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

Course Director: Dr. Ben Harden
Course Assistant: Jailyn Dorsett
Student Coordinator: Ayanna Butler

Lead Instructor:
Dr. Ben Harden

Location:
Online

Class Website:
https://pepclass2021.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 data from the Ocean Observatories Initiative (https://oceanobservatories.org/). 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 global ocean concepts relevant to these projects. Student will then develop a short research project based on OOI 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. 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 majority of the class will be self-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 2 to June 25, M-F from 1200 to 1500 Eastern time (see class schedule on class website for full details.) During these hours, the class instructors 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 3-4 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 OOI 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://pepclass2021.netlify.app/

Student Assessment and Evaluation:

The class will be self-paced with four topics broken down into modules and levels. See the class website for more details. Assessment of each module will build a topic grade, which will be weighted with the following percentages for a final grade:

Oceanography	20%
Research Skills	40%
Data Visualization	20%
Advanced Topics	20%

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

Oceanography: An introductory topic to global, large-scale oceanography with modules on physical oceanography, phytoplankton, the carbon cycle and climate change

Research Skills: A series of modules to build research capabilities through the OOI project and preparations for student summer research. Culminating activities are a project poster presentation and an oral presentation on student's summer research.

Data Visualization: A series of modules build student capacity in creating graphics in R.

Advanced Topics: A series of guest presenters will guide students through various advanced topics whilst introducing them to the range of science that happens in the Woods Hole Science Communication.

Communication

Communication will be conducted through the course Slack channel

You can also contact:

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