Earth Materials I – Mineralogy GEO 310 (4 cr.) Fall 2012

Lecture: Tuesday, Thursday 10:00-10:50 in Wilkinson 235
Lab: Tuesday, Thursday 1:00-3:00pm OR 3:00-5:00pm in Wilkinson 010
   You must attend your assigned lab time, as both sections are extremely full!

Instructor: Matt Loewen
   Office Hours: Tuesday, Thursday 11:30-12:30 or drop in/ make appointment
   Office: Wilkinson 119
   Email: loewenm@geo.oregonstate.edu

Teaching Assistants:
   Christine Chan, section 011, office Wilkinson 213, chanchr@geo.oregonstate.edu
   Richard Bradshaw, section 010, office Wilkinson 121, bradshar@onid.orst.edu

Prerequisites:
   Students should have a general course in geology (GEO 201, 221, or equivalent). I
   strongly recommend students complete a course in inorganic (physical) chemistry (CH 12
   or 221) *before* taking GEO 310, however you may enroll concurrently. *Mineralogy is the
   chemistry of inorganic solids!*

Texts:
   Optional: *Minerals of the World*, by Ole Johnsen
   *An Introduction to the Rock Forming Minerals*, by Deer, Howie and Zussman

Required Lab Materials:
   • 10x handlens (professional quality Hastings triplet will make your life easier!)
   • ~100 4”x6” notecards
   • Personal hardness kit (fingernail, 1982 or older copper penny, knife)
   • Hand Magnet
   You will have access to acid bottles, streak plates, and a glass plate in all labs.

Work Policy:
   Students should complete work and turn in the assignments by the due date/time in lab, lecture,
   or in the instructor’s mailbox. Please do not e-mail assignments. Late assignments may or may
   not be accepted for reduced credit, unless the student has contacted the instructor in advance of
   the due date with a reasonable explanation. All students are expected to complete their own
   work. They are encouraged to consult with the instructors, text and published papers, and with
   one another, particularly in lab. Nonetheless, each student is expected to write out his or her own
   answers in his or her own words, and where material is derived from previously published
   works it should be referenced (scientific citation). Don’t copy your buddy’s lab or homework,
   please.
Attendance:
You are expected to attend all lecture and lab sections where the instructor and/or TAs will be available to answer questions. There may be unscheduled quizzes during lecture or lab times. Make detailed notes of lectures and keep track of completed assignments and labs.

Grading:
The grading for the course is based on a point system weighted between different parts of the course:

- Lecture Exams & quizzes during lecture periods ~30%
- Lab Quizzes and Exam ~30%
- Laboratory Exercises, Homework Assignments, Projects ~30%

Grades will follow the following scheme:
- >93% A, 90-92.9% A-, 87-89.9% B+, 83-86.9% B, 80-82.9% B-, 77-79.9% C+, 74-76.9% C, 70-72.9% C-, 67-69.9% D+, 63-66.9% D, 60-62.9% D-, <60% F

I may or may not adjust the grade cutoffs to lower percentiles.

Learning Outcomes: To pass the course, students will demonstrate these abilities:
- Identify a series of major rock-forming minerals by their physical characteristics using simple tests.
- Know the names, crystal chemistry, physical properties, and occurrence of ~80 important mineral species.
- Identify the crystal symmetry groups and classes, and give mineral examples.
- Identify crystal morphology, cleavage, and symmetry of several of the crystal classes.
- Identify chemical mechanisms that cause color in minerals.
- Recognize Pauling’s Rules and how they govern how different elements are bonded (coordinated) to form stable crystal structures.
- List some important elemental substitutions that occur in minerals.
- Identify some of the conditions of formation of minerals, and how those can be used to understand the origin of the rocks that contain them.

Academic Honesty:
You will be expected to conduct yourself in a professional manner. Academic dishonesty such as plagiarism and cheating will not be tolerated. Therefore, students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:
- cheating- use or attempted use of unauthorized materials, information or study aids,
- fabrication- falsification or invention of any information,
- assisting- helping another commit an act of academic dishonesty,
- tampering- altering or interfering with evaluation instruments and documents, or
- plagiarism- representing the words or ideas of another person as one's own.

