

**MOLB/MICR 2021**  
**GENERAL MICROBIOLOGY**  
**Course Syllabus: Spring Semester 2015**

**Course Description**

Microbiology is the study of life forms and agents that are too small to be seen with the unaided eye. These tiny microorganisms are ubiquitous and while some are disease-causing pathogens, most are nonpathogenic and are, in fact, absolutely essential to all life. Without these organisms we would not have many of our favorite foods and beverages, key elements would not be recycled for human and plant use, and all life on planet Earth would end.

This course will provide an introduction to microbiology. We will look first at microbial cell biology, spending time exploring cell and macromolecular structures. The metabolic, energy producing and biosynthetic pathways of microorganisms will be reviewed and microbial genetics will be introduced. The course will also focus on the evolution, diversity and taxonomy of microbes and their ecological significance. Finally, we will explore the interfaces between humans and microorganisms; underlying themes throughout the course will include the human microbiome, probiotics and prebiotics and epidemiology. Coverage will also be dedicated to disease-causing microorganisms, including their pathogenicity strategies and the host defense mechanisms used to combat infectious diseases.

General Microbiology builds on several central themes in biology that were introduced in LIFE 1010, including: 1) Cell / Molecular Biology and Molecular Genetics, 2) Physiology and Metabolism, 3) Evolution and Diversity, 4) Ecology. These themes will be presented in an integrated fashion throughout the course. The course is intended for students pursuing diverse majors, including Biology, Botany, Molecular Biology, and Microbiology. However students in degree programs ranging from Science Education to Engineering may find that the course makes a valuable contribution to their undergraduate experience. Students must enroll in both a lecture and laboratory section. The prerequisites for the General Microbiology course are a passing grade of C in Biology 1010 (General Biology I) and in Chemistry 1000 or Chemistry 1010.

**Instructor**

<b>Name</b>	<b>Section</b>	<b>Time and Day</b>	<b>Room</b>	<b>Office/Phone</b>	<b>Email</b>	<b>Office Hours*</b>
Rachel Watson	01	MWF 11:00 –11:50 am	AG AUD	AG 5010 766-3524 314-9636 (Google)	rwatson@uwyo. edu	2:30 pm-3:30 pm M (AG 5030) 7:30-8:30 pm M (online <i>WyoCourses</i> ) 12-2 pm F (AG 5030) and by appointment

\*Office hours are not designed for and do not cater to students desiring a confidential meeting. There is often more than 1 student in my office at once and we frequently talk as a group. Please schedule alternative times for individual, confidential meetings.

## **Course Goal**

*The broad goal of this course is to facilitate the acquisition of a microbiology vocabulary (content-based learning outcomes) that will enable the development of process and skill specific learning objectives in a way that inspires learners to responsibly apply microbiology knowledge as a tool to enact positive social / medical and environmental change within the context of their chosen fields.*

Content-based learning objectives are prevalent and will be included on Exam Reviews. Below are the skill and process-based Learning Objectives:

## **Skill and Process-based Learning Objectives**

Upon successfully completing the course, learners will be able to

- 1) summarize / retain important points from a face-to-face lecture.
- 2) access vodcasts on the *WyoCourses* shell.
- 3) summarize / retain important points from a vodcast lecture.
- 4) summarize / retain important points from an active learning / discussion-based class session.
- 5) formulate either a pseudomanipulated or an observational and predictive hypothesis that is based in pertinent background information, is testable and has clear outcomes.
- 6) access public perspective and journal literature that pertains to the hypothesis.
- 7) write an introduction that funnels the reader to the hypothesis (clearly states the impetus for the hypothesis).
- 8) compare and contrast public perspective and journal literature with respect to the type of value that it gives in addressing the hypothesis.
- 9) assess public perspective and journal literature that pertains to the hypothesis.
- 10) summarize literature-based findings as they relate to the hypothesis.
- 11) create a poster that mixes visual and text equally and adequately to present literature research findings.
- 12) communicate in writing using microbiology-specific technical terms.
- 13) communicate research findings in writing and orally to both microbiologists and non-microbiologists.
- 14) cite references using the *Journal of Bacteriology* citation style.
- 15) write an abstract that follows the structure given in the Poster Presentation Assignment Description.
- 16) synthesize connections between microbiology course content and pre-existing knowledge.
- 17) recognize the social ramifications (social perceptions), applications and implications of pertinent scientific studies.

