

BI 410/510: Microbial Metabolism and Human Health

Spring 2023

Time and Location: MW 2:00 – 3:20PM, Lawrence 230

Professor: Dr. Melanie Spero (she/her)
mspero@uoregon.edu

Office hours: Thursday 3:30-4:40pm, 291 Onyx Bridge
(or email me to set up an appointment)

Prerequisites: BI 214

Course Description:

In this course we will explore the metabolic diversity of microorganisms, focusing on how the varied lifestyles of bacteria contribute to human health and disease. We will examine the ways that bacterial energetics and metabolism enable pathogenesis, contribute to disease, support human health, and help bacteria circumvent antibiotic treatment. Course content will be delivered as lectures and by reading and discussing primary research articles. Students will practice oral and written communication skills by developing and presenting a hypothesis-driven research proposal on a related topic of their choice. Prereq: BI 214

Expected Learning Outcomes. Upon completing this course, students will be able to:

1. Describe diverse modes of bacterial energy conservation and metabolism.
2. Predict how diverse lifestyles benefit bacteria in different environmental contexts.
3. Describe examples of how bacterial metabolism influences human health both positively and negatively.
4. Discuss and evaluate primary research articles in the field of microbiology.
5. Develop and communicate (written, oral) a scientific question, hypothesis, and related approaches in the field of microbial metabolism.

Website: The syllabus, course materials, assignments, and grades will be posted to the course Canvas site.

Course Materials: No textbook is required for this course. Assigned readings (primary research articles) will be posted to the course Canvas website. Students will require computer and internet access.

Communication/Emailing: The best way to contact the instructor is by email. Please include "BI 410" in the subject line. I will do my best to respond in a timely manner, but I may not check emails on evenings and weekends. If your question requires a lengthy discussion, please attend office hours or request a time to meet.

Evaluation:

20% Exam I

20% Exam II

5% First draft of final project (written assignment)

15% Final project (written assignment)

15% Final project (oral presentation)

- Students will pose a scientific question related to the field of microbial metabolism and human health and develop a testable hypothesis and appropriate methods towards answering their question. Students will present their ideas as a written specific aims page and as an oral presentation to the class.

10% Pre-class assignments (curiosity questions)

- Students will submit pre-class assignments to Canvas (10 total). Pre-class assignments include submitting questions related to primary research articles that students read in preparation for class. Students are permitted to miss one pre-class assignment without deduction from their grade.

5% Participation

- This course is largely discussion-based. Students should come to class prepared, having completed the assigned reading and ready to discuss their understanding of the reading.

10% Peer review

- Students will work in groups throughout the term. Group members will provide peer evaluations regarding the student's contribution to group discussions.

Grade	%
A+	97-100
A	93-96.9
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9
D+	67-69.9
D	60-69.9
F	0-59.9

Attendance: Because this is a discussion-based class, participation account for part of your final grade. Please email the instructor before class (or shortly thereafter) to let me know if you are unable to attend class. Please contact the instructor if you anticipate extended absences.

Policy on missed assignments and extra credit: Assignments must be turned in on time. The grading system is designed to allow for some flexibility if you miss a class or pre-class assignment. Extra credit assignments are not offered in this course. Please do not ask for exceptions.

Academic Integrity: Academic misconduct, including cheating and plagiarism, will not be tolerated. Students are encouraged to discuss ideas and study together, but do not copy someone else's work or allow anyone to copy yours. Students are expected to conform to the [Student Conduct Code](#). Please note that instructors are required to report incidents of academic misconduct. If a student is uncertain as to whether an act constitutes academic misconduct, it is the student's responsibility to clarify this point with the instructor.

Schedule:

Note: "CQs" is short for Curiosity Questions, which are submitted to Canvas prior to the start of class.

