

# HISTORY OF THE EARTH

## GEO-SCI 201 - Spring, 2008

**Lecture:** MWF 11:15-12:05 (#56790) (**Room 136**)  
**Labs:** W 1:25-3:20 (#56792) or F 1:25-3:20 (#56794) (**Room 225**)  
**Honors Colloquium:** Geo-Sci H03 TBD (1 credit; #80905)

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Office Hours: TuTh 2:30-3:30, and by appointment

Textbook (required)\*: *Historical Geology*, fifth edition (2007), Reed Wicander and James S. Monroe

Lab Manual (required)\*: *Earth History*, compiled by Mark Leckie

*\*the Textbook is available at the Textbook Annex (on campus); the Lab Manual will be produced in-house at a cost of \$10.*

### COURSE PHILOSOPHY AND ORGANIZATION:

*The lecture part of the course will cover two important aspects of historical geology. The first half of the course will cover **fundamental principles and concepts in geology** including the nature of Earth materials, paleontology and the evolution of life, plate tectonics, major sedimentary environments, relative dating and geologic time, and principles of stratigraphy and correlation. The second half of the course deals with **Earth history**; all 4.6 billion years of it!*

*The textbook by Wicander and Monroe presents a very readable account of this highly multidisciplinary field of science we call Geology. We will focus on the integrated nature of **Earth's interconnected and interrelated systems** of the Geosphere, Atmosphere, Biosphere, Hydrosphere, and Cryosphere. During the semester I will try to emphasize the question of "**How do we know what we know?**". This is an excellent mantra to follow as you investigate and learn new things.*

1. There will be **three in-class essays** dealing with material discussed in class and covered in the textbook; I will give you advance notice. These 50-minute writing assignments will replace the traditional exams and are each worth **10%** of your grade in the course (**30% total**).
2. There will be a **Final Exam** that will be worth **~15%** of your final grade and will cover the last 543 million years of Earth history (Phanerozoic Eon), and include a short essay.

*The laboratory part of the course is designed to give you hands-on learning experiences. These kinds of exercises will expose you a combination of practical applications in geology as well as basic **critical thinking and problem-solving** experiences (it is important to get practice at these basic life skills).*

3. The **Lab** portion of the course will be worth **25%** of your final grade. The labs will consist of **weekly exercises**, and a **Lab Final Exam**. You will need to prepare for each lab meeting by reading the assigned exercise prior to lab. In this way, you should be able to complete most assignments during the two-hour lab time; although a couple of our lab exercises may be extended over two weeks. The Lab Final will be worth 5% of the total grade for the course (the lab exercises count for 20%).

*Preparing for life as a professional is a tangible benefit of many of the courses you take as a geology major. What characteristics are employers looking for?: 1) ability to write a coherent report, 2) capacity to function in a diverse workplace, and 3) responsibility and determination to solve problems. **Writing and communication** are among the most basic aspects of everyday life as a professional in whatever occupation you seek. The ability to clearly and concisely convey information to a co-worker or the boss is of paramount importance to your success in the workplace. Not only the writing itself, but also **being punctual** and **meeting deadlines** will impact your success. In addition, **working in groups** is a common practice in many professional occupations where listening to other opinions, ideas, and approaches leads to creative **problem solving**, and compromise leads to effective team work. Your ability to communicate well with your boss and co-workers, function in team situations, and conduct yourself in a professional manner are important life skills to be honed while in college.*

4. There will be several short **writing assignments, take-home assignments** and/or **group projects** totaling **~15%** of your final grade. For example,
- We will do a **week long, in-class group "jigsaw" project** dealing with plate tectonics, the major paradigm in geology and the Earth sciences. In a jigsaw, each individual in the class will be responsible for a certain portion of the material to be covered. Everyone will prepare their own pre-report, which will be collected and graded. Groups of students working on the same topic will then convene a group meeting to share notes and build a thorough overview of the assigned topic. In the final phase of the jigsaw, new groups will be formed from representatives of the original groups. The task of these new groups is to share your newly gained knowledge with other group members who likewise will bring additional information to the table. A group report will be generated in class using laptop computers. Your grade will be based on your individual effort (pre-report) and the group report.
  - Other **in-class projects** may include: "Early Doctrines and Historical Figures", "The Rock Cycle", "Evolution", and/or "Evolution of Plate Tectonic Theory"