## **Textbooks and required materials**

1. *Prescott's Microbiology*, Ninth Edition by Willey, Joanne M., Sherwood, Linda M. and Christopher J. Woolverton, McGraw-Hill-Boston (We will use the e-book / LearnSmart available through McGraw Hill's Connect).
2. General Microbiology Laboratory Manual by Rachel Watson (available in the bookstore)

## **Optional Textbooks**

1. *A Photographic Atlas for the Microbiology Laboratory* by Michael J. Leboffe and Burton E. Pierce
2. *Fevered: Why a Hotter Planet will Hurt our Health – and how we can save ourselves* by Linda Marsa (available through Amazon and for Kindle)

**Additional Resources** (These sources provided background information for some lectures and would make great additional resources!)

Bryson, Bill. A Short History of Nearly Everything. Broadway Books. 2003

Madigan, Michael T., Martinko, John M. and Jack Parker. Brock Biology of Microorganisms. Upper Saddle River, NJ: Prentice Hall. 2000.

Lubert Stryer. Biochemistry. New York: W. H. Freeman and Company. 1995.

Becker, Wayne M., Reece, Jane B. and Martin F. Poenie. The World of the Cell. Menlo Park, CA: The Benjamin/Cummings Publishing Company. 1996.

Moran, Laurence A., Horton, Robert H., Scrimgeour, K. Gray, and Marc D. Perry. Principles of Biochemistry. Upper Saddle River, NJ: Pearson. 2012.

Murray, Patrick R., Rosenthal, Ken S., and Michael A. Pfaller. Medical Microbiology. St. Louis, Mosby. 2009.

Nester, Eugene W., Anderson, Denise G., Roberts, C. Evans Jr., Pearsall, Nancy N., and Martha T. Nester. Microbiology: A Human Perspective. Boston, McGraw Hill, 2004.

Pollan, Michael. The Omnivore's Dilemma: A Natural History of Four Meals. Penguin, 2006.

### **Lectures**

All lecture notes will be posted on the class web site at:

[http://www.uwyo.edu/molb2210\\_lect](http://www.uwyo.edu/molb2210_lect)

Those who desire an outline for the material that will be discussed in lecture can print these notes before class. During lectures we will discuss concepts, applications and implications, outline goals, and present demonstrations. **Attendance at all lectures will greatly improve your understanding of the material and your performance on assignments and exams!** Careful use of the textbook to augment your in-class learning will enable more holistic understanding of the content. All lectures are highly participative; time will be taken to consider and discuss all student questions, concerns and thoughts.

### **Homework**

Weekly problem assignments will be posted on the class WyoCourses Shell. These homework assignments will be posted on Tuesday and will be due the following Tuesday at midnight. Answers will be entered online in WyoCourses. All homework questions will relate specifically to the lecture material covered during the week prior to the homework due date. **There are 10 homework assignments worth 5 points each for a total of 50 points as part of your lecture grade.**

### **Current Events**

Microbiology is a rapidly growing field with very applied social and cultural interfaces. From studies of the human microbiome to antibiotic resistance, current literature about microbiology is prevalent. We will form groups of between 5 and 7 students and groups will choose a topic of interest. Groups will monitor relevant public perspective and scientific literature. Research will be presented in a poster presentation at the end of the semester. Please be sure to read the assignment description provided on the course web site and at the end of this syllabus!! Please also watch the vodcast explaining this assignment - provided on WyoCourses. **The poster presentation project is worth a total of 50 points as part of your lecture grade.**

