# ENVIRONMENTAL AND POLLUTION MICROBIOLOGY

11:375:411, 16:375:510

3 credits

## Time:
Spring Semester, 2014
MW, 6th period, 5:35 to 6:55 pm

## Place:
Foran Hall 138A, Cook Campus

## Instructors:
Prof. Lily Young
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## TA:
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Foran 308

## Office hrs:
(LY) by arrangement
(AWP) by arrangement

## Date  |  Topic                          | Assignment                                                                 |
---------|---------------------------------|---------------------------------------------------------------------------|
Jan 22   | Introduction                    | Ch. 1-4 (Brock 11, 12 & 13)                                               |
Jan 27   | Chemistry of the environment and the cell | Ch. 1-4 (Brock 11, 12 & 13)                                    |
Jan 29   | Phylogeny                        | Ch. 11 (B-11), Ch. 14 (B-12)                                          |
Feb 3    | Microbial groups                 | Ch. 12, 13, 14 (B-11) Ch. 15, 16, 17, 18 (B-12) Ch. 17, 18, 19 (B-13) |
Feb 5    | Heterotrophy, autotrophy, phototrophy | Ch. 17 (B-11), Ch. 20, 21 (B-12) Ch. 13, 14 (B-13)                     |
Feb 7    | Special Microbiology Symposium – Trayes Hall, [http://dbm.rutgers.edu/register2.php](http://dbm.rutgers.edu/register2.php) (free lunch!) |                                                   |
Feb 10   | Heterotrophy, autotrophy, phototrophy 2 |                                      |
Feb 12   | Introduction to Metabolism        | Ch. 5, 7 (B-11, 12), Ch. 4, 6 (B-13)                                   |
Feb 17   | Metabolism No lecture, do online exercise | Ch. 8 (Brock 1), Ch. 9 (B-12) Ch. 8 (B-13)                             |
Feb 19   | Catabolism                       | Ch. 5 (B-11, 12), Ch. 4 (B-13)                                           |
Feb 24   | Catabolism                       | “                                                                         |
Feb 26   | Catabolism                       | “                                                                         |
Mar 3    | Regulation No lecture, do online exercise |                                    |
Mar 5    | Adaptation                       | Ch. 8, 18, 31 (B-11) Ch. 9, 22, 12 (B-12) Ch. 8, 22, 11 (B-13)          |
Mar 10   | Adaptation                       | “                                                                         |
Mar 12   | MiniEXAM 2 (40 min)               |                                                                           |
Mar 17, 19 | SPRING BREAK                     |                                                                           |
### Resources:

4. Wastewater Microbiology, Bitton (on reserve)

### Requirements:

1. Four exams: Feb 12, Mar 12 (40 min, 60+60 pts), April 9 (80 pts), May 5 (80 pts)  
   (Point value for each exam is subject to change) (280 points in total)

2. Problem sets (4)  
   (60)

3. Poster session  
   (100)

4. Graduate students: 2 short papers, 5-8 pages each  
   Topics to be selected by student and approved by instructor  
   Due: Mar 24, May 5  
   Take either April 9 or May 5 exam, not both  
   (please notify us in writing which exam you are not taking)
Objective:
This course is intended to provide fundamental knowledge about microorganisms in the natural and engineered environment and their role in the cycling of elements, both natural and anthropogenically introduced into the environment. We will focus on understanding their role in the biodegradation of contaminant chemicals and the application of processes that take advantage of the microbiological biodegradation processes.

Plagiarism:
When information for your poster or paper (data, text, figures, tables) is copied from another document, it must be referenced appropriately. If it is directly quoted as text, it needs to be identified with quotation marks as well. Figures or tables may be copied from source material, but they must be properly referenced.

Internet resources:
It is easy to use search engines on the Internet to obtain information for your poster or paper. Information found on the Internet, however, is of varying quality. The most reliable reference is a scientific article that is subject to "peer review." Namely, experts have reviewed it and recommended it to the journal editor that the paper is well written, and that it contributes new findings to the field. This process usually requires several revisions, in which the author responds and makes changes to clarify points brought up by the reviewers. In this manner, quality and impact of publications is maintained. Most web pages are not subject to such a process and anyone can post any information. Therefore, web pages posted by individuals or unknown organizations, in general, should not be used as references. Many legitimate organizations can be be used as web reference, for example, government entities such as the EPA, Dept. of Energy, NOAA. In addition, web access to library resources and scientific journals is now routine and can be used.

Learning goals:
1. Acquire in-depth understanding of microbial processes in soil, sediment and aquatic environments.
2. Develop scientific expertise and literacy to evaluate, interpret and assess microbial activity in impacted and un-impacted environments.
3. Learn how to be critical, quantitative and independent in interpreting contemporary environmental issues.
4. Improve professional and communication skills.

Assessment outline:

<table>
<thead>
<tr>
<th>Learning goal</th>
<th>Instructional activity</th>
<th>Assessment activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Understanding microbial processes</td>
<td>Learning of basic microbiology and biodegradation principles through lectures, examples, readings, problem sets.</td>
<td>Evaluated through performance on problem sets, 4 exams and poster session.</td>
</tr>
<tr>
<td>2) Develop scientific expertise and literacy</td>
<td>Transmitted through lectures, examples, readings, discussion in class.</td>
<td>Evaluated through performance on problem sets, 4 exams and poster session.</td>
</tr>
<tr>
<td>3) Critical quantitative, independent thinking</td>
<td>Through lectures, discussion, problem sets, seminar attendance.</td>
<td>Assessed by performance on problem sets, exams, poster session and seminar critiques.</td>
</tr>
<tr>
<td>4) Professional and communication skills</td>
<td>Through lectures, discussion, seminar attendance, group project.</td>
<td>Assessed by performance on exams, group poster session, seminar write-ups.</td>
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