

Meetings:	Tuesday, 12:15 - 1:15	114 (and 110) Bretske Hall
Instructor:	J. W. Mies, Ph.D. e-mail: Jonathan-Mies@utc.edu web page: http://www.utc.edu/Faculty/Jonathan-Mies	105 Bretske Hall Office phone: 425-4606
Text:	Klein, Cornelis & Dutrow, Barbara, 2008, <i>The Manual of Mineral Science</i> , 23rd Edition, John Wiley & Sons, New York, 675 p. ISBN 0-471-25177-1 See Ch. 14, p. 307-321.	
Credit hours:	1 credit hour	
Pre or corequisite:	GEOL 341, <i>Mineralogy</i>	
Description:	GEOL 442, <i>X-ray Diffraction Methods</i> , emphasizes powder X-ray diffraction, as it is commonly used to identify and characterize minerals. This 1-hour course is also a supplement to GEOL 341, <i>Mineralogy</i> . It provides the mineralogy student with experience using an X-ray diffractometer.	

TENTATIVE SCHEDULE

Date	Topic
Aug 21	Demonstration of powder X-ray diffraction
28	Production, properties, and detection of X-rays
Sep 4	Radiation safety and safety considerations for X-ray diffraction
11	Principles of powder diffraction and the Bragg equation
18	Routine acquisition of power diffraction data (<i>X'Pert Data Collector</i>)
25	Manual data reduction and mineral identification, Powder Diffraction Files (<i>PDF</i>)
Oct 2	Computer-automated search match of PDF (<i>X'Pert Graphics and Identify</i>)
9	MID-TERM EXAM
16	Project 1—TBA
23	Project 1 (cont'd)
30	Project 2—TBA
6	Project 2 (cont'd)
13	Project 3—TBA
20	Thanksgiving Holiday, no class
27	Project 3 (cont'd)

TENTATIVE PROJECT TOPICS

- Instrumental experiments—measured effects of slits, sample displacement, etc.
- Effects of ionic substitution on the crystal lattice (diffraction pattern), e.g. of olivine
- Determination of an isometric unit cell dimension (a), e.g. of garnet
- Quantitative analysis using *Siroquant* (Rietveld refinement)
- Identification of clays from clay-bearing rocks
- Forensic applications, e.g., mud from crime scene, duct tape, residues of explosives, etc.
- Analyses and comparisons of common household substances, e.g. paints, cosmetics, food, etc.

GRADES

The *final numerical grade* for this class will be computed as follows.

35 %	Mid-term exam (October 9)	_____	x 0.35 =	_____.
25%	Avg. of 3 to 4 problem sets	_____	x 0.25 =	_____.
25 %	Avg. of 3 projects	_____	x 0.25 =	_____.
15 %	Attendance and participation	_____	x 0.15 =	_____.
	TOTAL (Final numerical grade)		=	_____.

The *final letter-grade* for this class will conform to the following scale, based upon the computed *final numerical grade*.

$$F \leq 59.9, D = 60-69.9, C = 70-79.9, B = 80-89.9, A = 90-100$$

MID-TERM EXAM

The mid-term exam will cover the basics of powder X-ray diffraction, with emphasis on radiation safety and the parts and operation of our diffractometer (class topics, Aug. 21 through Oct. 2). The exam will include questions of matching, fill-in-the-blank, multiple-choice, and short-answer formats, and may require computations like those made in class and on problem sets.

A make-up exam will be provided in only the most adverse circumstances (e.g. serious illness). Documentation of the circumstance (e.g. doctor's note) may be required.

Arrangements for a make-up exam must be made with the instructor prior to the scheduled time of the regular exam.

In the event that a student is provided with a make-up exam, he or she should anticipate that it is likely to be different from the regular exam.

PROBLEM SETS AND PROJECTS

Certain topics, particularly those that involve computation, lend themselves to problem sets. Others, such as instrumental experiments and diffraction studies of materials, require time on the diffractometer and are better served by short (2-week) projects and brief reports.

BLACKBOARD

Some aspects of this course are available through UTC's online course delivery system (Blackboard), which can be accessed at:

<http://utconline.utc.edu>

Your user name for logging on to the system is your UTCID (mix of letters and numbers). Your password for Blackboard is the same as your password for your UTC e-mail (Onenet) and for your access to the Lupton Library databases. If you change your password in Blackboard, you also change your password on both of these other systems. If you forget your password, follow the "Forgot Password" links from either the Onenet (<http://onenet.utc.edu/>) or Blackboard (<http://bb2.utc.edu/webapps/login>) login pages.

Documentation on student use of Blackboard is available at:

<http://utconline.utc.edu/BB6Students.html>

XRD LAB WEB PAGE

Information related to X-ray diffraction and our diffractometer, including notes, guides, instructional videos, and internet resources, can also be found on the web at:

<http://www.utc.edu/Faculty/Jonathan-Mies/xrd/xrd.html>

EMAIL (firstname-lastname@utc.edu)

To enhance student services, the University will use your UTC email address (firstname-lastname@utc.edu) for communications. (See <http://onenet.utc.edu> for your exact address.) Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423-425-2676.

OTHER POLICIES

Students are expected to attend class regularly. Attendance and participation will be considered in the final grade. (See *Grades* .)

Students are expected to be punctual, prepared for class, attentive, and respectful of others.

Students that arrive late for the mid-term exam may not be permitted to take the exam.

Assignments (problem sets and projects) are expected to be turned in on time. Late assignments will be accepted in only the most adverse circumstances (e.g. serious illness or accident). Documentation of the circumstance (e.g. doctor's note or police report) may be required.

All students are expected to follow the UTC honor code.

ATTENTION: If you are a student with a disability and think that you might need special assistance or special accommodation(s) in this class or any other class, call the Office for Students with Disabilities/College Access Program at 425-4006 or come by the office, 110 Frist Hall.

This syllabus is subject to minor changes.