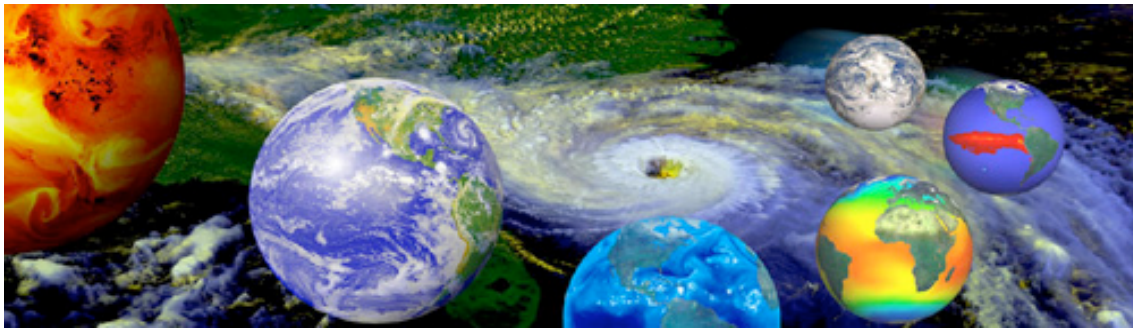


SPRING 2005



# GEOSCIENCES 103: INTRODUCTORY OCEANOGRAPHY (an interactive approach)

SECTION 01 Tues/Thur 11:15 - 12:30 Thompson Rm 104 class#52239



"The living ocean drives planetary chemistry, governs climate and weather, and otherwise provides the cornerstone of the life-support system for all creatures on our planet, from deep-sea starfish to desert sagebrush. That's why the ocean matters. If the sea is sick, we'll feel it. If it dies, we die. Our future and the state of the oceans are one."

Sylvia Earle, former chief scientist of NOAA;  
now chairperson, Deep Ocean Exploration & Research and  
National Geographic Society Scientist-in-Residence.

## INSTRUCTOR:

Dr. Julie Brigham-Grette, Professor  
Department of Geosciences

## OFFICE HOURS:

Tues 1-3 PM; Fri 10-12 AM  
or by Appointment

OFFICE: Room 247 in Morrill 2

PHONE: 545-4840

COURSE EMAIL:

[ocean@geo.umass.edu](mailto:ocean@geo.umass.edu)

WebCT SITE for all Info:

<http://webct.oit.umass.edu>

Course ID: geo103jg

Use this site for reviewing grades, getting updated info on review sessions, pre-class questions and concepts of emphasis, lecture notes.

## REQUIRED TEXT and WORKBOOK:

- *Essentials of Oceanography* by Trujillo and Thurman, Prentice-Hall Publishers, 8th Edition. 532 pg./2005; hard copy or on-line version; see [www.safarix.com](http://www.safarix.com)
- *Investigating the Ocean: an Interactive Guide to the Science of Oceanography*, by Leckie and Yuretich, McGraw-Hill Publishers, 3<sup>rd</sup> Edition 189 pgs., 2003,

**You must bring the workbook  
to every class session!**

## **COURSE ORGANIZATION:**

Welcome to Oceanography! There are a number of reasons why all of you are in this class. Many of you are interested in the oceans and wish to learn more. Perhaps you will decide to major in geology or biology and pursue advanced degrees in marine geology or marine biology. Perhaps you plan to go to law school and specialize in Coastal Law. Or maybe your family spends a lot of time near the coast and you've developed many questions about the sea.

This is a **general-education course** designed to acquaint you with the fascinating features of the 71% of our planet covered by water. This is also a course in which you will learn about scientific inquiry, a notion especially important to non-science majors. The oceans remain a region shrouded in mystery, where new discoveries are being made almost everyday.

