

<b>Faculty:</b>	Joseph P. Montoya 1244 Ford ES&T Building tel: 404-385-0479 email: montoya@gatech.edu	Office hours after class or by appt. (email 3 times that work)
Lectures:	MWF 1:05 – 1:55 am, EST L1105	
Prerequisites:	General, college-level biology and chemistry and an interest in how the oceans work.	
Description:	An interdisciplinary introduction to biological oceanography. Our goal will be to develop an integrated view of the oceans as a coupled physical-chemical-biological system, with an emphasis on the role of organisms in driving major biogeochemical cycles.	
Textbook:	Any standard oceanography textbook can serve as a general reference. Examples include: Miller, C.B. and Wheeler, P.A. 2012. <i>Biological Oceanography</i> , 2 <sup>nd</sup> Edition. Wiley-Blackwell. Trujillo, A.P. and Thurman, H.V. 2011. <i>Essentials of Oceanography</i> , 10 <sup>th</sup> Edition. Pearson Prentice Hall.	
Attendance:	Attendance in lecture correlates strongly with performance in Biology 4221/6221. All of the course materials will be presented and discussed in class. I will make my lecture slides available via T-Square and urge you to download and print them for use in taking notes during lecture.	
Class Participation	Contributing to our in-class discussions is a critical part of this course. If you don't contribute actively, you'll forfeit up to 15% of your overall grade.	
In Class use of Electronics:	You can use electronic devices for note-taking in class, but you may not use these devices during lecture for any task not related to class. Texting, posting to Facebook, shopping, and watching videos are examples of distracting activities that are explicitly prohibited in class.	
Exams:	Two midterms and a final exam. The exams will consist primarily of questions that require short (1-2 sentence) written answers designed to test your understanding and ability to articulate concepts as well as facts. Portions of these exams may be administered online.	
Missed Exams:	If you miss a midterm exam for any reason, you will receive a grade of 0 (zero) on that exam unless you <b>petition to have the exam grade excused within 24 h of the start of the missed exam</b> , and I approve your petition. Your petition must be submitted by e-mail and must include documentation of a legitimate reason for missing the exam. You can, of course, submit your petition before the exam if you know of your scheduling conflict in advance. We will consider each petition individually. Examples of legitimate reasons to miss an exam include illness, illness or death in your immediate family, and participation in official university activities. If I approve your petition, I'll remove the missed exam from your grade calculation by using the weighted mean of your other exam scores as your grade for the missed exam.	
Quizzes:	Short quizzes may be administered in lecture and online.	

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Group Presentation (Bio 4221):	Groups of 3-4 students will research a topic of current interest in biological oceanography and prepare an in-class presentation (15 minutes + 5 minutes for discussion) and a scientific poster. Each group must also submit a written statement outlining the contribution of each member to the overall project.
Individual Presentation (Bio 6221)	Each student enrolled in Biology 6221 will research a topic of current interest in biological oceanography and will prepare an individual class presentation (15 minutes + 5 minutes for discussion) and a 10 page paper.
Honor Code and Student Conduct:	All students are expected to abide by the Academic Honor Code, which can be viewed online at <a href="http://www.honor.gatech.edu">www.honor.gatech.edu</a> . Plagiarism and cheating are serious academic offenses and we are required to report any suspected occurrence. Please see the Student Code of Conduct for more info: <a href="http://www.catalog.gatech.edu/rules/19b.php">http://www.catalog.gatech.edu/rules/19b.php</a> .
Accommodations:	If you have learning needs that require some accommodations for you to succeed in this course, please contact The Office of Disability Services as soon as possible ( <a href="http://disabilityservices.gatech.edu">http://disabilityservices.gatech.edu</a> ). I will arrange to accommodate your learning needs based on their recommendations.

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Grading: Your final grade will depend on the following combination of scores:

<b>Course Component</b>	<b>Bio 4221</b>	<b>Bio 6221</b>
Midterm exams:	30%	30%
Final exam:	25%	25%
Quizzes:	10%	10%
Group Presentation/Poster	25%	—
Individual Presentation/Paper:	—	25%
Participation:	15%	15%

Note that these components total 105%, though the maximum score possible is 100%.

