BI 330 Microbiology, Spring 2016
Wednesdays and Fridays, 8:30-9:50
Pacific 123

Course Syllabus

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Course description

This course in Microbiology introduces students to the cell biology, physiology, evolution and ecology of microorganisms. Students will gain an appreciation for the diversity and elegance of microbial life strategies, the role of microorganisms in global processes, and microbial interactions with macroorganisms. Student will learn how the scientific process is applied in microbiology and become familiar with modern experimental methods for studying microorganisms in the laboratory and in their natural habitats. The course is organized into four units.

Unit 1: Microbial Cell biology

In the first portion of the course, we will study the structure and function of microbial cells, including the cell wall, the cell membrane, and the genetic material. Then we will consider how microbial populations grow, experimental approaches for measuring this growth, and practical approaches for inhibiting microbial growth. We will also discuss the biology and importance of non-bacterial microorganisms including microbial eukaryotes and viruses.

Unit 2: Microbial Evolution and Genetics

Next will we explore how genetic information is exchanged between microbial cells, how genes are made into proteins, and how this process is regulated. We will then take a more in-depth look at the genetic approaches which have been used to study cellular behaviors of microbial species, specifically including their ability to communicate, move, and sense chemical gradients. We will consider the origins of life on earth and how microbial physiologies have diversified and changed our planet. Finally, we will discuss examples of how microbial genes and physiologies have been harnessed for human benefit.

Unit 3: Physiology and diversity

The third unit of the class explores the metabolic diversity of microorganisms. We will study the metabolic strategies used by different classes of microorganisms that make their livings in remarkable ways from limited resources, for example, generating energy from sunlight and inorganic compounds. The focus of this unit is on the metabolic strategies and energetics of different physiologies, rather than on the details of the chemistry or enzymology.

Unit 4: Interactions and impacts of microorganisms

The final portion of the class focuses on the ecology of microbes and considers how microbial metabolisms function in concert in different environments. We will familiarize ourselves with modern experimental approaches to studying microbial communities in nature and will survey the types of microbial communities that inhabit our planet. Then we will focus our attention on the microbial communities that live in association with plants and animals. We will investigate the mechanisms by which microbes and their hosts orchestrate their co-existence, ranging from pathogenic to mutualistic relationships.

Learning objectives
This course is designed provide you with information and skills necessary to develop a sound understanding of the scope of the microbial world, how it is studied, and its role in shaping this planet and all it's inhabitants. You will become knowledgeable about the basic features of microbial cells, their lifestyles and metabolisms, and how they exist in their natural habitats. You will gain an understanding of the logic of seminal scientific experiments in the history of microbiology and scientific strategies used by microbiologists to study microorganisms. This training will allow you to apply the process of science to think critically about important issues in microbiology in order to able to form educated opinions about microbes in your daily life, including issues of food safety, public health, and climate change.

Prerequisites
The prerequisites for this course are BI214 or BI252. The course assumes knowledge of biologically important macromolecules and familiarity with basic cellular processes such as DNA replication, transcription, translation, and regulation of gene expression. Much of this material is covered in Chapter 6 of the course textbook. Students should review these pages to make sure they are comfortable with this background material.

Course materials
Textbook. *Brock Biology of Microorganisms, 13th ed.* (Prentice Hall). Available at the UO Bookstore and will be on 2-hour reserve in the Science Library. Additional readings will be available on Canvas.

Website. The course website can be accessed through Canvas (canvas.uoregon.edu). Canvas will be used to post all course materials, announcements, and reading quizzes. Some problem sets will also be hosted through Canvas.

Lecture notes. Lecture notes will be posted on Canvas (under "Course Documents") the evening before class. These notes are merely an outline of what is to be discussed in class to aid in note taking; they are not a substitute for coming to class and will not completely cover all material to be discussed in class. If you miss class, it is your responsibility to obtain detailed notes from a classmate, as the instructors will not provide them.

iClickers. This course will not use iClickers this quarter.

