

Fall 2015

EES 2700

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University of New Orleans

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EES 2700: Earth Materials

Syllabus – Fall 2015

Instructor: Dr. Melanie Thompson Stiegler **Office:** Geology & Psychology Rm 1042
mstiegle@uno.edu

Office hours: M 12:30-2, Th 1-2:30

TA: **Office:**

Lecture: TTh 11:00-12:15, GP 1004

Lab: W 12:30-3:15, GP 1004

Course materials: *Manual of Mineral Sciences, 23rd Ed.* by Klein, C. and Dutrow, B. The required textbook is available at the bookstore or a digital copy can be purchased at www.coursesmart.com. Additional readings will be posted on Moodle or distributed in class.

Course overview: Mineralogy serves as a foundation for studying the Earth as a geologic system because minerals are the fundamental building blocks of the Earth. This class provides the basis on which you will construct your geologic careers. Minerals are an integral part of our everyday environment. Minerals form the Earth's substrate in which our food grows; they soften our water, crack hydrocarbons, cleanse hazardous wastes, and provide us with materials that bring our life above subsistence living. Consequently, it is important that they are understood and appreciated. Plus, minerals can be lovely to admire.

This course is designed around the following core concepts and objectives:

- Importance of minerals in society and to the study of the Earth.
- Mineral properties and classification.
- Connect macroscopic mineral properties to internal structure.
- Promote critical thinking and analytical skills.

Student responsibilities: Respect your instructor and your classmates and we will return the favor. Respect includes creating an environment conducive to learning, which means being on time, turning off cell phones, listening, and contributing. A record of class attendance is required by the UNO registrar, there will be a daily sign in sheet in lecture. I do not lecture straight from the text and some points will not be in the book. There may be unannounced quizzes. You must be in class to earn those points. Please be on time for exams as no one will be allowed entrance after the first person finishes.

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|-----------------|------------------------------------|-------------------------------|
| Grading: | Lecture Exams 1-3 = 30% (10% each) | Lab Exams 1-3 = 21% (7% each) |
| | Lecture Final Exam = 14% | Lab Final Exam = 9% |
| | Lecture quizzes, homeworks = 6% | Lab activities = 20% |

Labs are due on the date announced in class. For each day late, 5 points will be deducted from your score until the labs are returned. After that date, a zero is assigned.

Make-up policy: If you must miss an exam, contact me *at least 48 hours prior* to the exam. If there is a medical excuse, you must present a note signed by a doctor. If no such notice is given, I will expect formal evidence of a sudden emergency that excuses your unannounced absence. *Make-ups will be essay exams.* There are NO make-up quizzes. No mechanical devices (cell phones, tablets, etc.) are allowed at your desk or on your person during the exam; if caught with one, your exam will be discarded.

Tentative lecture schedule:

| TOPIC | READINGS |
|--|---|
| Introduction | Ch. 1 (1-17) |
| Physical Properties of Minerals | Ch. 2 (19-36) |
| Bonding in Crystals | Ch. 3 (37-65) |
| Crystal Coordination and Pauling's Rules | Ch. 4 (66-78) |
| Crystal Structures and Compositional Variability | Ch. 4 (79-89), Ch.5 (96-99), Ch. 12 (276-281) |
| Physical Properties of Minerals: Growth, Color | Ch. 10 (218-225, 234-240) |
| Crystallographic Concepts: Symmetry, External Form | Ch. 6 (109-120) |
| Symmetry Notation, Crystal Axes and Systems | Ch. 6 (120-121, 129-131) |
| Crystal Symmetry: Internal order | Ch. 7 (143-168) |
| Crystal Intergrowths | Ch. 10 (226-233) |
| Earth's Structure, Mineralogy of the Core: Native Elements | Ch. 5 (90-95), Ch. 15 (333-336) |
| Mineralogy of the Mantle: Olivine, Pyroxene | 434-438, 483-487, 446-450, 505-510 |
| Analytical Techniques: XRF, XRD, EMPA, TEM | Ch. 14 (307-326) |
| Mineralogy of the Mantle: Amphibole, Diamond and Polymorphism | 452-456, 514-519, 346-350, 267-274 |
| Mineralogy of the Mantle: Oxides, Garnet | 86-87, 375-389, 487-490 |
| Introduction to Optical Mineralogy | Ch. 13 (287-304) |
| Mineralogy of the Crust: Tectosilicates | 574-603, 467-482, 534-553 |
| Mineralogy of the Crust: Phyllosilicates and Non-quad Inosilicates | 456-467, 519-533, 510-514 |
| Mineralogy of the Crust: Nesosilicates | 491-497 |
| Mineralogy of the Crust: Sorosilicates, Cyclosilicates | 498-505, 282-285 |
| Mineralogy of the Crust: Carbonates, Sulfates, Phosphates | 400-416, 420-425, 427-433 |
| Mineralogy of the Crust: Halides, Oxides, Hydroxides | Ch. 16 (368-398) |
| Mineralogy of the Crust: Ore Deposits (Sulfides, Native Elements) | Ch. 15 (331-367) |
| Minerals in Your Life and in the Solar System | |

Lecture Exam schedule:

| | |
|------------|--------|
| Th Sept 24 | EXAM 1 |
| Th Oct 22 | EXAM 2 |
| T Nov 17 | EXAM 3 |

COMPREHENSIVE FINAL EXAM: Tuesday, December 8, 10-12.

Tentative lab schedule:TOPIC

Classifying Minerals

Physical Properties – review rock classification

Bonding in Crystals

Crystal Coordination 1

Crystal Coordination 2 – atomic packing and radius ratios

Causes of Mineral Color

Determination of 3D symmetry, crystal systems, H-M symbols

Translating Symmetry, determining lattice types and space groups

Mineral Formulae Calculation & Graphical Representation of Composition- Ch. 5 (99-108)

Miller Indices, Forms, Parameters - Ch. 6 (131-138)

Mineral ID: Native elements, Mantle minerals

Introduction to Optical Mineralogy

Mineral ID: Tectosilicates (feldspars, quartz, zeolites)

Mineral ID: Phyllosilicates and non-quad inosilicates

Mineral ID: Neso-, Soro-, and Cyclo-silicates

Mineral ID: Carbonates, sulfates, phosphates

Mineral ID: Oxides, hydroxides, halides

Mineral ID: Ore Deposits (Sulfides, Native Elements)

XRD

Lab Exam schedule:

W Sept 30 EXAM 1

W Oct 28 EXAM 2

W Nov 18 EXAM 3

COMPREHENSIVE FINAL EXAM: Thursday, December 3, 11-12:15.

Course assistance: If you are having difficulties, don't wait. Come see me! It shows that you care about your education. Additionally, the EES department provides free tutoring services staffed by EES graduate assistants and volunteers from the Sigma Gamma Epsilon Honor Society. The Tutor Center is located in Geology & Psychology 1022 and is open M-Th from 10 am to 4 pm.

Students with disabilities: The University of New Orleans is committed to providing reasonable accommodations for all persons with disabilities. If you are seeking classroom accommodations under the Americans with Disabilities Act, you are required to register with the Office of Disability Services (ODS). ODS is located at 248 University Center. Phone is 504-280-6222. To receive academic accommodations for this class, please obtain the proper ODS forms and meet with me at the beginning of the semester.