

Marine Microbiology - Course Syllabus

Course Number: MarS 229/329

Course Title: Marine Microbiology

Academic Semester: Spring **Academic Year:** 2015/ 2016
Semester Start Date: Jan 24, 2016 **Semester End Date:** May 19, 2016

Class Schedule: Sunday-Thursday, 8h-16h

Classroom Number:

Instructor(s) Name(s): Xosé Anxelu G. Morán, Susana Agustí, Burton Jones
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Office Location: 2218

COURSE DESCRIPTION FROM PROGRAM GUIDE

Marine Microbial Ecology: This course covers recent developments in the field of marine microbial ecology and will give an overview on structure and function of microbial communities in the oceans including discussions on novel methods, results and hypotheses. Among the topics covered are: Photoheterotrophic bacteria, marine bacteria and the carbon cycle, UV radiation effects on microbes and microbial processes, uptake and regeneration of inorganic nutrients by marine heterotrophic bacteria, bacterivory: interactions between bacteria and their grazers, symbiosis and mixotrophy among pelagic microorganisms, marine viruses and their ecological impact, the Global Ocean Survey of Marine Metagenomics, single cell activity in marine bacterioplankton.

COMPREHENSIVE COURSE DESCRIPTION

The course will integrate key aspects of the oceanography, biology and ecology of microorganisms through lectures, literature reviews and field and lab work. Our current understanding of microbial diversity, physiology and interactions with the environment will be combined with hands-on work involving sample collection in Red Sea coastal ecosystems, biomass determinations and short-term experiments on responses to environmental drivers. The addressed topics will include:

- Vertical structure and physico-chemical gradients in the ocean
- The physical of the ocean (stratification / mixing, light gradients)

- Chemical and biological vertical partitioning
- Mesoscale oceanographic processes (seasonal cycles, eddies, upwelling)
- Phytoplankton photosynthesis and primary production
- Bacteria / archaea and heterotrophic prokaryotes production
- Eukaryotic microbes
- Viruses
- Microbial diversity and evolution
- Microbial food webs
- Role of microbes in biogeochemical cycles
- Climate change
- Physical effects of climate change (stratification, warming and sea level rise, global weather patterns)
- Biological effects of climate change (phenology, distribution, body size)

GOALS AND OBJECTIVES

Planktonic unicellular organisms are fundamental players of marine food webs mediating all fluxes of matter and energy in the oceans. The course will build up from the underlying oceanographic physico-chemical properties and processes affecting microbial life to a thorough review of microbial ecology, from viruses to phytoplankton, and the role of these microorganisms in global biogeochemical cycles.

The aim of this course is to provide the students with a basic theoretical and practical understanding of the interactions between microorganisms and ocean processes and discuss their future role in a rapidly changing planet.

REQUIRED KNOWLEDGE

MarS 221 is a prerequisite for this course.

REFERENCE TEXTS

Marine Microbiology: Ecology and Applications (C. Munn, Garland Science, 2011)

Microbial Ecology of the Oceans, 2nd ed. (Editor: D.L. Kirchman, John Wiley & Sons, 2008)

METHOD OF EVALUATION

Graded content

20% Class Participation: This is a graded component of the course, and includes in-class discussions and attendance, contribution of literature for the course, etc.

30% Assignments: This includes presentations made to the class based on reading assignments.

50% Final Exam: A comprehensive final exam.

COURSE REQUIREMENTS

Assignments

The course will include presentations to the class of assigned papers and written assignment based on the experimental work.

Course Policies

Attendance is mandatory to all lectures. Participation is a significant component of the grade. As a block course, students are expected to be available at any time and on short notice during the block period. Any anticipated absence should be cleared with the instructor by written (email) notification as early as possible. Students with approved absences are responsible for catching up on the materials from their classmates.

Additional Information

It is strongly preferred that communications are via email. For urgent issues, the instructors may be reached by phone (number will be provided to the class).

NOTE

The instructor reserves the right to make changes to this syllabus as necessary.

