

Marine Science

GEO 105

INSTRUCTOR

Anthony Drew Muscente (dmuscente@cornellcollege.edu)

Preferred name: Drew

Pronouns: He/him

Office: Norton Geology Building Room 102

CLASS MEETING TIMES & LOCATION

We will meet, as needed, from 8:30 to 11:30 in Norton Geology 308 each day during the block, except for the day dedicated to the field trip to the Shedd Aquarium.

COURSE DESCRIPTION

Marine science explores the broad range of factors that both influence, and are influenced by, the oceans on our planet. Marine science is thoroughly grounded in geology, chemistry, physics, climate, and biology (this is NOT simply a marine biology course). In addition to expanding your scientific understanding of the sea, you will gain the foundation needed to become well-informed citizens able to participate in important societal discussions that involve environmental issues related to oceans, climate, and coastal areas. Finally, you will develop a number of transferable skills related to critical thinking, verbal communication, and organization, which will complement your new scientific knowledge and understanding.

COURSE GOALS

1. Learn about the history and methods of ocean exploration
2. Gain a basic familiarity with major types of marine life
3. *Dive into* the physical, chemical, and biological properties of the world's oceans
4. Explore the connections between ocean chemistry, nutrients, currents, and biology
5. Evaluate and discuss current issues in marine science
6. Ask a question, execute a literature search, synthesize ideas, and communicate results
7. Investigate the ways in which the oceans are connected to, and drive, major Earth processes, such as: atmospheric and oceanic circulation, climate and weather, plate tectonics, nearshore environments, and sustainability of human and marine populations.

This course supports the Educational Priorities and Outcomes of Cornell College with emphases on knowledge, inquiry, reasoning, ethical behavior, and communication.

What I expect from you:

You should come to class on time and prepared to learn. Be engaged and actively participate in discussions and activities. If you put forth a solid effort in this course, you can expect to receive a satisfactory grade. Remember, you should be working a solid 8 hours/day, both for your own learning and to fulfill the requirements for this program to have accreditation. Consequently, you will spend at least 150 hours on this course. Most days, we will have ~3 hours in class. When we are not engaged in class, you should plan on reading your textbook, reviewing notes from class, working on your Final Project, and preparing your group and individual presentations. Of course, you may end up needing to do more (or perhaps less), depending on your own learning pace and style. I encourage you to read to understand, not to simply finish.

OFFICE HOURS

I am always happy to speak with you about class or other issues, and if there is anything you feel that I should know, I would prefer to meet as soon as possible. I will hold office hours by appointment in the afternoon after class. I do my best to promptly respond to emails BUT you may need to wait a day or so for an individual meeting.

TEXTBOOK

Our primary textbook will be *Introductory Oceanography* (Thurman and Trujillo, 2004, 10th edition) Pearson, ISBN-13 978-0131438880. Editions are available in the bookstore. You should plan to read roughly one chapter per day. You will only be tested and quizzed on material covered in class. Nonetheless, you will find the textbook useful for studying, preparing you're your group presentations, and selecting a Final Project topic. I strongly recommend that you read the chapters listed in the calendar BEFORE class, as it will improve your ability to participate.

EVALUATION

Your grade for this course will be based on seven factors: (1) attendance for the MANDATORY field trip to the Shedd Aquarium in Chicago on the second Friday of the block; (2) four group presentations on topics related to Marine Science; (3) participation in class activities; (4) daily quizzes; (5) a final exam; and (6) a final project in the form of a short paper and presentation on a topic of your choice pending approval by your Instructor; and (7) a one paragraph proposal on your Final Project topic (due at the end of Week One).

