

CEE 598

“BIOTRANSFORMATIONS”

Instructor:

Rosa Krajmalnik-Brown Ph.D.
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Classroom: ECG G317 (Tempe)

Schedule: Tu Th 3:00 PM - 4:15PM

Office hours: Tuesday from 2:00-2:45 PM, by appointment. Please contact Dr. Krajmalnik-Brown by email to arrange an appointment.

Course description

Goals:

To understand the principles, potential and limitations of microbial biotransformation processes.

Suggested Textbooks:

Brock Biology of Microorganisms. Michael T. Madigan and John M. Martinko. **12th edition.**

Other:

Biocatalysis and Biodegradation. Lawrence P. Wackett & C. Douglas Hershberger

Supplemental reading material will be distributed during the semester.

Course Requirements and Grading:

1. Examinations. One 1-hour midterm examination will be given during the semester. A final comprehensive exam will be given at the end of the course. Makeup exams will not be given except in cases of extreme hardship. Students who miss exams or deadlines without the instructor's prior consent will be given a grade of zero for the missed exam or deliverable.

2. Class Participation. Class participation and active discussion during class time is very important. Students are expected to attend each class, to prepare for each class by reading the material assigned for each topic prior to class, to actively participate in discussions, and to ask and answer questions regarding the material being covered. **I enjoy learning from my students.**

3. Term Paper

Teams of 2 students will collect information on a particular pollutant (or class of pollutants), and will write a critical review of biodegradation of that pollutant.

Additionally each team will give a 15 minute presentation about their pollutant and proposal.

More details regarding this assignment will be handed to the class sometime before the midterm exam.

I do not tolerate plagiarism during this course. Please visit www.Plagiarism.org to make sure you understand what plagiarism is.

Helpful resources:

Biocatalysis/Biodegradation Database <http://umbbd.msi.umn.edu/>

Toxfacts <http://www.atsdr.cdc.gov/toxfaqs/index.asp>

Grading policy

Grades will be calculated as follows

-Midterm exam	20%
-Term paper	15%
-Presentation	15%
-Class participation	15%
- Homework	10%
-Final Exam	25%

There is a blackboard site for the course, I do not post notes before the class. Notes will be distributed in class or available after the lecture.

I will invite special speakers to give lectures; the order of the topics in this syllabus might be shifted slightly to accommodate guest speakers. I will also make you aware of seminars which complement the course.

Important dates

Last day of classes: May 1st

Midterm: February 27

Spring brake: **March 11 and March 13, 2014**

Term Papers due: April 10

Presentations: April 17-29th

Final exam May 1st or

“Biotransformations”

Introduction

Brief introduction to applied microbiology

The impact of microorganisms on human activities

Microbial degradation of pollutants under different redox conditions

Microbial groups relevant to biotransformations

- Carbon cycle
- Acetogens and methanogens
- Photosynthesis
- Nitrogen cycle
- Microorganism and N
- Iron cycle
- Microorganisms and Fe
- Sulfur cycle
- Microorganisms and S
- Microbial Interactions

- Growth-linked degradation vis cometabolism
- Electron accepting Processes and Bioremediation
- Enzymes involved in biotransformations

Microbial Degradation of pollutants

- Monoaromatic compounds:
 - Benzene, toluene, phenol
 - Nitroaromatic compounds
- PAHs
- Aliphatic compounds
 - Alkanes and Alkenes
- Halogenated compounds
 - Chlorinated benzenes, phenols, benzoates
 - PCBs
 - Chlorinated aliphatic compounds (chlorinated solvents)
- Inorganic compounds
 - Perchlorate
 - Microbial transformation of metals and radio nucleotides

Emerging contaminants:

Plastics and their byproducts

In situ bioremediation of contaminated aquifers: case studies.

Presentations