

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

Professor Andreas Andersson

Hubbs Hall 2150. Phone: 858-822-2486 *e-mail*: aandersson@ucsd.edu

Professor Sarah Gille

Nierenberg Hall 348. Phone: 858-822-4425 *e-mail*: sgille@ucsd.edu

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

*Discussion*: Monday 3:00-3:50 York 4050A

(Wednesday 3:00-3:50, York 4050A also listed on schedule, but cancelled)

*Final exam*: Monday, March 17 2014, 3-6 pm. (Location TBA).

*Office hours*: by appointment. We're always available in the classroom before and after class, and we respond to e-mail.

*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:*

- *Oceanography: An Invitation to Marine Science*, Garrison, Brooks/Cole Cengage, 7th edition. Available at the UCSD Bookstore (new or used, in paperback) and in electronic form from Cengage Learning. (For background reading.)
- Additional reading will be made available in electronic form. (This may include journal articles or other materials.)

*Grading:*

- 15% homework. Focused on helping you prepare for class, so that you come ready to learn in class.
- 20% paper. (3-4 pages, tentatively due Wednesday, February 20 (week 7))
- 20% Group presentation, March 11 and 13 (week 10). One page individual synopsis tentatively due March 13.
- 15% midterm (Friday February 8 (week 5), in class)
- 30% final exam (Monday March 18, 3:00-5:59 pm)
- Up to 5% in bonus points for 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:** Climate and ocean circulation (physical processes).
- **Week 2:** Origins of the universe, elements, oceans, life, etc.
- **Week 3:** Tides, carbon cycle).
- **Week 4:** Carbon cycle, field-trip planning, tide pool field trip.
- **Week 5:** Tide pool processes, coastal California, review.
- **Week 6:** Midterm, coastal upwelling and the California current
- **Week 7:** Acidification.
- **Week 8:** High-nutrient, low-chlorophyll regions.
- **Week 9:** El Niño, the North Atlantic Oscillation, and large-scale circulation.
- **Week 10:** Student presentations (topics related to plastics, acidification and high-nutrient low-chlorophyll regions).

Tide pool field trip Friday, January 31 during class time. (Low tide at 3:39 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: 6 January 2014*