

# AHS 325

## Rocks & Minerals

# Spring 2015

## Syllabus & Schedule

**Catalog Description:** Physical and chemical properties of minerals, and igneous, sedimentary, and metamorphic rocks. Hand-sample identification.

The solid part of our planet is composed almost entirely of minerals. The physical and chemical properties of these minerals play major roles in shaping Earth's processes from the very small to the very large scales. Studying the mineralogy and petrography of rocks allows one to better understand or model the geological formation of rocks through time. This course provides an introduction to the systematic study of minerals and the processes that form them in igneous, sedimentary, and metamorphic settings as well as in weathering and ore-forming geologic environments.

**Mineralogy** is the scientific study of the chemistry, crystal structure, and physical properties of minerals.

**Optical Mineralogy** is the study of rocks and minerals in thin section, using a petrographic microscope.

**Petrology** is a general term referring to the study of the origin, composition, distribution, and structure of rocks.

**Petrography** is the branch of petrology that focuses on the detailed descriptions of rocks; this includes detailed field and hand sample descriptions, studies of rock mineralogy, the textural relations of the minerals, as well as the use of analytical geochemical techniques.

### CLASS MEETINGS

Lectures: M, W, F 11:00 am – 11:50 am in WSB 107

Labs: Thursday 9:00 am – 10:50 am in WSB-22

### INSTRUCTOR

Dr. Kate Pound

Office: WSB 155

Phone 320-308-2014 (*don't use this, I never remember to check phone messages*)

Email: [kspound@stcloudstate.edu](mailto:kspound@stcloudstate.edu)

Office Hours: to be posted *or* by appointment

### D2L and WEBSITE

A D2L site will be set up for this course. Most class materials will be posted on this site.

### TEXTBOOK

*Mineralogy*, Dexter Perkins, Prentice-Hall, 2011, 3<sup>rd</sup> Ed., 494p.

ISBN: 0-321-66306-3

### OTHER READINGS

There are several other articles or papers that I will expect you to read. A paper copy of each of these will be placed in the EAS office, lunchroom, or Faculty-Student Research area, or in D2L.

### GRADING:

Your grade will be determined as shown below. Shaded grades will be used.

A range = 90-100; B range is 80-90; C range is 70-80; D range is 60-70; F is below 60.

The exams may or may not be curved.

Component	Percentage
Exams (Lecture Exams 1 & II & Final, 10% each; Lab Exam 7.5%)	37.5%
Lab Exercises	40%
Class Participation (includes in-class work & quizzes)	12.5%
Mineral Collection Project	10%

**D2L** A D2L site is set up for this course. Some class materials will be posted on the D2L site. I will also post reminders about assignments and some diagrams from lectures and any lecture slides. Make sure you check the D2L Course News page regularly. I will try to post your grades in D2L Grades as material is graded, although sometimes I get very behind.

**THE EXAMS** There will be a total of 3 exams. Two of these will be 'Lecture' exams. The Final Exam (Exam 3) will be a cross between a 'Lecture Exam' and a 'Lab Exam'.

**CLASSROOM / LAB EQUIPMENT** You will need to bring the following equipment to class:

- Hand Lens – you can purchase from Heidi in the AHS office
- Colored pencils – minimum of 12 distinct colors.
- Ruler (12") – with measurements in inches *and* centimeters/ millimeters
- Basic calculator
- A good eraser
- Sharp pencils
- Your brain, in 'on' and 'alert' mode
- Three-ring binder to keep all the class materials well-organized in.

### GENERAL EXPECTATIONS

This class includes lectures, in-class exercises, and in-class discussion. I expect you to arrive for class on time and prepared for class, and to be respectful to the Professor and students at all times. These responsibilities include: refraining from checking email, instant messaging or texting in class, and turning off or silencing your cell phone. Class meets when some of you may be hungry, particularly if you have not had a good breakfast. Make sure you have eaten something so you are not too hungry to focus and learn. You can bring beverages or snacks to lecture, as long as they are not \*NOISY\*, and as long as they don't smell good (or bad). It is essential that you to be in class every day (on time), and I expect you to take good class notes. Many of the learning activities and discussions are impossible to replicate out of class, so attendance for the full class time is very important indeed. If you are sick and miss a class, it is **YOUR RESPONSIBILITY** to find out from classmates what we did in class; don't expect me to give you a private class. Also, promise *never* to ask me 'did I miss anything important?'. If you miss more than three classes, you need to arrange a meeting with me to discuss your situation and options. Attendance and participation in Lab is also essential. Don't miss Lab. Plagiarism and cheating will not be tolerated, and will be handled according to the student Code of Conduct (<http://www.stcloudstate.edu/studenthandbook/code/prohibited.asp>). Always proofread submitted work.

