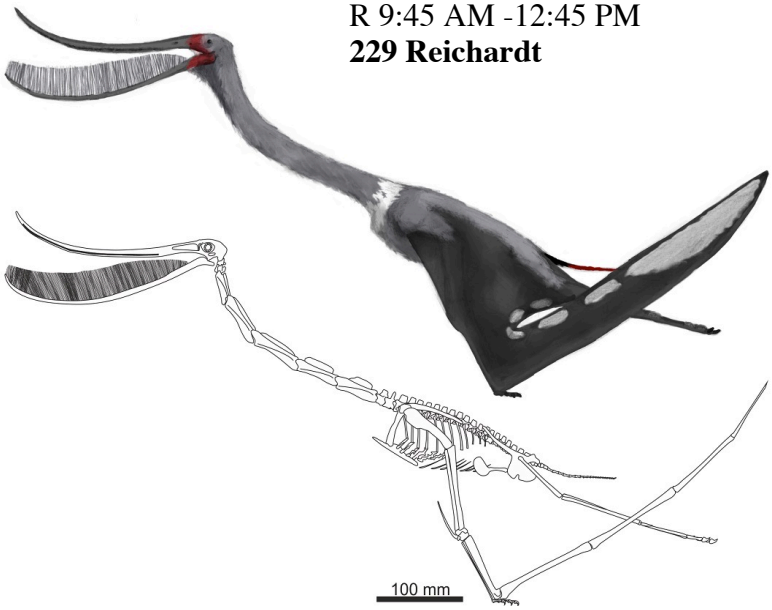
History of Earth and Life

Geos 112 Course Syllabus

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

Labs: W 6:00-9:00 PM or
R 9:45 AM -12:45 PM
229 Reichardt

4 Credits
Prerequisite: Geos 101 *or* GE 261



Professor: **Dr. Sarah J. Fowell**
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Office Hours: **W 4:00-6:00, R 3:00-5:00**

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Office Hours: **By appointment**

Required Materials:

❶ **Text:** Babcock, L., 2009. **Visualizing Earth History**. John Wiley & Sons.

❷ **i >clicker:** 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 Geosciences Department office (308 Reichardt) to pay your deposit and check out a clicker. Scored clicking will begin on **January 22**!

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 or 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, flora, fauna, and your place in history.

Course Goals: The primary mission of this course is to provide you will 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: The best way to learn and retain the material is by actively participating. In addition to listening to lectures and taking notes, 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. **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," labs are designed to 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 short quiz will be given during class on Fridays. These quizzes are not intended to be tricky. They will focus on main points of the week's lectures. The Earth is 4.6 billion years old, and its history necessarily covers lots of material. Quizzes will help you keep on top of the information and evaluate your understanding of key 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.

Previews: Prior to each class, you will be expected to complete a short reading assignment or watch a video and complete a brief follow-up quiz. The preview and the quiz will be posted to the 'Assignments' section of Blackboard. You will have 20 minutes to complete three quiz questions. We will be applying information from the previews in class, therefore quizzes will be available up to 30 minutes before class begins. After that you can still complete the assignment but you will no longer be able to access the quiz. Your cumulative score on the follow-up quizzes constitutes 10% of your final grade.

Field Trip: A field trip to collect invertebrate fossils and observe exposures of sedimentary rocks between Fairbanks and Livengood is scheduled for **Saturday, April 23.** 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 8:00 AM and return at approximately 5:00 PM. Students should bring the following: Warm clothes, hiking boots, raincoat, field notebook/pencil, water bottle 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 (474-5655) 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 Geosciences computer lab is located in 316 Reichardt. The lab is open to all students of geoscience, except when a class is meeting there. Use your UAF login (typically your initials + last name) and password to access graphics programs, including Adobe Illustrator and PowerPoint, in order to construct your poster. Consult the schedule on the lab door for availability and plan accordingly.