**Exams: Exams (except the Final) are given on Tuesdays from 7:30 am – 7:30 pm in AG 5030**

Exam 1: Tuesday, February 17<sup>th</sup>                      Exam 3: Tuesday, April 21<sup>st</sup>  
Exam 2: Tuesday, March 24<sup>th</sup>                      Final Exam: Due Monday, May 11<sup>th</sup> (flexible)  
Poster Presentations: Monday, May 11<sup>th</sup> 10:15 – 12:15 in AB Foyer

Absences from an exam will only be excused under very special circumstances. Excused absences include university sanctioned events, extreme illness, or other extenuating circumstances. If you will miss an exam due to a university-sanctioned event, you must contact me in advance. If you miss an exam with an acceptable excuse you must contact me immediately. Failure to notify me, or a TA at the soonest possible time will result in a zero on the missed exam.

**Make-up Exams**

Exams missed due to university-sanctioned events will be scheduled individually and taken in advance. These exams will have the same format as the regularly scheduled exams. Students missing exams because of other verified and acceptable excuses must individually schedule a time to take a make-up exam. Make-up exams will have the same format as the regularly scheduled exams and must be taken as soon as possible after returning to classes.

**Grades**

Your grade will be based on a maximum of 800 points. Lab accounts for 200 of these 800 points and it is possible to earn 600 points in lecture. **Grades for individual assignments can be viewed on WyoCourses (Canvas) throughout the semester.**

Lecture points are divided as follows:

Three semester exams (100 pts. each)	300 pts
Homework (10 assignments at 5 points each)	50 pts
Current events poster presentation	50 pts
<u>Final Exam</u>	<u>200 pts</u>
Total	600 pts

Each of the 3 lecture exams is worth 100 points. The final exam is 200 points and will include ~100 points of comprehensive material over exams 1, 2, and 3 plus an additional 100 points over new material presented in the last section of the course. Finally, the 10 homework assignments are worth 5 points each for a total of 50 points and your final poster presentation is worth 50 points.

Individual semester course grades are not curved and are calculated as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
93-100%	90-93%	87-89%	83-86%	80-83%	77-79%	73-76%	70-73%	67-69%	60-67%	<60%

**Laboratory**

**Labs will begin on Tuesday, February 3<sup>rd</sup>.** The labs are held in Agriculture room 5030:

Section 10: TR 8:00-9:50 am                      Section 12: TR 3:10-5:00 pm  
Section 11: TR 10:00-11:50 am

In the laboratory you will have the opportunity to experience directly some of the relationships discussed in the lecture and textbook. You will also apply experimental techniques to solve problems. The laboratory is extremely important to gaining an understanding and appreciation of microbiology.

**Laboratory attendance is mandatory. It is the course policy that two unexcused absences in the laboratory will result in an F in the entire course, regardless of lecture grades.** The laboratory will include a total of 200 points and will count for 25% of the course grade.

### **Procedure for Making Up a Lab**

Your laboratory Teaching Assistant will take attendance each laboratory period. If you miss a lab, you will be allowed to make up the lab ONLY if you notify your TA or instructor and you are involved in a recognized University activity or have a verified illness or hardship. Up to three excused absences will be universally allowed. Additional excused absences must be University-sponsored. If additional absences are not University-sponsored, they will be considered unexcused. **If excused, missed laboratory exercises must be made up during the open lab hours scheduled on Fridays from 12:10-2:00 p.m.** Missed labs must be made up within 10 days after the missed lab. Please refer to the laboratory syllabus for more details on procedures for making up a lab.

### **Academic Dishonesty**

Representing the work of others as your own constitutes academic dishonesty and is strictly forbidden in this course. The official University definition of academic dishonesty is: *An act is academically dishonest when it is an act attempted or performed which misrepresents one's involvement in an academic task in any way, or permits another student to misrepresent the latter's involvement in an academic task by assisting in the misrepresentation.* Further information and some specific examples of academic dishonesty can be found at: <http://uwadmnweb.uwyo.edu/legal/Uniregs/ur802.htm>. All sources (whether printed or verbal) used in assignments and projects, including those located on the WEB, need to be correctly cited. If you use 5 or more words from a source just as they are used in the source, you need to put those words in quotation marks and cite the source. It is better to not use quotes, but rather paraphrase and cite the source. If necessary, we will use electronic means to detect plagiarism. Students involved in any form of academic dishonesty can as a minimum, receive an automatic "F" in this course.

