

BIO 571 Microbial Ecology, Spring 2005
11:30-12:20 M W F
3 credits, prerequisites BIO 220 or 205

Instructors: Bruce Hungate, office: BC 214, Office hours: M 12:30-1:30 or by appointment
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Course Description: This graduate level course explores microbial evolution and population, community, and ecosystem ecology of microorganisms with an emphasis on microbial interactions with plants and animals, ecosystem processes, and the roles of microorganisms in biogeochemical cycles.

Course Objectives:

- Study the ecology of microorganisms at population, community and ecosystem levels.
- Gain an appreciation of microbial evolution and diversity.
- Gain familiarity with modern approaches and questions in microbial ecology including critical analysis through speaking and writing.

Course Structure: Material presented in lectures and assigned readings will be critically analyzed through in-class discussions and written reviews.

Required Readings: Articles available through Cline Library electronic reserves

Electronic Communication: All students must have an e-mail account because lecture outlines, discussion questions and other important materials will be sent through e-mail.

Article reviews (120 pts): Each week students will be required to write reviews of scientific articles. On Fridays, the instructors and graduate students will lead in-class discussions of the articles. At least one week before each review is due, review questions will be e-mailed to you. Your written reviews are worth 10 points each, and they will be collected at the *beginning of class* each Friday. Late reviews will not be accepted because we will discuss the answers to the questions during class. To accommodate absences, you can drop your lowest two review scores.

Discussion moderator (60 points): Each graduate student must moderate one of the weekly discussions. Sign up for your week during the first class period. At least one week before you moderate, you are required to e-mail the instructors a draft of the questions that you propose to discuss.

Exams (310 points): There will be one mid-term and a final exam. The mid-term will cover material during the first half of the course, and the final will cover all material presented during the course, with an emphasis on material from the second half. Exams will cover all material presented in lecture and assigned readings.

Exam questions (10 points): One week before each exam students must submit five questions and answers via e-mail. These questions will be collated, annotated, and e-mailed to each student as a study aid. Renditions of some of these questions may be incorporated into the exams.

Important dates: Exam questions for midterm are due February 25
 Midterm exam is March 4
 Exam questions for final exam are due May 4
Final exam May 11, 10 – 12 AM

Point distribution: Moderate discussion 60 points
 Article Reviews 120 points (14 @ 10 points each and drop the lowest two)
 Exam questions 10 points
 Midterm exam 100 points
 Final exam 21 points
Total points 500 points

Assessment of course grade: A \geq 450, B \geq 400, C \geq 350, D \geq 300 F < 300

| | Date | Topics | | Date | Topics |
|----------|-------------|---|---|-------------|---------------------------------|
| W | 1/19 | Introduction (start History) | | | |
| F | 1/21 | History of microbial ecology. | | | |
| M | 1/24 | Earth history 1 | M | 3/28 | Endosymbiosis |
| W | 1/26 | Earth history 2 | W | 3/30 | Endosymbiosis |
| F | 1/28 | <i>Discussion</i> | F | 4/1 | <i>discussion</i> |
| M | 1/31 | Biological evolution | M | 4/4 | Animal-Microbe Interactions |
| W | 2/2 | Antibiotic resistance | W | 4/6 | Animal-Microbe Interactions |
| F | 2/4 | <i>discussion</i> | F | 4/8 | <i>discussion</i> |
| M | 2/7 | Microbial diversity | M | 4/11 | Plant-Microbe Interactions |
| W | 2/9 | Bacterial lineages | W | 4/13 | Plant-Microbe Interactions |
| F | 2/11 | <i>Discussion</i> | F | 4/15 | <i>discussion</i> |
| M | 2/14 | Methods: stable isotopes etc. | M | 4/18 | Mycorrhizae and Global Change |
| W | 2/16 | Methods: lipid analyses etc. | W | 4/20 | Bioremediation |
| F | 2/18 | <i>Discussion</i> | F | 4/22 | <i>discussion</i> |
| M | 2/21 | The Abiotic environment | M | 4/25 | Element cycles |
| W | 2/23 | The Lithosphere | W | 4/27 | Global Change |
| F | 2/25 | <i>Discussion</i> | F | 4/29 | <i>discussion</i> |
| M | 2/28 | Extreme Halophiles | M | 5/2 | Soil biogeochemistry |
| W | 3/2 | The Atmosphere and hydrosphere | W | 5/4 | Microorganisms and carbon sinks |
| F | 3/4 | MID-TERM EXAM | F | 5/6 | REVIEW |
| M | 3/7 | Intra and Inter-specific Interactions | W | 5/11 | FINAL EXAM 10-12 AM |
| W | 3/9 | Molecular analyses of microbial communities | | | |
| F | 3/11 | <i>discussion</i> | | | |
| M | 3/14 | Community ecology | | | |
| W | 3/16 | Biofilms – guest lecture | | | |
| F | 3/18 | <i>discussion</i> | | | |
| | 3/21-3/25 | SPRING BREAK | | | |