Large Format Printer: As a geosciences student, you are each allowed to print one 36 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 in the 'Course Documents' section of Blackboard after the class in which they are presented. However, posted graphics are *not* a substitute for attendance. 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 60% 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 reason to have your laptop in class.

Late Work: Homework exercises, previews, and projects are due at the beginning of class on the due date. Late homework assignments will be accepted for one week after the due date and assessed a penalty of 5 points per day. Previews and projects will not be accepted after the due date.

Conduct: The **Student Code of Conduct** (see the online 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:	25%
Midterm Exam 2:	10%	Research Project/Poster:	10%
Final Exam:	10%	Participation/Attendance:	10%
Previews:	10%	Homework Assignments:	10%
Friday Quizzes:	5%		

Grade Scale: Quizzes, previews, 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	Due
	Sediment, Rocks, and Geologic Time		
Friday 1/15	Introduction: Geology as a 4D science	Chapter 1 (pages 1-15)	
Monday 1/18	**Civil Rights Day! No Class!!!!**		
Wednesday 1/20	Sedimentary rocks and the geologic record	Chapter 2 (36-55)	**Preview 1:** Sedimentary Rx
Friday 1/22	Sedimentary structures and depositional environments	Chapter 6 (158-170)	**Preview 2:** Types of bedding
Monday 1/25	Mountains, rivers, deserts, and clastic rocks	Chapter 6 (170-179)	**Preview 3:** Walther's Law
Wednesday 1/27	Coral reefs, carbonate platforms, and limestone	Chapter 6 (180-186)	**Preview 4:** Deltas & Lagoons
Friday 1/29	Relative ages and the principles of stratigraphy	Chapter 1 (15-21)	**Preview 5:** Steno's Rules
Monday 2/1	Construction of the relative geologic time scale	Chapter 3 (60-80)	**Preview 6:** Correlation
Wednesday 2/3	Radioactivity and the absolute time scale	Ch 2 (30-36) Ch 3 (81-85)	**Homework 1** **PV 7:** Isotopes
Friday 2/5	How old is Earth, and how do we know?		**Preview 8:** Oldest Rocks
	Fossils, Evolution and Extinction		
Monday 2/8	Fossilization: Preservation sans formaldehyde	Chapter 4 (107-118)	**Preview 9:** Body Fossils
Wednesday 2/10	Natural selection: Darwin, Wallace, and the idea that made sense of biology	Chapter 5 (124-133)	**Preview 10:** Homology
Friday 2/12	Genetics and the 'inheritance problem'	Chapter 5 (133-137)	**Preview 11:** Gregor Mendel

Date	Topic	Reading	Due
Monday 2/15	Fossils and the 'paleontological problem'	Chapter 5 (140 -142; 148-153)	**Homework 2** **PV 12:** Speciation
Wednesday 2/17	**Midterm Exam #1**		
	Continental Drift vs. Plate Tectonics		
Friday 2/19	Drifting continents	Chapter 7 (194-201)	**Preview 13:** Gondwana
Monday 2/22	Paleomagnetism and polar wander	Chapter 7 (202-207)	**Preview 14:** Earth's Interior
Wednesday 2/24	Seafloor spreading	Chapter 7 (207-225)	**Preview 15:** Plate Tectonics
	The Precambrian: Earth's First 3.5 BY		
Friday 2/26	Starting with a bang: A universe is born	Chapter 8 (226-239)	**Preview 16:** The Moon is Born
Monday 2/29	Archean protocontinents	Chapter 8 (239-243)	**Preview 17:** Greenstone Belts
Wednesday 3/2	The origin of life	Ch 8 (243-251)	**Preview 18:** What is Life?
Friday 3/4	Rocks, microbes, and atmospheric oxygen	Chapter 9 (260-262)	**Homework 3** **PV 19:** BIF's
Monday 3/7	Proterozoic cratons and supercontinents	Chapter 9 (252-259)	**Preview 20:** Rodinia
Wednesday 3/9	Snowball Earth	Chapter 9 (263-266)	**Preview 21:** The Cryogenian
Friday 3/11	The emergence of animals	Chapter 9 (266-277)	**Preview 22:** Ediacaran Biota
3/14-3/18	**Spring Break, No Classes!!**		

