

INTRODUCTION TO OCEANOGRAPHY
GEOL 18000
SUMMER SESSION II
ONLINE COURSE
MONDAY THROUGH THURSDAY
SUMMER 2020

CONTACT INFORMATION

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Office Hours: online only, by appointment (Skype, Google Hangouts or email)

***Note:** The best way to contact me is through your **Hunter College @myhunter** email – (1) You must include the **GEOL 18000** in your subject line (2) sign your full name as it appears in CUNYfirst, and (3) send all email from your @myhunter email address. I do not respond to personal email addresses. I try to answer all emails within 24 hours during the week and 48 hours on the weekend.

COURSE DESCRIPTION

This course will offer an introduction to the subject of oceanography. We will discuss the physical, chemical, biological and geological aspects of the oceans; learn about the structure and motion of the atmosphere and how they influence ocean circulation; and we will learn about waves, tides and tsunamis. The ocean, comprising 71% of the Earth's surface, is a crucial component of the Earth's climate system and its dynamics determine the cycling of carbon and the production of oxygen throughout the planet. The oceans' extreme environments host unusual forms of life, which are sensitive to anthropogenic influences. It is an important source of energy and economically valuable materials. Accordingly, the

ocean has a profound influence on humans and civilization. In addition to providing a good introduction to aspects of the scientific world, it is a foundational course for Environmental Studies, Geography and BA/MA Earth Science Education majors.

COURSE STRUCTURE

This is a fully online course. All materials will be available on the Hunter College Blackboard site. The Blackboard site will have a “Class Sessions” page. For each scheduled class meeting date (below) there will be folder labelled by date containing: podcast(s), recommended reading, additional articles, an assignment and/or other materials. Students are expected to complete all the work in each folder on a daily basis. Students should expect to spend 2-3 hours 4 days per week reading, studying and completing assignments for the course. All assignments and assessments will be due at the end of each week (Sunday at 11:59 PM). In addition, there will be a class discussion board where students can discuss the course material, ask and answer questions and discuss the case study material. I will be available online during the scheduled virtual meeting days and will respond to Discussion Board posts, email and have virtual office hours by appointment. There will likely be one synchronous class meeting per week via BB Collaborate or Zoom to discuss readings.

This course will cover four big ideas:

- Marine Geology and its relationship to Plate Tectonic Theory
- Ocean chemistry and its relationship to climate
- Ocean dynamics and its relationship to climate
- The Ocean Environment human impacts upon it.

The course has been divided into four units, each with a corresponding “**BIG IDEA**” and **INTEGRATING CASE STUDY** designed to achieve the expected **LEARNING OUTCOMES** listed below.

- Unit 1-Marine Geology
- Unit 2-Ocean Chemistry
- Unit 3-Ocean Dynamics
- Unit 4-The Ocean Environment

EXPECTED LEARNING OUTCOMES

1. Identify fundamental concepts in physics, chemistry, geology, biology, mathematics and engineering technologies as they apply to the study of modern oceanography
2. Describe the common tools used in oceanography
3. Demonstrate knowledge of the ocean's role within the broader Earth System
4. Produce well-reasoned written arguments using evidence to support conclusions.

CASE STUDIES

To support Expected Learning Outcomes:

- In addition to traditional instruction, each **CASE STUDY** will require students to gather data from several marine databases (NOAA, USGS, NASA), relevant journal articles and white papers. Through class discussions students will learn to interpret the collected data as they pertain to the specific process(es) or problem(s) presented and will be guided to assess the quality of the data being used.
- For each **CASE STUDY** a series of analytical questions (4-6) will be formulated, designed to highlight different perspectives or points of view that may be derived from the data. Students then will be required to provide a substantial answer to each question evaluating these perspectives.
- For each **CASE STUDY** students will be required to construct a 'position paper' (up to one page) about any potential controversy surrounding the topic(s), and to show exactly (in the assigned chapters and journal articles, lectures, data) what supports their arguments. Guidelines for the position paper will be distributed separately.
- There will be one **CASE STUDY** per week of the course.

- All **CASE STUDIES** are required. Student will select the one they would like to be graded.

INFORMED REGISTRATION STATEMENT

This is a **3-hr, 3.0-credit**, science-based course, which meets the Scientific World requirement of the Hunter Common Core and the GER 2E General Education Requirement.

RECOMENDED TEXT BOOKS

Essentials of Oceanography (12th Edition), Trujillo, A. P. and Thurman, H. V., 2017
ISBN 9780134073545, Pearson, retail \$180-\$200 (paperback).

Earlier editions are acceptable and eBook (\$124.99) options are available. In addition, most other introductory textbooks will contain the same information. There are cheap or free editions available online as well as on reserve in the Hunter College library. I strongly encourage you to explore all options before spending a small fortune on the recommended text.

GRADING METHOD AND SCALE

Grades will be based on class participation, homework assignments, two mid-term exams and one final exam. A detailed description of the Hunter College Grading System may be found at <http://catalog.hunter.cuny.edu/content.php?catoid=230&navoid=3149>. An itemized breakdown of the final grading rubric is provided below:

Case Studies	20%
Bi-weekly Assignments	40%
Weekly Assessment	30%
Discussion Boards	10%

WEEKLY ASSESSMENTS

Weekly learning assessments will be online. Because this is an online course, you will be able to use your textbook and other resources during the assessment. Hence, these assessments will both help you consolidate your knowledge and demonstrate your learning.

