

EAS 224 - MINERALOGY I - FALL TERM 2012

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Lectures A1 M W F 1100 - 1150 TL 12
Note room change from initial assignment

Laboratories D1 Monday 1400 - 1650 ESB 3-04
D2 Tuesday 1400 - 1650 ESB 3-04
D3 Wednesday 1400 - 1650 ESB 3-04
D4 Thursday 1400 - 1650 ESB 3-04
D5 Friday 1400 - 1650 ESB 3-04

Marks 15% Mid-term exam, **Monday, October 22**
(Lectures through ~October 17,
Crystal Chemistry)
35% Final exam, **Tuesday, December 11, 0900-1100**
(Cumulative, emphasis ~October 17 to end)
5% Class participation, use of i>clicker
15% Laboratory assignments (total of ten)
*** All labs must be completed and handed in to pass the course ***
10% Laboratory quizzes (total of 5 marked)
20% Laboratory final exam, begins November 28

**** Final Exam timing is unofficial; confirm on Bear Tracks
when official schedule is set and released by Registrar****

*** Deferred Final Exam is scheduled for
Saturday, Jan. 12, 2013, 0900-1100 ***

Texts *Mineral Science*, by C. Klein and B. Dutrow, 23rd
Edition, John Wiley and Sons. Required.

Notes **ESSENTIAL.** Lecture outline format, posted online
through eClass, on an ongoing basis. Files will
be in both Word and PDF format. **Sample mid-term
exam questions** will also be posted here.

Schedule October 8: Thanksgiving Day, no class
October 22: Mid-term Exam
November 12: Remembrance Day holiday, no class
Nov. 28-Dec. 4: Lab Exams
December 5: Last lecture
December 11: Final exam, 0900-1100
January 12/2013: Deferred Final exam, 0900-1100

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Schedule of Laboratories

<u>Lab</u>	<u>Topic & Minerals Introduced</u>	<u>Dates</u>
1.	Descriptive Mineralogy; native elements, sulfides	Sept. 10-14
2.	Crystal Symmetry; oxides	Sept. 17-21
3.	Miller Indices; halides and carbonates	Sept. 24-28
4.	Stereographic Projection; sulfates and phosphates	Oct. 1-5
5.	Lattices; nesosilicates	Oct. 9-12
Thanksgiving Holiday, Monday, October 8; Lab D1 students to join one of the other sections [or alternate section to be set later in week; TBD].		
6.	Packing and Coordination of Atoms; sorosilicates and cyclosilicates	Oct. 15-19
7.	Mineral Chemistry; inosilicates	Oct. 22-26
8.	Silicates I; phyllosilicates	Oct. 29-Nov. 2
9.	Silicates II; tectosilicates	Nov. 5-9
Remembrance Day Holiday & Fall Term Class Break Nov. 12&13; no D1 or D2 labs this week. All subsequent labs initiated by Wednesday D3 lab section, completed by Tuesday D2 lab section the following week.		
10.	Silicates III; no new minerals	Nov. 14-20
-	REVIEW SESSION; no new minerals	Nov. 21-27
-	Final Laboratory Exam	Nov. 28-Dec. 4

**** NOTE: ALL labs must be completed and handed in, in order for you to pass the course! ****

**** NOTE: Penalties for late labs will be announced in first lab sessions ****

THINGS YOU SHOULD KNOW (PART 1)

Class Attendance: You will need to attend class in order to turn the posted lecture outlines into notes. I will not make the material available any other way! As soon as possible, you should get to know one or two other students; in case you miss a class, you will be able to get the missing material from your Study Buddies.

Course Description: Principles of crystallography, physical and chemical properties of minerals, determinative mineralogy. Prerequisite: EAS 101, 105, 210, or SCI 100.

Course Objectives and Expected Learning Outcomes (Concise Version): To learn to apply the physical properties of minerals for their identification in hand specimen. The student should learn the symmetry elements of crystals and lattices, be able to identify the symmetry content of specific examples, and be able to assign them to their proper crystal class and system; proper notation and graphical representation are required. The student should be able to explain the chemistry and structure of minerals, with particular emphasis on the silicate minerals, and thus explain the physical properties of minerals. This knowledge base serves in particular as a foundation for EAS 232, Mineralogy II, as well as the petrology of all rocks.