GRADING SCALE

95-100	A
90-94.9	A-
86-89.9	B+
83-85.9	B
80-82.9	B-
76-79.9	C+
73-75.9	C
70-72.9	C-
66-69.9	D+
60-65.9	D
0-59.9	F

GRADING POLICY

Final project	20%
One paragraph proposal on Final Project topic	5%
Final exam	20%
Quizzes (daily)	20%
Group Presentations (5% each)	20%
Participation in class activities	10%
Attendance for Field Trip to Shedd Aquarium	5%

CLASS PARTICIPATION

Participation is central to the success of any small class. Accordingly, you are expected to attend and actively contribute to all class meetings and field trips (you should contribute in a positive manner). Your participation will be assessed PASS/FAIL. You will receive a passing grade each day if you (1) attend both sessions of class, (b) contribute to class discussions by asking questions and respectfully sharing your opinions, and (c) completing assigned activities. I expect you to ask questions about other students' presentations and projects.

LAB QUIZES

Most days, you will complete a short ~20-30 min quiz at 1 pm based on the lectures, presentations, and discussions in the prior day's class. You will provide your answers on index cards. These quizzes will assess your retention of knowledge from the previous day, offer you an opportunity to apply that knowledge, and prepare you for the Final Exam.

GROUP PRESENTATIONS

You will work in groups of three to prepare and execute presentations on major topics related to Marine Science. Overall, you will complete four group presentations. Your group will be different for each presentation, so please be prepared to show off your best teamwork skills! I expect each person to contribute equally to the presentation. Each presentation should be 12 minutes long, leaving a few minutes for questions. You are highly encouraged to prepare PowerPoint slides, and we will review how to prepare a professional PowerPoint presentation on the first day of class. That said, groups may ask for special permission for nonconventional presentation types (e.g. original videos, podcasts, songs, etc.). You can find additional instructions for these presentations at the end of the syllabus.

FINAL PROJECT

Working as an individual, you will select a Marine Science topic, identify a question of interest, conduct a search of literature, write a five-page paper with a works cited section, and present your findings to the class in Week Four. Your topic **MUST** be cleared by your Instructor. You should plan on submitting a one paragraph proposal for your Final Project topic via email (dmuscente@cornellcollege.edu) to your Instructor by the end of Week One. If your Instructor does not approve your topic, you will be asked to revise your proposal. As before, your presentation should be 12 minutes long, leaving a few minutes for questions. And again, you are encouraged to prepare PowerPoint slides, though you may also request permission to develop a presentation of a different form.

COURSE PHILOSOPHY

The design of this course will reinforce the major concepts of Marine Science, and over the block, help you to develop your verbal communication skills and prepare for the final exam. The group presentations will allow you to incrementally gain experience with public communication, culminating in your individual Final Project presentation. In addition to motivating you to review class materials each day, the quizzes will provide you with opportunities to recognize and overcome your own gaps in knowledge.

LATE WORK AND MAKE-UP POLICY

Due to the fast-paced nature of the class, policies are strict. Unless you inform me of absences in advance and your reasons are legitimate, I will **not** accept late assignments except under the most extreme circumstances. Lab exercises are the only exception to this rule.

Add/Drop/Withdrawal

This course may be added or dropped within the first three days of the block with the permission of the instructor, per College policy. A withdrawal may be granted on the 15th day, provided that you have completed all assignments, participated fully in course activities, and attended all class sessions (1 *excused* absence permitted). NOTE: A 15-day drop will not be granted to students who, in my estimation, have not made a good faith effort to learn and/or complete the course material. A health withdrawal (WH) may be obtained if health issues are serious enough to interfere with course completion. To qualify, you must speak with a health professional either on or off campus and receive written documentation.

ACADEMIC HONESTY POLICY

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgment of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

DISABILITIES AND ACCOMODATIONS POLICY

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Office of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see <http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml>.

A Note on MENTAL HEALTH

Your mental health is important to your success at Cornell College and beyond. It should not be ignored, and instead, should be treated with the same care as the rest of your physical state. If you believe you may be suffering any mental health problems (e.g. symptoms of depression, suicidal thoughts, trouble focusing, memory problems, etc.), you are encouraged to discuss them privately with your Instructor and seek assistance from trained professionals (including those in the Cornell College Counseling Center: <https://www.cornellcollege.edu/counseling/>). Academic success should not come at the cost of mental health, and we will take steps to ensure both.

