

GEOL-28000-01
MARINE GEOLOGY

Mode of instruction: Web-Enhanced
Tuesdays and Fridays 9.45 am to 11.00 am

Hunter North, Room 1021
Fall 2019

Instructor: Dr. Shruti Philips
Office: Hunter North, Room 1032
Office Hours: *Tuesday and Friday 9.15 to 9.45 am or by appointment*
E-mail: sph0001@hunter.cuny.edu (communications to me must have GEOL 280 in the subject line and you must sign your full name as it appears in CUNYFirst.)

Department of Geography Office: Rm 1006 HN, Phone: 212-772-5265

Introduction:

Marine Geology is the study of the seafloor and the geologic processes that have been at work throughout the seafloor's history. In this course we shall attempt to answer the questions “**what?**”, “**where?**”, “**when?**” and more importantly “**how?**” in order to better understand the processes that shape the ocean basins and determine the structure and composition of the oceanic lithosphere. The main patterns of sediment distribution in the ocean basins and how sediments preserve a record of past climatic and sea-level changes will be explored. In addition, the role of fluids in ocean sediments and the oceanic crust will be examined. The seafloor sediments will be studied with a focus on their role in marine biogeochemical cycles. We shall conclude with an examination of the how the marine environment has changed over Earth's history.

Basic material covered in the course includes:

- The structure, formation and evolution of ocean lithosphere
- Hydrothermal circulation in the oceanic crust
- Sources & composition of marine sediments
- Biogeochemical processes in deep-sea sediments
- The climatic imprint on marine sediments
- Paleoceanography and sea-level changes

Learning Outcomes:

At the end of the course the successful student is expected to be able to:

- apply the fundamental concepts of the plate tectonics theory to explain how geologic processes shape the ocean basins, and influence the formation and evolution of the oceanic lithosphere.
- describe the origin, nature and distribution of marine sediments
- identify and describe various biogeochemical processes that operate in the ocean basins.
- analyze and interpret geologic data to identify the major paleoceanographic and climatic changes that Earth has experienced over time.

This is a **3-hr, 3.0-credit**, science-based course, which fulfills **GER 3/B**.

Prerequisite: GEOL 10200 or GEOL 18000 or permission of the instructor.

Required Reading:

1. **The Ocean Basins: Their structure and evolution**, Open University Team, 2nd Ed. Elsevier, 2004. ISBN: 0-7506-3983-0. *This book is out of print but copies may still be available. I will place a few copies on reserve in the library.*
2. **Marine Biogeochemical Cycles**, Open University Team, 2nd Ed. Elsevier, 2007. ISBN: 0-7506-6793-1. *This book is out of print but copies may still be available. I will place a few copies on reserve in the library.*

Purchasing options:

- <http://hunter.textbookx.com/institutional/index.php?action=browse#books/2098994/> (Hunter College Bookstore).
- The eBook (ISBN 9780080537931) version of *The Ocean Basins: Their structure and evolution* is available from the publisher at <http://store.elsevier.com/product.jsp?isbn=9780080537931&pagename=search> .
- The eBook (ISBN 9780080940779) version of *Marine Biogeochemical Cycles* is available from the <http://store.elsevier.com/Marine-Biogeochemical-Cycles/-Open-University/isbn-9780080940779/>

Blackboard: Please note that course documents, hand-out sheets, and useful links will be posted on Blackboard. **Important:** Students should check their Hunter e-mail messages regularly for messages from the instructor!

Assessment and Grading Policy: There will be a **midterm** exam given during the semester and a **final** exam at the end of the semester. Exams are based on lecture, assigned readings, films shown in class and text material. These exams will count 30% each for a total of 60% of the grade. The remaining 40% of the grade will be based on **in-class and homework quizzes and detailed summaries of assigned readings from research journals** for a grand total of 100%. Assignments will **not be accepted** after the due date.

Midterm	→30%
Final	→30%
Assigned readings	→20%
In-class/HW quizzes	→20%

Your grades will be assigned based on the CUNY grading policy that can be found in the online undergraduate catalog that can be found at <http://catalog.hunter.cuny.edu/>.

Exam Policy: A ‘make up’ for the midterm will be given only if you miss it because (1) you are ill and can prove that with a physician’s note; and (2) you e-mail me BEFORE the exam and leave your name and phone number at which you can be reached. There will be **no make-ups** for missed quizzes.

- If you **miss the final exam** a makeup will be given only if you inform me within 72 hours of the day/time of the final exam **and** present me with checkable documentary evidence of the reason for your absence--a doctor's note, a bill from the hospital, a note from the funeral home etc. For an **IN** to be awarded you must contact me about making up the exam and fill out the

'Contract to Resolve an Incomplete Grade' form **within 72 hours** of the day/time of the final exam. An unresolved IN becomes an FIN at the end of the following semester.

