

Faculty:	Joseph P. Montoya 1244 Ford ES&T Building tel: 404-385-0479 email: montoya@gatech.edu	Office hours: after class or by appointment (send an email with 3 times that work for you)
Lectures:	MW 2:00– 3:15 pm, van Leer C341	
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 biogeochemical cycles.	
Textbook:	Any standard oceanography textbook can serve as a general reference. Three open-source texts are available on the Modules page of our Canvas website.	
Attendance:	Attendance in lecture correlates strongly with performance in Bio 4221/6221. All of the course materials will be presented and discussed in class. I will make my lecture slides available via Canvas and urge you to download and print them for use in taking notes during lecture. Note that my slides include the graphics that we will discuss in class but are generally not heavily annotated; taking notes is a critical part of the learning process in this class.	
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 20% of your overall grade.	
Learning Catalytics (LC)	We will use Learning Catalytics for a variety of in-class activities. All exercises are graded for participation (you get credit for submitting an answer to a question whether you get the right answer or not) and points earned in LC will contribute to the "participation" portion of your course grade. Learning Catalytics can be purchased directly at https://learningcatalytics.com/users/sign_up or from the Georgia Tech Bookstore in Tech Square. You will need an internet-capable smartphone, tablet, or laptop to earn class participation credit.	
In Class use of Electronics:	You can use any web-enabled device (laptop, tablet, or phone) to access Learning Catalytics in class, but you may not use these devices during lecture for any non-class related task. Texting, shopping, and watching videos are examples of distracting activities that are prohibited in class and may result in loss of LC credit.	
Exams:	Two midterms and a final exam. The exams will include multiple choice questions as well as questions that require short (1-2 sentence) written answers designed to test your understanding and ability to articulate concepts as well as facts. 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 petition to have the exam grade excused within 24 h of the start of the missed exam , 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. I 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.	

	<p>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.</p>
Quizzes:	<p>Short quizzes may be administered in lecture and online. If we don't have any quizzes, I will assign the mean of your other exam scores to the "quiz" category in your grade calculation, making it neutral with respect to exams.</p>
Group Project (Bio 4221):	<p>Groups of 3-4 students will research a topic of current interest in biological oceanography and prepare a 5 minute video overview suitable for a general audience. Each student must also complete two catme.org surveys to aid in group construction and to document the contribution of each member to the overall project. In addition, each student must complete a set of peer reviews.</p>
Individual Project (Bio 6221)	<p>Each student enrolled in Biology 6221 will research a topic of current interest in biological oceanography and will prepare an individual class presentation (12 minutes + 3 minutes for discussion) and a 10 page paper.</p>
Use of AI:	<p>Machine learning language processing and artificial intelligence are becoming common in the generation of text. These tools are sophisticated enough that they can now generate answers to some basic questions (which does not mean they are necessarily <i>correct</i> answers). The use of AI/ML-generated text is not allowed to generate your response to any assignment in this class. However, AI tools may be useful in the process of editing and refining a written response. AI tools should be used as you would a trip to the writing center, where the AI or writing tutor can help provide outlines, feedback, and editing to a written response. If you utilize AI in your response, you should submit the input you provided the AI, cite the AI you used, and explain how it was utilized.</p>
Academic Integrity:	<p>Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit https://osi.gatech.edu/content/honor-code.</p> <p>Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, which will investigate the incident and identify the appropriate penalty for violations.</p> <p>Plagiarism is the unattributed use of the words, works or ideas of others; plagiarism on any assignment, including laboratory reports and the group project, will be referred to the Office of Student Integrity for adjudication. If you have any questions regarding your assignments and plagiarism, we encourage you to consult with any of us before you submit the assignment.</p> <p>Cell phones must be turned off during exams, and access to any website or resource is forbidden. Students in violation of these policies during an exam will be referred to the Honor Council.</p>
Accommodations:	<p>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 (http://disabilityservices.gatech.edu) to make an appointment to discuss your needs and to obtain an accommodations letter. I will arrange to accommodate your learning needs based on their recommendations.</p>

Inclusivity: As members of the Georgia Tech community, we are committed to creating a learning environment in which all of our students feel safe and included. Because we are individuals with varying needs, I rely on your feedback to achieve this goal and invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make our classroom an environment in which every student feels valued and can engage actively in our learning community. Anonymous feedback can be provided through Piazza.