*Lastly, one of the most fun parts of the course will be two **field trips**. Collecting observational and other types of data in the field is the cornerstone of geology.*

5. We will have **two required field trips**. By necessity they will be on weekends; the first is a one-day trip, and the second may be an over-nighter. We have tentatively scheduled a field trip to the Massachusetts coast on **Sunday, February 24** (we may drive down to the Cape Saturday night) and a two-day trip to upstate New York the **weekend of April May 3-4**. Your participation and **field trip reports** will total **~15%** of your grade for the course. If you are unable to participate in these fun trips due to illness, participation in UMass sports, or work schedule, then alternate substitute project(s) will be assigned (e.g., you'll be able to substitute a *research paper or other longer writing assignment to be determined in consultation with me*). If you are unable to go on a trip, then it is important to notify me in advance so that we don't hold-up our scheduled departure waiting for a no-show.

**Please note: All take-home writing assignments and field trip reports must be typed double-spaced and turned-in on time** (tardy papers will lose 5%/day).

**Everyone should read and review Chapter 2 on Earth Materials – Minerals and Rocks, particularly if you have not had an introductory geology course with a lab**

## **MATERIALS YOU'LL NEED FOR THIS COURSE:**

1. **Textbook** – the book may be purchased at the Textbook Annex. You may need your book for some in-class exercises and for some labs; I'll remind you ahead of time.
2. **Lab manual** – this must be purchased from me for (\$10 to cover some of the photocopying expense); I will provide the materials on lab day.
3. **Field notebook** – this is basic geologic equipment and highly recommended (inexpensive and available at the University Bookstore in the Campus Center).
4. **10x hand-lens** – this is basic geologic equipment and highly recommended (inexpensive and available at the University Bookstore in the Campus Center).
5. **Pencils** are preferable to pens for many in-class exercises and lab assignments; **colored pencils** will be required for particular labs.

## **EXPECTATIONS:**

1. This is an information-intensive and big-picture course. Attendance is required in both the lecture and the lab. Please note that **class will start promptly at 11:15** and the **labs will start at 1:25**.
2. You will find it useful to **read the required chapters before the lectures**. On a number of occasions we'll be working in groups to discuss questions or compile information, and your textbook will be a valuable resource to have on-hand.
3. It is very important that you **read the laboratory manual before coming to the lab**. Most of the weekly exercises can be completed during the two-hour lab time if you have already familiarized yourself with the background material and are prepared to get on-task.
4. There will be a fair amount of grading for both the T.A. and me during the semester. For this reason, laboratory exercises, writing assignments, and field trip reports have **firm deadlines**. Late papers will lose 5% per day and will not be accepted after one week (see me immediately if you have legitimate extenuating circumstances preventing you from completing an assignment on time). These deadlines should also help you from getting behind in the course.

