

Introduction to Oceanography

Biology 342; Fall, 2016

Lecture GML 202: Mon, Wed & Fri 10:30 - 11:30

Laboratory GML 202/113: Mon & Tues 12:30-15:30

Instructor: Professor Jack DiTullio: GML, Rm. 204; phone: 953-9196; ditullioj@cofc.edu
 [Office hours: Mon and Tues 15:30 – 16:30 and by appointment]

	<u>Date</u>	<u>Topic</u>	<u>Chapter</u>
Aug.	24 W	Course Intro, Origin of Universe, Earth & Oceans	(1)
	26 F	Bathymetry/History of Ocean Studies	(2,3)
	29 M	Marine Geology/Plate Tectonics	(4)
	31 W	Geophysics	(4)
Sept	02 F	Plate Tectonics/Plate Boundaries	(4)
	05 M	Marine Sediments	(6)
	07 W	Marine Sediments	(6)
	09 F	Properties of water/seawater	(5)
	12 M	Temperature, Salinity, Density Relations	(5)
	14 W	Carbon & Nutrient Cycling	Hand- out
	16 F	Nutrient Cycling	Hand- out
	19 M	Forces Governing Winds	(7)
	21 W	Forces Governing Winds	(7)
	23 F	Atmospheric/Oceanic coupling	(7)
	26 M	Exam I	
	28 W	Currents & Wind-Driven Oceanic Circulation	(8)
	30 F	Currents & Wind-Driven Oceanic Circulation cont'd	(8)
	Oct.	03 M	Geostrophy and Subtropical Gyres
05 W		Thermohaline circulation	(8)
07 F		Thermohaline circulation	(8)
10 M		Waves	(9)
12 W		Waves	(9)
14 F		Tides	(10)
17 M		Tides	(10)
19 W		Coastal Oceans and Estuaries	(11)
21 F		Coastal Oceans and Estuaries	(13)
24 M		Phytoplankton & Primary Production	(12)
26 W		Phytoplankton & Primary Production	(12)
28 F	Zooplankton & Secondary Production	(12)	
31 M	Exam II		

Nov.	02 W	Marine Food Webs	(14)
	04 F	Marine Ecology	(15)
	07 M	No Class--- Fall Break	
	09 W	Benthos	(15)
	11 F	Hydrothermal Vents	(15)
	14 M	Coral Reefs	(15)
	16 W	Mangroves	(16)
	18 F	Pollution	(16)
	21 M	Pollution	
	23 W	No Class -- Thanksgiving Holiday	
	25 F	No Class -- Thanksgiving Holiday	
	28 M	Ocean Biogeochemistry	
	30 W	Ocean Biogeochemistry	
Dec.	02 F	Oceans and Climate	
	05 M	Last Class	
	07 W	Final Exam	

Text: *Text: Introduction to Ocean Sciences*, 2015, Douglas Segar, 3rd edition.
ISBN-978-0-9857859-0-1

Individual chapters from this text or the whole book can be accessed for free at the following links, respectively:

<http://www.reefimages.com/oceansci.php>

<http://www.reefimages.com/oceans/SegarOcean3Book.pdf>

Course Objective: To introduce the student to all aspects of general Oceanography including: Geological, Physical, Chemical and Biological Oceanography. Additional lectures not covered in the textbook will address the importance of the oceans in biogeochemical cycling of various elements as well as their effect on global climate change. The lab sections will involve both problem sets as well as analytical work. Lab projects will be completed and the results will be presented to the class.

Student Learning Outcomes:

- Students will gain an understanding of how various sub-disciplines of oceanography are inter-related and the importance of employing a multidisciplinary approach.
- Students will gain field experience in collecting oceanographic samples and data using a CTD system in Charleston Harbor.
- Students will learn how to analyze seawater for various chemical components including nutrients such as phosphate and silicate.
- Students will learn how to measure acidification of seawater by determining various components of the carbonate system (e.g. alkalinity, pH and carbonate)

concentration)

- Students will gain experience in identifying live plankton species from Charleston Harbor.
- Students will demonstrate an ability to interpret and synthesize oceanographic datasets and present analytical results in a power point presentation.

