

GEOLOGY 166: HISTORICAL GEOLOGY

Instructor: Garry Hayes - Science Community Center 336

Phone and Voice Mail: 575-6294

Office Hours: TTh 8:15-8:45; 11:45-12:45, 5:30--6:30

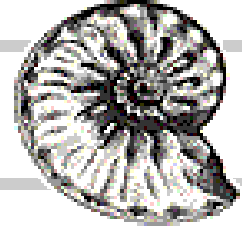
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Required Texts:

The Earth Through Time, Harold Levin



Welcome to the geological sciences! Historical geology deals with the history of planet Earth and the development and evolution of life throughout geologic time. During the semester, we will deal with the origin of the planet and Solar System, the origin of life, the myriads of life-forms that have inhabited the planet, mass extinctions, movement and collisions of continents, and the origins of many of the features we see on earth today.

Grading Policy: (subject to change due to extenuating circumstances)

Tasks	Points
Midterms	100 points
Final	200 points
Chapter Quizzes	200 points
Laboratory Exercises	300 points
Extra Credit Projects	(50 points)
Total	800 points

A: 800-720 B: 720-640 C: 640-560 D: 560-480

The Midterms and Final will each consist of multiple-choice questions, and a selection of essay questions. The final will be comprehensive. Chapter quizzes will mainly be fill-ins and true-false questions. **Quizzes cannot be made up** unless the instructor is notified in advance of an absence. Make-up quizzes will be essay questions.

Extra credit can be earned by completing at least 10 chapter review assignments at five points apiece. Up to 50 points can be earned. You are strongly encouraged to do the extra credit assignments. The chapter review assignments are due at the time of each quiz and **will not be accepted** if they are late.

“After sleeping through a hundred million centuries we have finally opened our eyes on a sumptuous planet, sparkling with color, bountiful with life. Within decades we must close our eyes again. Isn’t it a noble, an enlightened way of spending our brief time in the sun, to work at understanding the universe and how we have come to wake up in it? This is how I answer when I am asked—as I am surprisingly often—why I bother to get up in the mornings.”

Richard Dawkins

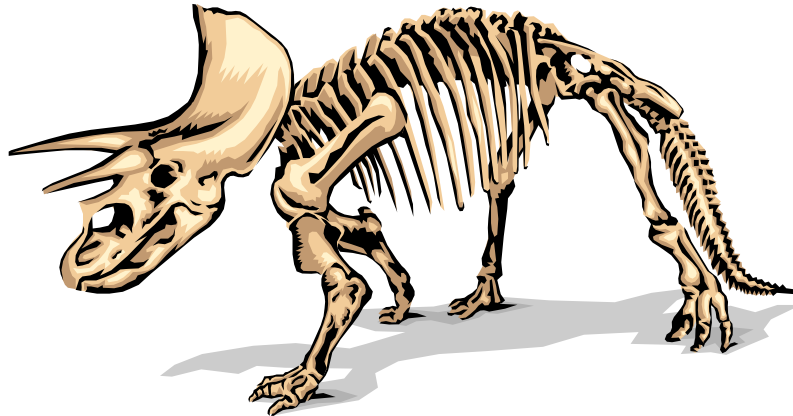
When does it all happen? (This schedule is really tentative...)

Week	Date	Topics	Reading
1	Jan 10-12	Intro to Earth History and Geologic Time	Chap. 1-3
2	Jan 17-19	Earth Materials	Chap. 4
3	Jan 24-26	The Sedimentary Archives	Chap. 5
4	Jan 31-Feb 2	The Fossil Record	Chap. 6
5	Feb 7-9	Earth Structure and Plate Tectonics(Thursday off)	Chap. 7
6	Feb 16-18	The Archean	Chap. 8
7	Feb 21-23	The Proterozoic Eon	Chap. 9
8	Feb 28-Mar 2	Early Paleozoic Events	Chaps. 10
9	March 7-9	Late Paleozoic Events	Chap.11
10	March 14-16	Life of the Paleozoic	Chap. 12
11	March 21-23	The Mesozoic Era	Chap. 13
12	March 28-30	The Mesozoic Biosphere	Chap. 14
13	April 4-6	The Cenozoic Era	Chap. 15
14	April 11-13	Life of the Cenozoic	Chap. 16
15	April 18-20	Human Origins	Chap. 17
16	Final Examination	Tuesday, April 25	Comprehensive

Surviving Historical Geology

Every student is unique with different strengths and weaknesses. Some of you may find this to be a difficult course, while others may find it to be relatively easy. The most important point to know is that you **can pass this course!** It may, however, be necessary to change some of your study habits and learning strategies, especially if you are just beginning your college education.

The number one rule is this: there is no substitute for effort. **Do not come to my office two weeks before the end of the course asking how you can pass the class.** You will know long before then that you are in trouble.



