

ENVIRONMENTAL ENGINEERING 541
Microbial Processes in Environmental Engineering Systems
Winter 2018
Class web page: Canvas

Class Times: TR 10:00 - 11:50 Gleeson 100

Instructor: Dr. Tyler Radniecki e-mail: tyler.radniecki@oregonstate.edu

Office Hours: M 11 am – 12 pm & W 3 – 4:00 pm office: Johnson 316J
Or by e-mail appointment

Email: Every student must have an ONID account. Read email daily. Note: a class email distribution list will be generated from ONID accounts.

Course Description

Energetics, kinetics and stoichiometry of microbial transformations of organic and inorganic compounds. Mathematical models of biodegradation.

Course Learning Objectives:

By the end of the course, you will be able to:

1. Address a current microbial environmental problem/issue/process by formulating a problem description, conducting research and providing written and oral reports of their findings.
2. Describe in their own words basic microbial concepts, such as cell structure and function, microbial growth requirements, and classification based on metabolic niches.
3. Describe the processes by which microorganisms harvest and capture energy when mediating chemical reactions.
4. Couple, balance and calculate free energy values for microbial mediated redox reactions.
5. Apply Monod kinetics to batch and chemostat systems to mathematically describe microbial growth and substrate utilization.
6. Describe in their own words the basic tools used in microbiology and molecular biology including techniques in microscopy, selective media, functional genomics and genome mining.

Required Textbook:

Brock Biology of Microorganisms, 14th Edition

Madigan, Martinko, Bender, Buckley, Stahl and Brock
Benjamin Cummings, 2014 (ISBN 978-0-32-189739-8)

Lecture Schedule (subject to change, as needed)

Dates	Topics	Reading Assignments
Week 1: 1/08 – 1/12	Introduction; Bacterial Structure & Function	Ch 1, Ch 2, Ch 21
Week 2: 1/15 – 1/19	Molecular Biology; Methods in Microbial Ecology & Functional Genomics	Ch 4, Ch 6, Ch 11, Ch 18
Week 3: 1/22 – 1/26	Methods in Microbial Ecology & Functional Genomics; Microbial Metabolism	Ch 3, Ch 6, Ch 11, Ch 18
Week 4: 1/29 – 2/02	Microbial Metabolism; Metabolic Diversity	Ch 3, Ch 13
Week 5: 2/05 – 2/09	Mid-term #1	
Week 6: 2/12 – 2/16	Metabolic Diversity	Ch 13
Week 7: 2/19 – 2/23	Growth and Control	Ch 5, Ch 21
Week 8: 2/26 – 3/02	Growth and Control	Ch 5, Ch 21
Week 9: 3/05 - 3/09	Mid-term #2	
Week 10: 3/12 – 3/16	Final Presentations	
Final Exam: M 3/19 9:30	Final Presentations	

Course Grades:

Grades will be based upon scores received on homework assignments, quizzes, examinations and final presentations. Generally, the class is graded on a curve based on the final accumulated score for the course; however, scores of 90-100% are guaranteed a grade of “A/-”, 80 – 90% a “B+/-”, and 70-80% a “C+/-”. The weighting of activities will be as follows:

<u>Category</u>	<u>Percentage</u>
Homework and in-class assignments/quizzes -	20%
Mid-term #1 -	30%
Mid-term #2 -	30%
Final Presentation Executive Summary -	5%
Final Presentation -	15%

Class Attendance:

Attendance is important. You are expected to attend every class and participate in discussions. If you are not able to make class, please notify the instructor when possible. If you do miss class, it is your responsibility to find out what was covered and to obtain any administrative information that was presented.

Religious Holiday Statement

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Student Conduct Code

Choosing to join the Oregon State University community obligates each member to a code of responsible behavior which is outlined in the [Student Conduct Code](http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/student_conduct_code_1.pdf). The assumption upon which this Code is based is that all persons must treat one another with dignity and respect in order for scholarship to thrive. For a copy of the Student Conduct Code, see: http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/student_conduct_code_1.pdf.

Diversity Statement

Oregon State University strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.

Disruptive Behavior

While the University is a place where the free exchange of ideas and concepts allows for debate and disagreement, all classroom behavior and discourse should reflect the values of respect and civility. Behaviors which are disruptive to the learning environment will not be tolerated. As your instructors, we are dedicated to establishing a learning environment that promotes diversity of race, culture, gender, sexual orientation, and physical disability. Anyone noticing discriminatory behavior in this class, or feeling discriminated against should bring it to the attention of the instructors or other University personnel as appropriate.

Cheating and Student Conduct:

The instructor of this class take the issue of academic honesty very seriously. Any instance in which a student is caught cheating will be handled in strict accordance with the policies outlined at <http://www.orst.edu/admin/stucon/achon.htm>. In order to provide students with a positive learning environment, OSU has adopted a pledge of civility, which can be found at

<http://osu.orst.edu/admin/stucon/index.htm>. If evidence of academic dishonesty comes to the instructor's attention, the instructor will document the incident, permit the accused student to provide an explanation, advise the student of possible penalties, and take action. The instructor may impose any academic penalty up to and including an "F" grade in the course after consulting with school head and informing the student of the action taken.

Disability:

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Veterans

Veterans and active duty military personnel with special circumstances are welcome and encouraged to communicate these, in advance if possible, to the Instructor.