

**Course Outline and Syllabus**  
**Phylogeny of Marine and Aquatic Microorganisms**  
**OCB 5930-02, OCE 4930-02**

**Course Time:** Tuesdays and Thursdays, 9:30 to 10:45 am

**Place:** Room 327 OSB and the Kostka Laboratory (3<sup>rd</sup> floor of the Collins Building)

**Instructors:** Joel E. Kostka  
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**Course Prerequisite:** General microbiology, microbial ecology or equivalent courses. A full year each of introductory biology and chemistry are strongly recommended.

**Breakdown of Grading:**

- 25 %- Class participation- asking and answering scientific questions during class periods
- 25 %- Written project proposal
- 25 %- Final project report
- 25 %- Oral presentation of final project report (20 minutes with 10 minutes of questions from the audience)

**Course Description:**

This course is designed as an introduction to the phylogeny and diversity of marine/aquatic microorganisms. This is an **ADVANCED** microbiology course that will be largely based on independent research of the literature, in the field, and in the laboratory. The focus will be on the phylogenetic relationships of microorganisms in an environmental or ecological context. We will cover the evolutionary basis for understanding the role of microorganisms in biogeochemical cycles and the trophic structure of marine and aquatic ecosystems. Students in the course are expected to have sufficient background in general biology, chemistry, and mathematics.

**Course Format:**

This course will consist of lectures and discussions of relevant scientific papers supplemented with a laboratory component. Students will be evaluated based upon participation in class discussions and on a special project geared toward the student's thesis research. Students will design, carry out, and write a report on their special project

that will represent original research. Research will be conducted in the Kostka lab independently of the lecture component of the course. The purpose of the laboratory component will be to introduce the students to benchtop techniques and computer analysis used in the characterization of microbial populations. The topic of the special project will be discussed and agreed upon with Dr. Kostka. A proposal will be written by the student and will serve as the template for the special project. The written proposal should include a summary of the literature on the topic, proposed methods, and expected results. Written proposals will be 10 pages in length, double-spaced, including an abstract and title page, but not including references and figures. Oral presentations and final project reports will be evaluated by all class participants, including the instructors and students. The final project report will consist of a paper (of manuscript length and format; 15 to 20 pages double-spaced in 12 pt. font) to be due at the end of the semester. The paper should include an introduction, materials and methods, results, discussion, and conclusions sections.

### **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 Outline:**

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| 6 Jan.-  | Introduction and Overview  |
| 8 Jan.-  | Biodiversity of Microbial Life   |
| 13 Jan.- | Phylogeny of Bacteria  |
| 15 Jan.- | Phylogeny of Archaea   |
| 20 Jan.- | Cultivation- overview and enrichment   |
| 22 Jan.- | Laboratory demonstration- MPN serial dilution assay                              |
| 27 Jan.- | Cultivation- strategies for isolation and purification                           |
| 29 Jan.- | Laboratory demonstration- plating, agar dilutions                                |
| 3 Feb.-  | Review session; planning day for special projects                                |
| 5 Feb.-  | Does cultivation still matter?- State-of-the-art cell separation and cultivation |
| 10 Feb.- | Phylogenetic Methods I.: Cloning and sequencing methods                          |

12 Feb.- Strengths vs. Weaknesses of Existing Clonal Analysis Approaches  
17 Feb.- Bacterial species concept I; **Proposals Due**  
19 Feb.- Bacterial species concept II  
24 Feb.- Phylogenetic Methods II. Statistical Approaches: Cold Hard Facts About  
Biodiversity Estimates  
26 Feb.- Lab demonstration on statistical approaches  
3 March- Biogeography  
5 March- Quantification of microbial activity  
10-12 March- Spring Break  
14-15 March- FSUCML- geochemical profiling, IPT, slurry incubation  
17 March- MIMS  
19 March- Nutrient chemistry  
24 March- Deep sequencing  
26 March- Evolution of eukaryotes  
31 March- Laboratory demonstration- statistical analysis of clone sequence data  
2 April- Cultivating the unculturable  
7 April- Special project work  
9 April- Special project work  
14 April- Biofuels  
16 April- Biofuels  
21 April- Special project work  
23 April- Project reports; **Written reports due**  
28 April- Project reports; **Written reports due**