INTRODUCTION TO GEOLOGY

Lecture: Monday, Wednesday and Friday 9:50 -11:00 AM Mudd 66
Laboratory, Monday and Tuesday 1: 00PM-5: 00PM, Mudd 66

Instructor: Bereket Haileab, Email **bhaileab@carleton**.edu, Mudd 162, Phone 507-222-5746
Website: http://www.people.carleton.edu/~bhaileab/IntroductionToGeology/
Office Hours: Monday 11:00 am - 12:00, Thursday 11:00-12:00 or by appointment
Text: Understanding Earth, by Grotzinger, and Jordan, Latest Edition.

Course Organization: Lectures will be given on Monday, Wednesday and Friday during 2A. The sequence of lecture topics will follow the sequence of chapters in the text (with few exceptions), and we will cover the vast majority of the material presented in the text-book. Also we will discuss some other issues, so please **do not** miss lectures!

Course Objective: To use observations, measurements, and the logic of science to gain an understanding of, and an appreciation for the Earth's dynamic systems.

Examinations: Two midterm exams (each one-hour long) are scheduled, and few short quizzes will be given. The quizzes and examinations will be various combinations of multiple-choice, short-essay, and sketch-drawing questions.

Group Projects: Few of us act alone in the real world, most things are done with the help or ideas of other people. Group projects are great practice for real life. Because of this, you will work on a project that will involve the local geology and write a paper, make a poster and present your findings at the end of the term.

Homework: There will be homework assignments after we are done with each chapter. Homework assignments will consist of writing or sketching responses to selected review questions at the end of each chapter, and are designed to help the student prepare for the exams and quizzes. Homework **MUST** be submitted to the instructor by the indicated due date. **Late** homework will **not** be accepted for grading.

Grading: Final grades will be determined on the basis of relative performance. Two midterm exams will count 100 points, quizzes and home works 150 points, labs 50 points, and group project 100 points.

Reading: You are expected to read each chapter in the textbook.

Laboratory and field sessions: You are required to attend each laboratory and field session in the course.

Office Hours: If you cannot make it to the above office hours, you can come visit me anytime that is convenient to both of us. If you see me around campus, please don't hesitate to ask any questions that you might have. If you are having trouble finding me (which won't happen), first check with our department secretary Mrs. Ellen Haberoth in Mudd 167 or (507-222-4407), if that does not work try calling me at home (507-664-9229) before 8:00 PM, or leave a note on my bulletin board or message on my voice mail.

ACCOMMODATION AND ALTERNATIVE FORMATS

Reasonable accommodations will be provided for students with documented physical, sensory, learning, and psychiatric disabilities. Contact the instructor to work out the details of accommodations. Class materials prepared by the instructor can be made available in alternative formats upon request. Please contact the instructor as early as possible.

Schedule of topics:

Days	Materials discussed	Reading Assignment
WEEK 1		
MONDAY	Introduction: The Earth System	Chapter 1
WEDNESDAY	Major features of the Continents and Ocean Floor	Chapter 2
FRIDAY	Rock and Minerals	Chapter 3
WEEK 2		
MONDAY	Igneous Rocks	Chapter 4
WEDNESDAY	Sedimentary Rocks	Chapter 5
FRIDAY	Metamorphic rocks	Chapter 6
WEEK 3		
MONDAY	Lecture by Dr. Richard With FIB-TEM: Exploring Earth Materials with ions and electrons	
WEDNESDAY	Plate tectonics: The Unifying Theory	Chapter 2 & 14
FRIDAY	P. tectonic, Continental Crust & Mountain Building	Chapter 2 & 14
Sunday Oct. 5, 2014	**Field trip to Taylors Falls**	
WEEK 4		
MONDAY	P. tectonic, Continental Crust & Mountain Building	Chapter 2 & 14
WEDNESDAY	Volcanism	Chapter 12
FRIDAY	EXAM I	
WEEK 5		
MONDAY	Earthquakes and the Earth's interior	Chapter 13
WEDNESDAY	Earthquakes Conti.	Chapter 13
FRIDAY		
WEEK 5	Geology Field Trip	
MONDAY	**Midterm Break**	
WEDNESDAY	Geology Field Trip	
FRIDAY	TBA	
WEEK 6		
MONDAY	Folds, Faults and Mountains	Chapter 7
WEDNESDAY	Geologic time	Chapter 8 and 10
FRIDAY	TBA	
WEEK 7		
MONDAY	Geologic time	Chapter 8 and 10
WEDNESDAY	Geobiology and History of Life	Chapter 11
FRIDAY	Glaciers, Pleistocene Glaciation	Chapter 15
WEEK 8		
MONDAY	Weathering Erosion and Mass Wasting	Chapter 16
WEDNESDAY	Ground water uses and abuses	Chapter 17
FRIDAY	EXAM II	
WEEK 9		
MONDAY	Final Project Presentations	
WEDNESDAY	Final Project Presentations	

