

History of Earth and Life

4 Credits

Prerequisites: Geos 101 *or* GE 261

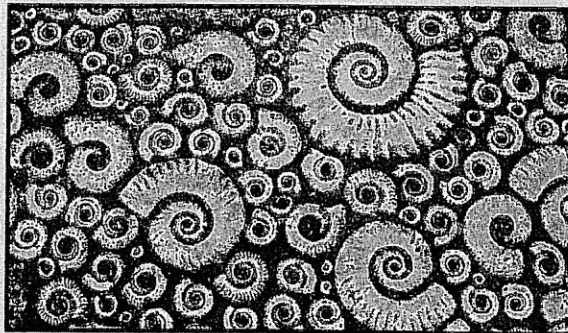
Professor: **Dr. Sarah J. Fowell**
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Geos 112 Course Syllabus

Lectures: MWF 10:30–11:30 am
202 Reichardt

Labs: W 6:00–9:00 pm
R 9:45 am –12:45 pm
229 Reichardt



Required Materials:

- **Text:** Babcock, L., 2009. **Visualizing Earth History.** John Wiley & Sons.
- **i>clicker:** i>clickers will be checked out to students for a \$30 deposit (*cash only*). You will get your deposit back when you return the clicker at the end of the semester. If you lose your clicker or fail to return it, the department will retain your deposit and put it toward the purchase of a replacement. Go to the Geology Department office (308 Reichardt) to pay your deposit and check out a clicker. Scored clicking will begin on **January 24!**

Historical geology is about evolution. This course will explore the evolution of planet Earth and the degree to which geological and biological processes have influenced each other throughout the history of 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 human experience. Events that are exceedingly rare during a human lifetime may be frequent and inevitable at geological time scales. If you take this course seriously, it will change your frame of reference to incorporate a sense of geologic time, a concept that will transform your understanding of the landscape, the biota, and your place in history.

Course Goals: The primary mission of this course is to provide you with the tools and skills necessary to reconstruct physical and biological events that occurred deep in Earth's past. To meet this goal, there are three primary course objectives: 1) Explore the ways in which plate tectonics, erosion, and climate change modify the size and topography of continents, using North America as the prime example. 2) Examine the sequence of organic evolution, from the triumphant trilobite to the mighty mammoth. 3) Understand the interrelationships between physical and biological processes and events.

Lecture Format: *Not* just “I talk, you take notes.” The best way to learn and retain the material is by actively participating. In addition to lectures, I will encourage you to participate in class activities, including group discussions and individual “clicker questions”. Your participation will be rewarded with a better grasp of the material and credit toward your participation/attendance grade.

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. **Completion of all lab exercises 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, each of you will investigate a topic and prepare a poster to display your findings. 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. Note that one class period is reserved for poster displays. During this period, you’ll have a few minutes to briefly summarize your findings. Teams will be expected to choose a topic shortly after the first exam. If you have partners that you wish to work with, please let me know at that time.

Quizzes: A very short, 3-5 point quiz will be given during class on Fridays. These quizzes are not intended to be “tricky”. 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. Since we will go over the quizzes in class, it is not possible to make up a missed quiz. However, your two lowest scores will be dropped from your final quiz grade.

Field Trip: A field trip to observe exposures of sedimentary rocks and fossils between Fairbanks and Livengood is scheduled for **Saturday, April 26**. This is a capstone experience that will allow you to apply your understanding of both physical and historical geology to reconstruct the geologic evolution of Alaska’s interior. 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. **As for all other labs, field trip attendance is mandatory.**

Support Services:

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.

Geology Computer Lab: The Department of Geology & Geophysics computer lab is located in 316 Reichardt. You can obtain a computer account from Instructor Jochen Mezger (jmezger@alaska.edu). Be sure to explain that you are enrolled in Geos 112, and include your full name and UAF login (typically your initials+last name), which will be your geology computer lab login. Jochen will send you a temporary password, which you will change the first time you log on.