TECHNOLOGY POLICY

Technology has become a major aspect of life and education. You are allowed **limited** use of cell phones, laptops, and tablets in this course. However, out of courtesy to your classmates and Instructor, please use your technology with care, and do not create distractions, for example, by using text messaging services, social media, web browsers, or games during class. If you DO create distractions or use your technology for non-essential activities, you will receive a verbal warning on your first offense, and on the second offense, you will be asked to leave class (i.e. you will not be allowed to take the daily quiz and you will not receive credit for participation for the day). You are permitted to type your notes. That said, you may ultimately find it more useful to write and sketch your notes, as Marine Science is an inherently visual science.

RESPECT AND TOLERANCE POLICY

Disrespectful and intolerant behavior is toxic by nature, and bullying of any kind is absolutely unacceptable. You will be treated like adults in this course. If your behavior becomes detrimental to the education and/or well-being of any of your classmates, and you do not immediately take steps to reconcile and remedy the situation, you will be asked to leave class (i.e. you will not be allowed to take the daily quiz and you will not receive credit for participation for the day). It is important to be mindful of the diversity of opinions and backgrounds of people at Cornell. In this course, we will be exercising a number of exercises involving public speaking – and it is certainly the case that this activity does not come easy to everyone. Please be mindful of this fact when observing and interacting your classmates' presentations.

INSTRUCTIONS FOR GROUP PRESENTATIONS

HELPFUL HINTS:

- Your textbook may provide you with some information to get started on your presentation BUT you will need to dig deeper.
- Be prepared to search the web, visit the library, and read books/papers on the topic of your presentation
- Wikipedia is a helpful starting point. But don't stop there. You need to find more reputable sources of information.
- Come prepared. You should not simply read off your PowerPoint slides. You should know the presentation in advance.
- Include a lot of pictures. Images make for engaging presentations. Take advantage of image search engines, like Google. Your presentation should not simply be text.
- Academic Integrity matters! You cannot simply copy and paste text into your presentation slides. Put things into your own words! Plagiarism will result in a ZERO for you and your partners.

GROUP PRESENTATION #1: **Explorers and Ocean Exploration**

Your group will give a presentation on a sailor, navigator, scientist, and/or group effort toward ocean exploration. Your 12-minute presentation should address the following questions:

- Who – who was this individual or group? What was their background? Where do they come from? What resources did they have at their disposal? What is their biography? What ultimately happened to them? What was their fate? How are they remembered? Positively and/or negatively? ***History often overlooks dark events and tragedies**
- What – what did this individual or person do for ocean exploration? Were they the first to accomplish some goal? Make some discovery? What other important things they do in their lives outside of ocean exploration?
- Why – why did the individual or group make their contribution to ocean exploration? What was their motivation?
- Where – where in the ocean did the person or group make their contribution? A specific continent? In a submersible deep in the ocean or a thousand leagues from the water in a science laboratory?
- When – when did they make their contribution to ocean exploration? Century? Year? Exact date? And why did it happen at this specific time versus another?
- How – how did the individual or group do it? What steps were required for their journey or mission to be a success?
- SIGNIFICANCE – what impact did the individual or group have on our understanding of Marine Science? How do people continue to benefit from the contribution to ocean exploration?

