

Syllabus: Geoscience 112 History of Earth and Life

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Office Hours: Monday 10:30 AM -12:30 PM, Wednesday 1:00 – 3:00 PM Or by appointment

Lectures and Discussions: 201B Natural Sciences Mon, Wed, Fri 9:15 AM-10:15 AM

Labs: 229 Natural Sciences T 9:45-12:45 AM T 2:00-5:00 PM W 1:00-4:00 PM W 6:00-9:00 PM

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Prerequisites: Geos 101X (The Dynamic Earth) or GE 261 (General Geology for Engineers)

Required Text: •Wicander, R., and Monroe, J.S., 2007. Historical Geology, 5th Edition.
Thomson Brooks/Cole Publishing, 427 p.

Introduction: This course is about the history of the Earth and the evolution of the life forms that inhabit our planet. This is a subject that is deeply concerned with time - large amounts of time. Geological events are typically measured in millions or billions of years. This time scale, *geologic time*, vastly transcends the human experience. Events that are exceedingly rare during a human lifetime may be frequent and inevitable at geological time scales. A primary objective of this course is to change your frame of reference to one that incorporates a sense of geologic time. In the process, you will gain an understanding of the evolution of the Earth and the degree to which geological processes and biological evolution have influenced each other throughout Earth's history. If you take this course seriously, it will change the way you see the landscape, the biota, and your place in history.

Lecture Attendance: I regard a university class as an adult audience. Lecture attendance is entirely your responsibility. However, it is highly unlikely that you can perform well in this course without attending lectures. You cannot pick up lecture material from the text alone. Therefore, I strongly recommend that you attend every session.

Labs: Hands-on experience in the lab is essential to a complete understanding of rock types and fossil organisms. Labs also provide an opportunity for you to make your own interpretations of the history contained in the rock record, using geological techniques. In other words, the lab is where you will practice *doing* science. Consequently, labs form an important component of your grade. The final lab grade will be a sum of all your lab scores, so you cannot afford to miss a lab. Consequently, **attendance in lab is absolutely required**. Failure to attend lab or to turn in all lab exercises *will* result in an incomplete. So that you will not have to spend additional time on "lab homework," each lab can be completed during the scheduled lab period. However, this will require that you commit yourself for most or all of the three hours. Do not schedule other activities during any portion of the lab period.

Posters: Working in teams of two, each of you will research a topic and prepare a poster to display your findings. Selection of a topic is up to you, but I will be glad to help if you need suggestions. You may research any subject your team chooses, so long as it pertains to Earth history. Your job is to explore the subject in greater depth than course lectures or textbooks permit, so be sure to select your topic

accordingly. The final poster should contain both a concise summary of your findings and some informative graphics. Completed posters will be displayed for the class in mid-April. At that time you will have the opportunity to explain what you have learned to your fellow students. Note that one class period is reserved for poster displays. During this period, you'll have a few minutes to briefly summarize your findings. A list of teams and topics (based on your choices) will be distributed after the first exam. If you have a partner that you wish to work with, please let me know at that time.

Quizzes: A very short, 3 point quiz will be handed out each Friday for completion in class. These quizzes are not intended to be difficult. Instead they will focus on main points of the week's lectures. The Earth is 4.6 billion years old, and the topic of its history necessarily covers lots of material. Quizzes will help you keep on top of the information and evaluate your understanding of the week's subjects. Your two lowest scores will be dropped from your final quiz grade.

Field Trip: Weather permitting, there will be a field trip to observe exposures of sedimentary rocks and fossils. This required trip is tentatively scheduled for Saturday, May 5, with a rain date of Sunday, May 6. Vans will depart the Natural Sciences parking lot promptly at 8 AM and return at approximately 5 PM. Students should bring the following: Warm clothes, hiking boots, raincoat, field notebook/pencil, and a lunch. If you own them, you should also bring a hand lens and a rock hammer. This field excursion takes the place of a lab; labs are canceled for the week of April 30th. **As for all other labs, field trip attendance is mandatory.**

Disability Services: The Office of Disability Services implements the Americans with Disabilities Act (ADA) and ensures that UAF students have equal access to the campus and course materials. I will work with the Office of Disability Services (474-7043) to provide reasonable accommodation to students with disabilities. Please let me know at the beginning of the course if accommodations should be provided.

Grading: Grades will be weighted as follows: 50% class, 35% lab, and 15% poster project. The class grade will be determined by performance on two midterm exams, a final exam, and quizzes. Exams and quizzes will be given only at the scheduled times. Make-up examinations will be given *only* under extenuating circumstances; a written explanation from your doctor or dentist will be required in the case of a medical emergency. The final examination will focus on material from the last third of the course, but you will also be expected to demonstrate a more general, comprehensive understanding of the subjects covered throughout the semester. The final exam will be given **ONLY** on the day and time scheduled by the university, so make travel and work plans accordingly. Lab grades will be based upon performance on lab exercises. Posters will be evaluated on the basis of content and presentation.

