

Instructor: Dr. Sean Regan, REIC 330, sregan5@alaska.edu

Class Time: MW 11:45 – 12:45 REIC 235 **Lab Time:** MW 2:15 – 5:15 PM; 6:00 – 9:00PM

Office Hours: Tuesdays and Thursdays from 1:00 PM – 3:00 PM; open door policy

Textbooks:

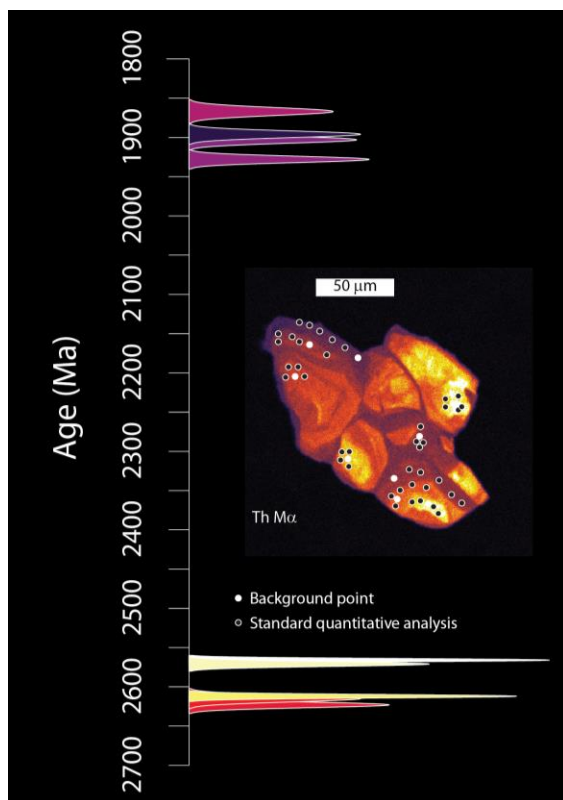
- Nesse, W.D., 2017, Introduction to Mineralogy, 3rd edition. (**Buy this one only**)

General:

Mineralogy deals with the identification and origin of mineral species. It is a foundation for many branches of geology; a good understanding of mineralogy is essential for **all** geologists. Also, a knowledge of mineralogy is often useful in dealing with environmental and health issues.

In this course, we will look at both the theoretical and practical aspects of mineralogy. We will focus on the rock forming minerals in a variety of contexts. By using the rock forming minerals as our guide, we will also investigate the different branches of mineralogy, like crystal chemistry, optical mineralogy, systematic mineralogy, and provide an introduction to some of the modern tools mineralogist use (SEM, XRD, EPMA).

Lectures and Labs:



Lectures will give the theoretical basis for mineralogy - crystallography, mineral chemistry, optical mineralogy, and systematic mineralogy. As much as possible, the lectures will be coordinated with topics covered in labs. It is important for you to complete assigned readings *before* coming to class. This course was designed to minimize out-of-class assignments to provide you with time to study for weekly quizzes.

However, the bulk of hands-on work will be related to the lab. The main purpose of the lab work is to teach you techniques of mineral identification - in hand sample and under the microscope. Secondly, as a result of understanding and applying these techniques, you will, of course, learn to identify many minerals. The rock forming minerals will be the main focus of the course - you will learn to identify them and learn about their origins in class and lab.

The major project in the lab component of the course is to make your own lab manual in a 3 inch 3 -ring binder. Feel free to include, drawings, descriptions, diagnostic properties, etc. You will be allowed to use your lab manual on the practical part of the final exam and during the 3rd non-cumulative tests.

Project 1: Detailed report on a mineral, and its application to the broader geologic community

Minerals are used in a wide array of other geology and environmental subdisciplines. We can not cover all, or even a representative fraction, of them. Your job is to choose a mineral and create a PowerPoint presentation with photos of those minerals plus information on their characteristics, origin, and how it is utilized by another field in the geological sciences. This project will be completed the second half of the semester and will culminate with an in-class presentation (10 minute). Some good examples are (zircon, monazite, apatite, tourmaline, columbite, rutile, garnet, quartz, and the list goes on).



