SAN JOSÉ STATE

Advanced Practical Computing Topics Section 01

CS 185C

Spring 2025 Hybrid 3 Unit(s) 01/23/2025 to 05/12/2025 Modified 01/14/2025

Contact Information

Instructor: Mike Wood

E : mike.wood@sjsu.edu

In addition to the office hours listed below, I am also happy to schedule a one-on-one office hour outside in the case that students have scheduling conflicts - please don't hesitate to reach out.

Office Hours

Friday, 12:00 PM to 2:00 PM, Virtual on Zoom

Course Information

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This upper-division undergraduate course is designed for students interested in exploring how ocean simulations are developed, run, and analyzed for applications in science and beyond. Students will gain hands-on experience using code to construct and run models, and visualize model results. Particular focus will be placed on the numerical algorithms underlying ocean models including their limitations and stability criteria. In addition, students will become familiar with deploying code on a high-performance computing cluster. In the final project of this course, students will create and run a model using parallelized code and generate a visualization of model results to examine an oceanographic process. Skills developed through this course are applicable to many other fields that use large quantities of data on remote machines, including weather forecasting.

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A grade of C- or better in Math 32 and

Either:

Computer Science, Applied and Computational Math, or Software Engineering majors

Or:

Marine Science, Geology, Meteorology, or Climate Science majors with a grade of C or better in CS 22A and CS 22B

Or:

Instructor Consent.

Virtual Lecture

12:00 PM to 1:15 PM, Zoom

In-Person Lecture

Thursday, 12:00 PM to 1:15 PM, MacQuarrie Hall 422

Course Description and Requisites

Computing topics of current interest in industrial practice. Emphasis on effective use and integration of software/hardware. Different topics may be offered at different times in a short-course lecture/lab format and may be repeated for credit.

Prerequisite: Varies with topic; Allowed Majors: Computer Science or Data Science.

Letter Graded

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1. Describe how numerical ocean models are used in research and forecasting (PLO 6)
2. Explain the physical concepts underlying ocean models and how they are represented with numerical algorithms (PLO 1)

5. Navigate, organize files, and submit jobs on a high-performance computing cluster (PLO 2)
6. Work in teams to present complex computational ideas for non-expert audiences (PLO 3, 5)

The above CLOs are aligned with the Computer Science Program Learning Outcomes (PLOs) listed HERE and copied below for reference

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Course Materials

For this course, will you will need a laptop with at least 5 GB of storage as well as a flash drive or external hard drive with at least 100 GB of storage (1 TB recommended).

All readings for this course will be selected from open source materials.

In addition, course notes will be updated in a Jupyter Book hosted on Github, accessible HERE (https://profmikewood.github.io/ocean_modeling_book/intro.html).

Grading Information

course will be split evenly between homework assignments and the course project

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Weekly Assignment	50	Homework	Homework is due before before Tuesday class meetings. Homework is posted on Canvas and will typically be turned in via a Github repository. Students should reference Canvas for pertinent files and instructions.

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11	4/8, 4/10	What does the ocean "feel"? Generating external forcing conditions for simulations
12	4/15, 4/17	What's on the edge? Generating boundary conditions for simulations
13	4/22, 4/24	Working on a high-performance computing cluster (HPC)
14	4/29, 5/1	Running jobs on an HPC
15	5/6, 5/8	Projects

The following schedule is tentative and subject to change. Please see Canvas for updates.