Upper level marine microbes class (796/896) -- Kai Ziervogel, research assistant professor in EOS/OPAL.

Course title:

Marine microbial ecology and biogeochemistry

Catalog entry:

The term “marine microbe” covers a diversity of microorganisms, including microalgae, bacteria and archaea, protozoa, fungi, and viruses. These microscopic organisms account for ~98% of ocean biomass. Their metabolisms drive elemental cycles in the ocean with consequences for the global carbon cycle. This course will introduce students to the marine microbial biosphere, their diversity and role in biogeochemical cycles through a combination of classroom lectures and laboratory work. Upon completion of this class, students should have a general understanding of principle features of microbial diversity and should be able to explain the role of microbes in elemental cycles in the ocean.

Syllabus:

Instructor:	Kai Ziervogel, OPAL, 136A Morse Hall, kai.ziervogel@unh.edu
Semester:	Spring 2019
Credits:	4
Class hours:	TBD
Office hours:	TBD
Prerequisites:	This course is designed for oceanography and marine biology graduate students who need to have completed introductory courses in oceanography and microbiology. Senior undergraduate students must petition to get into the course.
Text:	Microbial Ecology of the Oceans, 2nd ed. (Editor: D.L. Kirchman, John Wiley & Sons, 2008). Journal articles will be assigned periodically.

Assignments: Oral presentations to the class of assigned papers (10 – 15 min); lab work with final report.

Evaluation: Exams: 50%**,** Oral presentations: 25%**,** Lab report: 25%.

Content:

Introduction and overview of marine microbes -- brief history of marine microbiology -- microbial community structure and diversity in the sea.

Marine microbial food webs and biogeochemical cycles -- photoheterotrophic prokaryotes**,** heterotrophic prokaryotes**,** eukaryotes **--** Carbon, nitrogen, phosphorous cycling –

Lab work: measurements of microbial metabolic rates and abundance in samples from the coastal ocean and the Great Bay Estuary.

Water quality and global change – toxic cyanobacterial blooms, microbes and oil -- N-fixing microbes in the future ocean, calcifying microbes in the future ocean

Draft schedule:

Week	**Lectures / *Labs***
Jan 22 – 25	Introduction and overview of marine microbes
Jan 28 - Feb 01	Brief history of marine microbiology
Feb 04 – 08	Microbial community structure and diversity in the sea (guest lecturers – TBD)
Feb 11 – 15	Intro microbial food webs **/ *Prepare sampling and lab work (Morse Hall)***
Feb 18 – 22	Microbial food webs, methods; assignment of oral presentations I / ***Sampling I for microbial enumeration and metabolic rate measurements (JEL, CML)***
Feb 25 - Mar 01	Midterm **/ *Intro to microbial cell enumeration using flow cytometry (UNH Instrumentation center)***
Mar 04 – 08	Oral presentations I / ***Continue microbial cell enumeration using flow cytometry (UNH Instrumentation center)***
Mar 11 - 15	**Spring break**

Mar 18 – 22	Intro to biogeochemical cycles; assignment of oral presentations II / ***Sampling II for microbial enumeration and metabolic rate measurements (JEL, CML)***
Mar 25 – 29	Resource control of bacterial dynamics in the sea (growth, nutrient uptake); oral presentations II
Apr 01 – 05	Marine viruses and elemental cycling
Apr 08 – 12	Midterm / ***Sampling III for microbial enumeration and metabolic rate measurements (JEL, CML)***
Apr 15 – 19	Marine microbes and oil in the sea; Research following the 2010 Oil spill in the Gulf of Mexico; Oil and microbes in the Arctic Ocean / ***Start final lab report in groups as peer-reviewed research article, discuss aspects of peer-review***
Apr 22 – 26	Marine microbes and global change; N-fixing microbes in the future ocean; Calcifying microbes in the future ocean / ***Continue lab report***
Apr 29 - May 03	Review / ***finish up lab report***
May 06	Last day of classes
May 09 - 15	Final exam