**My goal with Geo 103 is to provide you with a working knowledge of just how the oceans work, how they impact and control the habitability of our planet, and how vital they are to our very existence.** These are

broad themes, but as citizens of our small world, I 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 hours a day, and global populations striving to live as well (and as wastefully) as we do, it's important for all of us to gain a holistic view of our physical world. At the same time, I want you to understand the notion of scientific thinking and analysis, how researchers collect data, form ideas, and then test those ideas. I want you to understand the basis upon which we have developed many scientific theories. For example, we think that the core of the Earth is solid. Why? No one has ever been there. Hurricane frequency is likely to increase 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? And will this impact the price of fish in the grocery store? Scientific research can have a direct effect on public policy and spill into your everyday lives.

**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 time will be spent doing exercises and interpreting data so you can learn

by doing. I know the problems with a super-large class like this one, but I anticipate extensive discussions on topics of current importance and your participation is crucial!

Please remember that **classes are 75 minutes long** and we will need all of that time to consider the subject of the day. Be prompt, but if you are unavoidably delayed or must leave early **please use the back entrances to the auditorium** and move as quietly as possible. It is very distracting to the class and to me to have people going through the doors behind the podium in the middle of lecture.

Courtesy during class is important. Pay attention to what we are doing. Be prompt and turn off the walkmans, cell phones, and pagers.

**TEXTBOOK AND WORKBOOK:** We can not examine all the scientific material related to the oceans in 14 weeks of classes, let alone have time for in-class projects! For this reason we need a textbook, which will fill in those details we can't possibly explore during class time and provide a framework for the subject under review. I expect you to keep current in your readings. You will get more out of the course and also have an easier time preparing for exams. A good rule of thumb is to study two hours outside of class for every hour in class.

My colleagues have also put together *an Interactive Guide* that contains most of the in-class exercises and homework that you will do this semester. **You must bring this book to every class!** On most days, you will hand in a completed sheet from this workbook at the end of class.

**ATTENDANCE** -- Is mandatory! Although all the factual material is in the two textbooks, 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. Over the years there has always been an excellent

correlation between class attendance and grades!  
**If you miss a class, we try to simplify things by putting copies of the lecture notes on the WebCT site.**

**You can not make up in-class exercises,**  
however, see below.

### **IN-CLASS EXERCISES AND**

**HOMEWORK:** We will do some exercise or analysis in almost every class. Scientific investigation involves learning by doing and solving problems, not just listening and reading, and that is the goal of these assignments. These will be collected and will constitute 20% of your final grade. **In-class exercises will NOT be accepted once that particular class is over.** Due to the flu, sports events, etc., we expect nearly everyone to miss handing in an exercise now and then. For this reason, full credit for the in-class materials will mean you have handed in at least 3/4ths of the exercises. For example, if we do 16 exercises over the semester, you need to hand in at least 12 of these for full credit. If you take only the exams and never hand in these assignments, it is entirely possible that you will flunk this class.

### **PRE-CLASS EXERCISES USING WEBCT**

- Before some class meetings, there will be a short list of questions to answer on the Geo 103 WebCT site. I will announce these in the class before they are due and they will always be listed that same day or before on the web site. These are designed to prepare you for the topic(s) of the next class meeting. You will only have a short time in order to complete the exercise and earn credit; typically 7 days. The exercise for any given class topic will be turned off 30 minutes before class time. Please plan accordingly. The exercises collectively will be worth **5% of your grade.**

### **SLIDES, FILMS, VIDEOS, AND**

**DEMONSTRATIONS:** Oceanography is a field science conducted shipboard or at the coast. In order to explain certain principles and convey visual information, numerous films and videos will be shown during the semester. After all, this is the only way I can take the whole class to the ocean. You will be responsible for the subject matter covered in these films -- these form an integral part of the course as in-class investigations. I may give you questions to hand in for specific movies -- no makeups for these.

**EXAMINATIONS:** Five exams will be given during the semester. The first four exams will be given during regularly-scheduled class meetings. The fifth and final exam will be given during Finals week as scheduled by the University, and this will be a **CUMULATIVE EXAM.** Don't ask to take the Final exam early -- make arrangements now with your summer employer or your sibling who is graduating from another school.

All exams will be done in two stages ("pyramid exams") You will take the exam in the traditional manner during the first half of the class. Then, you will take the exam a second time allowing open notes and discussions with other students in the class. The individual portion of the exam counts for 75% of the exam grade: the group portion will be worth 25%.

