

## Syllabus: SIO 119 Physics and Chemistry of the Ocean

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*Lectures*: Monday/Wednesday/Friday 2:00-2:50, York Hall 4080A

*Discussion*: Wednesday, 3:00-3:50 York 4080A and second section TBD

*Final exam*: Monday, March 14 2015, 3-6 pm. (Location TBD).

*Office hours*: by appointment. We're always available in the classroom before and after class, and we respond to e-mail. Can schedule a regular time if that would help.

*Grading*: Letter or P/NP permitted.

*Course website*: <http://www-pord.ucsd.edu/~sgille/sio119>

*Objectives*: This course will help you master the key elements of physical and chemical oceanography that influence marine ecosystems. The course uses an interdisciplinary approach to examine how properties of sea water, ocean currents, air-sea forcing, and chemical processes determine the marine environment, and we examine specific examples relevant to nutrient availability, ocean acidification, and biological productivity.

Lectures, in-class discussion, weekly assignments, term papers and exams will ask you to think and synthesize material.

Specifically, by the end of the course, you should understand, and be able to discuss:

- the basics of the ocean heat and freshwater budgets;
- factors determining the density of sea water;
- locations of major ocean currents and processes driving these currents;
- factors influencing vertical motions in the ocean;
- origin of elements and basics of ocean chemistry;
- the ocean carbon cycle;
- impacts of rising  $CO_2$  concentrations in the atmosphere, as pertaining to ocean climate and ocean acidification.

*Maintaining Academic Integrity*: Students agree that by taking this course all required papers will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

This course will also adhere to the standard UCSD policy on academic integrity: “Students are expected to do their own work, as outlined in the UCSD Policy on Integrity of Scholarship. Cheating will not be tolerated, and any student who engages in forbidden conduct will be subjected to the disciplinary process. Cheaters will receive a failing grade on the assignment or the exam and/or in the entire course. They may also be suspended from UCSD.” See <http://www-senate.ucsd.edu/manual/Appendices/app2.htm> for details.

*Reading:*

- Required reading will be made available in electronic form. (This may include book chapters, lecture notes, journal articles or other materials.)

*Grading:*

- 15% homework, participation, discussion section attendance. Homework and discussion are focused on helping you understand material discussed in class. Normally due weekly on Fridays.
- 20% paper. (3-4 pages, due Friday, February 19 (week 7))
- 20% Group presentation, March 7 and 9 (week 10). 1-2 page individual synopsis due March 9.
- 15% midterm (in class Monday February 1 (week 5))
- 30% final exam (Monday March 14, 3:00-5:59 pm)
- Up to 5% in bonus points for exceptional participation.
- Late assignments will not normally be accepted. Provided that >90% of the class complete CAPE evaluations, the lowest homework grade will be dropped.

*Schedule Highlights. (See web for full details and reading assignments.)*

- **Week 1:** Origins of the universe, elements, oceans, life, etc.
- **Week 2:** Climate and ocean circulation (physical processes).
- **Week 3:** Carbon cycle, review.
- **Week 4:** Currents and tides.
- **Week 5:** Midterm; developing a hypothesis; tide pool field trip
- **Week 6:** Tide pool processes, changing climate, coastal upwelling and the California Current. (Take home midterm due)
- **Week 7:** Upwelling and the California Current, the biological pump.
- **Week 8:** Ocean acidification; coral reefs and chemistry.
- **Week 9:** High-nutrient, low-chlorophyll regions.
- **Week 10:** Student presentations (topics related to plastics, acidification and high-nutrient low-chlorophyll regions). Final course summary; review

Tide pool field trip Friday, February 5 during class time. (Low tide at 2:47 pm.) If possible, plan to come early and stay late. We'll go to the tide pools at the north end of La Jolla Shores beach.

*version date: 12 December 2015*