

GEOL 380/PGEOG 705.69
Advanced Oceanography w/MatLab. The Physics of the Oceans
Monday, Tuesday & Wednesday 11:00 am – 2:00 pm
Fully Online
7/13/20–8/16/20
Professor Haydee Salmun

Lecture hours/location: Fully online/synchronous, using a combination of activities: lectures, seminar-style discussions and quantitative work (labs) using the Matlab software. A detailed course schedule will be available on the first class. All readings and other materials will be available on the Hunter College Blackboard site.

Professor Salmun Contact Information

Office Department of Geography and Environmental Science,
Room1035 Hunter North
E-mail hsalmun@hunter.cuny.edu (*)
Office Hours: Virtual (tentative) hours: Mo 4:00 pm - 6:00 pm; ***please kindly make an appointment***

(*) **Note:** the best way to contact me is via email – (1) You must include the course name or number in your subject line (2) You must include your entire name in your email (3) I try to answer all emails within 24 hours. Allow for a 48 hour delay on the weekends.

Diversity & Inclusion: I am committed to fostering an intellectual environment that is enriched and enhanced by diversity in all dimensions, including race, ethnicity and national origins, gender and gender identity, sexuality, class and religion. I am especially committed to increasing the representation of those populations that have been historically excluded from participation in U.S. higher education in STEM fields. It is my hope that we can work together and collectively move closer to accomplish that objective.

Note for Graduate Students:

Although the course description and topics described below are the same for graduates and undergraduates, the expectations of your work and general performance are not. You will be invited to use this course as an opportunity to develop some of your own research tools, skills and interests and to combine these in a major project/presentation at the end of the session.

Course Prerequisite: This is a quantitative science course and we expect students to have a basic foundation in physical sciences and mathematics. We will require a strong commitment to learning the quantitative skills offered.

Course Description:

The oceans play a significant role in how the climate system responds to anthropogenic perturbations. To understand past, present and future climate, therefore, we need to know and understand our oceans. Oceanography is a multidisciplinary science. It offers a wonderful opportunity to review and to apply many of the concepts taught in the major traditional disciplines such as physics, chemistry, biology and mathematics. This course will offer an in-depth ‘tour’ to the fascinating and complex subject of Oceanography and an introduction to

quantitative methods in oceanography using Matlab. This is a science-base course and it will require that students learn to understand, and be willing to work with, physical and quantitative concepts. It requires that students be prepared to learn the basics of scripting/programming syntax and logic, which in turn is one of the great skills to be acquired in this course.

The two main objectives of this course are (1) to further students' understanding of the ocean in the context of the earth system, and (2) to expand students' skills in quantitative analysis using Matlab, a high-level language and interactive environment for numerical computation, visualization and programming. Labs are meant to provide students with a number of identifiable skills that can be applied in other courses as well as in work environments. Consequently, class time will be spent on theoretical material (typically the first part) and on work with Matlab.

Topics to be covered include atmosphere-ocean interactions; wind-driven ocean currents and their role in the global distribution of energy; other major ocean current systems such as equatorial current systems and the circulation at high latitudes; the role of waves (large scale) in the ocean and atmosphere-ocean interactions; the South Atlantic circulation and the Overturning Meridional Circulation; Temperature, Salinity, Pressure & Density in the Ocean.

Expected learning outcomes

1. Theory

At the end of the semester, students would be expected to have a basic understanding of

- the world's oceans as a major component of earth-system science
- the ocean strong influence on climate including Earth's surface temperature, by influencing the amount of CO₂ in the atmosphere, the transport of heat from the tropics to polar regions, the operation of the hydrological cycle and the Earth's carbon cycle
- how to explore the way the oceans 'work' by studying processes that involve other components of the Earth system, particularly the atmosphere
- how these processes function together to determine and regulate Earth's climate, the circulation of the atmosphere and ocean and the recycling of elements

2. Skills

At the end of the semester, students would be expected to have acquired basic quantitative skills that will allow them to

- use basic mathematical calculations to quantify physical processes under study
- understand the importance of data visualization and explain graphs and charts in detail
- use basic Matlab to perform calculations and generate charts
- gain a basic appreciation of modeling environmental problems in a marine context through the use of the Matlab software
- gain an appreciation of computer models and data analysis

Computer Labs

Labs will consist of exercises designed to introduce students to some of the concepts and skills necessary to study problems in a marine environment in a quantitative fashion. These include basic mathematical concepts, as well as using computer simulations, or models. Windows operating system, MS WORD and MS EXCEL, is expected. A greater emphasis will be placed on analysis of data and results.

Group work – is allowed and encouraged for all labs. Reports from group work should make explicit (1) which students are working together; and (2) hand in only one lab per group, with all students' names on the lab and their contribution to the report.

Assignments must be submitted electronically (to email provided). A hard copy will be accepted but electronic copies are highly recommended.

When submitting your assignments electronically, the document name must have the following format:

lastname_firstname_assignmentname_geolxxx.docx (.pdf)

Examples:

haydee_salmun_HW#1_geolxxx.docx

salmun_Assig#1_geolxxx.docx

This naming approach helps me keep track of student work. If you do not name your documents as specified above, I do not guarantee that they will be graded or/and lost, or/and overwritten.

In addition, within the document itself, you must include your full name, assignment title and any other students with whom you worked. All work must be presented in a clear and professional manner. If I cannot read it, I cannot grade it.

Recommended Text Book:

Introduction to Physical Oceanography by Robert H. Stewart (Department of Oceanography, Texas A & M University) Copyright 2008, September 2008 Edition.

This textbook can be downloaded FOR FREE from <https://oaktrust.library.tamu.edu/handle/1969.1/160216>, and going to “View/Open stewart_textbook_physicaloceanography.pdf”

Grading Method and Scale

Grades will be based on class participation, homework assignments and lab reports. A detailed description of the Hunter College Grading System may be found at <https://ww2.hunter.cuny.edu/students/academic-planning/degree-requirements/construct-an-academic-plan/gpa-calculator/grading-scale>. An itemized breakdown of the final grading rubric is provided below:

- Class participation: 30%
- Discussion of articles: 30%
- Lab Work and Reports: 40%

As with all courses at Hunter College:

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.

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. For details, see:

http://policy.cuny.edu/manual_of_general_policy/article_i/policy_1.03/pdf/#Navigation_Location

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.barry@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:

<http://www.cuny.edu/about/administration/offices/la/policy-on-sexual-misconduct-12-1-14-with-link.pdf>