

Deep-Sea Biology (OCN430/630) - Syllabus

Fall 2009

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T TH 10:30-11:45

MSB306

Syllabus schedule subject to change

Course Goals – The deep sea is the largest living space on the planet. Its inhabitants are varied and its communities are often complex, adapted to the particular characteristics of their habitat. This course will cover the major topics in the field, such as benthic-pelagic coupling, depth zonation, energetics, diversity, ecosystem function, adaptations, and the ecology of major habitats. The last portion of the course will deal with anthropogenic threats such as deep-sea fisheries, mining and global climate change. Its goal is to provide you with a basic understanding of what we know (and don't know) about the biology, ecology and biodiversity of deep-sea ecosystems, the methods used in the field, and it will create a forum for discussion of the major current questions and recent exciting discoveries.

Course Structure – Each week there will be a lecture and a student-lead discussion session. The lecture will present the basics of the topic. The discussion will be based on assigned readings (primarily current scientific papers), allowing the class to explore the controversies, implications of recent findings, and highlight future directions for research.

Student Learning Outcomes – At the end of this course you will be able to:

- 1) Describe the co-varying effects of temperature, pressure, oxygen and light levels on the adaptations of deep-sea organisms.
- 2) Evaluate the influence of variables co-varying with depth on communities, populations, and species.
- 3) Discuss the various sources of energy available to deep-sea organisms and their controls on community processes.
- 4) Compare and contrast various deep-sea habitats and their faunas.
- 5) Evaluate the potential impacts of anthropogenic activities on deep-sea communities.
- 6) Read and understand a scientific paper, evaluate its findings and discuss the implications of those findings.
- 7) Synthesize a body of literature on a topic and communicate a clear synopsis of the background, controversies, and future directions for research orally.

Reading/Texts –

Gage and Tyler 1991. *Deep-Sea Biology: A natural history of the organisms at the deep-sea floor*. Cambridge University Press.

Herring 2002. *The Biology of the Deep Ocean*. Oxford University Press.

In addition readings will be assigned each week from the scientific literature.

Office hours – By appointment.

<u>Week</u>	<u>Lecture topic</u>
<u>Introduction</u>	
Aug 25	The physical environment and history of investigation (JCD and CRS)
Aug 27	Data collection techniques (CRS and JCD)
<u>Adaptations</u>	
Sept 1 Sept 3	Bioluminescence (JCD)
Sept 8 Sept 10	Physiological adaptations (JCD)
Sept 15 Sept 17	Energetics (JCD)
<u>Community Composition and Dynamics</u>	
Sept 22 Sept 24	Pelagic-benthic coupling – Food supply (JCD and CRS)
Sept 29 Oct 1	Depth zonation, trends in body size and the source-sink hypothesis (CRS)
Oct 6 Oct 8	Diversity – local and regional patterns (CRS)
Oct 13 Oct 15	Evolution and speciation (TBD)
<u>Habitats</u>	
Oct 20 Oct 21	Hydrothermal vents (CRS)
Oct 27 Oct 29	Cold seeps and whale falls (CRS) Topics due
Nov 4 th (8:30 MSB307) Nov 5	Seamounts (Les Watling 8:30)
Nov 10 Nov 12	Canyons and Trenches (JCD and CRS)
<u>Anthropogenic effects</u>	
Nov 17 Nov 19	Fisheries (JCD)
Nov 24	Mineral Exploitation (CRS)

Dec 1
Dec 3 Climate change (JCD and CRS)

Dec 8

Exam week Topic presentations

Graduate Grading Scheme

Paper discussions	50 points
Topic presentations	50 points
 Total	 100 points

Paper discussions (14 sessions to be divided evenly amongst students)

Each student will be assigned 2-3 papers to lead a discussion section

Provide an outline on powerpoint

 Introduce the rationale for study

 Hypotheses or goals

 Major findings

 Conclusions

Be prepared with one or two questions per paper to stimulate discussion

Topic Presentations

Choose a topic relating to deep-sea biology and review it via a 15 minute presentation

Introduce the topic, why you chose it, review the major results and conclusions

Summarize by identifying where the gaps are and critiquing progress in the field

15 minutes + 5 minutes for questions

Presentation (powerpoint file) with bibliography due at time of presentation

Evaluation by your peers and instructor

Topics due Oct 27th - email a paragraph describing it