## Tentative Schedule and Readings for Geo-Sci 201 - Spring, 2008

DATE	TOPIC	READINGS
Jan. 28	<b>What is Historical Geology?</b>	Chapt. 1 (1-6)
30	<b>Geologic Roots</b>	Chapt. 1 (11-13), Chapt. 4 (66-67)
Feb. 1	<b>Evolution and the Fossil Record</b>	Chapt. 5 (85-91), Chapt. 7
	<i>Geologic Doctrines Assignment due</i>	
4	Evolution and the Fossil Record	
6	Evolution and the Fossil Record	<i>Evolution Assignment due</i>
8	<b>Absolute Dating Methods &amp; the Geologic Timescale</b>	Chapt. 4, Chapt. 5 (91-98)
11	Absolute Dating Methods & the Geologic Timescale	
13	Absolute Dating Methods & the Geologic Timescale	
15	<b>ESSAY: DEVELOPMENT OF THE GEOLOGIC TIME SCALE</b>	
18	<i>HOLIDAY - President's Day (NO Classes)</i>	
19	Follow Monday schedule: <b>Plate Tectonics</b> (jigsaw project)	Chapt. 1 (9-11), Chapt. 3
20	Plate Tectonics (jigsaw project)	
22	Plate Tectonics (jigsaw project)	
24	<b>** (SUNDAY) FIELD TRIP TO THE BEACH ON CAPE COD **</b>	
25	<b>Nature of the Sedimentary Record &amp; Depositional Systems</b>	Chapt. 6
	<i>Plate Tectonics Group Report due</i>	
27	Nature of the Sedimentary Record & Depositional Systems	
29	Nature of the Sedimentary Record & Depositional Systems	
Mar. 3	<b>Principles of Stratigraphy and Correlation</b>	Chapt. 5
	<i>Cape Cod Fieldtrip Report due</i>	
5	Principles of stratigraphy and correlation	
7	<b>ESSAY: NATURE OF THE SEDIMENTARY RECORD</b>	
10	<b>The Formation of Earth</b>	Chapt. 1 (6-9)
12	<b>The Archean Eon and the Origin of Life</b>	Chapt. 8
14	The Archean Eon and the Origin of Life	
15-23	<b>SPRING BREAK</b>	
24	The Archean Eon and the Origin of Life	
26	<b>The Proterozoic Eon: Growth of Continents &amp; Evolution of Life</b>	Chapt. 9
28	The Proterozoic Eon: Growth of Continents & Evolution of Life	
31	<b>Snowball Earth Hypothesis</b>	extra reading
Apr. 2	<b>ESSAY: ARCHEAN AND PROTEROZOIC HISTORY &amp; CONTRASTS</b>	
4	<b>The Cambrian Explosion</b>	Chapt. 12 (232-234)
7	<b>The Early Paleozoic Era</b> (Cambrian-Silurian Periods)	Chapts. 10, 12, 13
9	The Early Paleozoic Era (Cambrian-Silurian Periods)	
11	The Early Paleozoic Era (Cambrian-Silurian Periods)	
14	<b>The Late Paleozoic Era</b> (Devonian-Permian Periods)	Chapts. 11, 12, 13
16	The Late Paleozoic Era (Devonian-Permian Periods)	
18	The Late Paleozoic Era (Devonian-Permian Periods)	
21	<i>HOLIDAY - Patriot's Day (NO Classes)</i>	
23	<b>End-Permian Mass Extinction</b>	Chapt. 12 (244-245)
25	<b>The Mesozoic Era (Triassic Period)</b>	Chapts. 14, 15
28	<b>Cyclicality in the Rock Record: Milankovitch theory</b>	Chapt. 17 (362-366)
30	<b>Guest Lecture by John Hubert: Triassic-Jurassic Rift Basins of the Northeast</b>	
May 2	<b>The Mesozoic Era (Jurassic &amp; Cretaceous Periods)</b>	Chapts. 14, 15
3-4	<b>** (SAT.-SUN.) FIELD TRIP TO ORDOVICIAN &amp; DEVONIAN OF NY **</b>	
5	The Mesozoic Era (Jurassic & Cretaceous Periods)	
7	<b>The End-Cretaceous Mass Extinction</b>	Chapt. 17
9	<b>The Cenozoic Era (Paleogene &amp; Neogene Periods)</b>	Chapts. 16, 18
12	<b>The Cenozoic Era (Pleistocene &amp; Holocene)</b>	Chapt. 17
14, 17	<b>READING DAYS</b>	
15-22	<b>FINAL EXAMS ** FINAL EXAM TBA **</b>	
24	<b>UNDERGRADUATE COMMENCEMENT</b>	