Course Objectives and Expected Learning Outcomes (Long Version):
By the end of this course, you should be able to:

- 1) Define minerals, and explain why certain materials do or do not conform to the definition; explain the connection between both of chemical composition and crystal structure, and various properties of minerals, as an aid to their identification.
- 2) Apply the appropriate tests to determine the physical properties of minerals in hand specimen, in order to identify the most common rock-forming and/or important minerals based on those properties; in the lab, this will require you to be able to identify approximately 80 minerals, and specify their chemical formulae.
- 3) Name and define the various symmetry elements that may be present in the external form of crystals, or in 2-D and 3-D lattices, and characterize the symmetry content of

specific examples (especially as presented in labs) with Hermann-Mauguin notation; identify and name 3-D lattices as illustrated in lab examples in particular.

4) Characterize each of the six crystal systems by the relative lengths of, and angular relationships between, the crystallographic axes; assign the symmetry content of any example given in lab or lecture to the correct crystal class, and thus to the appropriate crystal system; represent the symmetry content of any example or crystal class by a diagram, using standard symbols.

5) Characterize the individual faces of a crystal using Miller or Bravais-Miller Indices, and plot them on a stereographic projection; identify and correctly name zones and forms exhibited by crystals, using proper notation.

6) Explain the chemical basis for bonding of atoms and ions, name and describe the types of bonds exhibited by minerals, and explain some of the effects that these various bonds have on the physical properties of minerals.

7) Explain the relationship between ionic radius/size of atoms, and their coordination in crystal structures, with reference to coordination numbers and coordination polyhedra, especially in the context of the silicate minerals.

8) Explain the concepts of ionic substitution/solid solution, polymorphism, and twinning, with reference to specific examples.

9) Derive the chemical formula of a mineral, and ideally identify it, from chemical analytical data.

10) Describe the systematic mineralogy of the silicate minerals, from the perspective of chemical composition (especially generic formulae), and crystal structure, both for silicate minerals as a whole, as well as for the various subgroups as indicated elsewhere in the syllabus.

11) Define the terms used to describe mineral phases and systems, and interpret mineral stability/phase diagrams for unary and binary systems.

THINGS YOU SHOULD KNOW (PART 2)

Access To Instructor: Anytime you can find me in my office with the door open; I do not keep set office hours, so feel free to drop by. If you wish to ensure that I will be there, arrange a meeting ahead of time, either by phone or e-mail.

Class Participation: Throughout the term, we will be using i>clicker technology to review material and/or survey opinions on various topics. Your participation in these questions forms the basis for your class participation mark. To give you an idea, response on 90% or more of the questions will get you 5/5, 70-89% gets 4/5, and so on.

In addition to the sample exam questions posted on the course web site, a number of additional questions will be posed in class; some of these will appear on the exams.

If you do not yet have one, you will need to purchase an i>clicker remote, available at the University Bookstore, and register it (i.e. identify it as yours). Registration is to be done on-line, going to www.iclicker.com, then Support, then Register Your Clicker. Of course, use your first and last name as indicated, and for your ID use your CCID (e.g. Charlie Brown's CCID might be cbrown. Do **not** use your student ID#).

You are responsible for bringing a functioning remote to class every day; I will neither provide "loaners" nor batteries. Using more than your own remote in class constitutes an academic offence - both you, and the person whose remote you are using, are misrepresenting that person's attendance and participation.

Format of Exams: Exams are a combination of multiple choice (20/50 on the midterm exam, 20/100 of the final) and written answer questions. The style of questions is represented by the sample questions (to be posted on eClass).

Grading Criteria: Grades will be assigned neither with pre-determined numerical cut-offs, nor with slavish adherence to a curve or so-called historical distribution. That distribution is used as a rough guide to what the marks distribution could be, but a talented class that performs well will be rewarded with higher grades than "normal"; conversely, an underachieving class will not be propped up

by the curve, but will bear the consequences.

Grades are assigned only at the end of the course, based on the total mark as determined according to page 1 of the syllabus. Typically, all marks over 80% receive a grade of A- or better; below that, every 3 or 4% reduction in total mark typically represents one grade lower. Where natural breaks in the mark distribution do not occur, the final lecture exam is used as the discriminator to set grade breaks. In 2010, the GPA was 2.7 and the median grade B-. The number of students assigned a grade of some version of A was 21, compared to the 20.5 predicted by historical distributions. The method of lecture presentation then was completely different; my updated style has seen improvements of at least 5% on exam scores in most courses.

In addition, courses with a lab component typically clump marks together at a relatively high total that is not indicative of the students' grasp of the material. **You should be aware, therefore, that a total score of 50% or more in the course as a whole will not ensure a passing grade.** If said score exceeds 50% only by virtue of the lab component, whereas lecture exam results indicate inability to master the course content to any significant degree, the student may still be assigned a failing grade. I would suggest this may occur for anyone whose final exam score is less than 40%, or other circumstances that suggest a passing grade is inappropriate.

