University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Plankton Ecology

3 credits

MEES 637
Fall 2018

Course Objectives / Overview

Prerequesite: MEES 621 (Biological Oceanography) or permission of the instructor

The goal of this course is to provide students with a quantitative understanding of phytoplankton and zooplankton ecology, including growth and grazing, population dynamics, nutrition, behavior, trophic interactions, and bio-physical interactions, to answer the overarching question, ***what controls the magnitude, distribution, and transfer of production in plankton communities in estuaries, coastal, and open ocean systems?***
Emphasis will be placed on critical analysis of plankton dynamics from a variety of public data sources, in class discussions of peer-reviewed papers, and assessment of simple numerical models of plankton dynamics. Grading will be based on a combination of homework problem sets, a written proposal, and class participation in discussions.

Expected Learning Outcomes

At the conclusion of the course students will be able to:

- Recognize key taxa of phytoplankton and zooplankton, and characterize their importance in marine food webs and biogeochemical cycling.
- Assess the methods for calculating and estimating growth, grazing, productivity, respiration, and mortality, and the relative importance of these processes to marine food webs and biogeochemical cycling.
- Implement and analyze the results of simple numerical models of plankton dynamics under different scenarios, and evaluate the sensitivity of model output to changing parameters, such as nutrient availability, mixed layer depth, temperature, feeding, and migration behavior.
- Compare and contrast the results from plankton modeling exercises with observational and experimental data.
- Synthesize available zooplankton data to quantify birth, death, immigration, and emigration rates driving population dynamics of key zooplankton taxa.
- Write an NSF style proposal on a topic relevant to zooplankton ecology, complete with a draft budget and budget justification.

Course Assessment / Grading

INSTRUCTOR DETAILS:
James Pierson
jpierson@umces.edu
410.221.8218

CLASS MEETING DETAILS:
Dates:
Times:
Originating Site: HPL
IVN bridge number: (*******)
Phone call in number: (***)
Room phone number:(*****)

COURSE TYPE:
Check all that apply
☐ Foundation
☐ Professional Development
☐ Issue Study Group
☐ Seminar
☒ Elective

Prerequisites
MEES 621 (Biological Oceanography) or permission of the instructor

Teaching Assistant
N/A

Assessment of student learning outcomes will be divided among leading and participating in class discussions of peer-reviewed papers (20%), take-home quantitative problem sets (30%), and a final written proposal (50%).

- Students will be expected to lead at least one discussion on peer-reviewed papers relevant to one of the course topics; selection of papers will be done in conjunction with the instructor.
- Problem sets will require analysis of actual data and/or results of numerical models using various computer software packages such as Matlab or R, and instruction will be given in class for using these programs and accessing relevant data sets.
- The written proposal will be a semester-long project in which students will be expected to develop a hypothesis about a topic related to zooplankton ecology and propose a study to test the hypothesis. Background and introduction of the proposal will require critical literature review, data analysis, and/or modeling. Assessment of the proposal will be done for different aspects of the proposal, including the initial hypothesis development and outline (5% of total course grade), the budget and budget justification (10% of the total course grade), and the final NSF style written summary and project description (35% of the total course grade).

Tentative Weekly Course Schedule

Week	Topic	Milestones
1	History, Plankton Blooms, & Match-Mismatch	
2	Biogeography, Taxonomy, & Diversity	*Problem Set I Handed Out*
3	Photosynthesis, Nutrient Uptake, Respiration	
4	Growth, & Development	
5	Reproduction & Mortality	**Problem Set I Due**
6	Life History & Demography	
7	Modeling Plankton: NPZ	**Proposal Outline Due**
8	Modeling Plankton: IBMs & Coupled models	*Problem Set II Handed Out*
9	Vertical Distribution	
10	Vertical Migration, Flux, and Export	
11	Trophic Dynamics	**Problem Set II Due**
12	Parasitism & Toxins	**Draft Budget Due**
13	Mesopelagic and Bathypelagic Communities	
14	Estuarine Plankton Communities	
15	Polar and Tropical Communities	
		Final Proposal Due

Required textbooks, reading and/or software or computer needs

Readings will be primarily from primary literature. We will use modeling software, such as R and/or Matlab for the course, but knowledge of these programs is not necessary at the beginning of the course – any necessary instruction for use of the modeling programs will be given with the course material.

Course Communication

Students will communicate with the instructor through email, phone, MOODLE, and/or Google Drive as appropriate for given announcements.

Resources

TBD

Campus Policies

The University of Maryland Center for Environmental Science has drafted and approved of various academic and research-related policies by which all students and faculty must abide.

Please visit http://www.umces.edu/consolidated-usm-and-umces-policies-and-procedures for a full list of campus-wide academic policies.

Course-Specific Policies and Expectations

Students are encouraged to work together for problem sets. Late assignments will be deducted points on a case by case basis.