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Introduction to Oceanography – Honors (Geol 103H)

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Syllabus Introductory Oceanography Honors (Geology 103H) - Fall 2019

*Credits—General Education
Physical Science (PS)*



Instructor:

Dr. Isla Castañeda

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- Office location:
246 Morrill II

Office Hours

M & F: 1:25-2:15 pm
and by appointment

Course Description

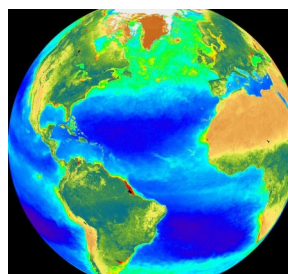
Welcome to Introductory Oceanography! There are a number of reasons why you are taking this class. Many of you are taking this course to fulfill your **Physical Science (PS) general education requirement**. Many of you are interested in the oceans and wish to learn more. Perhaps you will decide to major in the Earth or Life sciences and pursue advanced degrees in marine geology or marine biology. Perhaps you plan to go to law school and specialize in Environmental Law or the Law of the Sea. Or maybe your family gets its livelihood from the sea, or spends a lot of time near the coast for pleasure. Over the years perhaps you've developed many questions about the sea.

You have enrolled in a **general education** course designed to acquaint you with the fascinating features of the nearly 71% of our home planet covered by water. These are **broad themes that reflect the spirit and value of the general education curriculum** that is a part of **your UMass experience**. As citizens of our small world, we would argue that everyone *should* take a course like this! With jet service to almost anywhere in the world, financial markets electronically and politically linked for "real time" transactions 24-7, and global populations striving to live as well as we do here in the U.S., it's important for all of us to gain a holistic view of our integrated geosphere, atmosphere, hydrosphere, biosphere, and cryosphere. At the same time, we want to explore the notion of scientific thinking and analysis. We will discuss how researchers collect data, form ideas, and then test those ideas. We want you to understand the scientific theories that help us understand Earth processes and history. For example, it is clear that the core of the Earth is solid. *Why?* No one has ever been there. Hurricane frequency and/or intensity are likely to change in coming years, say climatologists. *Why?* The Labrador Current moving south along the New England coast is warmer now than it's been in 70 years. *Why?*

Will this impact the price of fish in the grocery store? We are rapidly depleting our natural hydrocarbon reservoirs. Can the ocean provide alternate sources of energy? Scientific research can help evaluate the impact of human activity on our home planet and it can have a direct effect on public policy. The latter is also governed in large measure by how global change begins to affect our everyday lives.

In addition to a broad introduction to the science of oceanography, the scientific principles upon which it is based, and the importance of the ocean in our daily lives, there are other benefits of this PS General Education course. Specifically, the **pedagogy** used in this course and the policies implemented here are relevant to the **real world**. For example, meeting deadlines, arriving to class on time, preparing for classes and exams, working in groups, considering diverse perspectives, communicating effectively (see below), and writing well are **tangible life skills** that will serve you well while you are here and after you leave UMass. Geology 103H is an Honors Gen Ed course fulfilling the Physical Science (PS) General Education requirement.

Please note—the Honors section of Oceanography has a different grading scheme and some assignments that are different from other sections of Geology 103. This is because the curriculum has been enriched to provide knowledge and breadth beyond the regular curriculum.



Primary productivity in the world's oceans plays a major role in regulating Earth's major nutrient cycles

Syllabus Introductory Oceanography Honors (Geology 103H)

*Credits—Gen Ed
Physical Science (PS)*

**Meeting Times:
Tues & Thurs
11:30 am - 12:45 pm**

**Meeting Place:
108 Morrill III**

Syllabus Outline:

Learning goals	2
Moodle	2
Textbook information	2
Scientific paper	2
Course structure & Policies	3-4
Grading scheme	4
Expectations	4
Academic honesty policy	4
Detailed Weekly Class Schedule	5

Learning Goals

- To gain basic knowledge of how Earth's oceans work.
- To understand how the oceans impact & control the habitability of our planet.
- To understand how the oceans are vital to our very existence.
- To demonstrate that **science is accessible** to a largely non-scientific audience by gaining exposure, familiarity, confidence, and interest in our home planet and our place in it.
- To grasp **fundamental concepts** about how Earth works as an integrated system comprising the geosphere, hydrosphere, atmosphere, cryosphere, and biosphere.
- To relate **common experiences** to our understanding of the world around us and to gain clearer perspective of our collective **human impact** on the Earth system.
- To ask **how we know what we know**.
- To explore **scientific inquiry as a process** that reveals the details and splendor of our natural world.
- To challenge ourselves to become better **stewards** of our home planet.