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

Course Component	Bios 4221	Biol 6221
Midterm exams:	30%	30%
Final exam:	20%	20%
Quizzes:	10%	10%
Group Project:	25%	—
Individual Project:	—	25%
Participation/LC:	20%	20%

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 $< 70.0\%$

Note that this scheme doesn't constrain the final grade distribution in any way. Everyone can earn an A in this class and I'd be delighted if you all did.

Tentative Course Schedule

Wk	Day	Date	Lecture Topics (tentative and subject to change)	Notes
Course Intro & Physical Oceanography Overview				
1	M	8 Jan	Introduction to the course History of ocean science The ocean as a physical environment	
	W	10 Jan	Physical properties of seawater: Temperature, Salinity, Density Spatial distribution of physical properties	Biol 6221: start thinking of presentation/paper topics
	F	12 Jan		Last day to make schedules changes or drop a class without a "W" grade.
2	M	15 Jan	Holiday	
	W	17 Jan	Wind-driven circulation Coriolis force, Ekman spiral, geostrophy	
3	M	22 Jan	The thermohaline circulation Deep water formation Chemical tracers of deep circulation	
Chemical Oceanography Overview				
	W	24 Jan	Seawater as a solution: Dissolved constituents of seawater pH and alkalinity	Biol 4221: We'll form groups this week. Start thinking of a presentation topic.
4	M	29 Jan	Gases in seawater Solubility, speciation of CO ₂ in solution Alkalinity and TCO ₂	Biol 6221: Turn in a 1 paragraph overview of your presentation/paper.
	W	31 Jan	Sources and sinks of CO ₂ in the ocean Box model of the C cycle The biological pump	
5	M	5 Feb	Midterm Exam	Physical and Chemical Oceanography
Biological Oceanography				
	W	7 Feb	Introduction to the phytoplankton Survey of habitats & taxa	Biol 4221: Turn in a 1 paragraph overview of your presentation/poster.
6	M	12 Feb	Introduction to the phytoplankton Survey of taxa (contd)	
	W	14 Feb	Phytoplankton and primary production Light in the ocean Phytoplankton photosynthesis	
7	M	19 Feb	Nutrients and primary production Uptake kinetics N and P limitation	Remote lecture

Wk	Day	Date	Lecture Topics (tentative and subject to change)	Notes
	W	21 Feb	Primary production: spatial & temporal patterns New production and fate of primary production	Remote lecture
8	M	26 Feb	Blooms (contd) and the Microbial loop	
	W	28 Feb	Micro Loop and Intro to the zooplankton 1	
9	M	4 Mar	Intro to the zooplankton 2	
	W	6 Mar	Intro to the zooplankton 3	
10	M	11 Mar	Zooplankton feeding and feeding strategies Zooplankton production Secondary production and biomass Trophic structure of marine systems	
	W	13 Mar	Zooplankton vertical migration Diel and ontogenetic vertical migration	Last day to change grade mode or to drop the class
11	M	18 Mar	Spring Break	
	W	20 Mar	Spring Break	
12	M	25 Mar	Zooplankton vertical migration (continued) Deep sea benthos Diversity and production Presentations: Manan Jain & Gabrielle Krueger	
	W	27 Mar	Benthic biogeochemistry: Sediment geochemistry Vents and seeps Presentations: David Clark & Jeongin Kim	
13	M	1 Apr	Fisheries Fishery management Presentations: Kelly Bowers & Maggie Straight	
	W	3 Apr	Midterm Exam	Materials through 27 Mar
14	M	8 Apr	Ocean biogeochemistry: C, N, P cycles Student presentations: Lucy Bricker & Daniel Sperling	
	W	10 Apr	Ocean biogeochemistry: C, N, P cycles Presentations: Louis Walls	
	F	12 Apr		Bios 4221 videos due
15	M	15 Apr	Ocean biogeochemistry: C, N, P cycles Presentation: Nolan Barrett & Eli Harrison	
	W	17 Apr	The oceans and climate Long-term oceanic records of climate Ocean circulation and climate Presentations. Anna Huang & Sarina Maybeck	
	F	19 Apr		Biol 6221 papers due

Wk	Day	Date	Lecture Topics (tentative and subject to change)	Notes
16	M	22 Apr	Course wrap-up and review	
	W	24 Apr	Reading Period	
	Th	25 Apr	Start of Final Exams	
17	W	1 May	Final exam: 1440 – 1730	Comprehensive exam.