The following tactics have all proven helpful to students over the last few years:

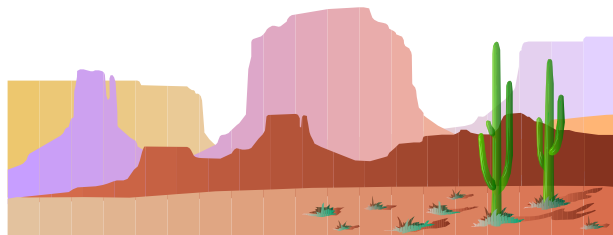
ALWAYS ATTEND CLASS - This shouldn't have to be said, but it is truer for science courses than for many others: You will miss a tremendous amount of information if you aren't there. If you **have** to miss a class, you are **still responsible** for all that occurs, including test and quiz announcements. Call me or get notes from someone else in the class. (Also, three (3) consecutive absences will be considered sufficient grounds for dropping you from the course). If you have access to a computer, you can ask questions through the Internet (my E-Mail address is on the first page).

READ THE TEXT BEFORE THE LECTURE - Read the text after the lecture. And read it before tests. Do the practice quizzes at the end of the chapters. Books are required for a reason. Make use of them.

ALWAYS TAKE COMPLETE NOTES - and rewrite them after referring to your text. You will remember only 10% of what you hear, 20% of what you write, but more than 40% of what you hear and rewrite. Practice your drawing skills; a picture many truly be worth a thousand words.

If these standard suggestions do not work for you, and you are not meeting your goals, it is time to start changing your strategy. Try the following (in no particular order):

USE 3X5 FLASH CARDS to help memorize terms. Much difficulty in this course results from not learning the language of science. Put the term on the front, and the definition on the back. Carry a few in your pocket or purse, and glance at them when you are standing in line, or during commercials.



SET ASIDE STRICT STUDY HOURS. Students often rebel at the concept of study time outside the classroom (at least I did while in school!) This is unfortunate, since most learning occurs during study time. Make it a habit to give 2 hours of study for every hour of class lecture

FORM A STUDY GROUP with other members of the class. Often what is not understood by one person can be

explained by another. You can quiz and drill each other.

GET THE HELP OF A TUTOR OR LAB ASSISTANT. Too few students take advantage of the tutoring program here at MJC. The tutors are students who received 'A's when they took the course, and students who have received tutoring have had marked increases in their test scores.

MAKE USE OF THE INSTRUCTOR'S OFFICE HOURS: I am available and happy to help you in any way I can. If you can't make it during regular office hours, call me and make an appointment, or contact me through E-Mail.

GET MORE INVOLVED IN THE SCIENCE OF GEOLOGY: The National Association of Geoscience Teachers and the Geological Society of America have low student membership rates. Both organizations are a great way to find out what professional geologists do. I am the campus representative for both of these organizations and can provide you with more information.

Some people are scared of science courses, believing them to be mysteriously different from other courses, as well as harder and difficult to pass. This is unfortunate because most scientists approach the world with an almost childlike curiosity. Every elementary school child I've dealt with has had an innate fascination for volcanoes, earthquakes, fossils and crystals. I do too, and I hope you will rediscover some of that fascination during this course.

SCORE CARD:

Quizzes:

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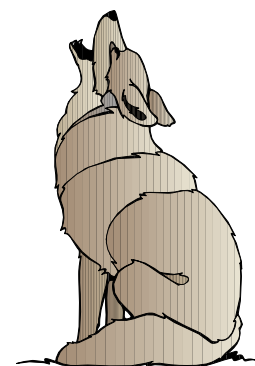
Chapter Review:

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Midterms and Final:

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If you successfully read all of the above, you have earned the right to some extra credit points! Get to a computer, and visit the Geology 166 website, linked from the department web page shown on the front cover (you can access it at <http://havesg.faculty.mjc.edu/Geology166.html>). Note the location at which the picture was taken, and e-mail me before the second class meeting to receive 5 extra points.



What will you know when you finish this course? What new skills will you have? The following items are the Student Learning Outcomes (SLO's) for Historical Geology. Upon successful completion of the course, you will be able to:

- A. **Analyze the elements of the scientific method and explain how these principles apply to the study of the earth.** All sciences share a common methodology of attaining knowledge that seeks to eliminate bias and prejudice in research. You will know the difference between a hypothesis and a theory (and it may very well not be what you think!).
- B. **Use the basic geologic principles of uniformitarianism, original horizontality, lateral continuity, superposition, cross-cutting relationships, and biologic succession and the examples of present-day geologic processes to explain the formation and evolution of the features of the earth.** Many people are surprised that a geologist can look at a few rocks in a roadcut or mountainside and then immediately tell a complete story of how those rocks came about. In this class, you will learn the set of principles that geologists use to tell the story of the rocks. You will have the ability to interpret the story in the rocks yourself, either in pictures and diagrams, or by visiting the localities yourself.
- C. **Assess and evaluate competing hypotheses regarding the concept of geologic time, the origin of the earth and solar system, patterns of evolution and paleobiology, and the development and movement of continents through time.** Geologists are still arguing about geological processes. This is how science is meant to work, so we will be learning how controversies and arguments are settled in geologic research.
- D. **Test for the physical and chemical properties of minerals, and identify the most common minerals and igneous, sedimentary and metamorphic rocks.** The nuts and bolts of geology is the ability to identify the most common rocks and minerals. You will know fully 95% of all the minerals and rocks anyone will ever ask you about! We will especially observe sedimentary rocks and the structures they have that reveal the past history of the earth and its environment.
- E. **Interpret geologic features and landforms from geologic and paleogeographic maps.** Historical geologists reconstruct past worlds through the use of these maps; we will do the same, figuring out the locations of ancient mountain ranges, valleys and oceans, where none exist today
- F. **Identify and interpret the evolution of life through time** through the observation and analysis of fossil specimens. The record of life is replete with strange creatures of great diversity. We will learn of the extensive fossil record that exists in the rocks.
- G. **Explain the necessary role of the historical geologist in the modern technological society in areas such as urban planning, the search for new energy resources, and environmental research.** Can we drill offshore of California and bring back \$2/gallon gas? Are politicians correct when they say global warming is not real, or that what we are now experiencing is a natural, repeating process? What are the long-term effects of human activity on the biosphere? Are we causing a mass extinction event like those of the geologic past? (yes) Geologists have a lot to say about these issues, and you will understand how scientists approach these problems.



Historical Geology Laboratory

"DOING" SCIENCE:

Contrary to the view of many people, most scientific research is not done by the lonely and slightly mad research genius working in an isolated castle. It is a communal effort of many people working together, trying to solve a common problem or puzzle.

In the lab, we will also work in groups. Your grade points will be evenly split between your individual efforts and those of your group. Each group should have 3-4 people and will be selected during the first lab period. If anyone is not doing their part in the group, they will not be given the credit for the group's work. Please see the instructor if there are any problems. If you work better on your own, you may feel free to do so.

THE LAB:

The Lab meets in Room 326 of the Science Community Center. Each week a new exercise will be assigned. Unless otherwise noted, the lab exercises will be due at the beginning of the following week. Although each individual will complete the assignment in their own lab manuals, most weeks the group will submit a single copy of the assignment with everyone's signature. **Twice during the semester, the lab notebooks will be collected and graded for individual credit.** Pop quizzes will be given a number of times during the semester (groups will work together on these). **The midterm and final will be individual efforts.**

LAB EXIT QUIZZES

You can leave the lab as soon as you are done with the day's assignment. For attendance purposes, and as a source of learning outcome feedback, you are requested to take the **lab exit quiz**, a series of four questions or problems on the subject of the day. You are to answer the questions by yourself, and without the help of books or notes. To get credit, you must get three out of the four questions correct. You may make three attempts to pass, but you must go to the end of the line each time. Take the completed lab to the instructor or laboratory assistant to receive your grade. The quizzes are worth two points each, and cannot be made up at a later time.

EQUIPMENT AND TEXT:

The Earth Through Time by Levin

Historical Geology Lab Manual (provided)

10 power handlens (available at Bookstore, Great Valley Museum or NASCO West)

Colored Pencils

Group Exercises

Assignment																
Score																
Exit Exam																

Tentative Schedule

Week	Date	Topics	Reading
1	Jan 10-12	Introduction to Rock Forming Minerals, Igneous and Metamorphic Rocks	Chap. 4
2	Jan 17-19	Sedimentary Rocks and Textures	Chap. 5
3	Jan 24-26	Sedimentary Environments	Chap. 5
4	Jan 31-Feb 2	Facies and Paleogeographic Maps	Chap. 5
5	Feb 7-9	Lithofacies Maps and Geologic Cross-Sections	
6	Feb 16-18	TBA	Chap. 5
7	Feb 21-23	Tectonics and Sedimentation	Chap. 7
8	Feb 28-Mar 2	Introduction to Paleontology	Chap. 4
9	March 7-9	Micropaleontology	Chap. 15
10	March 14-16	Porifera, Cnidaria, Bryozoa, and Brachiopoda	Chap. 15
11	March 21-23	Mollusca: Pelecypoda, Gastropoda, Cephalopoda	Chap. 15
12	March 28-30	Arthropoda, Echinodermata, Graptolithina	Chap. 10
13	April 4-6	Geological Maps	Chap. 12
14	April 11-13	Geologic Maps	
15	April 21	Laboratory Final	Chap. 14