CR/NCR POLICY

The CR-NCR option will be honored only if the conditions stated on the CR/NCR form are satisfied: all course work has been completed and you earned grades such that you accumulate at least 50 points total in the course. Students on probation are ineligible.

ATTENDANCE

This is a fully online course. As such, we will not be meeting in the classroom. The class is designed for asynchronous learning, i.e you can log in any time during the day and access the class materials. Because this class will move at a fast pace, it is important that you check in every day. Therefore, I will be monitoring student online activity and requiring that you post at least one question/answer or comment on the course discussion board each day.

SYLLABUS CHANGE POLICY

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. Updates will be posted regularly on Blackboard.

EXAMPLES OF INTEGRATING CASE STUDIES

Each case study highlights various content and themes within the discipline, and is designed to promote the development of a citizen scientist, from describing fundamental concepts in oceanography, collecting, analyzing and synthesizing data to articulating the empirical evidence that supports theories and points of view. Students will be responsible for constructing a position paper for each selected case study.

- **Plate Tectonic Theory:** Possibly the most substantial contribution the discipline has made to society, this theory details the basic processes of the scientific method from the construction of the continental drift hypothesis to the elevated unified theory involving mantle convection and sea floor spreading.
- **Sand Waves:** The mining of sand waves on the continental shelf is crucial for the maintenance of the NY barrier island system. However, little is known about the processes shaping these features and timescales upon which they evolve. The DOD and the DOI have different perspectives on the roles these features currently play and should play in coastal resilience and management strategies.
- **Hurricane Sandy:** Students investigate the role of significant storm events in barrier coastline evolution. Analysis of the acute and long term impacts will be discussed. How did the storm influence the economy, habitat gain/loss, and bay water quality? How is it now shaping our thoughts and policies on climate change and coastal resilience?
- **Eutrophication, Gulf of Mexico Dead Zones to Lobster Die Offs in Long Island Sound:** Students deconstruct the processes that give rise to eutrophication on the local and regional scale, and how these conditions have been influenced by land use and management policies. Students will review the current research to determine what role eutrophication played in the decline in lobster populations in LIS.
- **Grey Seals To Great Whites:** Through this case study students explore population dynamics and fishery management. The rebound in the grey seal population following cullings in the 19th and 20th centuries has led to the return of the North Atlantic white sharks and a birth of ecotourism for Cape Cod, MA.

- **Garbage Islands, Plastic Land Up For Grabs:** Students explore ocean circulation and the world’s most pervasive surface drifter. Ownership and responsibility is called into question as Ocean Stewardship becomes an increasing global priority.
- **Arctic Sea Ice, The Polar Vortex and Planetary Scale Waves:** Students investigate how accelerated sea ice loss in the Arctic has influenced the recent breakdown of the polar vortex, mechanisms for ocean-atmosphere coupling and global teleconnections.
- **Meridional Overturning Circulation:** Students research the debated primary and secondary processes influencing the rate and variability of MOC, the role observing systems play in deciphering the redistribution of heat and carbon.
- **Antarctica, the Southern Ocean and Climate Change:** The Antarctic Peninsula is one of the fastest warming spots on the planet and the latest evidence seems to indicate that it is the warm ocean waters that are eating away the ice along the western part of the Peninsula. Students will research the primary and secondary processes influencing the rate and variability of melting, the role the atmosphere and the ocean systems play in deciphering the redistribution of heat and the specific conditions of this area that may be aiding the melting process.
- **The Oceans and their Giant Waves** - Learning from the mariners, the scientists and the surfers. Students will read different chapters of the book “The Wave” by S. Casey and will then research the most recent evidence of these giant waves as detected by modern measuring methods.

HUNTER COLLEGE POLICY ON 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.

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-biased harassment retaliation against student, employees, or visitors, as well as certain intimate relationship. 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, or contacting the College's Public Safety Office (212-772-4444)

- B. ***All other forms of sexual misconduct***: Students are strongly encouraged to contact the College's Title IX Campus Coordinator, Dean Jean Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barr7@hunter.cuny.edu or 212-772-4534) and seek complementary services through the Counseling and Wellness services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link:

Tentative Schedule: The professor reserves the right to change the schedule on an as needed basis.

Date	Unit	Sub-topic	Trujillo Text Chapter	Notes:
July 13	Marine Geology	Plate tectonics	2	
July 14	Marine Geology	The ocean floor	2	
July 15	Marine Geology	Marine provinces	3	
July 16	Marine Geology	Marine sediments	4	
July 20	Ocean Chemistry	Water and seawater	5	
July 21	Ocean Chemistry	Water and seawater	5	
July 22	Ocean Chemistry	Air-sea interaction	6	
July 23	Ocean Chemistry	Air-sea interaction	6	
July 27	Ocean Dynamics	Surface ocean	7	
July 38	Ocean Dynamics	Deep ocean	7	
July 29	Ocean Dynamics	Waves and water dynamics	8	
July 30	Ocean Dynamics	Tides	9	

August 3	Ocean Biology	Biological Productivity & energy transfer	13	
August 4	Ocean Biology	Biological Productivity & energy transfer	13	
August 5	Oceans and Climate	The Oceans and climate change	16	
August 6	Oceans and Climate	The Oceans and climate change	16	
August 10	Ocean Environment	Shoreline and coastal processes	10	
August 11	Ocean Environment	Marine pollution	11	
August 12	Ocean Environment	Marine pollution	11	
August 13	Final Exam			