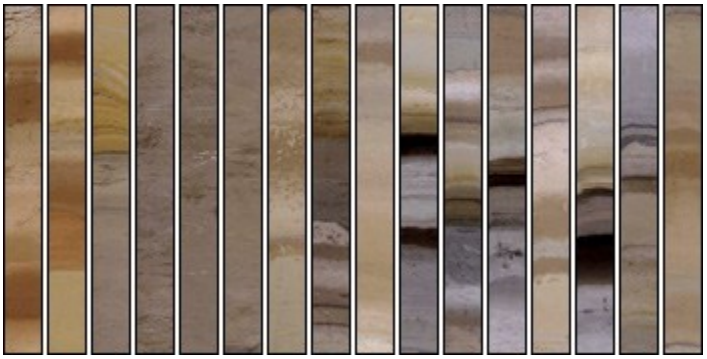
GEOL 364: MARINE GEOLOGY, SPRING 2026

COURSE INFORMATION

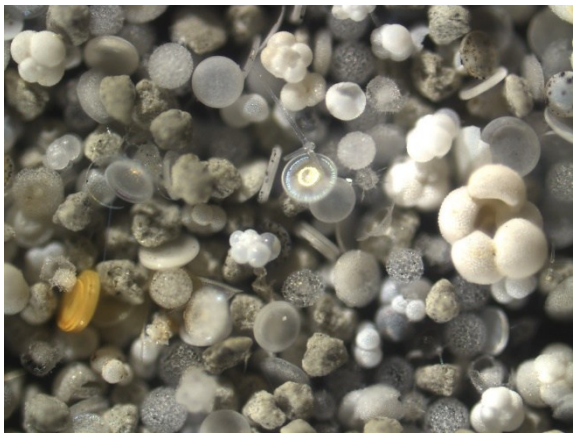
Instructor: Dr. Brittany Hupp (she/her/hers)
Contact Information: bhupp@gmu.edu
Class Hours: Mondays, 9:00 to 11:45 am
Class Location: Exploratory Hall 1005
Office Hours: Mondays 3:00 to 4:00 pm or by appointment; Exploratory Hall 3406

COURSE CATALOGUE DESCRIPTION

This course will present a global overview of the geologic origin and composition of the ocean seafloor, and an introduction to the basic principles of the geologic processes occurring in the marine environment. Primary topics include geologic, tectonic and sedimentary characteristics of the deep ocean basins and continental margins; transport and deposition of marine sediments; micropaleontology and paleoceanography; geochemistry and hydrothermal systems; and marine mineral resources.



Images: Deep-sea sediment cores (above) and microfossils (below) that can be used to reconstruct Earth's past climate and ocean conditions.



CLASS TEXTS:

There is no required textbook for this course. Helpful readings will be added to the course website (Canvas) as needed.

RECOMMENDED PREREQUISITES

GEOL 101 and GEOL 103, GEOL 102, GEOL 302, and CHEM 211.

STUDENT LEARNING OBJECTIVES

Upon successful completion of this course, students will be able to:

1. Recall how we investigate tectonic processes using physical and chemical signatures of oceanic crust.
2. Describe the origin and distribution of sediments on the seafloor.
3. Identify and interpret changes in deep sea sediment composition.
4. Recall the variety of deep-sea mineral resources and describe the considerations for mining such resources.
5. Interpret seismic data to interpret subsurface structure of marine sediment and ocean crust.
6. Construct an age model based on biostratigraphic data and radiogenic isotopic ages.

7. Investigate how changes in micropaleontological assemblages reflect past ocean changes in ocean conditions.
8. Interpret paleoceanographic proxy data to reconstruct changes in Earth's past climate.
9. Describe techniques used to study modern marine sedimentation processes.
10. Evaluate published literature of marine geological research.
11. Construct a study to investigate a marine geology research question.

Course Structure

For each class meeting we will start the class with a 1- to 1.5-hour lecture, followed by a mid-class break. The latter half of each class meeting will focus on active learning, where we will work on mini-lab exercises, group activities, and/or reading discussions. The majority of your grade (80%) for this course is based on the work conducted during class meetings and homework assignments. Therefore, it is imperative that you attend every class meeting. The remaining 20% of your grade is based on your final project and presentation which will focus on writing and presenting the plans for a research proposal.

Assignment Type	% of Total Grade
In-Class Activities & Homework	80%
Final Project & Presentation	20%

Bonus! Students have the two opportunities to increase their total course grade. 1) Take a self-guided tour of the Smithsonian Institutes Museum of Natural History Ocean Hall and complete a write-up. This bonus activity may only count as one bonus assignment. 2) Attend relevant GEOL seminars (to be announced) and submit a summary of the seminar talk. Weekly seminars take place on Thursday afternoons (4:30 to 5:45 pm, Exploratory Hall 1309). This bonus activity may be completed up to 3 times. Bonus opportunities may only be completed 3 times in total, with the potential of each write-up raising your total final grade by 0.5% (for a maximum potential grade increase of 1.5% upon high-quality completion of 3 bonus activities). You can find the directions for bonus activities on Canvas. All bonus assignments must be turned in by midnight on the last day of classes for the semester, May 4th.

