SIO 175 Syllabus Fall 2024
Analysis of Oceanic and Atmospheric Data

Instructor: Mark Merrifield, mamerrifield@ucsd.edu, CCS 308
Office Hours: Wed 4-5pm, Zoom 965 4057 7761, or by appointment
Course Schedule: Tu, Th 9:30-10:50am, Lab Tu 11-11:50am, NH101
Teaching Assistant: Noah Brown, nebrown@ucsd.edu
Final Exam: Th, 8:00-11:00am
Prerequisites: MATH 18 or MATH 20F or MATH 31AH or consent of instructor

Overview: Oceanic and atmospheric observations and model output typically involve large multidimensional, multivariate data sets with signals of interest embedded in some form of random variability. To infer useful information requires skills in statistics and computational methods. We will work together to examine various phenomena with a climate focus using in situ and satellite observations, with MATLAB as our analysis platform.

Topic areas and Grading:
The course will be divided into four project-based modules:
- Marine heat waves
- Climate variability – the El Nino Southern Oscillation
- Sea level rise – spatial and temporal patterns
- Extreme wave events and coastal flooding

Each module will introduce new statistical concepts needed to address homework assignments, including probability functions, trend analysis, correlations and regressions, principal components, and spectral methods. Coding techniques needed to complete the assignments will be demonstrated and reinforced during lectures and lab sessions. Homework assignments will consist of MATLAB or Python scripts that will be submitted via Canvas.

For the final project, you will analyze a dataset of your choosing and produce a written and oral report of your findings. Homework assignments (70%) and the final project (30%) will determine the course grade.

Course Website: Assignments, example programs, additional reading material, podcasts of the lectures, and grades will be posted on Canvas.

Suggested Textbooks: available on the UC San Diego Library ScienceDirect

Thomson, R. E. and W. J. Emery, 2014: Data Analysis Methods in Physical Oceanography, 3rd edition, Elsevier.

Menke, W., and J. Menke, 2016: Environmental Data Analysis with MATLAB, 2nd Edition, Elsevier.

Hahn, B. H., and D. T. Valentine, 2017: Essential MATLAB for Engineers and Scientists, 6th edition, Elsevier.

Course Policy and Academic Integrity:

- We (students and instructors) will adhere to the UCSD Policy on Integrity of Scholarship (http://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2).
- Please be aware that lectures will be recorded, and that this program uses video and audio recording or other personal information for the purpose of facilitating the course and/or test environment. UCSD does not allow vendors to use this information for other purposes. Recordings will be deleted when no longer necessary.
- You are encouraged to discuss homework assignments with fellow students, this is a group learning effort, but please ensure that all submitted assignments reflect your own work.
- The homework is due at the time specified on Canvas. We will be discussing the homework results in the class session immediately following the deadline, so all late homework will receive a substantial point reduction.
- We encourage and appreciate questions and discussion during the lectures.

Disability Resources: Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD). Students should present their AFA letters to the instructor at least two weeks prior to an exam to ensure that accommodations may be arranged.

Contact the OSD for further information:

     University Center 202 behind Center Hall
     858.534.4382, osd@ucsd.edu, http://disabilities.ucsd.edu