GROUP PRESENTATION #2: Marine Resources

Your group will give a presentation on a natural resource associated with the ocean. Your 12-minute presentation should address the following questions:

- What – what is the natural resource? What is its origin? What are its properties? Describe it. Where does it come from? How did it form?
- How – how do people collect this natural resource? Or do they not? What steps are needed to capitalize on it? Why infrastructure is necessary?
- Where – where can one find this natural resource? Where in the ocean is it located? Are there any special places worldwide that are reknown for this natural resource? What factors affect and control the distribution of this natural resource?
- When – when was this natural resource discovered? When did it form? How long have people been using it? Does it exist all the time or does it vary with the time of day or year?
- Who – who discovered the natural resource? And who takes advantage of it? Do any countries or economies particularly rely on the natural resource?
- Why – why do people care about this natural resource? Why is it a good or bad natural resource? What are the advantages and disadvantages to using it? How does it affect the daily lives of people around the world? Or does it?
- ETHICAL CONCERNS – does the use of this natural resource create any problems for ocean environments or marine life? Why should we be excited or hesitant to use it?

GROUP PRESENTATION #3: Marine Life

Your group will present on a group of organisms that live in the ocean. You should plan to spend some time at the Shedd Aquarium working with your group to gather information for this presentation. Your 12-minute presentation should address the following questions:

- What – what is the background on the organisms in this group? Describe them to us. What do they look like? What 'level' of variation exists among the different organisms? What is their morphology? Are there different types?
- Where – where do the organisms in your group live? Are they found at a specific latitude? Do they live on certain continents? Are they pelagic (i.e. live up in the water column) or benthic (i.e. live on the seafloor)? If they are benthic, are they epifaunal (i.e. live ON the sediment) or infaunal (i.e. live down with the muds and sands).
- How – how do the organisms in your group live? How do they feed? What do they eat? How do they reproduce? Are they nektonic (i.e. actively swim) or planktonic (i.e. drift in the water column)? Are they sessile (i.e. attached) organisms or do they move? How?
- Who and why – who should care about the organisms in your group and why? Do they have economic or cultural value? Do people hunt them? Eat them? Keep them as pets?
- DIVERSITY – how diverse is the group? How many species? What sort of variation exists?
- THREATS – Is the group threatened? Is there a risk of extinction? What are the threats? What conservation steps could be taken to ensure their survival?

GROUP PRESENTATION #4: Marine Environmental Concerns

Your group will give a presentation on an imminent threat to marine environments. Your 12-minute presentation should address the following questions:

- What – what is the threat or concern? Describe it to us in detail. What is its cause? What factors are involved? Who are the players? What interactions are involved? AND what are the repercussions for marine environments?
- When – when did this threat or concern first arise? And why? When did people first take notice of it? And why?
- Where – where is this threat or concern located? Is it localized or widely distributed? Is there are specific areas on concern? Why? Why are these places threatened?
- Why – why should people care about this threat or concern? Why does it matter? Does it threaten any natural resources? Beachfront property? Marine animals?
- Who – who are most likely to be affected by this threat or concern? Who should care most about it? And who has the ability to make changes to address the problem?
- How – How can we manage the issue? Are there any possible solutions to the problem? Have people taken steps to manage the issue already? Is there any hope?

INSTRUCTIONS FOR FINAL PROJECT & INDIVIDUAL PRESENTATION**Topic of your choice**

You will propose a topic in Marine Science that interests you, ask a question, write a five-page paper, and give a 12-minute presentation after conducting a search of literature. Your paper should include in-text citations of papers and books, which should be listed in a properly formatted works cited page (I encourage you to follow Chicago MLA format guidelines for citing literature in your paper). Your work cited page should contain, at least, 10 references. You must write your paper in your own words – plagiarism will not be tolerated. Any papers with evidence of plagiarism will receive ZEROS. Your presentation should mirror the others described above (i.e. you should tell your audience everything they would want to know about your topic – who, what, where, when, why, and how – to a degree that is appropriate). Likewise, you should plan on asking questions about other students' topics and presentations.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Sept 23 <ul style="list-style-type: none"> Review syllabus Review how to present What is marine science? Properties of water 	Sept 24 Air & water dynamics (waves, tides, & currents)	Sept 25 Bathymetry, marine provinces, & plate tectonics with G-Plates exercise PLEASE BRING YOUR LAPTOP	Sept 26 Presentations on ocean exploration	Sept 27 Marine sediments and sea level change	Sept 28
Sept 29	Sept 30 Beaches, coasts, and shorelines & marginal marine environments	Oct 1 Presentations on the marine resources	Oct 2 Shedd Aquarium	Oct 3 <i>CLASS will not meet --- plan to work on your presentations & final project</i>	Oct 4 Presentations on marine life	Oct 5
Oct 6	Oct 7 The Marine Habitat	Oct 8 Other pelagic and benthic animals	Oct 9 Presentations on environmental threats & conservation	Oct 10 Marine Energy Transfer	Oct 11 The origins of Earth, life, and the ocean	Oct 12
Oct 13	Oct 14 Final project presentations	Oct 15 Final project presentations	Oct 16 Final Exam			