Project 2:
Mineral of the week

Grades: •labs (30%) •Quizzes (30%)
•non-cumulative tests (30%) •final exam (30%)
•projects (10%)
***Lab Grades will be dominated by the Lab Manual, make sure you put time and effort into this.**

*You will notice that this adds up to over 100 points (130). As the semester progresses you can choose to

keep two of the three: 1) quizzes, 2) non-cumulative tests, and 3) the final exam.

Academic Dishonesty/Accommodations Policy

- Please review the University’s academic dishonesty policy. Cheating, fraud, and plagiarism are not allowed and will result in academic censure through appropriate University procedures.
- I will do anything within my power, that is legal, to help you succeed and thrive. If you have any type of learning disadvantage, consider meeting with Student Support Services staff to figure out the best actions to take.

Possible project ideas:

Sm-Nd/Lu-Hf garnet geochronology
Zircon/rutile/ apatite U-Pb geochronology
Fission track analysis of apatite
U/He analysis of zircon and apatite
Hf isotopic analysis of zircon
U-Th-total Pb analysis of monazite
Oxygen isotopes of various minerals
Ti in quartz thermometry
Ti in biotite barometry
Carbon isotopes in graphite

EBSD analysis of silicate phases
U/Pb Baddeleyite geochronology
Oxygen isotopes in oxides

*Other interests? We can think of something

Monday	Wednesday
08/27 Introduction (<i>Text ch 1</i>) <i>No lab</i>	08/29 Physical Properties of Minerals <i>No lab</i> <i>Reading: Ch. 6</i>
Labor Day. Take it easy.	09/05 Lattices, unit cells, and systems LAB : Mineral Resources of Alaska <i>Reading : Ch. 2 ; p. 12-27</i>
09/10 Symmetry and Form LAB : PPOM I <i>Reading: Ch. 2; p. 27-49</i>	09/12 Chemistry of Earth's crust LAB : PPOM II <i>Reading: Ch. 3; p. 50-58</i>
09/17 Bonding in Minerals LAB : Symmetry <i>Reading: Ch. 3; p. 59-69</i>	09/19 Crystal Structure/Growth LAB : Block Models <i>Reading: Ch. 4,5</i>
09/24 Optical Mineralogy LAB : intro to scopes <i>Reading: Ch. 7</i>	09/26 Jeopardy (p. 74- 87) LAB : Interference Figures
10/01 Test 1 LAB : Opaques	10/03 Sulfides and sulfates LAB : Opaques <i>Reading: Ch. 19</i>
10/08 Carbonates/phosphates LAB : Carbonates <i>Reading: Ch. 17</i>	10/10 Nesosilicates/tectosilicates LAB : Phosphates <i>Reading: Ch. 16, 12</i>
10/15 Inosilicates LAB : Nesosilicates <i>Reading: Ch. 14</i>	10/17 Inosilicates LAB : Tectosilicates <i>Reading: Ch. 14</i>
10/22 Phyllosilicates LAB : Inosilicates <i>Reading: Ch. 13</i>	10/24 Phyllosilicates LAB : Inosilicates <i>Reading: Ch. 13</i>
10/29 Soro/cyclosilicates LAB : Phyllosilicates <i>Reading : Ch. 15</i>	10/31 Finish systematic mineralogy/Jeopardy LAB : Phyllosilicates
11/05 Test 2 LAB : Soro/cyclosilicates	11/07 Analytical Mineralogy I LAB : Finish up systematic mineralogy/Lab manual
11/12 Analytical Mineralogy II LAB : Systematic Min Review <i>Reading: Ch. 9</i>	11/14 Geochronology LAB : Project Presentations

Monday	Wednesday
11/19 Economic Mineralogy <i>LAB:</i> Mineral ID in rocks <i>Reading: hand out</i>	BREAK
11/26 Environmental Mineralogy <i>LAB:</i> AIL Tour <i>Reading: hand out</i>	11/28 Minerals in Igneous Rocks <i>LAB:</i> EPMA Feldspar Analysis
12/3 Jeopardy <i>LAB:</i> Economic Mineralogy	12/5 Test 3 <i>LAB:</i> Study/Prep/Office Hours

SEE YOU IN PETROLOGY!!!!!!