**BIO 462 Deep Sea Biology**

MWF Friday Hall 1014, 12-12:50 PM

Ms. Elizabeth Darrow, Instructor Office Hours: Mon 2-4 PM

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(910) 962-7153

*E-mail is the best way to reach me; please e-mail me through Blackboard, or include “BIO462” in the subject line to get my attention. I will usually respond quickly, but please allow 24 hours for a response before you send a follow-up. I do not always check e-mail at night or on weekends. If you are unable to meet during office hours due to a class conflict, e-mail me to set up an appointment. I do not review grades over e-mail: this requires an in-person meeting.*

Course Goals and Teaching Philosophy

Deep Sea Biology is an introduction to our present knowledge of the biology of the deep and open ocean. BIO 462 reviews concepts of biological oceanography, focusing on adaptations and constraints of life in the extreme habitats of the deep sea. We will use a combined lecture and interactive format to explore the technology and methods used for deep-sea research, read current primary literature, and practice data analysis and communication skills. Deep Sea Biology is an upper-level elective for the B.A. Biology, B.S. Biology, and B.S. Marine Biology degrees. Prerequisite: BIO362 or instructor permission.

I expect students to work at mastering the subject matter, but also to dig deeper, since the process of discovery is the most exciting part of both learning and scientific research. I am a coastal and estuarine ecologist and look forward to learning about the Deep Sea along with you!

Catalog Description

Study of deep-sea biosphere, with emphasis on the biology of abyssal zones off the North Carolina coast and hydrothermal vent ecosystems. Topics include unique benthic and pelagic animals in deep-sea environments and their physiological adaptations to hydrostatic pressure and low temperature, nutritional dynamics, reproductive strategies, energy flow, and speciation in abyssal and ultra abyssal zones. Three lecture hours each week.

Learning Outcomes

The following outlines the key topics that will be covered during this course, and learning goals you will have the opportunity to achieve. As your instructor, I intend to provide the supportive learning environment and materials necessary for you to achieve these goals and to challenge you to realize your academic potential.

1. Understand and apply key concepts in deep sea biology. For example:

a. Abiotic interactions: explain physical and chemical constraints of life in the deep sea, such as pressure, darkness, temperature, nutrient and carbon limitations

b. Biodiversity: describe patterns in zonation and biological diversity of benthic organisms

c. Benthic-pelagic coupling: explain the biological pump, mesoscale eddy “stirring”, and links between surface and deep sea productivity

d. Special environments: describe the biogeochemical processes involved in hydrothermal vents, methane seeps, and whale falls; and how they support specialized forms of life

e. Deep sea species: recognize, identify, and describe the ecology of important deep sea animal species

2. Develop quantitative and analytical skills, including:

a. interpretation of graphically presented data and statistical results

b. use of publicly-available datasets, databases, and video footage to quantitatively address independently-developed hypotheses and present results orally

3. Develop critical thinking and reading skills

a. read and analyze current literature in deep sea biology, summarizing data in “Creature Feature” wiki article and in group projects

Recommended Text: Gage and Tyler’s Deep-Sea Biology (Cambridge University Press 1991) is recommended but not required, and can be found at the University bookstore or on Amazon.com. This book and other helpful books will be on reserve in the library. Other assigned readings will be from the primary scientific literature, posted on Blackboard or placed on reserve in the library.

Course Structure: Marine biology in general is an interdisciplinary subject that draws from not only biology, but also chemistry, physics, geology, and mathematics. Be prepared to recall things from other non-biology classes, and review unfamiliar topics as needed. Class meetings will consist of lectures using PowerPoint slides and material written on the board, with discussion and in-class activities interspersed. Slides will be available to you after class, but slides alone are no replacement for the in-person lecture. We will have a series of Friday “labs” during class time that will comprise most of your participation grade. Please be prepared to bring or share a laptop to class on Fridays.