For more information about academic integrity and the University's policies and procedures in this area, please refer to the Student Conduct website at: http://www.orst.edu/admin/stucon/achon.htm and the section on Academic Regulations in the OSU Schedule of Classes.

I will pursue any instances of cheating or plagiarism to the fullest extent allowed under OSU policy including issuing an “F” grade for the course and reporting the incident to the Office of Student Conduct.
**Students with special challenges:**
Students with documented disabilities who may need accommodations, who have any emergency medical information the instructor should know of, or who need special arrangements in the event of evacuation, should make an appointment with the instructor early during the course. Colorblindness is a common issue, and such students are encouraged to make notes of the “colors they see.” For further information regarding accommodations for students with disabilities in this class, please see the SSD web site at ssd.oregonstate.edu.

**Tentative Course Schedule (almost certainly subject to change!):**

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<th>Day</th>
<th>Lecture</th>
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<th>Lab</th>
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<td>25-Sep</td>
<td>Course Intro, Physical Properties</td>
<td>ch. 1, ch. 2</td>
<td>1. Physical Properties</td>
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<td>27-Sep</td>
<td>Mineral Classification, Bonding</td>
<td>ch. 3</td>
<td>Hydrothermal Minerals</td>
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<td>2-Oct</td>
<td>Bonding cont., Pauling's Rules</td>
<td>ch. 4</td>
<td>2. Closest Packing</td>
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<td>4-Oct</td>
<td>Symmetry Elements</td>
<td>ch. 6-7, 9</td>
<td>3. Plane Symmetry, notecard check</td>
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<td>9-Oct</td>
<td>3D Symmetry</td>
<td>ch. 6-7, 9</td>
<td>Lab Quiz 1, Sedimentary Minerals</td>
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<td>11-Oct</td>
<td>Crystal Morphology</td>
<td>ch. 6-7, 9</td>
<td>3. 3D symmetry 1</td>
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<tr>
<td>16-Oct</td>
<td>Crystal Morphology cont.</td>
<td>ch. 6-7, 9</td>
<td>4. 3D symmetry 2</td>
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<td>18-Oct</td>
<td>X-ray techniques</td>
<td>ch. 14</td>
<td>5. XRD-Lab1, check notecards</td>
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<td>23-Oct</td>
<td>X-ray techniques cont.</td>
<td>ch. 14</td>
<td>Lab Quiz 2</td>
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<td>25-Oct</td>
<td>Mid Term</td>
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<td>Igneous Minerals</td>
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<td>1-Nov</td>
<td>Substitution</td>
<td>ch. 5, 12</td>
<td>Project 1/ Mineral Formula Calculation</td>
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<td>6-Nov</td>
<td>Substitution cont., Phase Diagrams</td>
<td>ch. 5, 12</td>
<td>Lab Quiz 3, Metamorphic Minerals</td>
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<td>8-Nov</td>
<td>Phase Diagrams cont., Crystal Growth</td>
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<td>Unknown Mineral Project</td>
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<td>13-Nov</td>
<td>Crystal Growth Cont.</td>
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<td>7. Mineral Formula Calculation 2</td>
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<td>15-Nov</td>
<td>Amhibole Case Study-Koleszar</td>
<td>p. 452-456</td>
<td>Project Day, check notecards</td>
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<td>20-Nov</td>
<td>Sheet Silicate Case Study</td>
<td>p. 456-467</td>
<td>Lab Quiz 4, Unkown Mineral XRF</td>
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<td>22-Nov</td>
<td>No class or Lab-Thanksgiving</td>
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<td>Review Day</td>
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<td>27-Nov</td>
<td>Plagioclase Case Study-Lange</td>
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<td>Lab Final Exam</td>
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<td>29-Nov</td>
<td>Review</td>
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<td>Unkn Mineral Presentations</td>
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<td>3-Dec</td>
<td>Final Exam 6-8 pm</td>
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