**FIELD TRIP:** I am planning a whole-day field trip to the Core Repository in Hibbing, Minnesota, to examine and log some core of igneous and metamorphic rocks. It will probably be later in the semester. The details (day, SCSU departure and return times) still need to be finalized.

**STUDENT LEARNING GOALS** After this class you will:

- Be able to apply the skills necessary to accurately identify and name minerals and rocks
- Be able to use and explain the classification systems used for minerals as well as igneous, sedimentary and metamorphic rocks
- Be able to apply the mineral and rock identification skills and classifications to suites of unknown samples
- Be able to interpret and explain the geological and geochemical formation history of rock and mineral samples based on their physical and chemical characteristics

## AHS 325 Rocks & Minerals – Class & Lab Schedule Spring 2014

Date	Topic	Reading	Assignments
Mon Jan 12 <sup>th</sup>	Introduction – Geochemistry, Elements, Minerals, Mineral ID Silicate Tetrahedra	Perkins Ch.1, p. 3-25 Perkins Ch.2, p. 26-43	Readings Lab 1 Min. Coll. Ass. #1
Weds Jan 14 <sup>th</sup>			
Fri Jan 16 <sup>th</sup>			
Thurs Jan 15 <sup>th</sup>	Lab 1: Minerals Review & Mineral Collection Project 1		
Mon Jan 19 <sup>th</sup>	Martin Luther King Day – No Classes		
Weds Jan 21 <sup>st</sup>	Mineral Classification, Crystallography	Perkins Ch.3, p. 44-63 Perkins Ch.9, p. 177-209 Perkins Ch.10, p. 210-239 Handouts	Readings Lab 2 Min. Coll. Ass. #2
Fri Jan 23 <sup>rd</sup>			
Thurs Jan 22 <sup>nd</sup>	Lab 2: Crystallography & Mineral Collection Project 2		
Mon Jan 26 <sup>th</sup>	Silicate Minerals I Phase Diagrams Analytical Techniques Framework Silicates	Perkins Ch.11, p. 240-252 Perkins Ch. 12, p. 253-275 Perkins Ch. 14, p. 302-315 Handouts	Readings Lab 3 Min. Coll. Ass. #3
Weds Jan 28 <sup>th</sup>			
Fri Jan 30 <sup>th</sup>			
Thurs Jan 29 <sup>th</sup>	Lab 3: Silicate Minerals I & Mineral Collection Project 3		
Mon Feb 2 <sup>nd</sup>	Silicate Minerals II Phase Diagrams Analytical Techniques Sheet Silicates, Chain Silicates, Ring Silicates	Perkins Ch.13, p. 276-298 Perkins Ch. 14, p. 316-336 Handouts	Readings Lab 4 Min. Coll. Ass. #4
Weds Feb 4 <sup>th</sup>			
Fri Feb 6 <sup>th</sup>			
Thurs Feb 5 <sup>th</sup>	Lab 4: Silicate Minerals II & Mineral Collection Project 4		
Mon Feb 9 <sup>th</sup>	Silicate Minerals III Isolated Tetrahedral Silicates Paired Tetrahedral Silicates	Perkins Ch. 14, p. 337-351 Handouts	Readings Lab 5 Min. Coll. Ass. #5
Weds Feb 11 <sup>th</sup>			
Fri Feb 13 <sup>th</sup>			
Thurs Feb 12 <sup>th</sup>	Lab 5: Silicate Minerals III & Mineral Collection Project 5		
Mon Feb 16 <sup>th</sup>	Non-Silicate Minerals I Native Elements, Halides, Sulfides, Oxides	Perkins Ch. 14, p. 352-377 Handouts	Readings Lab 5 Min. Coll. Ass. #6
Weds Feb 18 <sup>th</sup>			
<b>Fri Feb 20<sup>th</sup></b>	<b>LECTURE EXAM # I</b>		
Thurs Feb 19 <sup>th</sup>	Lab 6: Non-Silicate Minerals I & Mineral Collection Project 6		
Mon Feb 23 <sup>rd</sup>	Non-Silicate Minerals II Hydroxides, Carbonates, Borates, Sulfates, Phosphates, Tungstates, Molybdates, Others	Perkins Ch. 14, p. 378-399 Handouts	Readings Lab 7 Min. Coll. Ass. #7
Weds Feb 25 <sup>th</sup>			
Fri Feb 27 <sup>th</sup>			
Thurs Feb 26 <sup>th</sup>	Lab 7: Non-Silicate Minerals II & Mineral Collection Project 7		
Mon Mar 2 <sup>nd</sup>	Optical Mineralogy	Perkins Ch.4, p. 64-88	Readings Lab 8 Min. Coll. Ass. #8
Weds Mar 4 <sup>th</sup>			
Fri Mar 6 <sup>th</sup>			
Thurs Mar 5 <sup>th</sup>	Lab 8: Optical Mineralogy & Mineral Collection Project 8		