Course Grading:

Exam I -----	20%
Exam II -----	20%
Labs -----	25%
Final -----	25%
Current Topics Paper-----	10%

Each exam will cover material from the preceding section only. The final exam, however, will be cumulative. Exams will cover all assigned readings as well as lecture material. Exam questions will include definitions, short answers and short essay questions. Please note that class attendance is strongly advised as lectures will include a significant amount of material not covered in the text. Final grades will be determined according to the following scale:

- A = 93-100
- A- = 90-92
- B+ = 87-89
- B = 83-86
- B- = 80-82
- C+ = 77-79
- C = 73-76
- C- = 70-72
- D+ = 67-69
- D = 60-66
- F = 0-59

Laboratories: The labs will be held in GML Rm. #113. Lab reports will be due one week after they are assigned unless otherwise noted. Late lab assignments will lose 10% of the maximum grade per week. No write-ups will be accepted more than 3 weeks late. A field trip to Charleston Harbor and associated estuaries aboard the R/V *Silver Crescent* is scheduled tentatively for the afternoons of September 24 and 26, 2013 (weather permitting). More details about the cruise will be provided the week before the cruise. A class debate will be held to discuss various ways of mitigating anthropogenic CO₂ rise and associated climate change impacts.

Student Presentations: Each student will prepare a 5 page paper (double spaced) on some current oceanographic topic of interest. The topics will need to be approved before fall break by the instructor. Peer reviewed papers should be part of the bibliography. The deadline for submission is on or before Nov 26, 2013.

Oceanography Lab

Biology 342, Fall 2016

Teaching Assistant: Rebecca Balazs

Email: sampsonrj@g.cofc.edu

The labs will meet on Monday and Tuesday at the Grice Marine Lab in Fort Johnson (James Island) in Rm #202 and #113 from 1230 to 1530 hr. Please report to room 202 first. Some lab periods will also include a short lecture. There will be a class field trip aboard the R/V *Silver Crescent* on September 26 and 27, 2016 at 12:30 pm. All Lab reports must be turned in the following week. Late lab reports will be penalized 10% per week. The requirements for the Debate and Special Topics Presentations will be discussed during the first lab period. A 5-10 pg Current Events Paper will also be due on the last day of class (Dec 5th).

	<u>Date</u>		<u>Topic</u>
Aug.	29/30	M/T	Lab Intro; Bathymetry
Sept.	05/06	M/T	History of Oceanography /Plate Tectonics
	12/13	M/T	Total CO ₂ & the Carbonate Buffering System in Seawater
	19/20	M/T	Measurement of the Primary Nutrients in Seawater
	26/27	M/T	Class Cruise aboard R/V <i>Silver Crescent</i>
Oct.	03/04	M/T	Spectrophotometric and Fluorometric Pigment Analyses
	10/11	M/T	Plankton Tows/Microscopy
	17/18	M/T	Harbor Sampling
	22/24	M/T	Ocean Fluid Dynamics---Thermohaline Circulation
	24/25	M/T	Lab Analyses and Journal Discussion
Nov	31/01	M/T	Harbor Sampling
	07/08	M/T	No lab—Fall Break
	14/15	M/T	Lab Analyses and Special Topics Presentation
	21/22	M/T	Class Debate
	28/29	M/T	Presentations and Final Lab Write-ups Due

College Policies:

1. **Center for Student Learning:** I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies, speaking & writing strategies, and course content. They offer tutoring, Supplemental Instruction, study strategy appointments, and workshops. Students of all abilities have become more successful using these programs throughout their academic career and the services are available to you at no additional cost. For more information regarding these services please visit the CSL website at <http://csl.cofc.edu> or call (843)953-5635.

2. **Center for Disability Services (<http://disabilityservices.cofc.edu/for-faculty/faqs.php>)**
 - Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged.
 - The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me one week before accommodation is needed.
 - This College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services/SNAP, 843.953.1431 or me so that such accommodation may be arranged.

3. **College of Charleston Honor Code and Academic Integrity**

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved. Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation,

suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor. Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>

4. SAFETY POLICY AND PROCEDURES

The School of Sciences and Mathematics of the College of Charleston understands that the safety of our students, staff and faculty is of paramount importance. Engendering a safety culture is an important part of our mission in teaching and doing science. Each department, course of instruction, or research lab may require higher standards or procedures. The policies and procedures set forth below are understood to be minimum requirements across our departments.

