

**Microbial Ecosystems**  
BIOL 3960/5960 Special Topics, Spring 2015  
3 cr, Tues-Thurs 12:25 pm - 1:45 pm

**Instructor**

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**Course Description**

Microorganisms run the world. They are the foundation of every habitat on earth, from our bodies to the deep sea. This course will explore the roles that bacteria, archaea, and microbial eukaryotes play in several example ecosystems including the human microbiome, the pelagic ocean, deep-sea hydrothermal vents, and local aquatic and terrestrial ecosystems. Students will learn to appreciate the diverse 'personalities' of different microbial species as well as their ecological roles. The aim of the course is to train students to appreciate the fundamental microbial processes that are at the heart of every system on Earth and are inherent to many pressing medical and environmental issues today. Because microorganisms play fundamental roles in so many different aspects of ecosystems around the globe, the course is inherently interdisciplinary and will involve concepts in microbiology, genomics, ecology, evolution, and biogeochemistry. The course is intended to bring together undergraduate and graduate students from diverse backgrounds; students with any interest in medical, molecular, environmental, or evolutionary aspects of microbiology are welcome.

**Prerequisites:** BIOL 1210, BIOL 2010

**Modes of Learning**

Each 80 minute class period will include a short introductory lecture by the instructor to provide background information on the day's topic as well as a presentation of a scientific study by a student that is relevant to the topic. This structure is intended to encourage a discussion-oriented format that will catalyze student-student teaching and learning interactions. Outside of class, students are expected to read scientific papers as well as general-audience materials suggested by the instructor and to complete the writing assignments described below. Students are encouraged to meet outside of class to work together on the assignments, but each student must complete the reading and writing assignments on their own.

## **Evaluation**

The final course grade will be determined by:

(1) Class participation (40%): Participation is mandatory, and missed classes will count against the final grade. Effective participation requires completing reading assignments before class. Students enrolled in 3960 will also present and lead a class discussion on at least one scientific paper during the course. Students enrolled in 5960 will lead class discussions on scientific papers several times during the course (approximately every other week). Preparation for these presentations will require careful reading of scientific papers and presentation of the material in a format that helps the other students to understand the material.

(2) Writing assignments (60%): Students will write annotated bibliographies that summarize key papers on a topic chosen by the student. One summary of one scientific paper is due on week 3, week 5, week 7, week 9, and week 12. The final annotated bibliography, due at the end of the semester, will contain summaries of at least 10 research papers on a single topic chosen by the student. These 10 papers may include the 5 papers summarized in earlier assignments, but all 10 papers must be related to a single topic chosen by the student. In addition, the summaries of each paper in the final assignment must explain how each paper relates to the topic as a whole and to the other papers. Each student must choose a unique topic, with help from the instructor. The same paper can be summarized by more than one student, but the overlap should not exceed 2 papers without approval by the instructor. Students enrolled in 5960 are expected to include at least 15 papers in their final annotated bibliography writing assignment. Graduate students enrolled in 5960 cannot choose a topic that is identical to their dissertation topic, although it can be related and can serve to explore interdisciplinary connections to their dissertation topic.

## **Class Schedule and Readings**

See following pages

### Class Schedule, BIOL 3960/5960: Microbial Ecosystems

<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Assignments</b>
1	Jan 13, 15	Human Microbiome: Overview	
2	Jan 20, 22	Human Microbiome: Cultures, human and microbial. Presentations 1,2	
3	Jan 27, 29	Human Microbiome: G-I tract. Presentations 3,4.	Summary 1 Due Jan 30 11:59pm
4	Feb 3, 5	Pelagic Ocean: The Microbial Loop. Presentations 5,6.	
5	Feb 10, 12	Pelagic Ocean: Ocean Acidification. Presentations 7,8,9,10.	Summary 2 Due Feb 13 11:59pm
6	Feb 17, 19	Pelagic Ocean: Oxygen Minimum Zones. Presentations 11,12.	
7	Feb 24, 26	Hydrothermal Vents: Discovery and Early Work. Presentations 13,14.	Summary 3 Due Feb 27 11:59pm
8	Mar 3, 5	Hydrothermal Vents: Chemosynthesis and Symbioses. Presentations 15,16.	
9	Mar 10, 12	Hydrothermal Vents: Rock-Powered Life. Presentations 17,18.	Summary 4 Due Mar 13 11:59pm
10	Mar 17, 19	Spring Break – no class	
11	Mar 24, 26	Dr. Brazelton out of town. Presentations 19,20,21,22 on topic of choice.	
12	Mar 31, Apr 2	Microbes and Water in Utah: Sewage Treatment and Water Purification. Presentations 23,24.	Summary 5 Due Apr 3 11:59pm
13	Apr 7, 9	Microbes and Water in Utah: The Great Salt Lake. Presentations 25,26.	
14	Apr 14, 16	Microbes and Water in Utah: Mountains, Snow, and Climate Change. Presentations 27,28,29,30.	List of Papers for Final Assignment Due April 17
15	Apr 21, 23	Microbes and Water in Utah: Groundwater and Subsurface Microbiology. Presentations 31,32	
16	Apr 28	Presentations 33, 34.	First Draft of Final Assignment Due May 1
17	May 6	Finals Week, no class meeting	Revision of Final Assignment Due

