

SUMMER STRETCH 2019
INTRODUCTION TO MICROBIOLOGY

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Architecture Hall G070 (Weeks 1-3)
Smith Hall 205 (Week 4)
Hitchcock Hall 344 (Lab)

Course Description

Microbiology is everywhere! In this course we will explore the microscopic world around us through laboratory experiments and discussion-based learning. Beyond the fundamentals, students will learn how to interpret the microbiology we encounter every day – news headlines about food poisoning and the flu, the science behind the vaccines we get, and even the microbes that make cheese and yogurt so delicious. We will investigate environmental and pathogenic microbes, the human microbiome, viruses, and more. This course is intended to be fast-paced and challenging, but no prior microbiology experience is required.

Essential Questions

- How are bacteria, archaea, eukaryotes, and viruses different from one another?
- How do different microbes make a living?
- How do microbes interact with each other, with humans, and with the environment?
- How do you design an experiment based on a hypothesis?
- How is science, and microbiology in particular, reported in the news, and how can we interpret that information responsibly?

Learning Outcomes

Students will expand their understanding of:

- Classic microbiology: the past, present, and future of an exciting field!
- The interactions between microbes and the environment, other microbes, and humans.
- The diversity of life in the microbial world.

Students will develop and strengthen skills for:

- Basic microbiology lab techniques
- Interpreting science in our lives
- Scientific reasoning
- Public speaking
- Communication and collaboration

Instructional Strategies

Classes will center on interactive lectures, student-led discussions, in-class activities, and student presentations. Labs will be hands-on experiments based on hypotheses.

Student Assessment

Grades will be determined based on weekly quizzes, written lab reports and thought experiments, participation in discussions, and several class presentations. Detailed assessment rubrics will be distributed on the first day of class.

Resources and Materials

Please bring the following each day: course pack, notebook (both to be distributed the first day), and writing utensils. Outside of class, you will need to have access to a computer with Internet access for completing homework and preparing for presentations.

SAFETY FIRST! As this course contains a laboratory component, it is also required that on lab days (specified in the course schedule below), students wear close-toed shoes, wear long pants to cover their legs, do not have bare legs, and keep long hair tied back. Labs will all be Biosafety Level 1 (BSL1, lowest risk), but students are nonetheless expected to handle all materials and organisms with care and caution. BSL1 organisms are safe and do not cause disease in healthy humans. So that we can ensure the safest environment possible for everyone, please advise us if a student is immunocompromised so that extra precautions can be taken.

We may plan brief out-of-classroom trips around the UW campus. The instructors will inform students of any planned out-of-classroom activity at least a day in advance.

Tentative Course Schedule

Date	Topic(s)	In-class Activities	Labs
Day 1 Mon 7/1/19	- Introduction - Prokaryotes vs. eukaryotes - Chemistry background	- Microbiology in the news - Icebreakers and introductory activities	- Introductory Lab 1 - How Food Spoils 1
Day 2 Tues 7/2/19	- Central dogma (DNA --> RNA --> Proteins) - Common lab techniques	- Microbiology in the news - Cool Microbes - Getting Creative with Transcription & Translation	
Day 3 Wed 7/3/19	- Prokaryotes: cellular structure & function - Bacterial metabolism and growth	- Microbiology in the news - Cool Microbes - Soil sample collection	- Introductory Lab 2 - Food Microbiology 1 - Soil Microbiology 1

Day 4 Mon 7/8/19	- Food microbiology - Taxonomy and phylogeny	- Microbiology in the news - Cool Microbes - How to read a scientific article - Taxonomy activity - Quiz 1	- Microbial Diversity 1 - Soil Microbiology 2 - How Food Spoils 2
Day 5 Tues 7/9/19	- Bacterial genetics - Introduction to viruses	- Microbiology in the news - Cool Microbes - Conjugation activity	
Day 6 Wed 7/10/19	- Microbial diversity & ecology - The scientific process	- Microbiology in the news - Cool Microbes - "Bacteria Quest!" Video Game - Practice creating hypotheses	- Microbial Diversity 2 - Food Microscopy
Day 7 Thurs 7/11/19	- Immunology - Vaccines: past & present - Introduction to pathogens	- Microbiology in the news - Cool Microbes - Health data activity - Quiz 2	- Food Microbiology 2 - Microbiology Art Contest - How Food Spoils 3
Day 8 Mon 7/15/19	- Pathogens - Epidemiology: past & present	- Microbiology in the news - Cool Microbes - Pathogens and defenses card game - Panel discussion	
Day 9 Tues 7/16/19	- Human microbiome - Parasitic & symbiotic relationships	- Microbiology in the news - Cool Microbes - How to read a scientific article - Movie Review	- Soil Microbiology 3 - Microbial Diversity 3 - Antibiotic Resistance 1
Day 10 Wed 7/17/19	- Controlling microbial growth - Antibiotic use & resistance	- Microbiology in the news - Cool Microbes - Public health past and present - Quiz 3	- Biotechnology 1 - How Food Spoils 4

Day 11 Thurs 7/18/19	- Soil microbiology - Introduction to yeasts & fungi	- Microbiology in the news - Cool Microbes - Book excerpt review	
Day 12 Mon 7/22/19	- Marine microbiology - Bioluminescence - Quorum sensing	- Microbiology in the news - Cool Microbes - Quorum sensing activity	- Biotechnology 2 - Antibiotic Resistance 2
Day 13 Tues 7/23/19	- Strange bugs and what they do	- Microbiology in the news - Cool Microbes - Movie review - Quiz 4	- Food Microbiology 3 - Antibiotic Resistance 3
Day 14 Wed 7/24/19	- Solving today's microbiological questions and problems	- Microbiology in the news - Cool Microbes - Invited Speaker (UW Microbiologist) - Discussion of current issues	- Food Microbiology 4 - How Food Spoils 5 - Lab Wrap-up
Day 15 Thurs 7/25/19	- The future of microbiology - Course wrap-up	- Microbiology in the news - Cool Microbes - Final poster presentations	

Note: we want to this course to be an interactive experience for the student. To this end, we may change the proposed schedule to better suit the interest expressed by students in class. Any change will be communicated in advance and an updated schedule may be provided.