Note as well that all labs must be completed and handed in, in order for you to pass the course.

Unofficial grades will be posted on eClass once calculated. Grades remain unofficial until approved by the Department and/or Faculty offering the course.

Students with Disabilities: Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students' Union Building).

Academic Support Centre: Students who require additional help in developing strategies for better time management, study skills, or examination skills should contact the Academic Support Centre (215 Central Academic Building).

Examinations Through SSDS: Students who will be writing exams through SSDS (Specialized Support and Disability Services) should bring their Letter of Introduction to the instructor as early in the term as possible, and the Exam Instructions & Authorization (orange form) sheet to the instructor at least one week before individual exams. As well, you should book the exams with SSDS as soon as possible, as the demand for spaces is high and they may not be able to accommodate you if you try to book too close to the exam date(s).

Deferred Midterm Examinations: A student who cannot write a midterm examination due to incapacitating illness, severe domestic affliction or other compelling reasons may be granted a deferral (timing to be determined in consultation with instructor), or an excused absence (very unlikely; weight transferred to the Final Exam). Applications for deferral of or excused absence from the midterm examination must be made in writing to **the instructor** with suitable supporting documentation (e.g. doctor's note, statutory declaration, or other as determined in consultation between student and instructor), within 48 hours of the missed examination. Misrepresentation of facts to gain a deferral or excused absence is a serious breach of the *Code of Student Behaviour*.

Deferred Final Examinations: A student who cannot write the final examination due to incapacitating illness, severe domestic affliction or other compelling reasons can apply for a deferred final examination. Such an application must be made to the student's Faculty office within 48 hours of the missed examination and must be supported by a Statutory Declaration (*in lieu* of a medical statement form) or other appropriate documentation (Calendar section 23.5.6). The course instructor does not have authority to grant deferred final examinations, although they may have input into the decision to grant a deferred exam. Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. Misrepresentation of facts to gain a deferred examination is a serious breach of the *Code of Student Behaviour*. The date for said deferred exam, should it be granted, is noted on the schedules on the first page.

Reexaminations: There will be no reexaminations in this course, because the final exam counts less than 40% toward the course mark (see Calendar section 23.5.5[1b]).

STUDENT RESPONSIBILITIES

Missed Laboratory Assignments or Lab Exam: A student who cannot complete their laboratory work or quizzes because of an incapacitating illness, severe domestic affliction or other compelling reasons must arrange to submit the lab work, and can apply to have the weight of the assignment or quiz distributed over the rest of the lab assignments or quizzes; a missed final lab exam needs approval for a deferral. Applications for such measures must be made in writing to the **Geology Undergrad Lab Coordinator (Marilyn Huff; <huff@ualberta.ca>; Room 3-04A ESB)** with supporting documentation, within 48 hours of the missed due-date of the assignment, quiz, or exam. Deferral of laboratory work, quizzes, or exams is a privilege and not a right; there is no guarantee that a deferral will be granted. Misrepresentation of facts to gain a deferral is a serious breach of the Code of Student Behaviour. **Remember that all labs have to be completed to pass the course.**

Academic Integrity: The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the *Code of Student Behaviour* (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour, which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All forms of dishonesty are unacceptable at the University. Any offense will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Cheating, plagiarism and misrepresentation of facts are serious offenses. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. As well, in the Faculty of Science the sanction for **cheating** on any examination will include **a disciplinary failing grade** (no exceptions) and senior students should expect a period of suspension or expulsion from the University of Alberta.

Students should also be aware of the Faculty of Science's stance on plagiarism, as described on their web site, and the Truth in Education (TIE) issues covered on the web site <http://www.uofaweb.ualberta.ca/TIE/>. We recognize that there will be collaboration and cooperation in the completion of lab exercises, but the work you submit should be clearly and distinctly your own. If you are in any doubt you should consult the "Collaborating on Assignments" link on the TIE web site. Additional guidance may be obtained from the Lab Coordinator and/or Teaching Assistants.

Examinations: Your student photo I.D. is required at exams to verify your identity. Students will not be allowed to begin the final examination after it has been in progress for 30 minutes, and students must remain in the exam room until at least 30 minutes has elapsed. Electronic equipment cannot be brought into examination rooms and hats should not be worn (they have been used for cheating).

Cell Phones and Other Electronic Devices: Cell phones and related devices are to be turned off and stowed (i.e. off the desk/tablet top) during lectures and labs, and are not to be brought to exams. Given that course materials are posted online and intended for in-class use, students may use laptop computers in class to make/fill in notes. Any other use of laptops in class is prohibited. Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.

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DISCLAIMER: Any typographical errors in this Course Outline are subject to change and will be announced in class.