In this document, the term "laboratory" is meant for a work space/facility where chemicals, biological agents, or equipment is used for research and/or instruction. No one (student, staff, faculty, or visitor) will be allowed in a laboratory (teaching or research) to perform experiments or where experiments may be in progress unless these regulations are followed. Students dismissed from a teaching lab due to violations of the safety procedures will not be allowed to re-enter the laboratory until authorized to do so by their supervisor (instructor) and, in the case of research laboratories, by the department chair or designee. Any course work missed because of a violation of these guidelines cannot be made up at another time (or by an extension of the lab period) and will be treated as an unexcused absence.

1. You are responsible for knowing the biological, chemical, electrical, ergonomic, mechanical, and physical hazards associated with the equipment and materials that are being utilized in the laboratory. Listen to all instructions and ask questions about that which you do not understand.
2. Know the location of safety equipment: telephones, emergency shower, eyewash, fire extinguisher, fire alarm pull.
3. Know the appropriate emergency response procedures. If there is an injury or emergency, call 953-5611.
4. Do not work alone in the laboratory if you are working with hazardous materials or equipment.
5. Use hazardous chemicals, equipment, and biological agents only as directed

and for their intended purpose.

6. Do not engage in horseplay, pranks or other acts of mischief while in lab.

7. Drinking, eating, and application of cosmetics is forbidden in laboratories where chemicals or biohazards are present. Smoking is forbidden in all College buildings.

8. Appropriate personal protective equipment shall be worn. The dress code for laboratory work when using chemicals, biological or physical hazards, or when instructed to do so by the laboratory supervisor is as follows:

a) Wear safety glasses or goggles at all times.

b) No exposed skin on arms, legs or torso.

c) Wear lab coats or other approved protective garments.

d) Wear gloves or other personal protective equipment (PPE) as directed by the instructor or mandated by prudent practices based on the chemicals being handled. If in doubt, wear appropriate gloves. Latex is not permitted. Avoid cross-contamination.

e) Remove PPE (gloves and lab coat) when exiting the laboratory.

f) Wash your hands, even if gloves were used, before leaving a lab where you did any lab work.

g) Closed toe shoes are required. The heel and top of foot must be covered. High heeled shoes, sandals, and perforated shoes are not permitted.

h) Confine long hair and loose clothing.

9. Inspect equipment or apparatus for damage before adding chemical reagents or biological samples or energizing electrical equipment. Do not use damaged equipment.

10. Never remove chemicals, biological samples, or laboratory equipment from a lab without proper authorization.

11. Presume that all chemicals and biological samples used in the laboratory are hazardous for you and the environment, unless instructed otherwise.

12. Never leave an experiment unattended unless proper safety precautions are in place.

13. Read all labels on chemicals twice before using them in the lab. Read all instructions twice for the operation of any equipment or machinery.

14. Properly and safely dispose of all waste materials.

15. Treat sharps and broken glassware containers carefully.

a) Broken glass should be disposed of in properly marked safety containers. All sharps (needles, razor blades, etc.) used for any purpose must be disposed of in specially labeled SHARPS containers.

b) Do not place contaminated glass in the broken glassware container. Consult your supervisor.

c) Waste chemicals and contaminated PPE should be discarded as directed.

16. When using a reagent, replace the lid immediately. Never return unused reagents to stock bottles. Take only the amount needed for your experiment.

17. All chemicals and biological samples/media are to be disposed of in appropriately labeled containers. Specific instructions for each material will be provided. Pay attention to waste container labels before adding the material to be discarded.

18. Use good personal hygiene. Keep your hands and face clean. Wash hands thoroughly with soap and water after handling any chemical or biological agent.
19. Keep the work area clean and uncluttered with chemicals and equipment. Clean up the work area on completion of an operation or an experiment. Before leaving the laboratory, you are responsible for making sure your lab area is clean and organized.
20. Never store a chemical or biological specimen in an unlabeled container.
20. Always have your College of Charleston identification and insurance information with you when working in a laboratory. MedicAlert identification must be worn if you have any potential life-threatening chemical sensitivities or medical conditions.
21. Report any accident or injury, however minor, to your teaching assistant, instructor, or lab supervisor immediately. An accident report form must be completed and forwarded to the department chair, dean and to the Director of Environmental Health and Safety.

If you have questions/concerns about safety in the lab please first consult your instructor. If these are not answered, please see the department chair. Finally, you may consult the director of Environmental Health and Safety, Randy Beaver at 3-6802 or beaverr@cofc.edu