Acceptable technology use in the classroom

If you choose to use a laptop or tablet computer for note taking, please sit toward the back of the classroom so that your screen content does not become a distraction to others. If we notice you are using an electronic device for non-class related activities, you will be asked to refrain from bringing it to further lectures. Cell phone use is prohibited during lectures. All electronics (e.g. cell phones, music players, laptops, tablets) must be out of reach during all quizzes and exams. Instructor permission is required for recording lectures.

Students with disabilities
The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center (formerly Disability Services) in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Academic integrity
All students will be expected to adhere to the University's guidelines on academic integrity as outlined in the Student Conduct Code (http://conduct.uoregon.edu). Students are encouraged to discuss class material with one another, including the reading and homework questions. However, all submitted written work, including answers to homework questions, must be the original work of each student.

Office hours
Instructor: Mondays, 1:00-3:00pm Klamath 73
If you are not available at those times, you may schedule an appointment with me between 10am and 4pm, Tuesdays or Fridays. I will be available to answer brief questions via email (asaunder@uoregon.edu) in the evenings. Your email correspondences are an extension of your class participation, so please maintain a professional tone.

GTF Office hours:
Emily Sutton: Wednesday 10:00-11:00 Onyx 360
Austin Harvey: TBD Onyx 360
Michelle Sconce: TBD Onyx 360
Note: Students are not permitted to visit Instructor or GTFs in their lab or research spaces outside of office hours or scheduled appointments. Dropping in on Instructors or GTFs will result in a mandatory deduction from class participation grade.

Student evaluation
There will be five components taken together to assess student learning throughout the course: Midterm exams, Problem Sets, Reading Quizzes, Participation, and a Final Exam.

Exams (2 * 15%) = 30%
Final Exam = 25%
Problem Sets (best 3/4) = 30%
Reading Quizzes (best 10/11) = 10%

Participation = 5%

If a student misses an exam for any reason, valid or not, the remaining exam and final will be weighted an additional 5% and 10%, respectively. Given the flexibility in grading, there will be no other opportunities for late submission or make-ups for unit exams, problem sets, or reading quizzes. Please do not ask for exceptions. For students who need accommodations due to absences for documented medical or family emergency leave, or university sanctioned travel (club/ASUO sports and activities do not qualify), notify the instructor in a timely manner.

Exams. Exams will cover material up through the lecture one week before the exam. Each exam consists of a variety of short answer and longer, multi-section questions. You will be provided with example questions and study guides before the exams. Each unit exam is worth 15% of your final grade. For each grading method, your unit exam scores will be worth a total of 30% of your final grade. Unit exams will be given during the lecture time in class (see schedule). Early or make-up exams will not be offered.

Final Exam. The final exam is designed to cover material from Unit 4, and will also be comprehensive on material covered in all the units. The comprehensive questions will be designed to assess your ability to synthesize concepts covered in all units. The final is scheduled during finals week at 10:15 am, Thursday June 9. There will be no opportunity to take the final exam at a different time, so accommodate travel plans accordingly.

Problem sets. There will be four problem sets that will consist of questions designed to help solidify material covered in the lectures and reading. Most questions will be formatted similar to exam questions to assist with preparation and others will involve practical online activities. Problem sets are due by at the beginning of lecture on the day indicated in the schedule. They will be available one week before they are due. Questions will be located in the "Assignments" folder on Canvas. You will be able to view your answers and the correct answers through the grade book on Canvas after the due date has passed. Each problem set will be worth 10% of your final grade and the lowest score will not be counted. Late problem sets will not be accepted.

Reading quizzes. Reading quizzes will be located in Canvas and due before lecture on the day indicated. If you do the reading, answering these questions will be straightforward. The total of your top 10 out of 11 quiz scores will make up 15% of your final grade. There are no make-ups for reading quizzes.

In-class participation. During the first week of lectures, you will be randomly assigned the name of an important microbe to be your microbial identity for the class. This is designed to be a fun and irreverent way to get acquainted with microbial species on a more personal level. You will be responsible for reading about this microbe and being the ambassador/resident expert for this organism. During class you might be called upon to answer questions relating to your microbe or respective taxonomic group. Quizzes, problem sets, and exams will have questions relating to your microbe. Your participation grade will be based on your contributions when your microbe is being discussed.