Large Format Printer: As a student of geology, you are each allowed to print one 36 inch x 40 inch color poster on the department's large format printer. For general printing information and a list of acceptable file formats, go to: <https://cms-prod-edit.uaf.edu/geology/facilities/poster-printing/>. To schedule a printing time, e-mail Instructor Jochen Mezger (jmezger@alaska.edu). Be sure to explain that you are printing a poster for Geos 112. Include the program the poster was created in and the day/time you would like to print (allow 1 hour and be sure to print *before* the due date).

Blackboard: Course graphics will be posted on Blackboard (classes.uaf.edu) after class. However, posted graphics are not a substitute for class notes! Many of the graphics lack explanatory text. They are intended to supplement your notes and jog your memory as you work on homework assignments or prepare for exams.

Course Policies:

Participation and Attendance: Participation in class discussions and activities enhances your understanding and retention of the material. Therefore, **class attendance is required** and 10% of your final grade will be based on participation. Please try to remain punctual! If you arrive late, you may miss activities that will document your presence. In other words, if you are late, you may be counted absent. Because attendance is *highly* correlated with performance on labs and exams, students with a midterm attendance record of less than 65% will be removed from the course by faculty-initiated withdrawal.

Exams: The final exam will be given only on the day and time scheduled by the university, so make travel and work plans accordingly. 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. It is not possible to make up missed quizzes, but under some circumstances it may be possible to take the quiz a day early if you know that you will be absent on a given Friday.

Phones and Computers: Turn off your electronics during class. Take notes with a pen or pencil; the process of writing promotes retention and allows you to add arrows or draw sketches in the margins. In addition, highlighting and editing your notes by hand is far more effective than re-reading typed material. Therefore, there is no need to have your laptop in class.

Late Work: Homework exercises and projects are due at the beginning of class on the due date. Late assignments will be accepted for one week after the due date and assessed a penalty of 5 points per day. Assignments will no longer be accepted after 7 days.

Conduct: The **Student Code of Conduct** (p. 52 in the UAF Catalog) outlines your rights and responsibilities, as well as prohibited forms of conduct. Please be aware of the contents of the code.

Grading: Grades will be weighted as follows:

Midterm Exam 1: 10%	Laboratory Exercises: 30%
Midterm Exam 2: 10%	Research Project/Poster: 15%
Final Exam: 10%	Participation/Attendance: 10%
Friday Quizzes: 5%	Homework: 10%

Grade Scale: Quizzes, homework, laboratory exercises, research projects, and participation/attendance will be graded according to the following scale: 100-91% = A, 90% = A-, 89% = B+, 88-81% = B, 80% = B-, 79% = C+, 78-71% = C, 70% = C-, 69% = D+, 68-61% = D, 60% = D-, <60% = F. Midterm exams, final exams, and final weighted scores will be graded on a curve.

Lecture Schedule

Date	Topic	Reading & Homework
	Sediment, Rocks, and Geologic Time	
1/17 (F)	Introduction: Geology as a 4D science	Chapter 1 (pages 1-15)
1/22 (W)	Sedimentary rocks and the geologic record	Chapter 2 (26-59)
1/24 (F)	Mountains, rivers, deserts, and sandstone	Chapter 6 (158-179)
1/27 (M)	Coral reefs, carbonate platforms, and limestone	Chapter 6 (180-193)
1/29 (W)	Relative ages and the principles of stratigraphy	Chapter 1 (15-25)
1/31 (F)	Construction of the relative geologic time scale	Chapter 3 (60-80)
2/3 (M)	Earth's age: Radioactivity and the absolute time scale	Chapter 3 (81-85)
2/5 (W)	Dates vs. ages: What's the difference?	HW 1 Due
	Fossils, Evolution and Extinction	
2/7 (F)	Fossilization: Preservation sans formaldehyde	Chapter 4 (86-123)
2/10 (M)	Evolutionary theory before Charles Darwin	Chapter 5 (124-133)
2/12 (W)	Natural selection: The blind watchmaker	Chapter 5 (133-142)
2/14 (F)	Genetics and the "inheritance problem"	HW 2 Due
2/17 (M)	Fossils and the "paleontological problem"	Chapter 5 (143-157)
2/19 (W)	Exam #1	
	Continental Drift vs. Plate Tectonics	
2/21 (F)	Drifting continents	Chapter 7 (194-201)
2/24 (M)	Paleomagnetism and polar wander	Chapter 7 (202-207)
2/26 (W)	Seafloor spreading	Chapter 7 (207-225)
	The Precambrian: Earth's First 3.5 BY	
2/28 (F)	Starting with a bang: A universe is born	Chapter 8 (226-239)
3/3 (M)	Archean protocontinents	Chapter 8 (239-243)
3/5 (W)	The origin of life	Ch 8 (243-251) HW 3 Due
3/7 (F)	Rocks, microbes, and atmospheric oxygen	Chapter 9 (260-262)
3/10 (M)	Proterozoic cratons and supercontinents	Chapter 9 (252-259)
3/12 (W)	Snowball Earth	Chapter 9 (263-266)
3/14 (F)	The emergence of animals	Chapter 9 (266-277)