Scientific Review Paper

Regardless of your major or career path, effective writing is a skill that is essential for success. In this course, each student will write a scientific review paper on any topic relating to **ocean warming**. The paper should be based on at least two studies on the same topic published in scientific journals (I will provide information in class as to which journals are appropriate). The paper should address the following points:

- A) identify the main research question that each paper addresses
- B) explain how the main research methods are used to address these questions
- C) summarize the main findings of the papers
- D) answer "Do these findings adequately answer the research question(s)?"
- E) identify one or more unknowns related to the main research question(s) that still remain after completion of this study
- F) answer the question "are there any short-comings or ambiguity in the methods or interpretation in this paper?"
- G) describe next steps in this topic of research that would address unknowns and short-comings.
- H) Compare and contrast the two studies in the context of the above questions.

The first draft of your review paper will be read by 4-5 of your classmates for peer review. You will receive comments and scores based on a grading rubric, which will be provided in class. You will then have an opportunity to revise your essay before handing in the final version to me.

The scientific review paper is worth 20% of your overall grade in GeoSci-103H. Additional instructions will be provided during the semester in class.

Moodle

- **Moodle is the UMass-Amherst Learning Management System (LMS)**, designed to provide course information and management via the web. Only students enrolled in Geology 103H will have access to the course website. **Everyone must have an active OIT (Office of Information Technology) computing account.** Access the OIT guide **for new students** at <http://www.oit.umass.edu/guides/new.html>.
- **Moodle will be used for several major functions:** 1) view PowerPoint lecture notes; you can also print these pages if you wish, 2) To provide links to key videos (note that not all videos shown in class can be uploaded to Moodle due to size limitations so you should take notes on videos shown in class, 3) to provide links to or copies of extra readings. In addition, Moodle will be used to provide updates to the syllabus and post special announcements. To **access Moodle** go to: <https://moodle.umass.edu>.

Required In-Class Book & Other Materials

Investigating the Ocean: Illustrated Concepts & Classroom Inquiry. Written by R. Mark Leckie and Richard Yuretich (2012, McGraw-Hill; ISBN: 0-07-804588-6). Dr. Leckie has generously made the PDF version of this book available to our class so that you do not have to buy it. The book, a 5-part PDF, is available for download on Moodle. Sometimes, we will do investigations (in-class or take home exercises) from this book. I will post the relevant exercises on Moodle and announce when you should bring them to class. Please note that it is **your responsibility to print out these investigations and bring them to class!** Some of these will be collected and graded. If you do not have the required investigation with and it is collected, you cannot turn it in late. No exceptions.

Throughout this course, we will be plotting oceanographic data using **Microsoft Excel, Google Sheets**, or another spreadsheet/plotting program. I will provide guidance for using Microsoft Excel and Google Sheets; you may use another spreadsheet and plotting program if you wish but I may not be able to provide advice. You should expect to sometimes bring your laptop or tablet to class (I will let you know ahead of time) and to sometimes have homework assignments that involve graphing. You need to be able to plot a basic time series dataset (with X and Y axes, and to be able to label the axes accordingly). If you do not know how to do this yet, it is not a problem! I will provide tutorials for those of you who are unfamiliar with using spreadsheets and graphing programs. I am also happy to work with you during my office hours to get you started in Excel or Google Sheets.