Date	Topic	Reading	Due
	The Paleozoic Era: Old Life, Old Hills		
Monday 3/21	Invertebrates and the Cambrian explosion	Chapter 10 (278-299)	**Preview 23:** Eye Evolution
Wednesday 3/23	Assembling Pangea	Chapter 10 (300 -303;313-316)	**Preview 24:** Taconic Orogeny
Friday 3/25	Leaving the water: Fins, feet & the greening of Gondwana	Chapter 10 (304-312)	**Homework 4 PV 25:** Tiktaalik
Monday 3/28	Carboniferous Wetlands: Scale trees and big bugs	Chapter 10 (319-321)	**Preview 26:** Primeval Forest
Wednesday 3/30	Amniotes gain reproductive freedom	Chapter 10 (322-327)	**Preview 27:** Meganeura
Friday 4/1	**Midterm Exam #2**		
	The Mesozoic Era: Monsters & Mountains		
Monday 4/4	Mountains rise in the west	Chapter 11 (337 -339; 354-356)	**Preview 28:** Atlantic Origins
Wednesday 4/6	Archosaurs and Dinosaurs	Chapter 11 (334-336)	**Preview 29:** Diapsid Skulls
Friday 4/8	Dinosaurs and birds	Chapter 11 (343-353)	**Preview 30:** Dinosaur Hips
Monday 4/11	Sea Monsters	Chapter 11 (331 -334; 340-342)	**Preview 31:** Plesiosaurs
Wednesday 4/13	Mammalian innovations		**Preview 32:** Molars
Friday 4/15	**Student Poster Presentations**		**Poster Projects**
Monday 4/18	First flowers and flourishing foraminifera	Chapter 11 (356-360)	**Preview 33:** Calcite Seas
Wednesday 4/20	Meteorites and mass extinction	Ch 11 (360-363)	**Homework 5 PV 34: Impact!**

Date	Topic	Reading	Due
Friday 4/22	**UAF SpringFest! No Class!!!**		
Saturday 4/23	**Field Trip: Evolution of Alaska 8AM - 5PM**		
	The Cenozoic Era: Feathered & Furry		
Monday 4/25	Origin of modern mountain ranges	Chapter 12 (368-380)	**Preview 35:** Himalayas
Wednesday 4/27	Birds are terrible lizards, too	Chapter 12 (380-393)	**Preview 36:** Whale Evolution
Friday 4/29	Icehouse vs. greenhouse: Glaciers come and go	Chapter 12 (393-411)	**Preview 37:** Precession
Monday 5/2	Where have all the Pleistocene giants gone?		**PV 38:** American Interchange
Wednesday 5/4	**Final Exam: 10:15 AM - 12:15 PM**		

Laboratory Schedule

Dates	Topic
January 20/21	Deep Time and the Geologic Time Scale
January 27/28	Sedimentary Structures and Environments
February 3/4	Sequencing Geologic Events
February 10/11	Fossils: Symmetry, Diversity, and Preservation
February 17/18	Rocks, Facies, and Correlation
February 24/25	Seafloor Spreading and Plate Tectonics
March 2/3	Tectonics on Other Planets
March 9/10	Paleozoic Life I: Shallow Seas
March 16/17	**Spring Break! No Labs!**
March 23/24	Geologic Maps I: Folds, Faults, and Unconformities
March 30/31	Paleozoic Life II: Primeval Wetland Forests
April 6/7	Computer Graphics and Poster Presentations
April 13/14	Geological Maps II: Tectonic and Environmental Reconstruction
April 20/21	Mesozoic Life: Predators and Burrowers
April 23	**Field Lab: Evolution of Alaska SATURDAY 8AM-5 PM**
April 27/28	Tour of the Fox Permafrost Tunnel (bring your winter coat!)