I will use the following procedure in calculating your final grade:

1. I will first combine your scores into a raw composite score (0 – 100%) using the weights shown above.
2. I will use the mean score earned by the top 5% of the class as a gauge of real student performance in the class.
3. I will normalize your score to actual student performance by dividing your raw composite score by the mean score earned by the top 5% of the class. If you're in the top 2.5% of the class, your score will be 100%.
4. I will assign final letter grades using the following scale:

A:  $\geq 90.0\%$

B:  $\geq 80.0\%$  and  $< 90.0\%$

C:  $\geq 70.0\%$  and  $< 80.0\%$

D:  $\geq 60.0\%$  and  $< 70.0\%$

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## Tentative Lecture Schedule

Wk	Day	Date	Lecture Topics (tentative)	Notes
1	M	11 Jan	Course introduction and overview.	
	W	13 Jan	History of ocean science The ocean as a physical environment	
	F	15 Jan	Physical properties of seawater: Temperature, Salinity, Density Spatial distribution of physical properties	<b>Last day to make schedules changes or drop a class without a "W" grade.</b>
2	M	18 Jan	<b>Holiday</b>	
	W	20 Jan	Wind-driven circulation Coriolis force, Ekman spiral, geostrophy	Biol 6221: start thinking of presentation/paper topics.
	F	22 Jan	The thermohaline circulation Deep water formation Chemical tracers of deep circulation	
3	M	25 Jan	Seawater as a solution: Dissolved constituents of seawater pH and alkalinity	Biol 4221: form groups and start thinking of a presentation topic.
	W	27 Jan	Gases in seawater Solubility, speciation of CO <sub>2</sub> in solution Alkalinity and TCO <sub>2</sub>	
	F	29 Jan	Sources and sinks of CO <sub>2</sub> in the ocean Box model of the C cycle The biological pump	
4	M	1 Feb	Chemical Oceanography wrap-up	Biol 6221: Turn in a 1 paragraph overview of presentation/paper.
	W	3 Feb	Guest Lecture (TBD)	
	F	5 Feb	Introduction to the phytoplankton Survey of habitats & taxa	
5	M	8 Feb	Phytoplankton and primary production Photosynthesis	Biol 4221: Turn in a listing of group members and a 1 paragraph presentation overview.
	W	10 Feb	Nutrients and primary production Uptake kinetics N and P limitation	
	F	12 Feb	<b>Midterm Exam</b>	Physical and Chemical Oceanography
6	M	15 Feb	Primary production: spatial & temporal patterns	
	W	17 Feb	New production and fate of primary production	
	F	19 Feb	Phytoplankton and primary production wrap-up	

Wk	Day	Date	Lecture Topics (tentative)	Notes
7	M	22 Feb	Microbial loop	
	W	24 Feb	Introduction to the zooplankton Survey of habitats & taxa	
	F	26 Feb	Zooplankton feeding strategies	
8	M	29 Feb	Planktonic food webs Feeding & assimilation of nutrients	
	W	2 Mar	Zooplankton production Secondary production and biomass Trophic structure of marine systems	
	F	4 Mar	Zooplankton vertical migration Diel and ontogenetic vertical migration	Overview & discussion of presentation topics.
9	M	7 Mar	Introduction to the benthos Survey of habitats and taxa	
	W	9 Mar	Deep sea benthos Diversity and production	
	F	11 Mar	Presentation abstracts (Biol 6221)	
10	M	14 Mar	Hot vents Chemosymbiosis & production	
	W	16 Mar	Cold seeps Chemosymbiosis & production	<b>Last day to change grade mode or to drop the class</b>
	F	18 Mar	Presentation abstracts (Biol 4221)	Overview & discussion of presentation topics.
11	M	21 Mar	<b>Spring Break</b>	
	W	23 Mar	<b>Spring Break</b>	
	F	25 Mar	<b>Spring Break</b>	
12	M	28 Mar	Benthic biogeochemistry	
	W	30 Mar	Student presentations (day 1)	
	F	1 Apr	<b>Midterm Exam</b>	All materials through 28 Mar
13	M	4 Apr	Nearshore and intertidal benthos.	
	W	6 Apr	Student presentations (day 2).	
	F	8 Apr	Fisheries Fishery management Cod and other failures	
14	M	11 Apr	Intertidal ecology.	
	W	13 Apr	Student presentations (day 3)	
	F	15 Apr	Ocean biogeochemistry N cycle & C cycle	

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Wk	Day	Date	Lecture Topics (tentative)	Notes
15	M	18 Apr	The oceans and climate Long-term oceanic records of climate Ocean circulation and climate	
	W	20 Apr	Student presentations (day 4)	
	F	22 Apr	Student presentations (day 5)	Posters due
16	M	25 Apr	Course wrap-up and review	
	W	27 Apr	Reading Period	
	F	28 Apr	Start of Final Exams (after 2:20 pm)	
17	M	2 May	<b>Final exam (2:50 – 5:40 pm)</b>	Comprehensive exam
		3 May	Reading Period (8:00 am – 2:20 pm)	
	Sa	5May	End of Final Exams	

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