
ENVIRONMENTAL AND POLLUTION MICROBIOLOGY

11:375:411, 16:375:510

3 credits

Time: Spring Semester, 2013
MW, 6th period, 5:35 to 6:55 pm

Place: Foran Hall 138A, Cook Campus

Instructors: Prof. Lily Young Dr. Abigail Porter
Foran 308B Foran 312B
e-mail: Lyoung@aesop.rutgers.edu awporter@rci.rutgers.edu

TA: Sarah Wolfson
wolfson@eden.rutgers.edu
Foran 308

Office hrs: (LY) by arrangement
(AP) by arrangement

<u>Date</u>	<u>Topic</u>	<u>Assignment</u>
Jan 23	Introduction	Brock 1*, Ch. 1-4 Brock 2**, Ch. 1-4
Jan 28	Chemistry of the environment and the cell	Ch. 1-4 (Brock 1,2)
Jan 30	Phylogeny	Ch. 11 (Brock 1) Ch. 14 (Brock 2)
Feb 4	Microbial groups	Ch. 12, 13, 14 (Brock 1) Ch. 15, 16, 17, 18 (Brock 2)
Feb 6	Heterotrophy, autotrophy, phototrophy	Ch. 17 (Brock) Ch. 20, 21 (Brock 2)
Feb 11	Heterotrophy, autotrophy, phototrophy 2	"
Feb 13	Metabolism MiniEXAM 1 (40 min)	Ch. 5, 7 (Brock 1, 2)
Feb 18	P Metabolism	Ch. 8 (Brock 1) Ch. 9 (Brock 2)
Feb 20	P Catabolism	Ch. 5 (Brock 1, 2)
Feb 25	P Catabolism	"
Feb 27	P Catabolism	"
Mar 4	P Regulation MiniEXAM 2 (40 min)	"
Mar 6	P Adaptation	Ch. 8, 18, 31 (Brock 1) Ch. 9, 22, 12 (Brock 2)
Mar 11	P Adaptation	"
Mar 13	P Adaptation	"
Mar 18, 20	SPRING BREAK	

<u>Date</u>	<u>Topic</u>	<u>Assignment</u>
Mar 25	Y Growth in batch and continuous culture	Ch. 6 (Brock 1, 2) Ch. 28 (Brock)
Mar 27	Y Water and wastewater treatment	Bitton, Ch. 7-13; Ch. 28 (Brock)
Apr 1	Y Pathogens	Bitton, Ch. 4-6
Apr 3	Y Waterborne diseases	Bitton, Ch. 4-6;
Apr 8	Y Bioaerosols	pp. 831-846 (Brock 1) pp. 947-963 (Brock 2) Bitton, pp. 309-315
Apr 10	EXAM 3	
Apr 15	Y Monitoring, detection, metals	Ch. 18, 19 (Brock 1) Ch. 22, 24 (Brock 2)
Apr 17	Y Selective enrichments and biotic and abiotic factors	Ch. 17, 18, 19 (Brock 1) Ch. 20, 22, 23 (Brock 2)
Apr 22	POSTER SESSION 1	
Apr 24	POSTER SESSION 2	
Apr 29	Y Remediation, field applications	Ch 19 (Brock 1) Ch. 24 (Brock 2)
May 1	P Remediation	TBA
May 6	P Remediation, emerging technologies	TBA
May 10	EXAM 4	

Resources:

1. Brock, Biology of Microorganisms, Madigan, Martinko, Parker 11th ed. (2006) (on reserve and available for purchase at the Cook/Douglass Bookstore)
2. Brock, Biology of Microorganisms, Madigan, Martinko, Dunlap, Clark 12th ed. (2009) (on reserve and available for purchase)
3. Wastewater Microbiology, Bitton (on reserve)

Requirements:

1. Four exams: Feb 13, Mar 4 (40 min, 60+60 pts), April 10 (80 pts), May 10 (80 pts)
(280 points in total)
2. Problem sets (4) (60)
3. Poster session (100)
4. Graduate students: 2 short papers, 5-8 pages each (100)
Topics to be determined
Due: Mar 25, May 6
Option of not taking April 10 or May 10 exam
(please notify us in writing)

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 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:

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