COURSE STRUCTURE AND POLICIES: (please read carefully)

1. Class Meetings – Our class meetings will be **interactive**. Although traditional lectures will be used to convey the basic information necessary to understand the topic being addressed, much of the time will be spent discussing issues, doing exercises, and interpreting data so you can **learn by doing**. Your participation is crucial to your success in the course! **Attendance is mandatory**. Although all the factual material is in the textbook and PowerPoint slides, class time allows us the opportunity to highlight the important points, look at the interrelationships among the different parts of the science, discuss current events and discoveries, and clarify questions you may have with the readings. Taking your own notes really helps in learning, too, and over the years there has always been an excellent correlation between class attendance and grades (see Excused Absences below). **Classes are 75 minutes** long and we will need all of that time to consider the subject of the day. Please be prompt, but if you are unavoidably delayed or must leave early **please be respectful and enter the classroom quietly**. Courtesy during class is important. Pay attention to what we are doing. Please come to class prepared to engage in the material.

2. Lectures and Readings – There is no way possible to examine all the scientific material related to the oceans in 14 weeks of classes, and still have time for discussion and inquiry. For this reason we need an abbreviated textbook ("*Investigating the Ocean*"). The goal of the readings is to prepare for the subject under discussion. The reading assignments in the textbook will parallel the lecture material. If you keep current with the readings, then you will get more out of the course and you'll also have an easier time preparing for the exams. "*Investigating the Ocean*" also contains the in-class exercises and/or homework assignments that we'll be doing this semester. **You must print out the required in class exercises and bring them to class!** On most days, we will do one or more of the exercises in this book and we will collect and grade many of these completed exercises during the semester (see In-Class Exercises below). In order to do well in this course, you will be expected to attend all lectures, take good notes, actively participate in the in-class exercises and discussion, and *read the assigned material*. It is to your advantage to read the material before class. **The exams will be based on the material presented in class** (including videos and in-class exercises, see #3 and #5 below) **and on the assigned readings**.

3. Daily In-Class Exercises and/or Take-Home Assignments – Throughout the semester, **problem solving exercises and follow-up classroom discussions** will be a **daily** component of our active-learning environment. You must be in class to participate and benefit from these exercises and discussions. Some of the exercises will be collected, others will not. However, please note, there will be **no make**

-ups (see Excused Absences below) and **no papers will be accepted after that class has ended**. The concepts covered in these in-class materials will be included on the exams (see #2 above). **These exercises will be collected and graded during the semester** (# to be determined). **Full credit** for each exercise will be earned by successful completion of all requested information. The exercises collectively will be worth **10% of your grade**. More than 10 exercises likely will be collected.

4. Films and videos – there will be numerous good films and videos during the semester. **You will be responsible for the subject matter covered in these films**.

5. Exams - THREE EXAMS will be given during the semester (see attached schedule). The lowest exam score will be dropped. Your highest two exam grades will account for a total of **40% of your grade** in the course. The format of the class will be discussed prior to each exam. .

6. Final Exam – The **FINAL EXAM** will cover the last segment of the course plus additional questions from previous material; i.e., **the Final Exam is cumulative** and will be **worth 25%** of your overall grade. The date, time, and place of the Final Exam will be announced later in the semester.

EVERYONE MUST TAKE THE FINAL EXAM

7. Excused Absences – If you must miss an exam or a class because of participation in **athletics, band**, or other legitimate reason, you must **notify me before the event** so that we can make arrangements for missed work. If you miss an exam or a class because of **illness**, you **must contact me or as soon as possible**. If need-be, have a friend or parent contact me; **communication is essential**. If you do miss class, lecture material will be available on Moodle after each class.

8. Communication & Email Policy – When communicating with us, please use an appropriate **subject line** ('Re:' or 'ATTENTION' are not appropriate subject lines). Begin your message with some form of **greeting (salutation)** such as Dear Prof. Castañeda so I can filter out spam. Also, don't forget to **sign your message with your name**. Be professional. This is not text messaging; it is more like communicating with your boss, not your buddy. .

• **I will do my best to respond to your emails within 24 hours;** however, please be aware that **I do not check my work email (isla@geo.umass.edu) outside of normal work hours (generally 8:30 am-5:30 pm)**. **Furthermore, I may not check this email account on the weekend**. So if you email me at 11pm the night before an exam, you should not expect to get a response immediately. Also, please take care to use isla@geo.umass.edu when emailing me. If you try to send a message through SPIRE it may end up at my lab account email, which I only check once or twice a semester. It is your responsibility to make sure you are contacting me at the correct email address (isla@geo.umass.edu).

