning or who have special needs are invited to share these concerns or requests with the instructor as soon as possible.

**Academic Responsibility:** All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct ([www.ndsu.nodak.edu/policy/335.htm](http://www.ndsu.nodak.edu/policy/335.htm)).