BIOS 450: Advanced Microbiology  
Tues/Thurs 9:30-10:45am, SELE 4289

Instructor:  
Dr. Rachel Poretzky  
Room 4100 SELE  
Office Phone: 312-355-5102; E-mail: microbe@uic.edu  
Office hours: By appointment

Course description and objectives:  
An overall objective for the course is to expose students to advanced concepts and principles of current microbiology, microbial ecology, and genomics. We will explore microbial diversity and ecology, molecular microbial genetics, techniques and tools used to explore microorganisms, bioenergetics and physiology, and applied microbiology. Topics covered include, but are not limited to: the diversity of microbial genes and genomes; the value of this diversity for life-sustaining biogeochemical cycles; the complexity and functionality of microbial communities; interactions between microbes and their environments, including human/animal hosts, aquatic/terrestrial environments, and engineered systems; and the influence of the environment in shaping and driving the evolution of microorganisms and their communities.

The course is geared towards advanced undergraduate and early graduate students interested in microbial systems from an environmental, engineering, or medical perspective. Satisfactory completion of BIOS 350 is required. BIOS 220 is strongly recommended.

Evaluation:  
Participation in class, note taking and sharing: 10%  
My favorite microbe: 10%  
Four exams at 20% each: 80%  
Make-up exams will NOT be given.  
The final exam will not be cumulative

Grading Scale:  
100-85%= A; 70-85%= B; 55-70%= C; 50-55%= D; <50%= F

Textbook:  
Brock Biology of Microorganisms 14th Edition (Madigan, Martinko, Bender, Buckley, Stahl)

Any additional required readings will be provided on Blackboard

The course incorporates Pearson’s Modified Mastering Microbiology course content, which is available within the Blackboard course page. To access the course, you need the following:  
• Your Blackboard account  
• Your Pearson account (if you have used a Pearson product in the past such as MathXL, MyEconLab, etc. you have a login/password for Pearson, otherwise you will create one during the registration process)  
• An access code for your Modified Mastering product (packaged with your new text at the bookstore)
Alternatively, you can purchase access with a credit card or PayPal account or opt to get temporary access while awaiting Student Financial Aid. *Please refer to your Pearson MyLab/Mastering Student User Guide for more information.

**My favorite microbe:**
Students will select and research an important microbial taxon (organism or functional group), focusing on aspects of its physiology, genetics, ecology, and biogeochemistry, and submit a short written summary (2-5 pages single-spaced, 12pt Times New Roman/Arial/Helvetica font) of the selected microbe. At least two primary literature papers should be cited, using the citation format of the journal *Applied and Environmental Microbiology*. **Proper grammar and spelling are important.**
Paper is due by 5pm on the day indicated on the calendar below. They can be printed out and turned in during class or emailed as a pdf or Word document.

Reference guidelines: http://aem.asm.org/site/misc/journal-ita_org.xhtml#03
UIC Writing Center: http://www.uic.edu/depts/engl/writing/

**Learning Catalytics:**
During some classes, I will ask you to respond to a number of questions using the Learning Catalytics student response system. I will use your responses to gauge the overall comprehension of the subject, to clear up any misunderstandings, and to learn your opinions on various topics. You may not use another student's account to answer questions for them. Answering questions for another student, whether they are present or absent, is unacceptable. To use Learning Catalytics, you will need to bring an internet-enabled device (smart phone, iPad, iPod Touch, tablet, or laptop) to every class. Please let me know if you do not have such a device.

**Note taking and sharing:**
Each student, in groups of 2-3 students, will help assemble class notes for two lectures per semester. There should only be one set of notes posted for each lecture. Work with your peers to put together a single set of notes! These notes will be posted on Blackboard in the discussion section, where everyone will be able to add comments and thoughts. Notes can be sent to me, so that I can post on the Blackboard discussion page, OR you can upload them yourselves to Blackboard as a new discussion. Discussion and comments on the notes are encouraged. **I will chime in if there are specific questions or misinformation.**

These are to be submitted by Friday of the week of lecture.

Credit for this will be based on a) whether you did the assignment; b) whether your notes are comprehensive and c) whether you participate in discussion about the notes. Grammar/spelling aren't a priority, but remember that your peers will want to be able to understand your notes, so try to as clear as possible. It's ok if there are mistakes in your notes, too; if your peers don't catch them, I will. For each set of notes you do, you'll get 4 points if your notes are detailed and on time, 2 if they are late or poorly done, and 0 if you did not do it at all. You'll get an additional point for participating in discussions on Blackboard.