COURSE STRUCTURE AND POLICIES: (continued)

9. Final grades - There are 3 exams but the lowest exam score will be dropped. Each of the 2 remaining exams is worth 20% of your overall grade (so exams are 40% in total), in class exercises are worth 15%, the scientific paper is worth 20% and the final exam is also worth 25%. Remember, there are no make-up exams (unless you have an excused absence – see #7 above).

10. Grading - The following Grading Scale will be used:

A	93-100	Exceptional
A-	90-92	Superior
B+	87-89	Excellent
B	83-86	Very good
B-	80-82	Good
C+	77-79	Better than Satisfactory
C	73-76	Satisfactory
C-	70-72	Below satisfactory
D	65-69	Just Passing
F	0-64	Not passing

Accommodation Statement

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), Learning Disabilities Support Services (LDSS), or Psychological Disabilities Services (PDS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Academic Honesty Policy Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent (http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).

How can I earn an "A" in this class? It is very feasible! If you always attend class, there are many opportunities to succeed.

Attend all classes and engage in the material

Review your class notes that evening; *what's not clear to you?* write it down

Review the previous class notes while waiting for class to begin; *do you have any questions for me?*

Participate in and complete all in-class and on-line exercises (**worth 20% of your grade!!!**)

Study for and take all exams

Ask questions, participate, get involved with the material

Seek help with your questions: come to instructor **office hours**

TO SUMMARIZE: WHAT YOU CAN EXPECT

- You will get a broad introduction to the science of oceanography, the scientific principles upon which it is based, and the importance of the ocean in our daily lives.
- Class meetings will be interactive, with numerous in-class activities and exercises. Grades will be based on both individual and group exams, and your participation in these exercises.

WHAT I EXPECT

- Regular attendance, keeping-up with the readings in the text, active participation during class, and completion of the in-class exercises and on-line assignments.
- Courtesy during class. This means arriving to class on time, paying attention to what we are doing that day, remaining as quiet as possible during lecture, and participating actively in class discussions and exercises. **Cell phones and other personal electronic devices are not to be used during class time.** Thank you!



The blobfish—yes it is real.



Detailed weekly schedule*

Date	Topic
3-Sept	Course introduction; why study the ocean?
5-Sept	Navigation; where in the world are we?
10-Sept	Continents and Ocean Basins: Earth in 2, 3 & 4 dimensions; maps, structure and history
12-Sept	Ocean Basins: the structure of the seafloor
17-Sept	Plate tectonics: earthquakes, shifting continents & seafloor spreading and Earth through time
19-Sept	What is so special about water and why is the ocean salty?
24-Sept	Marine sediments and seasons
26-Sept	Seawater density and ocean stratification
1-Oct	EXAM 1
3-Oct	Earth's Heat Balance and the Coriolis Effect
8-Oct	Prevailing winds and global climate
10-Oct	Wind-driven circulation and upwelling <i>topic for scientific review due</i>
15-Oct	No class today—UMass follows a Monday schedule
17-Oct	Thermohaline circulation and the global conveyor
22-Oct	Waves
24-Oct	Tides
29-Oct	EXAM 2
31-Oct	Marine life classification, phytoplankton
5-Nov	Primary productivity and nutrient cycling
7-Nov	Seasonality, food webs, and the trophic pyramid <i>(first draft of scientific review due)</i>
12-Nov	Fertile oases: coastal ecosystems and coral reef ecosystems
14-Nov	Food chains and food webs; benthic food chains
19-Nov	Hydrothermal vents and life in the deep biosphere
21-Nov	EXAM 3
25-29 Nov	<i>Thanksgiving break—no class this week</i>
3-Dec	Climate change and our oceans introduction
5-Dec	Sea level rise and coastal hazards
10-Dec	Ocean warming and ocean acidification <i>(final draft of scientific review due)</i>
13-Dec	FINAL EXAM —tentatively set for 11:30am on Fri Dec 13th in our normal classroom

*The syllabus may be modified depending on the pace and interests of the class.