Laboratory: All laboratories will meet in Mudd 66.

Lab #	Date	Activity	Location	Reading
1	Week 1	Rocks and Minerals	Mudd 66	Chapter 3, 4, 5, 6
2	Week 2	Rocks and Minerals continued	Little Chicago field trip	Chapter 3, 4, 5, 6
3	Week 3	Geology of Southern Minnesota	Field trip to Sogn	Hand out
4*	***Sunday Oct. 5, 2014***	Geology of Southern Minnesota	*Taylors Falls*	Hand out
5	Week 4	Geology of Southern Minnesota	Field trip Red Wing	Hand out
6	Week 5	Geology of Southern Minnesota	Field trip to Cannon Valley Wilderness Park	Hand out
7	Week 6	**No lab on Monday, but there will be lab on Tuesday**	**Geology Dept field trip**	
8	Week 7	Geology of Southern Minnesota	Field trips to Lakes and streams	Hand out
9	Week 8	Geology of Southern Minnesota	Soil mapping	Hand out
10	Week 9	Geology of Southern Minnesota	Mudd 66	Hand out
11	Week 10	Finishing final projects	Mudd 66	

Please note the following 2 items:

* Sunday Oct. 5, 2014: Meet at @7:30 AM and Leave @ 8:00 AM return to Northfield at 4:30 PM.

Class Projects:

For several years my students have been doing group projects. Learning and working in groups involves shared and/or learned values, resources and ways of doing research. Students from many of my classes have done great group projects and you can see them in the website or in prints. In the past, these projects include local geology, water chemistry and mapping. This term, we will learn a great deal about minerals and textures of rocks from thin sections. You will be giving a rock and its thin section and you will take photomicrography of that rock and study the minerals and the textures using a petrographic microscope. I will give you a variety of possible topics that you can choose by the end of the first week. At the end of the term, you will write a report, make a poster and present your findings using power point. You will follow the following is a format for your paper. There are several papers about past projects in my website and in my office, please look at the early to see the format and the work done.

Final paper and poster format

Think of the report as a scientific paper. It should have a title and sections containing:

- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Reference

A brief description of what should be included in each of these sections is included below.

- Introduction. Your introductory paragraphs must include:
  - Purpose: A single, concise statement of the major objective of the lab, i.e. what are the questions you are tying to answer.
  - Background: A brief summary of the topic being investigated, including any information which may be necessary in order to understand your
  - Stated purpose of the lab.
  - State the major results/findings of the lab exercise.
- Methods. Include the information necessary to allow someone to repeat what you did.
  - What data did you use?
  - Include geographic locations, definitions of key terms, and anything else necessary in order to understand exactly what you did.
- Observations and Results.
  - What did you observe in each part? Include all observations made at the suggestion of the lab exercises. Always include the units of physical quantities and label axes of plots.
  - Describe any relationships that you observed between variables.
  - Where appropriate include figures, graphs and calculations.
- Discussion. This is the most important part of the lab, as it is where you interpret your observations and results.
  - Give explanations for and implications of any relationships observed. Were the relationships as you expected from underlying physical principles?
  - What are the main sources of uncertainty in interpreting your observations?
  - Address any interesting questions you may have had as you were working through the lab exercises, as well any general questions included in the lab exercises.
  - Can you make any generalizations? Why or why not?
- Conclusion. Summarize your results, the main points of your discussion, and how they relate to your stated purpose of the lab. It is a good idea to include how the main points of your discussion are connected, in order to demonstrate the overall significance of your findings and the concepts you learned.
- Reference: Follow GSA style of listing all resources used in the lab report.