

Ecology of Pelagic Marine Animals (OCN627)

Spring 2009

T/TH 9:00-10:15 MSB 315

Lab F 2:30-5:00 or longer! MSB 203

Instructor: Jeff Drazen, office MSB605, jdrazen@hawaii.edu, 956-6567

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Syllabus schedule subject to change

Course Goals – The pelagic environment is the largest on the planet, comprising the water column from coastal waters to the deep sea. Its inhabitants are varied and its communities are often complex, adapted to the particular characteristics of their habitat. Thus the subject is extremely large. Your marine microbiology course will have already covered microbial ecology, phytoplankton dynamics, primary productivity, and ocean biogeochemistry. The present course will cover a variety of major topics from zooplankton ecology to fisheries science. Its goal is to provide you with a basic understanding of what we know and don't know about the ecology and biology of pelagic marine animals (zooplankton through whales), the methods used in the field, and to create a forum for discussion of the major current questions.

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

- 1) Identify the major groups of pelagic zooplankton and nekton.
- 2) Understand the basic biology of pelagic animals and their adaptations to their environment.
- 3) Compare and contrast various sampling methods and be familiar with some basic instruments and methods in the field and laboratory.
- 4) Discuss temporal and spatial variations in pelagic ecosystems.
- 5) Evaluate the potential impacts of anthropogenic activities on pelagic communities.
- 6) Synthesize a body of literature on a topic and communicate a clear synopsis of the background, controversies, and future directions for research.

Reading/Text – There is no central textbook for this course, however there are several general texts that you may want to use for general reference. Two good sources are -

Miller CB (2004) Biological Oceanography. Blackwell Science Ltd

Jennings S, Kaiser MJ, Reynolds JD (2001) Marine Fisheries Ecology. Blackwell Science Ltd.

If your research area is at all related to the class, we recommend that you obtain a copy. Readings will be assigned each week from the primary literature. For each lecture we give a bibliography that will include sources for general overviews (i.e. textbooks and review papers) and primary literature sources for delving deeper into the subject.

Office hours – Neither of us has formal office hours, but please feel free to drop by our office/labs if you have questions or would like to discuss a topic. You are also welcome to email us, but please do not expect an immediate response.

Week Date Lecture topic

Introduction

1 13 **Jan** Introduction to the pelagic realm - JD

Nekton ecology

- 15 Nekton reproductive biology, life history strategies, age and growth - JD
- 2 20 Nekton feeding strategies - JD
22 Trophic ecology and food webs – JD
- 3 27 Locomotion - JD
29 Guest Lecture –Nekton movement patterns and migration – **Kevin Weng**
- 4 3 **Feb** Animal schooling - JD
5 Vision and bioluminescence in the deep sea – JD
- 5 10 Sampling the zooplankton – JD
12 **Student cruise, R/V KM**
- 6 17 Buoyancy and camouflage - JD
19 Reproductive and energetic strategies of deep-sea pelagic animals - JD

Zooplankton Ecology

- 7 24 Zooplankton: an introduction to individuals and communities - EG
26 Zooplankton reproduction and life cycles - EG
- 8 3 **Mar** Population growth and life history strategies - EG
5 **MIDTERM EXAM**
- 9 10 Diel vertical migration - EG
12 Zooplankton feeding: strategies and mechanisms – EG
- 10 17 Zooplankton feeding 2: feeding rates - EG
19 Guest lecture - Zooplankton/predator interactions – **Petra Lenz**
Presentation topics due
- 11 23 – 27 Spring break
- 12 31 Secondary production - EG
2 **Apr** Guest lecture – Topic TBA - **Karen Selph**

Spatial and Temporal patterns

- 13 7 Spatial patterns in abundance and diversity 1 - EG
9 Guest lecture - Zooplankton and thin layers – **Margaret McManus**
- 14 14 Spatial patterns in abundance and diversity 2 - EG
16 Temporal dynamics and climate in pelagic ecosystems - EG
- 15 21 Biogeography and biodiversity - EG

Fisheries Oceanography

- 23 Fisheries introduction - JD
- 16 28 Fisheries oceanography, larval biology and recruitment - JD
30 Fisheries stock assessment, management and global fisheries - JD
- 17 5 **May** Fisheries discussion - JD
- 12 May 9:45-11:45 FINAL EXAM MSB315

Grading Scheme

Midterm	150 points
Final Exam	150 points
Lab exercises	2x25 points
Lab practical	50 points
<u>Presentations</u>	<u>100 points</u>
Total	500 points

Lab Exercises

- 1 – Assessing diel vertical migration from trawl data – due Feb 27th in lab
- 2 – Characterizing fish feeding habits and functional morphology – due Apr 17th in lab

Lab practical

Lab exam to test your ability to identify various zooplankton and nekton
~50 questions – timed
Material from lab is stored in MSB604, a key will be available

Student presentations

15 minutes
Presentation (powerpoint file) with bibliography due at time of presentation
Evaluation by your peers and instructor
Topic (a question or controversy) due March 19th
Presentations during the last lab on May 1st

Lab Topics and Schedule
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The lab component of this course will provide you with hands on learning opportunities that can not be served in the classroom. It will introduce you to the diversity of pelagic animals, give you direct experience with the pelagic habitat, and provide a forum for discussion and presentations.

Date	Lab topic
16 Jan	no lab
23 Jan	pelagic fish diversity
30 Jan	pelagic fish diversity, cont.
6 Feb	zooplankton diversity
13 Feb	cruise on RV Kilo Moana
20 Feb	zooplankton diversity, cont. - lab exercise 1 assigned
27 Feb	LAB PRACTICAL
6 Mar	nekton dissection and functional morphology
13 Mar	nekton feeding and diet analysis – lab exercise 2 assigned, lab exercise 1 DUE
20 Mar	Mesopelagic lab
27 Mar	no lab - Spring Break
3 Apr	Molecular techniques for ecologists; discriminating species complexes using PCR/RFLP
10 Apr	Holiday – no lab
17 Apr	climate change discussion, LAB EXERCISE 2 DUE
25 Apr	Honolulu fish auction – SATURDAY 5:00am complete course evaluations
1 May	STUDENT PRESENTATIONS