**Policy for missed/late work:**
Late work will not be accepted, nor will make up exams be permitted. If you believe you have an extenuating circumstance that requires or results in missed work, please contact me as soon as possible, prior to the exam or deadline, if possible.
**Extra credit:**
Attend relevant seminars for bonus points!

1. Each seminar you attend and write up will count as a max of 2 points added to an exam score.
2. The maximum number of extra credit points is +5 per exam. I will add the points at the end of the semester

**Academic honesty:**
As an academic community, UIC is committed to providing an environment in which research, learning, and scholarship can flourish and in which all endeavors are guided by academic and professional integrity. All members of the campus community—students, staff, faculty, and administrators—share the responsibility of insuring that these standards are upheld so that such an environment exists. Instances of academic misconduct by students will be handled pursuant to the Student Disciplinary Policy: [http://www.uic.edu/depts/dos/studentconduct.html](http://www.uic.edu/depts/dos/studentconduct.html)

*Instances of academic misconduct will not be tolerated. This includes, but is not limited to:*
- Possessing, using, or exchanging improperly acquired written or oral information in the preparation of homework, class project, and exams.
- Use of material that is wholly or substantially identical to that created or written by another individual or group.
- False claims of performance or work that have been submitted by a student

**Disability accommodations:**
Concerning disabled students, the University of Illinois at Chicago is committed to maintaining a barrier-free environment so that individuals with disabilities can fully access programs, courses, services, and activities at UIC. Students with disabilities who require accommodations for full access and participation in UIC Programs must be registered with the Disability Resource Center (DRC). Please contact DRC at (312) 413-2183 (voice) or (312) 413-0123 (TDD).
## Weekly schedule (subject to change…)

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<thead>
<tr>
<th>Jan</th>
<th>TUES</th>
<th>THURS</th>
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| 10      | The importance of microorganisms in our understanding of biology (Overview on evolution and diversity, Ch. 1, Ch. 12) | 12 Molecular microbiology and genetics review (Ch. 4)  

*Winogradsky columns*  |
| 17      | Microbial genomics (Ch. 4, 6)             | 19 Microbial Genetics (Ch. 10)             |
| 24      | Microbial ecosystems (Ch. 19)             | 26 Microbial metabolism- Redox=life, (Ch. 3, II-IV)   |
| 31      | Microbial metabolism- Biosynthesis (Ch. 3, IV)   |                                             |

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<th>Feb</th>
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<tr>
<td>7</td>
<td>Photosynthesis (Ch. 13, I)</td>
<td>9 Chemolithoautotrophy: Sulfur oxidation (Ch. 13, 14)</td>
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<tr>
<td>14</td>
<td>Chemolithoautotrophy: H₂, CO, Fe²⁻ oxidizing bacteria</td>
<td>16 Methane and C1 oxidizing bacteria</td>
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| 21      | Nitrification and Annamox (Ch. 13, Ch. 14) | 23 Magnetotactic bacteria and the tricky microaerophiles  

*Introduction to the anaerobic environment*  |
| 28      | EXAM 2                                    |                                             |

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<tr>
<td>7</td>
<td>Sulfate reduction, other electron acceptors (Ch. 13, Ch. 14)</td>
<td>9 Acetogenesis</td>
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| 14      | Methanogenesis                            | 16 Fermentations  

*MY FAVORITE MICROBE PAPER*  |
| 21      | SPRING BREAK                              | 23 SPRING BREAK                            |
| 28      | Interspecies H₂ transfer, syntrophy (Ch. 13, 20) | 30 Symbiosis (Ch. 22)  |

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<tr>
<td>4</td>
<td>EXAM 3</td>
<td>6 The human microbiome (Ch. 22)</td>
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<td>11</td>
<td>Methods in microbial ecology I (Ch. 18)</td>
<td>13 Methods in microbial ecology II (Ch. 18)</td>
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<td>18</td>
<td>Unique bacteria and archaea (predatory, luminous, extremophiles, etc.) (Ch. 5, 7, 14, 16)</td>
<td>20 Unique bacteria and archaea (predatory, luminous, extremophiles, etc.) (Ch. 5, 7, 14, 16)</td>
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<td>25</td>
<td>Hydrocarbon degradation and Bioremediation</td>
<td>27 Antimicrobials (Ch. 21)</td>
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<td>May</td>
<td>EXAM 4, finals week, TBD</td>
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