Date	Topic	Reading	Assignments
Mon Mar 9 <sup>th</sup>	<b>SPRING BREAK</b>		
Weds Mar 11 <sup>th</sup>			
Fri Mar 13 <sup>th</sup>			
Mon Mar 16 <sup>th</sup>	Igneous Rocks & Minerals I Igneous Rock Classifications	Perkins Ch.5, p. 89-118 Handouts	Readings Lab 9 Min. Coll. Ass. #9
Weds Mar 18 <sup>th</sup>			
Fri Mar 20 <sup>th</sup>			
Thurs Mar 19 <sup>th</sup>	Lab 9: Igneous Rocks Hand Samples & Mineral Collection Project 9		
Mon Mar 23 <sup>rd</sup>	Igneous Rocks & Minerals II Igneous Rocks Geochem & Tectonics	Perkins Ch.5, p. 89-118 Handouts	Readings Lab 10 Min. Coll. Ass. #10
Weds Mar 25 <sup>th</sup>			
Fri Mar 27 <sup>th</sup>			
Thurs Mar 26 <sup>th</sup>	Lab 10: Igneous Rocks Geochemistry & Mineral Collection Project 10		
Mon Mar 30 <sup>th</sup>	Catch-up, Review		
<b>Weds Apr 1<sup>st</sup></b>	<b>LECTURE EXAM # II</b>		
Fri Apr 3 <sup>rd</sup>	<b>Faculty Day – No classes</b>		
<b>Thurs Apr 2<sup>nd</sup></b>	<b>MINERALS LAB EXAM</b>		
Mon Apr 6 <sup>th</sup>	Sedimentary Rocks & Minerals	Perkins Ch.6, p. 119-134 Handouts	Readings Lab 11 Min. Coll. Ass. #11
Weds Apr 8 <sup>th</sup>			
Fri Apr 10 <sup>th</sup>			
Thurs Apr 9 <sup>th</sup>	Lab 11: Sedimentary Rocks & Minerals & Mineral Collection Project 11		
Mon Apr 13 <sup>th</sup>	Metamorphic Rocks & Minerals I	Perkins Ch.7, p. 135-156 Handouts	Readings Lab 12 Min. Coll. Ass. #12
Weds Apr 15 <sup>th</sup>			
Fri Apr 17 <sup>th</sup>			
Thurs Apr 16 <sup>th</sup>	Lab 12: Metamorphic Rocks / Metamorphic Minerals & Mineral Collection Project 12		
Mon Apr 20 <sup>th</sup>	Metamorphic Rocks & Minerals II	Perkins Ch.7, p. 135-156 Handouts	Readings
Weds Apr 22 <sup>nd</sup>			
Fri Apr 24 <sup>th</sup>			
<b>Thurs Apr 23<sup>rd</sup></b>	<b>Mineral Projects Display Presentations / Student Research Colloquium Posters (Tues 21<sup>st</sup>)</b>		
Mon Apr 27 <sup>th</sup>	Ore Deposits	Perkins Ch.8, p. 157-174 Handouts	Readings Lab 13
Weds Apr 29 <sup>th</sup>			
Fri May 1 <sup>st</sup>			
Thurs Apr 30 <sup>th</sup>	Lab 13: Ore Deposits & Ore Minerals		
<b>FINAL EXAM: Wednesday May 6<sup>th</sup>, 10:15 am – 12:45pm, WSB-107</b>			

### Mineral Collection Project: Summary

The AHS Department was gifted a large mineral collection in Summer 2014. For the mineral collection project you will each select 4 boxes of samples to unpack, and after bartering samples with your classmates you will either:

(a) Create a mineral display comprising 10-20 samples **OR**

(b) Present a poster at the Student Research Colloquium based on your examination of 10-20 samples. You will be provided with full details and expectations for this project in the first Lab meeting. This project will be ongoing throughout the semester; it is designed so you can build in your growing knowledge of mineralogy and rocks.