Week	Date	Subject	Due today
1	3-Apr	Course overview, Types of energy	
1	5-Apr	Redox reactions, Electron carriers	
2	10-Apr	Aerobic respiration	
2	12-Apr	Anaerobic respiration	Read paper 2B, CQs
3	17-Apr	Fermentation	Read paper 3A, CQs
3	19-Apr	ATP synthase/ATPase	Read paper 3B, CQs
4	24-Apr	Essential nutrients and precursors	Read paper 4A, CQs
4	26-Apr	Exam 1	Peer evaluation 1
5	1-May	Variations on metabolism	Read paper 5A, CQs
5	3-May	Microbial food web, cross-feeding	Read paper 5B, CQs
6	8-May	Microbial metabolism and the host 1	Read paper 6A, CQs
6	10-May	Microbial metabolism and the host 2	Read paper 6B, CQs
7	15-May	The gut-brain axis	Read paper 7A, CQs
7	17-May	Intro to specific aims page	Read paper 7B, CQs
8	22-May	Exam 2	Peer evaluation 2
8	24-May	Hypothesis development	Read specific aims pages
9	29-May	HOLIDAY - NO CLASS	
9	31-May	Peer-review specific aims project	Specific Aims first draft
10	5-Jun	Specific aims oral presentations	Oral presentations
10	7-Jun	Specific aims oral presentations	
11	13-Jun	Written specific aims page due	Specific Aims final draft

Classroom Behavior: Students are expected to arrive to class on time.

In this class we aim to build an inclusive learning environment. We recognize that our community members represent a variety of backgrounds and perspectives. In order to build a learning environment that respects diversity, we agree to the following:

- Be open to other viewpoints
- Honor the uniqueness of our classmates
- Appreciate the opportunity to learn from one another
- Value each other's opinions and communicate in a respectful manner
- Keep confidential the discussions that students share of a personal (or professional) nature.

Class rosters are provided to the instructor with the students' legal names. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the quarter (or before) so that we may address you properly.

Accessible Education: Please contact the instructor if there are aspects of instruction or course design that result in disability-related barriers to your participation and learning. You are encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu. The AEC offers a wide range of support services including note-taking, testing services, sign language interpretation and adaptive technology.

Accommodations for Religious Observances: The University of Oregon respects the right of all students to observe their religious holidays, and will make reasonable accommodations, upon request, for these observances. If you need to be absent from a class period this term because of a religious obligation or observance, please fill out the [Student Religious Accommodation Request fillable PDF form](#) and send it to me within the first weeks of the course so we can make arrangements in advance.

Discrimination and Harassment: Students who have experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at safe.uoregon.edu. To get help by phone, students may also call either the non-confidential Title IX Coordinator/OICRC at 541-346-3123 or the Dean of Students Office 24-hour hotline at 541-346-SAFE [7244].

Students experiencing all forms of prohibited discrimination or harassment may find information and resources at investigations.uoregon.edu or contact the non-confidential Title IX Coordinator/OICRC at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. Specific details about confidentiality of information and reporting obligations of employees can be found at investigations.uoregon.edu/employee-responsibilities.

I am an Assisting Employee under the University's Prohibited Discrimination and Retaliation Policy. As an Assisting Employee, I will direct students who disclose prohibited discrimination and harassment, including sexual harassment or violence, to

resources that can help and will only report the information shared to the university administration if the student requests that the information be reported (unless someone is in imminent risk of serious harm or a minor).

I am a mandatory reporter of child abuse. Please find more information at [Mandatory Reporting of Child Abuse and Neglect](#).

Academic Disruption Due to Campus Emergency or Inclement Weather: In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email and on Canvas. If we are unable to meet face-to-face, students should immediately log onto Canvas to access announcements and/or alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas. In the event that the instructor of this course has to quarantine, the course may be taught online during that time.

It is generally expected that class will meet unless the University is officially closed for inclement weather. If it becomes necessary to cancel class while the University remains open, this will be announced on Canvas and by email. Updates on inclement weather and closure are also communicated as described on the [Inclement Weather](#) webpage.