

Microbiology 312: Bacterial Physiology and Metabolism

Spring 2017

Instructor: Dr. Ryan Mueller (ryan.mueller@oregonstate.edu)

Lecture Hours & Location: Mon, Wed, Fri 08:00-08:50; Furman 102

Office Hours & Location: Wed 15:00-17:00, or by arrangement; 448 Nash Hall

Required Text: Microbiology, Prescott's, 10th Edition (2017) J. Willey, L. Sherwood, C. Woolverton. McGraw-Hill, New York City, NY.

Other Text (purchase not required): The Physiology and Biochemistry of Prokaryotes, 4th Edition (2012) D. White, J. Drummond, C. Fuqua. Oxford University Press, NY, NY.

Reading Assignments: All reading assignments from other texts and journal articles will be available on Canvas. The reading assignments reference the background materials that will be summarized and discussed in class. Exam questions may come from these sources in addition to the primary, required text and lecture material.

Course Policies: Read the assigned materials. Pay attention during lectures. Ask questions of me and your peers frequently. Come to office hours as needed. Although these statements are written in the imperative, they are merely suggestions. Ultimately, you will get out of this course what you put in.

Exams: Students are scored on five non-comprehensive exams. There are no make-ups for missed exams. If a student misses an exam, that student must take a comprehensive exam, which will be given during finals week alongside the last standard, non-comprehensive exam. If a student misses more than one exam, that student must complete a term paper on a topic of my choosing in addition to taking the comprehensive final. The comprehensive exam is optional for those who took the other four exams and want to attempt to improve their final score. For these students, the comprehensive final exam score will be substituted for the lowest score from a previous exam, even if the final exam score is lower than any of the others. The format of the exams will be multiple choice. Each exam will be worth a total of 20 points. Extra credit questions will be given on exams, and be worth up to five additional points.

Total exam points (5 exams; not including extra credit): 100 points

Participation Assignments: There are two types of participation assignments that will periodically be graded throughout the term. The first will involve the electronic submission of questions related to the material covered in previous lectures. Each student will have the option of writing and submitting up to two multiple choice questions and one open-ended discussion question on Canvas prior to review sessions. Multiple choice questions may be chosen as the basis for extra credit questions on future tests. Open-ended

questions will serve as the basis of discussion during review sessions. For each question submitted students will receive one point for a total of three points. For grading consideration and to allow for time to review submissions, they must be uploaded to Canvas by 5PM the day prior to class review sessions, without exception. Submission is optional.

The second participation assignment will be brief written summaries of research articles relevant to the topics covered in class. Students will be graded on a three point scale (0-2 points): Well-written summaries will score highest (2 points), completed assignments will be given at least one point, and incomplete assignments will not receive any points. For grading consideration, article summaries must be submitted to Canvas before class on the date shown on the syllabus, without exception. Exam questions may come from these assigned research articles whether they were covered in class or not. Submission is optional.

Total multiple choice question points (5 total assignments; 2 points each): 10 points

Total discussion question points (5 total assignments; 1 point each): 5 points

Total research article summary points (5 total assignments; 2 points each): 10 points

Group Assignments: Time during review sessions will also be set aside for in-class group assignments. Students will work in groups of up to four in order to collectively answer several short-answer questions related to an assigned topic or exercise. Five in-class group assignments will be given throughout the term. Each assignment will be worth 25 points.

Total group assignment points (5 total assignments; 25 points each): 125 points

Total points available (not including extra credit exam questions): 250 points

Grading: A standard grading scale will apply.

A = > 93 %

A- = > 90 – 93 %

B+ = > 87 – 90 %

B = > 83 – 87 %

B- = > 80 – 83 %

C+ = > 77 – 80 %

C = > 73 – 77 %

C- = > 70 – 73 %

D+ = > 67 – 70 %

D = > 63 – 67 %

D- = ≥ 60 – 63 %

F = < 60 %

Learner Outcomes:

- Understand the basic facts, principles, theories related to bacterial physiology and metabolism.
- Understand key events in the development of this field, and recognize that it is an evolving body of knowledge that must be constantly questioned and challenged.
- Acquire, retain, and communicate, both orally and in writing, vocabulary and complex conceptual ideas related to bacterial physiology and metabolism.
- Demonstrate in writing an understanding of concepts presented in class and in primary literature.
- Use knowledge acquired from assigned reading and lectures to solve problems presented on exams and in-class exercises.

Class Schedule:

Class	Day	Week	Activity	Topic
1	M	1	Lecture	Course Introduction & Microbial Cell Review
2	W	1	Lecture	Technology/Methods to Study Microbes – Part 1
3	F	1	Lecture	Technology/Methods to Study Microbes – Part 2
4	M	2	Lecture	Cell Walls and Membranes
5	W	2	Lecture	Chemotaxis and Motility
6	F	2	Review/Assign.	Group Assignment; Question Submission; Article Summary
7	M	3	Exam	Exam #1 (Class 1-6)
8	W	3	Lecture	Environmental Sensing
9	F	3	Lecture	Microbial Behavior
10	M	4	Lecture	Solute Transport
11	W	4	Lecture	Stress Response
12	F	4	Review/Assign.	Group Assignment; Question Submission; Article Summary
13	M	5	Exam	Exam #2 (Class 8-12)
14	W	5	Lecture	Protein Translocation
15	F	5	Lecture	Protein Secretion
16	M	6	Lecture	Bacterial Metabolism - Overview
17	W	6	Lecture	Regulation of Bacterial Metabolism
18	F	6	Review/Assign.	Group Assignment; Question Submission; Article Summary
19	M	7	Exam	Exam #3 (Class 14-18)
20	W	7	Lecture	Fermentation
21	F	7	Lecture	Central Carbon Metabolism
22	M	8	Lecture	Anabolism
23	W	8	Lecture	Anaplerosis
24	F	8	Review/Assign.	Group Assignment; Question Submission; Article Summary
25	M	9	Holiday	N/A
26	W	9	Exam	Exam #4 (Class 20-24)
27	F	9	Lecture	Bacterial Cell Cycle & Cell Division
28	M	10	Lecture	TBD
29	W	10	Lecture	TBD
30	F	10	Lecture	Synthetic Microbiology; Article Summary
TBD	-	-	Review	Review session to be scheduled
31	Su	11	Assign.	Group Assignment; Question Submission
32	T	11	Exam	Exam #5 (Class 27-30) and Comprehensive Final Exam*

* The comprehensive exam is required for those who missed one of the previous exams, and optional for those who want to substitute the comprehensive exam score for their lowest score of the previous non-comprehensive exams.

University and Departmental Policies: Students with documented disabilities who may need accommodations, who have any emergency medical information the instructor should know, or who need special arrangements in the event of evacuation, should make an appointment with the instructor as early as possible, no later than the first week of the term. In order to arrange alternative testing, the student should make the request at least one week in advance of the test. Students seeking accommodations should be registered with the Office of Services for Students with Disabilities.

The Department of Microbiology follows the university rules on civility and honesty. These can be found at:

<http://oregonstate.edu/instruct/cssa556/CIVHON556.htm>

Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- cheating- use or attempted use of unauthorized materials, information or study aids
- fabrication- falsification or invention of any information
- assisting- helping another commit an act of academic dishonesty
- tampering- altering or interfering with evaluation instruments and documents
- plagiarism- representing the words or ideas of another person as one's own

Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action. The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.