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Sept 23 Intro & Chapter 6	Sept 24 Chapters 7–10	Sept 25 Chapters 3 & 4	Sept 26 Chapter 1	Sept 27 Chapter 5	Sept 28
Sept 29	Sept 30 Chapters 11 & 12	Oct 1 Chapter 17	Oct 2 none	Oct 3 Chapter 15–16	Oct 4 Chapter 15–16	Oct 5
Oct 6	Oct 7 Chapter 13	Oct 8 Chapters 15 and 16	Oct 9 Chapter 18	Oct 10 Chapter 14	Oct 11 Chapter 2	Oct 12
Oct 13	Oct 14	Oct 15	Oct 16			

Calendar of Reading Assignments (You should **complete** the readings by the dates indicated in the calendar)

Student	GROUP Number for PRESENTATION #1	GROUP Number for PRESENTATION #2	GROUP Number for PRESENTATION #3	GROUP Number for PRESENTATION #4
Frank McGuire	4	5		
Adi Spears	8	4	4	
Laila Williams	5	1		4
Nathan Segelke	7	2		
Tommy Foster	7	1		
Drew Bruck	3	6	5	7
Devin Stortz	3	2		2
Ciera Davis	6	3	8	3
Cole Downey	2	6		8
Drew Lopez	7	7	5	
Billie Fogarty	2	5	8	4
Jake Alm	5	4		
Maddie Donahue	3	7	5	4
Sylvia Busse	4	1		
Josie Page	6	2		
Justyna Kruczalak	5	2	8	5
Matt Atlas	4	6		
Peter Weber	-	3		
Alex Boler	8	3		
Jackson Meeker	8	4		
Ariel Barbee	2	7		
Rafael Romain-Edghill	6	5		

Group #	Presentation topic #1	Presentation topic #2	Presentation topic #3	Presentation topic #4
1	Vikings (Erik "The Red" Thorvaldson, Bjarni Herjolfsson, and Lief Erikson)	Petroleum	sharks & rays	Oil spills
2	Circumnavigators (Ferdinand Magellan, Sir Francis Drake, and James Cook)	Mariaculture	penguins & sea birds	Fertilizers, eutrophication, and 'dead zones'
3	The Challenger Expedition	Medicine from the sea	seals and manatees	coastline development and habitat loss
4	The HMS Beagle and Charles Darwin	Freshwater & Evaporative salts	cetaceans (whales, dolphins, and porpoises)	greenhouse gases, climate change, ocean acidification, and sea level rise
5	Alfred Wegener	Thermal Energy	echinoderms (sea stars, sand dollars, and sea urchins)	thermal warming events, coral bleaching, and reef collapse
6	The Deep Sea Drilling Project	Tidal Power	crustaceans & horseshoe crabs	Over-fishing and dredging
7	DSV Alvin	Gas hydrates, manganese nodules, and metal sulfides	Squid, octopii, and cuttlefish	Sewage sludge and plastic pollution
8	Sealab I, II, III		coral, jellyfish, & their relatives	Invasive species