The highest three grades from the first four exams will be counted in your final average. In other words, you can miss one exam with no penalty and no questions asked, **BUT make-up exams will not be administered if you miss one exam, even if you had the flu!** If you miss two exams because of reasons beyond your control, I will allow you to make up one of them (your choice) only on **Make-Up Marathon Morning**, which is the first day of Reading Period -- Thursday May 18th. **No exceptions to this date!**

Again: **EVERYONE MUST TAKE THE FINAL EXAM.**

**GETTING HELP** Help sessions will be offered in the evening prior to each exam. The time and location of each help-session will be announced in class and posted on the WebCT course site. In addition, **please seek help** with the lecture material from myself or the TA throughout the semester during our **office hours** (please come & see us with questions) to avoid last minute cramming. Cramming is an ineffective way of **learning**. If you have a scheduling conflict with my office hours, call me, see me after class, or email (ocean@geo.umass.edu) and we will set up an appointment that is convenient for you. I am here to help you learn. This is

a big class, but I will try to make myself as accessible as possible.

**GRADES:** Grades will be calculated on the following basis:

|                                 |     |
|---------------------------------|-----|
| Your best 3 Class Exams:        | 45% |
| Final Exam                      | 25% |
| In-class questions & Exercises: | 25% |
| WebCT study exercises:          | 5%  |

There will be no other components to figuring our final grade: no book reports, no term papers, no special projects. Don't ask "Isn't there anything I can do to raise my grade?" Grades for each exam will normally be posted on WebCT (see below). Please do not call me or the teaching assistant on to ask about grades; **we cannot give out grade information over the telephone or via e-mail** (it violates the Family Educational Rights & Privacy Act).

**ACADEMIC HONESTY** -- Cheating is a burden upon everyone; a betrayal of your fellow students as well as your own accomplishments and an insult to true learning and curiosity. You are all responsible adults and I expect you to conduct yourselves accordingly. If you are caught cheating, you will not pass this class and I will report the incident to the Academic Dishonesty Board. It could become a permanent part of your transcripts!

**WEBCT:**

This is a WebCT course, designed to provide course information and management via the web. Only students enrolled in Geo 103 will have access to the course website. Everyone must have a computer account with UMass OIT (Office of Information Technology). This includes non-UMass 5 college students. You

can get help with this at <http://www.oit.umass.edu/help> or you can go to Room A113 Lederle GRC for assistance. WebCT will be used for two major functions: on-line pre-class exercises and grade information. The pre-class exercises will give you an opportunity to practice solving problems and help you prepare for an upcoming lecture. The grade information will allow you to track your progress in the course. In addition, we will use WebCT to update the syllabus, post special announcements, keep a course calendar, and post lecture notes.

To get onto WebCT, go to

<http://webct.oit.umass.edu>

**The webcourse ID is: geo103jg**

**TENTATIVE GRADE SCALE:** I am commonly asked about my expectations for an A or a B grade, etc. To give you an idea, I have listed below my typical grade 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  | = 63-66  |
| D- | = 60-62  |
| F  | = < 60   |

## INTRODUCTORY OCEANOGRAPHY

| DATE | TOPIC | Essentials Text<br>Chapter (specific pages TBA) | <i>Interactive<br/>Guide</i> |
|------|-------|---|------------------------------|
|------|-------|---|------------------------------|

### THE GEOSPHERE

#### ORIGIN OF OCEANS, EARTHQUAKES AND VOLCANOES

|               |    |   |               |                   |
|---------------|----|---|---------------|-------------------|
| Jan.          | 31 | Course logistics, science, and why study the oceans       | Chapter 1     | pg 91             |
| Feb           | 2  | Earth in 2, 3, & 4 dimensions: maps, structure, history   | Chapter 1 & 2 | pg. 88, 92-95     |
|               | 7  | Continents and Ocean Basins                               | Chapter 3     | pg. 100-101       |
|               | 9  | Plate Tectonics: Shifting Continents, Sea Floor Spreading | Chapter 2     | pg. 96-97;102-107 |
|               | 14 | Marine Sediments and Ocean History                        | Chapter 4     | pg. 108-109       |
| <b>FEB.16</b> |    | <b>EXAM 1</b>   |               |                   |

