

Ecology of Pelagic Marine Animals (OCN627)

Spring 2014

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

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

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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.

Required text and readings -

Miller CB (2012) **Biological Oceanography**. Blackwell Science Ltd

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.

Suggested texts - general texts that you may want to use for general reference. If your research area is at all related to the class, we recommend that you obtain a copy.

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

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

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 14 **Jan** Introduction to the pelagic realm – JD

Zooplankton Ecology

- 16 Zooplankton biology and communities – EG
- 2 21 Zooplankton reproduction, life histories and population growth – EG
23 Guest lecture - Zooplankton/predator interactions – **Petra Lenz**
- 3 28 Sampling the zooplankton – EG
30 Diel vertical migration – EG
- 4 4 **Feb** Zooplankton feeding 1: strategies and mechanisms – EG
6 Zooplankton feeding 2: feeding rates – EG
- 5 11 Secondary production – EG

Nekton Ecology

- 13 Nekton reproductive biology, life history strategies, age and growth – JD
- 6 18 Nekton feeding strategies – JD
20 Guest lecture – Topic TBA - **Karen Selph**
- 7 25 Trophic ecology and food webs – JD ONLINE
27 Nekton movement patterns and migration – **Kevin Weng**
- 8 4 **Mar** Locomotion – JD
6 MIDTERM EXAM
- 9 11 Animal schooling and aggregation – JD
13 Buoyancy and camouflage – JD
- 10 18 Vision and bioluminescence in the deep sea – JD
20 Reproductive and energetic strategies of deep-sea pelagic animals – JD
- 11 24-28 Spring break

Fisheries Oceanography

- 12 1 **Apr** Fisheries introduction – JD
TBD Fisheries oceanography, larval biology and recruitment – JD
3 Fisheries stock assessment, management and global fisheries – JD
TBD Discussion on the state of global fisheries – JD

Spatial and Temporal patterns

13	8	no class
	10	no class
14	15	Spatial patterns in abundance and diversity 1 – EG
	17	Spatial patterns in abundance and diversity 2 – EG
15	22	Guest lecture – Physical forcing of biotic spatial pattern – Margaret McManus
	24	Biogeography and biodiversity – EG
16	29	Temporal dynamics and climate in pelagic ecosystems – EG
	1 May	Effects of anthropogenic climate change on pelagic animals – EG
17	6	no class

15 **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 – Nekton feeding and diet analysis – due Mar 21st in lab
- 2 – Molecular techniques for ecologists – due May 2nd 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 7th
 Presentations during lab on Apr 4th

Lab Topics and Schedule
 Ecology of Pelagic Marine Animals (OCN627): Spring 2012
 Lab F 2:30-5:00 or longer! MSB 203

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
17 Jan	no lab
24 Jan	zooplankton diversity
31 Jan	zooplankton diversity, cont.
7 Feb	pelagic fish diversity
14 Feb	pelagic fish diversity, cont.
21 Feb	rise of gelatinous plankton – reading and discussion
28 Feb	LAB PRACTICAL (MSB604)
7 Mar	nekton feeding and diet analysis – lab exercise 1 assigned Presentation topics due
14 Mar	movement patterns in oceanic nekton (bring your laptop) – Kevin Weng
21 Mar	Deep sea adaptations lab/paper discussion Lab exercise 1 due
28 Mar	no lab - Spring Break
4 Apr	STUDENT PRESENTATIONS (early start if schedules permit)
5 Apr	Honolulu fish auction – SATURDAY 6:00am
11 Apr	Zooplankton molecular ecology lab – lab exercise 2 assigned
18 Apr	GOOD FRIDAY - HOLIDAY
25 Apr	Zooplankton molecular ecology lab 2
2 May	climate change – reading and discussion Lab exercise 2 due