

# Ecology of Pelagic Marine Animals (OCN627)

Spring 2012

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 (2004) **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**

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Introduction

1 10 **Jan** Introduction to the pelagic realm – EG

Zooplankton Ecology

- 12 Zooplankton biology and communities - EG
- 2 17 Zooplankton reproduction, life histories and population growth- EG  
19 Sampling the zooplankton – EG
- 3 24 Diel vertical migration - EG  
26 Zooplankton feeding 1: strategies and mechanisms – EG
- 4 31 Zooplankton feeding 2: feeding rates - EG  
2 **Feb** Guest lecture - Zooplankton/predator interactions – Petra Lenz
- 5 7 Secondary production – EG

Nekton Ecology

- 9 Nekton reproductive biology, life history strategies, age and growth - JD
- 6 14 Nekton feeding strategies – JD  
16 Guest lecture – Topic TBA - Karen Selph
- 7 21 Trophic ecology and food webs – JD  
23 Nekton movement patterns and migration – Kevin Weng
- 8 28 Locomotion – JD  
1 **Mar** MIDTERM EXAM
- 9 6 Animal schooling and aggregation – JD  
8 Buoyancy and camouflage – JD
- 10 13 Vision and bioluminescence in the deep sea – JD  
15 Reproductive and energetic strategies of deep-sea pelagic animals - JD

Spatial and Temporal patterns

- 11 20 Spatial patterns in abundance and diversity 1 - EG  
22 Spatial patterns in abundance and diversity 2 – JD  
**Presentation topics due**
- 12 26-30 Spring break
- 13 3 **Apr** Guest lecture - Zooplankton and thin layers – Margaret McManus  
5 Temporal dynamics and climate in pelagic ecosystems - EG

- 14 10 Effects of anthropogenic climate change on pelagic animals - JD  
 12 Biogeography and biodiversity - EG

Fisheries Oceanography

- 15 17 Fisheries introduction - JD  
 19 Fisheries oceanography, larval biology and recruitment - JD
- 16 24 Fisheries stock assessment, management and global fisheries - JD  
 26 Fisheries - effects of removing top predators - JD

- 17 1 **May** Discussion on the state of global fisheries

10 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 9<sup>th</sup> in lab  
 2 – Zooplankton molecular lab – due Apr 3<sup>th</sup> in class

**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 22<sup>nd</sup>  
 Presentations during the last lab on Apr 27<sup>th</sup>

**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.

<b>Date</b>	<b>Lab topic</b>
13 Jan	no lab
20 Jan	zooplankton diversity
27 Jan	zooplankton diversity, cont.
3 Feb	pelagic fish diversity
10 Feb	pelagic fish diversity, cont.
17 Feb	LAB PRACTICAL
24 Feb	Ocean Sciences meeting - no lab
2 Mar	nekton feeding and diet analysis – lab exercise 1 assigned
9 Mar	movement patterns in oceanic nekton (bring your laptop) – Kevin Weng <b>Lab exercise 1 due</b>
17 Mar	Klaus Field trip – SATURDAY, all day (!). details TBD
23 Mar	Zooplankton molecular ecology lab – lab exercise 2 assigned
30 Mar	no lab - Spring Break <b>Lab exercise 2 due Apr 3<sup>th</sup> in class</b>
6 Apr	Good Friday - Holiday
13 Apr	climate change discussion
21 Apr	Honolulu fish auction – SATURDAY 6:00am
27 Apr	STUDENT PRESENTATIONS