### THE HYDROSPHERE

#### NATURE OF SEA WATER, HYDROLOGIC CYCLE, GLOBAL CLIMATE

|              |    |  |           |                     |
|--------------|----|--|-----------|---------------------|
|              | 21 | No class - Follow Monday Schedule                |           |                     |
|              | 23 | Sea Water: what's in it and why                  | Chapter 5 | pg. 110-111;114-115 |
|              | 28 | Solar Heating of Earth & Transfer of Heat Energy | Chapter 6 | pg. 116-119         |
| Mar          | 2  | Seawater density and ocean stratification        | Chapter 6 | pg. 128-131         |
|              | 7  | Coriolis Effect and Winds                        | Chapter 6 | pg. 132-135         |
| <b>MAR 9</b> |    | <b>EXAM 2</b>                                    |           |                     |

### ATMOSPHERE, OCEAN CIRCULATION, WAVES

#### MOTION IN THE OCEAN AND GLOBAL ENERGY TRANSFERS

|               |       |   |                  |             |
|---------------|-------|---|------------------|-------------|
| Mar.          | 14    | Prevailing Winds and Global Climate           | Chapter 6        | pg. 133     |
|               | 16    | Wind-Driven Ocean Circulation and Upwelling   | Chapt 7          | pg. 132-137 |
|               | 21-23 | Spring Break (Go visit the Ocean somewhere!)  |                  |             |
|               | 28    | Thermohaline circulation: the Global Conveyor | Chapter 7 (238+) | pg 138-141  |
|               | 30    | Waves   | Chapter 8        | pg. 142-143 |
| <b>APR 04</b> |       | <b>EXAM 3</b>                                 |                  |             |

## ***TIDES AND THE MARINE BIOSPHERE***

|            |           |  |                                      |              |
|------------|-----------|--|--------------------------------------|--------------|
| Apr        | 6         | Tides  | Chapter 9                            | pg. 144-145  |
|            | 11        | Distribution of Life in the ocean            | Chapter 12                           | pg. 146-151  |
|            | 13        | Primary Productivity and Nutrient cycles     | Chapter 13                           | pg. 152, 154 |
|            | 13        | Evening lecture by Kate Moran, Univ RI       | Thomp 104                            | 7 PM         |
|            | 18        | Seasonality, food webs, and trophic pyramids | Chapter 13                           | pg. 156, 158 |
|            | 20        | Pelagic and Benthic Ecosystems               | Chapter 14                           | pg. 160-167  |
|            | 25        | "Chicken" of the Sea: Dolphins Safe?         | Special film with in-class questions |              |
| <b>APR</b> | <b>27</b> | <b>EXAM 4</b>                                |                                      |              |

## ***THE COAST AND GLOBAL ENVIRONMENT HABITATS, HAZARDS, RESOURCES***

|     |    |                                 |   |             |
|-----|----|---------------------------------|---|-------------|
| May | 2  | Coastlines and Beaches          | Chapter 10                              | pg.168-175  |
|     | 4  | Sea Level, Beaches and Erosion  | Chapter 10                              | pg.176-183  |
|     | 9  | Coastal Habitats                | Chapter 11 and 15                       | pg. 182-183 |
|     | 11 | Marine Resources and Pollution  | Chapter 11                              |             |
|     | 16 | Global Change and Human Impacts | pg 198-201, pg.314-315<br>plus research | pg. 184     |

**MAY 18 Make-up Marathon Morning (Thursday, Reading Day)**

**EXAM WEEK: Friday, May 19 after 1:30 PM - Friday May 26, 2003**

**NOTE: The University Administration decides when specific exams will be held. The dates and times for exams are announced in late Feb. This exam will not be given early so please do not make plans to leave campus for jobs or family obligations until you have seen the exam schedule.**