Midterm Exam 1: 15%
Midterm Exam 2: 15%
Final Exam: 15%

Friday Quizzes: 5%
Laboratory Exercises: 35%
Research Project/Poster: 15%

Lecture and Lab Schedule

Date	Topic	Reading
1/17 (W)	Introduction: Geology as a 4D science	Chapter 1 (1-14)
1/19 (F)	Sedimentary rocks and the geologic record	Chapter 2 (16-33)
1/22 (M)	Mountains, rivers, deserts, and sandstone	Chapter 6 (101-111)
1/24 (W)	Coral reefs, carbonate platforms, and limestone	Chapter 6 (111-120)
1/26 (F)	Relative ages and the principles of stratigraphy	Chapter 5 (77-85)
	Lab #1: Deep Time and the Geologic Time Scale	
1/29 (M)	Fossilization: Preservation sans formaldehyde	Chapter 5 (85-91)
1/31 (W)	Biostratigraphy and the meaning of fossils	
2/2 (F)	Construction of the relative geologic time scale	Ch. 4 (60-67); Ch. 5 (91-98)
	Lab #2: Sedimentary Structures and Environments	
2/5 (M)	Radioactivity and the absolute time scale	Chapter 4 (68-75)
2/7 (W)	Evolution I: Life before Darwin	
2/9 (F)	Evolution II: Natural selection and genetics	Chapter 7 (122-130)
	Lab #3: Fossils: Symmetry, Diversity, and Preservation	
2/12 (M)	Evolution III: The paleontological “problem”	
2/14 (W)	Diversification and extinction	Chapter 7 (130-144)
2/16 (F)	Exam #1	
	Lab #4: Sequencing Geologic Events	
2/19 (M)	Plate Tectonics I: Drifting continents	Chapter 3 (35-41)
2/21 (W)	Plate Tectonics II: Paleomagnetism and polar wander	Chapter 3 (41-42)
2/23 (F)	Plate Tectonics III: Seafloor spreading	Chapter 3 (42-44)
	Lab #5: Correlation of Ancient Rocks	
2/26 (M)	Plate Tectonics IV: How to recognize a plate boundary	Chapter 3 (45-58)
2/28 (W)	Starting with a bang: Birth of the universe	Chapter 1 (6-9)
3/2 (F)	Archean protocontinents	Chapter 8 (146-159)
	Lab #6: Plate Tectonics	
3/5 (M)	The origin of life	Chapter 8 (159-164)
3/7 (W)	Proterozoic geology: Cratons and supercontinents	Chapter 9 (166-175)
3/9 (F)	Snowball Earth and the emergence of animals	Chapter 9 (175-186)
	Lab #7: Geologic Maps I: Fundamentals	
3/12 - 3/18	Spring Break, No Classes!!	
3/19 (M)	Early Paleozoic geology: Continental seas and orogenies	Chapter 10 (189-207)
3/21 (W)	Invertebrates and the Cambrian explosion	Chapter 12 (230-246)
3/23 (F)	Late Paleozoic geology: Assembling Pangea	Chapter 11 (209-229)

Lab #8: Paleozoic Life I: Shallow Seas

3/26 (M) Vertebrate evolution: Stepping fin onto land Chapter 13 (249-260)
3/28 (W) Carboniferous wetlands: When bugs were big Chapter 13 (260-270)
3/30 (F) **Exam #2**

Lab #9: Paleozoic Life II: Wetlands

4/2 (M) Mesozoic tectonics I: Birth of the Atlantic Ocean Chapter 14 (272-282)
4/4 (W) Mesozoic tectonics II: Mountains rise in the west Chapter 14 (282-293)
4/6 (F) Mesozoic life I: Reptiles, dinosaurs, and birds Chapter 15 (300-310)

Lab #10: Geological Maps II: Case Studies

4/9 (M) Mesozoic life II: Mammalian innovations Chapter 15 (310-318)
4/11 (W) Mesozoic life III: First flowers and flourishing forams Chapter 15 (295-300)
4/13 (F) K/T extinctions: Gradual or catastrophic? Chapter 15 (316-319)

Lab #11: Mesozoic Life: Predators and Burrowers

4/16 (M) Cenozoic tectonics: Mountains and more mountains Chapter 16 (321-345)
4/18 (W) Cenozoic carnivores: Birds are terrible lizards, too Chapter 18 (371-378)
4/20 (F) **Poster Session**

Lab #12: Exploring the UAF Museum

4/23 (M) The spread of grasslands and hoofed grazers Chapter 18 (378-390)
4/25 (W) Icehouse vs. greenhouse: Glaciers come and go Chapter 17 (347-368)
4/27 (F) **Nanook Springfest, No Classes!**

Lab #13: Trip to the Permafrost Tunnel

4/30 (M) Mammalian oddballs: Marsupials, whales, and primates
5/2 (W) Evolution of fruit bats: Guest Speaker Trina Roberts
5/4 (F) Monkey smart! Overview of the human family tree Chapter 19 (397-410)

5/5 (Sat) Lab #14: Field Trip/Sedimentary Rocks Exercise (8 AM on Saturday!)

5/7 (M) Where have all the giant Pleistocene mammals gone? Chapter 18 (390-394)

5/11 (F) Final Exam: 8:00 AM – 10:00 AM