Global Climate Change: Ocean and Environmental Sciences
University of Maryland Eastern Shore
ENVS 488A

Course Director: Dr. Ben Harden
Course Coordinators: André Price and Onjalé Scott Price
Student Coordinator: Dr. Joniqua Howard

Lead Instructor:
Dr. Ben Harden

Location:
Online

Course Description:
The goal of this class is to prepare students to address questions pertinent to Global Climate Change within the Ocean and Environmental Sciences. The class complements a research internship within the Woods Hole Science community by building a foundation of concepts and skills required to be a successful researcher.

The main focus of the class will be a research project framed around data from two cruises aboard the SSV Corwith Cramer in June 2018 and 2019. This project will be an opportunity for students to develop their research skills, which can then be applied in their internship over the summer. Class will begin with a brief overview of important ocean concepts relevant to these projects within the local oceanic environment. Student will then develop a short research project based on cruise data and present their findings to the SEA and PEP community in a research poster. Through this process students will develop their understanding of: communicating the importance of their research; reading and using scientific literature; preparing and adapting a research plan, coding for data visualization; presenting findings clearly and professionally; and working collaboratively.

In addition to these research projects, students will have six Advanced Topics classes where a researcher from the Woods Hole community will present some of their work and engage students in a discussion of the frontiers of a variety of disciplines.

In parallel with this coursework, students will begin to develop the foundations for their research internship with their mentor from one of the PEP Partner Institutions in the Woods Hole Community (Woods Hole Oceanographic Institution, U.S. Geological Survey, NOAA National Marine Fisheries Service, Marine Biological Laboratory, Woods Hole Research Center and Sea Education Association). The skills students learn during the course projects will be directly relevant to their research internship and we will utilize them to digest relevant literature and develop a research plan in collaboration with their research mentors. This will culminate in a short research presentation to the PEP community where students will describe the background science and importance of their projects and will present their plan for the summer.

Course Objectives:
During the course, student will:

- Build a base level understanding of fundamental concepts in oceanography.

- Practice reading and using relevant scientific literature.
- Develop a research project.
- Learn about at-sea ocean measurements
- Learn data analysis and visualization skills.
- Deliver professional communications in written, poster and aural formats.

Course Requirements:

1. Punctual attendance is required at every class meeting online. Please contact instructor well in advance if you anticipate needing to miss a class session.
2. Active participation in class is expected.
3. For every day an assignment is late, 10% of the maximum score will be deducted from the assignments grade.
4. The policy on academic accuracy, quoted below, will be strictly followed in this class.

The papers that you submit in this course are expected to be your original work. You must take care to distinguish your own ideas and knowledge from wording or substantive information that you derive from one of your sources. The term "sources" includes not only published primary and secondary material, but also information and opinions gained directly from other people and text that you cut and paste from any site on the Internet.

The responsibility for learning the proper forms of citation lies with you. Quotations must be placed properly within quotation marks and must be cited fully. In addition, all paraphrased material must be acknowledged completely. Whenever ideas or facts are derived from your reading and research, the sources must be indicated. (Harvard Handbook for Students, 305)

Considerations for use of internet sources: *As you browse websites, assess their usefulness very critically. Who posted the information and why? Can you trust them to be correct? Authoritative? Unbiased? (It's okay to use a biased source as long as you incorporate it knowingly and transparently into your own work.) Keep track of good sources that might be useful for subsequent assignments, and annotate in your bibliography any sites you cite. Your annotation should include the name of the author or organization originating any material that you reference. If you can't identify the source, don't use it!*

Course Organization:

The course will meet most days during June, M-F from 1400 to 1500 EDT for four weeks (see class schedule on class website for full details: https://pepclass2020.netlify.app/).

In preparation for class every day students will need to:

- Engage with relevant readings
- Apply what they have learnt to a set of exercises (answers to be submitted, but graded only on participation)
- Meet with a peer to discuss the exercises (remaining questions to be submitted, but graded only on participation)

It is anticipated that students will spend 2-3 hours on the above work in addition to the 1 hour of in-person class every day. It is our expectation that students will be using time not in classes or at sea for coursework and beginning their research internship working closely with their mentor in their lab.

The class concludes with student poster presentations on their cruise research projects and research presentations outlining the objectives and approaches of their independent research internships already begun with their mentors in the Woods Hole community. These internships will end with a final presentation by each student on the last day of the program (not assessed as part of the course)

Course Materials:

Oceanography Text

- Introduction to Ocean Sciences (Segar, 2nd edition): https://www.reefimages.com/oceansci.php

R Texts

- R for Data Science, (Grolemund and Wickham): https://r4ds.had.co.nz/
- ggplot2: Elegant Graphics for Data Analysis: https://ggplot2-book.org/

Students will be expected to be able to have access to a computer with R and RStudio software. Instructions for download onto students' laptops will be provided as will computers for students who do not have access to a personal computer.

Additional information and materials are provided on the course website: https://pepclass2020.netlify.app/

Student Assessment and Evaluation:

The following components will be evaluated to determine student's grades:

Course Participation:	25%	
Submission of exercise answers		*10%*
Submission of peer questions		*10%*
Attendance and participation in class		*5%*
Coursework Assignments	25%	
Poster Presentation	20%	
Personal Reflection	10%	
Research Presentation	20%	

Grading Schedule: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F ≤ 59%

Course Participation: Will be based on on-time submission of both exercise answers and peer questions completed prior to the class. Attendance and participation in assignments, including engagement in classroom and research-group discussions is also expected.

Coursework Assignments: Throughout the course, students will be expected to undertake both independent and group coursework assignments.

Poster Presentation: The culmination of the course research projects will be a poster presentation to the SEA and PEP community. Student poster presentations will be assessed based on content, presentation, and through a student's ability to talk about their work succinctly and accurately.

Research Presentation: Research presentations will consist of 5-7 minute talks from each student to introduce their research topic that they will undertake with their research mentors during the program.

This will include relevant background information, the importance of the work and a research plan for the summer. Successful presentations will clearly convey this information in a manner that is accessible to both specialists and aspiring scientists (i.e., their peers). This presentation will be an initial step in framing a longer (10-12 minute) professional meeting-style presentation (not graded) to be delivered on the last day of the program during the PEP symposium.

Communication
Communication will be conducted through the course Slack channel:
https://app.slack.com/client/T013MCF3TTK

You can also contact:

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