Grade Breakdown (Percent) Grading Scheme

“Creature Feature” Wiki 10% % Course Points Grade

Group Database Project 25% >93 A

Midterm Exam 25% 90-93 A-

Final Exam 25% 88-89 B+

Labs/Participation 15% 83-87 B

**Total: 100%** 80-82 B- 78-79 C+

 73-77 C

 70-72 C-

 68-69 D+

 63-67 D

 60-62 D-

 <60 FLecture and Reading Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| Week | Day | Date | Subject |
| 1 | M | 1/12/15 | Intro/History of Deep Sea Exploration |
| 1 | W | 1/14/15 | Physical/chemical/geological background |
| 1 | **F** | 1/16/15 | Physical/chemical/geological background |
| 2 | M | MLK Day | No classes |
|  |  | 1/20/14 | Add/Drop Deadline |
| 2 | W | 1/21/15 | Faunal composition, depth zonation |
| 2 | **F** | 1/23/15 | Faunal composition, depth zonation, **Creature Features Due** |
| 3 | M | 1/26/15 | Sampling methods & technology |
| 3 | W | 1/28/15 | **Undersea Vehicles - CMS** |
| 3 | **F** | 1/30/15 | **Undersea Vehicles - CMS** |
| 4 | M | 2/2/15 | Biological oceanography review |
| 4 | W | 2/4/15 | Oceanographic time series data |
| 4 | **F** | 2/6/15 | **Time Series Lab** |
| 5 | M | 2/9/15 | Deep sea microbiology |
| 5 | W | 2/11/15 | Guest lecture - Craig Bailey - deep sea eukaryotes |
| 5 | **F** | 2/13/15 | The Biological Pump - Guest lecture - Rob Condon |
| 6 | M | 2/16/15 | Benthic pelagic coupling |
| 6 | W | 2/18/15 | Deep sea zooplankton |
| 6 | **F** | 2/20/15 | **Zooplankton Lab** |
| 7 | M | 2/23/15 | Benthic communities: size, abundance, trophic |
| 7 | W | 2/25/15 | Benthic communities: size, abundance, trophic |
| 7 | **F** | 2/27/15 | **OBIS and Oceanic Databases Lab** |
| 8 | M | 3/2/15 | Animal-sediment interactions |
| 8 | W | 3/4/15 | **Midterm Exam** |
| 8 | **F** | 3/6/15 | **Group Database Projects** |
|  |  | 3/7-3/15/15 | **Spring Break - No classes** |
| 9 | M | 3/16/15 | Species diversity |
| 9 | W | 3/18/15 | Physiological/biochemical adaptations |
| 9 | **F** | 3/20/15 | **Group Database Projects** |
| 10 | M | 3/23/15 | Reproduction, life histories, population dynamics |
| 10 | W | 25-Mar | Mid-water and seamounts |
| 10 | **F** | 3/27/15 | **Group Database Projects** |
| 11 | M | 3/30/15 | Vent ecology and biogeography |
| 11 | W | 4/1/15 | Vent physiology |
| 11 | **F** | Good Friday | No classes |
| 12 | M | 4/6/15 | Methane seeps |
| 12 | W | 4/8/15 | Osedax and whale falls |
| 12 | **F** | 4/10/15 | **Group Database Projects** |
| 13 | M | 4/13/15 | OMZs, troughs, and other special settings |
| 13 | W | 4/15/15 | Oil/gas exploration  |
| 13 | **F** | 4/17/15 | **Group Database Projects** |
| 14 | M | 4/20/15 | Deep sea fishing |
| 14 | W | 4/22/15 | **Final Presentations** |
| 14 | **F** | 4/24/15 | **Final Presentations** |
| 15 | M | 4/27/15 | **Final Presentations** |
| 15 | W | 4/29/15 | **Final Presentations** |
|  | M | 5/4/15 | **Final Exam 11:30-2:30** |

Attendance Policy: Students are expected to be present at all regular class meetings and examinations for the courses in which they are registered. Students who miss the first class may be dropped if enrollment is full and there are students waiting to enroll. Students who do not complete in-class activities due to absences will be given a zero. Likewise, no make-up exams will be given if they are missed, unless the absence is excused. Absences due to illness or family emergencies must have a formal letter of excuse. A student who expects to miss class because of participation in a university-sponsored activity must notify the instructor in advance of the absence. For all excused absences, arrangements with the instructor must be made to complete all missed work and, if necessary, to do any compensatory projects which the instructor assigns.

Classroom Management

Studies have shown that students retain the most information by taking notes by hand, so no laptop note-taking! **I do not permit laptops, phones, or other electronic devices to be used during class.** Read, listen, write, absorb, ask questions, and you will learn at your best. Repeated late arrivals or other class disruptions will be penalized by downgrading participation points. This is a class of adults, and I expect respect and courtesy to be shown by all.

**I strongly support the Academic Honor Code and will not tolerate academic dishonesty of any type.** Cheating, plagiarism, turning in an assignment with someone else’s name, and using electronic devices during exams are all Honor Code violations. You are also required to inform me if you become aware of a classmate cheating. All violations of the Honor Code will be given a zero on the assignment, and the Department Chair and Dean of Students will be informed. Review the Honor Code at http://uncw.edu/odos/documents/Honor\_Code\_12-13.pdf.

Disabilities:

I am happy to make accommodations to those students with disabilities. Students should first contact the Office of Disability Services in Westside Hall (3746). After obtaining your referral from this office, please contact me. If you require special accommodations for test-taking, please let me know at least 3 days before exam time so that I have time to make accommodations.

**THE UNIVERSITY LEARNING CENTER**

DePaolo Hall 1056 & 1003, first floor

910.962.7857

[www.uncw.edu/ulc](http://www.uncw.edu/ulc)

The University Learning Center’s (ULC) mission is to help students become successful, independent learners. Tutoring at the ULC is NOT remediation: the ULC offers a different type of learning opportunity for those students who want to increase the quality of their education. ULC services are free to all UNCW students and include the following:

* Learning Services (University Studies) <http://www.uncw.edu/ulc/learning/index.html>
* Math Services <http://www.uncw.edu/ulc/math/index.html>
* Study Sessions <http://www.uncw.edu/ulc/includes/StudySessions.html>
* Supplemental Instruction <http://www.uncw.edu/ulc/si/index.html>
* Writing Services <http://www.uncw.edu/ulc/writing/index.html>