- **CR/NC** grades will be assigned based on the rules outlined on the CR/NCR form and must be submitted no later than 15 minutes before the beginning of the final exam.
- As per CUNY, an **Unofficial Withdraw (WU)** is assigned to students who **attended a minimum of one class**. It is important to understand the definition of a WU and the difference between this grade and an F grade. The conditions for assigning the WU grade include:
 1. A student's enrollment has been verified by the course instructor, and
 2. The student has severed all ties with the course at any time before the final exam week and, consequently, has failed to complete enough course work -- as specified in the course syllabus -- to earn a letter grade, and
 3. The student has not officially withdrawn from the course by completing the process for a W grade, or made arrangements to receive an INC.

Attendance: Students are urged to attend *all* classes. ***There is a direct correlation between good grades and good attendance.*** All students are responsible for work covered in their absence and must be sure to obtain any hand-out material.

Tips for getting good grades: *The more time you put in, the better your grade will be.*

- Attend class and take detailed notes.
- Read the assigned material in the text (or other) before coming to class.
- Re-write your notes as soon as possible after class. This will allow you to fill in the details still fresh in your memory, and prepare questions for the next time the class meets.
- Test yourself by answering the questions in the book and in class.
- Carefully study the diagrams and charts in the book and in the lectures.

Academic Integrity: Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. See the following report by the Hunter College Senate for more details:

<http://www.hunter.cuny.edu/senate/assets/Documents/Hunter%20College%20Policy%20on%20Academic%20Integrity.pdf>

ADA Policy: In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY, located in Room E1214B, to secure necessary academic accommodations. For further information and assistance, please call: (212)772-4857 or (212)650-3230.

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

- a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, on contacting the College's Public Safety Office (212-772-4444)
- b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link:

<http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

Tentative Syllabus for Fall 2019

Dates	Lecture Topic	Chapter
T 8/27	Introduction and overview	1 OB
F 8/30	Introduction and overview	1 OB
T 9/3	The shape of the Oceans	2 OB
F 9/6	Continental margins, ocean ridges, transform faults, deep ocean	2 OB
T 9/10	The evolution of the Ocean Basins	3 OB
F 9/13	Red Sea, Mediterranean Sea	3 OB
T 9/17	The structure, formation & fate of the Oceanic Lithosphere	4 OB
F 9/20	Pillow lavas, segmentation of axes, rates of spreading, seamounts, OIB, MORB	4 OB
T 9/24	Hot spot-ridge interactions, LIP's, Subduction factory, Back-arc basins; (QUIZ-1)	4 OB
F 9/27	Hydrothermal Circulation in Oceanic crust	5 OB
F 10/4	Chemical changes, biological significance, black & white smokers	5 OB
F 10/11	Biogeochemical processes in sea water	2MBC
T 10/15	Biological particle cycle;	2MBC
F 10/18	Role of N, P, Fe, S, O ₂ in seawater; (QUIZ-2)	2MBC
T 10/22	Vertical & lateral variations, & behavior of dissolved constituents	2MBC
F 10/25	MIDTERM EXAMINATION	
T 10/ 29	Sediments in the Ocean- shelf seas & shallow marine sediments	6 OB
F 11/1	The distribution & nature of deep-sea sediments; Seafloor resources;	3MBC
T 11/5	The Accumulation of Deep Sea sediments:	3MBC
F 11/8	Biogenic sediments, CCD, Acidification; Terrigenous sediments (QUIZ-3)	3MBC
T 11/12	Authigenesis & Diagenesis	5 MBC
F 11/15	Climatic Clues from Restricted seas	readings
T 11/19	Deep Sea Sediments and Paleoceanography:	4MBC
F 11/22	Evolution of the ocean basins: Opening & Closing Gateways; use of proxies	4MBC
T 11/26	Paleoceanography & The Long Term Climate record:	readings
T 12/3	Major Ice ages-Proterozoic & Phanerozoic, HE/DO, Bipolar seesaw;	readings
F 12/6	Paleoceanography & Sea Level changes-Messinian Salinity crisis; (QUIZ-4)	6OB
T 12/10	The broader picture: The Global cycle; Film: 'Cracking the Ice Ages'	7OB
TBA	FINAL EXAMINATION	

- *All assignments due by this date.
- A **reading list** of research articles will be posted on Blackboard. You are expected to hand in detailed summaries of **10** of these articles by **Monday December 3rd, 2018**. Each summary must be in two parts: **part-1** will be in the form of bullet notes on the significant points made in the article; **part-2** will be a summary **in your own words** explaining the content of the article. You must **conclude** with the significance of the information and what you have learnt from it. This is worth **20%** of your total grade.
- **OB** = The Ocean basins: Their Structure and evolution; **MBC**= Marine Biogeochemical Cycles **Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice. Any changes to the syllabus will be posted on Blackboard.**