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

Course Director: Dr. Ben Harden

Location:
SEA campus in Woods Hole, MA and aboard SSV Corwith Cramer

Class Website:
https://pepclass2023.netlify.app/

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 a 5-day cruise aboard the *SSV Corwith Cramer* from June 14-18. This project will be an opportunity for students to understand a broad base of ocean and environmental science topics and 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 the sea component within the local oceanic environment. Students will then go to sea and implement a sampling plan as a crew member of the *SSV Corwith Cramer* and will be responsible for all aspects of life at sea. On return from sea, students will devise a research question and work-up their data and present their findings to the SEA and PEP community in a research poster. Through this process students will develop their understanding of: ocean and environmental science topics; communicating the importance of their research; reading and using scientific literature; preparing and coding for data visualization; presenting findings clearly and professionally; and working collaboratively. Students will also reflect on their own understanding, how to work effectively as a team, and learn about how their work connects to the broader community of researchers through guest presentations.

In parallel with these research projects, students will begin to develop the foundations for their research internship in 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 Cramer 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 part of a class session.
2. Active participation in class is expected.
3. 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:

A good amount of the class will be flexibly paced with a number of fixed-point assessments, discussions, and presentations. Topics are broken down into modules and levels and students should work through these work to make sure they are prepared for the fixed-point classes.

The course will be active from June 5 to July 10 general meeting on Mondays (see course website for full details). During these hours, the class instructor will be available to students and students are expected to be available to meet for full-class, small group and individual instruction.

It is anticipated that students will spend 3-5 hours on class work 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 Cramer 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 that can run a web browser for the course. Laptops will be provided for students who do not have access to a personal computer.

Additional information and materials are provided on the course website:
https://pepclass2023.netlify.app/

Student Assessment and Evaluation:

Assessment will be made of student growth through a pre-assessment and then an individual contract with the instructor, which will be reviewed throughout the class. For each skill component, students will be expected to show the instructor their current level of attainment before agreeing to a certain number of growth areas.

Grades will be awarded such that:

A = Excellent level of growth in skills
B = Some growth in skills
C = Demonstrated self-assessed skill level
D = Unable to demonstrate current self-assessed skill level
F = Active disengagement

The rubric for levels of student skills acquisition will be distributed to students at the beginning of the program. Students who self-assess at level 3 for any skill and can quickly demonstrate mastery at that level may conference with the instructor to make a level 4 plan.

Communication

Communication will be conducted through the course Slack channel

You can also contact:

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