

## **Course Outline and Syllabus Microbial Ecology - OCB 5636- Fall, 2008**

**Course Time:** Tuesdays and Thursdays, 11:00 am to 12:15 pm

**Place:** 327 Oceanography-Statistics Building

**Professor:** Joel E. Kostka

Office: Room 312 Leroy Collins Research Bldg. (Nuclear Research Bldg.)

Email address: jkostka@ocean.fsu.edu

Phone: 644-5719

OFFICE HOURS: Tues./ Thurs., 12:15 to 1:15 pm and/or by appointment

**Textbook:** The textbook for the course will be *Aquatic Geomicrobiology*, Canfield et al. (edit's). 2005.

### **Grading:**

Two take-home exams- 50 %

One lab report- 20 %

One term paper- 20 %

Discussion paper and class participation- 10 %

### **Course Description:**

The intent of this course is to provide students with an understanding of the interactions between microorganisms and their surrounding environment. Graduate students and advanced undergraduates are welcome. Course discussions will be based mainly on the primary literature with some introductory material from texts. The course will involve lectures, readings, class discussions, and field trips to regional marine habitats. Interactions between all marine microbes, which include bacteria, viruses, Archaea, and protists will be discussed in the context of a range of different marine habitats, both in the water column and in sediments. The latest experimental methods for characterizing microbial populations, including molecular techniques, will be covered. Laboratory exercises will be associated with the field trips.

### **Course Format:**

This course will consist of 1 hour and 15 min. lecture periods which generally follow with the order of subjects found in the syllabus. Approximately one third of the course will cover an introduction to the environmental biology of microorganisms according to the text listed above. The remaining two-thirds of the course will cover water column and sedimentary marine habitats, drawing heavily from the refereed literature. Lectures will be supplemented with live demonstrations, videos, and internet exercises. Three laboratory exercises and two exams will be evenly spaced throughout the semester.

### **Discussion Papers:**

Students will be graded based upon their in-class presentations as well as written reports of discussion papers. For in-class presentations, students are expected to provide a well-organized, thorough presentation of a paper from the refereed literature. Papers should

be chosen by the student with approval from the instructor at least two weeks ahead of the class discussion. For each paper, the presenter should provide the following: 1) an overall introduction, 2) a general explanation of any "unusual" scientific concepts or techniques that might not be understood by the whole class, 3) mediation of the class discussion of each section (introduction, materials and methods, results, discussion). All students, INCLUDING THE PRESENTER AND OTHER CLASS PARTICIPANTS, should be prepared to ANSWER AS WELL AS ASK LEADING QUESTIONS RELATED TO EACH DISCUSSION PAPER.

**Accommodations for students with disabilities:**

Students with disabilities needing academic accommodations should:

- 1) Register with the Student Disability Resource Center (SDRC).
- 2) Bring a letter to the instructor from the SDRC indicating you need academic accommodations. If at all possible, this should be done within the first week of class.

Note: The FSU SDR Center is in Kellum Hall, room 8; phone number is 644-9566 (voice); TDD is 644-8504; fax is 644-7164. for a map of how to get to Kellum Hall.

**Honor Code:**

Students in this course are bound by the FSU Academic Honor Code as written in the FSU Student Handbook. You have the responsibility to: 1) uphold the highest standards of academic integrity in your work, 2) refuse to tolerate violations of academic integrity in the University community, and 3) foster a high sense of integrity and social responsibility on the part of the University community.

## Course Schedule

**Main text is Aquatic Geomicrobiology, Canfield et al. (edit's). 2005.**

### **Lectures supplemented by:**

Brock Biology of Microorganisms, 11<sup>th</sup> edition. 2006. Madigan et al.

Microbial Ecology of the Oceans, Kirchman (edit.). 2000.

Marine Microbiology, Methods in Microbiology, Vol. 30. 2001. J.H. Paul (edit.)

Biodiversity of Microbial Life: Foundation of Earth's Biosphere. 2002. Staley and Reysenbach

### **I. Introduction to Microbial Ecology**

- 26 Aug.- Evolution of Life on Earth
- 28 Aug.- Thermodynamics, Redox, and Energy Generation
- 2 Sept.- Introduction to Course, Microbiology of Cold Environments
- 4 Sept.- Redox Disequilibria and Global Biogeochemical Cycles
- 9 Sept.- Systematics and Phylogeny
- 11 Sept.- Introduction to Molecular Biology and Genetics
- 16 Sept.- Enumeration and Isolation of Microorganisms
- 18 Sept.- Bioremediation
- 20-21 Sept.- Field laboratory at the FSU Coastal and Marine Laboratory
- 23 Sept.- Structure and Growth of Microbial Populations
- 25 Sept.- Microbial Metabolism
- 30 Sept.- Metabolic Diversity
- 2 Oct.- Discussion papers- diversity
- 7 Oct.- Heterotrophic Carbon Metabolism
- 9 Oct.- Carbon Fixation and Phototrophy

### **II. Methods**

- 14 Oct.- Molecular Techniques Lab I (to meet in Kostka Lab at Nuclear Research Building)
- 16 Oct.- Molecular Techniques Lab II (to meet in Kostka Lab at Nuclear Research Building)
- 21 Oct.- Discussion papers- molecular techniques
- 23 Oct.- Mid-term exam (take-home); TITLE AND OUTLINE FOR TERM PAPER DUE

### **III. Biogeochemical Cycles**

- 28 Oct.- Nitrogen Transformations by Microorganisms
- 30 Oct.- The Oxygen Cycle; LAB REPORT DUE
- 4 Nov.- The Iron and Manganese Cycles
- 6 Nov.- The Sulfur Cycle
- 11 Nov.- Subsurface Microbiology
- 13 Nov.- Methane and Global Climate Change
- 18 Nov.- Discussion papers- biogeochemical cycles

### **IV. Microbial Ecosystems**

- 20 Nov.- Water column and microbial loop
- 25 Nov.- Saltmarshes and mangroves; TERM PAPER DUE
- 27 Nov.- Thanksgiving holiday
- 2 Dec.- Discussion papers- habitats
- 4 Dec.- Deepsea, hydrothermal vents
- 8 to 12 Dec. - Final exam (take home)