Date	Topic	Reading & Homework
3/17-3/21	Spring Break, No Classes!!	
	The Paleozoic Era: Old Life, Old Hills	
3/24 (M)	Invertebrates and the Cambrian explosion	Chapter 10 (278-299)
3/26 (W)	Assembling Pangea	(300-303; 313-317) HW 4 Due
3/28 (F)	Leaving the water: Fins, feet & the greening of Gondwana	Chapter 10 (304-312)
3/31 (M)	Carboniferous Wetlands: Scale trees and big bugs	Chapter 10 (317-321)
4/2 (W)	Amniotes gain reproductive freedom	Chapter 10 (322-327)
4/4 (F)	Exam #2	
	The Mesozoic Era: Monsters & Mountains	
4/7 (M)	Birth of the Atlantic Ocean	Chapter 11 (328; 337-339)
4/9 (W)	Mountains rise in the west	Chapter 11 (354-356)
4/11 (F)	Reptiles, dinosaurs, and birds	Ch 11 (330-336; 340-353)
4/14 (M)	Sea monsters (<i>Guest Speaker: Pat Druckenmiller</i>)	
4/16 (W)	Mammalian innovations	
4/18 (F)	Poster Session	Poster Projects Due
4/21 (M)	First flowers and flourishing foraminifera	Chapter 11 (356-360)
4/23 (W)	Meteorites and mass extinction	Chapter 11 (360-367)
4/25 (F)	UAF SpringFest - No Class!!!	
4/26 (S)	Field Trip: Evolution of Alaska 8AM-5PM	
	The Cenozoic Era: Feathered and Furry	
4/28 (M)	Origin of modern mountain ranges	Chapter 12 (368-375)
4/30 (W)	Birds are terrible lizards, too	Ch 12 (376-393) HW 5 Due
5/2 (F)	Icehouse vs. greenhouse: Glaciers come and go	Chapter 12 (393-411)
5/5 (M)	Where have all the Pleistocene giants gone?	
5/7 (W)	Final Exam: 10:15 AM - 12:15 PM	

Laboratory Schedule

Dates	Topic
January 22/23	Deep Time and the Geologic Time Scale
January 29/30	Sedimentary Structures and Environments
February 5/6	Sequencing Geologic Events
February 12/13	Fossils: Symmetry, Diversity, and Preservation
February 19/20	Rocks, Facies, and Correlation
February 26/27	Seafloor Spreading and Plate Tectonics
March 5/6	Tectonics on Other Planets
March 12/13	Paleozoic Life I: Shallow Seas
March 19/20	Spring Break! No Labs!
March 26/27	Geologic Maps I: Folds, Faults, and Unconformities
April 2/3	Paleozoic Life II: Primeval Wetland Forests
April 9/10	Geological Maps II: Tectonic and Environmental Reconstruction
April 16/17	Mesozoic Life: Predators and Burrowers
April 23/24	Tour of the Fox Permafrost Tunnel (bring your winter coat!)
April 26	Field Lab: Evolution of Alaska SATURDAY 8AM-5 PM