Final Grade Scale

A+ = 97 – 100%	B+ = 87 – 89%	C+ = 77 – 79%	D = 60 – 69%
A = 93 – 96%	B = 83 – 86%	C = 73 – 76%	F = 0 – 59%
A- = 90 – 92%	B- = 80 – 82%	C- = 70 – 72%	

Course Policies

Attendance: Attendance at all scheduled class meetings is required to achieve the requisite level of knowledge in this course.

Expectations for time spent outside of class: Please allot three hours per week outside of class time work on homework, finish assignments that were started in-class, complete readings, and work on your final project.

Technology requirements: Access to a working computer with a strong internet connection is required for course work done outside of class. If you have a laptop or tablet, please bring it to each class meeting. Microsoft Excel is required to complete course problem sets and can be

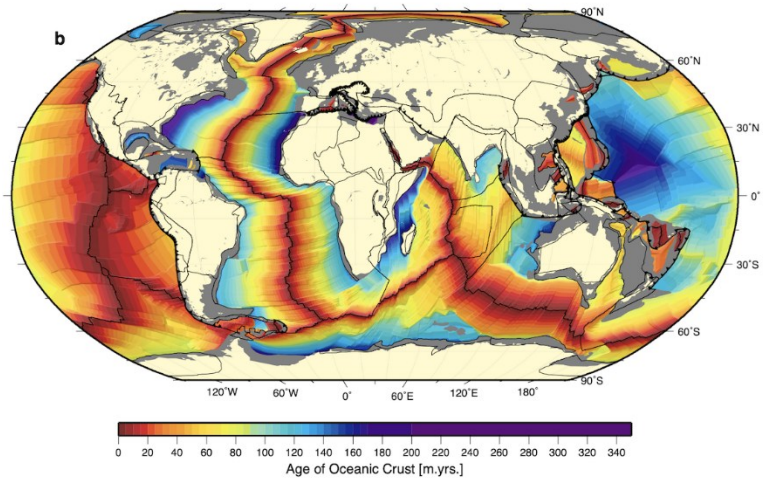
downloaded for free; read more about Excel installation here: https://its.gmu.edu/service/microsoft365apps/. Additional free software will need to be downloaded over the course of the semester.

Use of technology: During class, please be respectful of our time together and do not engage in activities that are unrelated to class. Cell phones may be left on but muted and used for emergencies only.

Names and Pronouns: I will gladly honor your request to address you by your preferred name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes.

Late Policy: All assignments are due at their assigned due dates unless an alternative arrangement has been made. In general, each student is allowed one "freebie" extension of 3 days for one assignment per semester. Beyond the freebie extension, grades earned for work turned in late will be reduced by 25% each set of 3 days it is late (e.g., an assignment turned late will have the grade reduced by 25%, whereas an assignment 3 to 5 days late will have the grade earned reduced by 50%.) If there are circumstances that prevent you from turning in an assignment on time, please contact me before an assignment is late so that we may establish an alternative timeline.

Communication Plan: Email is the best way to get in touch with me. If you send me an email, I will respond within 2 business days. *Please note, I do my best not to read or respond to emails past 6 pm.* I am also reachable in-person before/after class and during office hours. If you would like to meet at an alternative time in person or via zoom, feel free to reach out and we can work together to find a different time to meet.



Above: Manganese nodule mineral deposits on the seafloor. Right: Map showing the age of oceanic crust.

COURSE SCHEDULE*

Date	Topic
Jan. 19th	NO CLASS-Semester Starts Jan. 19th
Jan. 26nd	How do we study marine geology?
Feb. 2nd	Plate Tectonics
Feb. 9th	Paleomagnetism and Magnetostratigraphy
Feb. 16th	Ocean Crust Chemistry
Feb. 23rd	Deep Sea Minerals & Hydrothermal Activity
March 2nd	Deep Sea Sediments
March 9th	NO CLASS- Spring Break
March 16th	Deep Sea Sediments
March 23th	Seismic Stratigraphy & Geophysical Techniques
March 30th	Dating Techniques & Age Models
April 6st	Biostratigraphy & Sedimentation Rates
April 13th	Micropaleontology
April 20th	Paleoceanographic Proxies
April 27nd	Modern Sediment Processes
May 4th	Marine Geology at the United States Geological Survey
May 11th	FINALS WEEK: Research Proposals Due & Final Project Presentations

**Note: I reserve the right to make changes to this syllabus and schedule as needed.*

POLICY ON CHATGPT AND OTHER AI TOOLS

Chat GPT or other AI tools can be used to get started on researching a topic for the assignments for this class. However, **you CANNOT turn in text for any assignment in this class that was written directly by Chat GPT or another AI tool**. Any text handed in written by an AI tool will be given an automatic zero and be reported to the university academic integrity office. Handing in AI-written work is cheating

MASON POLICY GUIDELINES

These university policies common to all Mason courses are also important to review and understand: https://stearnscenter.gmu.edu/home/gmu-common-course-policies/