### **Non- Discrimination Statement**

A campus environment characterized by diversity, free inquiry, free expression has always been a top priority of the University of Wyoming. Civil discourse is an essential aspect of the search for and transmission of knowledge. Words and actions that promote and encourage self-worth, respect and dignity are consistent with the university's mission. Conversely, words or actions that reflect prejudice, stereotypes and discrimination are antithetical to the mission of the university and will not be tolerated. Specifically, racist and other discriminatory or harassing conduct based on gender, color, disability, sexual orientation, religious preference, national origin, ancestry or age impair and disrupt legitimate university functions. Every effort, within the context and protection of the First Amendment rights, will be expended to eliminate such conduct from the campus community. Teaching students to live productively in a multicultural/multiethnic society is a process that must take place within a constructive and harmonious environment. It is the obligation of the faculty, staff, students and the administration of the University of Wyoming to provide this environment.

It is the policy of the University to accommodate students with disabilities, pursuant to federal and state law. Any student who needs accommodation because of a disability should inform the instructor at the beginning of the course. Students with disabilities who seek accommodations must contact Student Educational Opportunity Services, Knight Hall room 330, at 766-6189.

### **Course Contacts**

If you have any concerns with the lecture or laboratory portions of the course, you should first contact your lecture instructor and/or your laboratory T.A.. Questions related to the laboratory should first be directed towards your laboratory Teaching Assistant. If you have course related concerns that cannot be addressed by the lecture instructor, feel free to contact the Microbiology Program Director, Dr. Gerry Andrews, at 766-3139 or preferably by e-mail ([GAndrews@uwyo.edu](mailto:GAndrews@uwyo.edu)).

## TENTATIVE LECTURE SCHEDULE

Date	Day	Lecture	Topic	Reading Assignment	Homework assignment
Jan. 26	M	1	Overview and Scope of Microbiology	Chapter 1 (pp. 5-7 and 11-19)	<i>Pre-test and Knowledge Survey</i>
Jan. 28	W	2	Cell Structures and Functions	Chapters 3 and 5	<i>Lectures for January 26<sup>th</sup> through February 2<sup>nd</sup> will be vodcast</i>
Jan. 30	F	3	"	"	Homework set #1
Feb. 2	M	4	Review of Macromolecules (A game)	Appendix 1	<i>Poster presentation: Groups and topic selected in lab on Tuesday / Thursday</i>
Feb. 4	W	5	Microbial Growth	Chapters 7 and 8 (excepting p. 139-140)	
Feb. 6	F	6	"	"	Homework set #2
Feb. 9	M	7	Enzymes, Introduction to Catabolism / Anabolism	Chapter 10	
Feb. 11	W	8	Evolution of Metabolic Diversity	Chapter 11	
Feb. 13	F	9	"	"	No Homework
Feb. 16	M	10	"	"	
<b>Feb. 17</b>	<b>T</b>		<b>Exam #1 (AG 5030)</b>		
Feb. 18	W		"	"	<i>Poster presentation: hypothesis</i>
Feb. 20	F	11	"	"	Homework set #3
Feb. 23	M		Anabolism	Chapter 12 (ONLY pp. 266-270)	
Feb. 25	W	12	Macromolecular Structure/Function	Chapter 13	
Feb. 27	F	13	"	"	Homework set #4
March 2	M	14	Regulation of Gene Expression	Chapter 14 (excepting pp. 333-340 and 343-345)	
March 4	W	15	Bacterial Genetics	Chapter 16 (excepting pp. 380-384)	<i>Lectures for March 2-6 will be vodcast</i>
March 6	F	16	"	"	Homework set #5
March 9	M	17	Recombinant DNA Technology	Chapter 17 (ONLY pp. 411-413)	
March 11	W	18	"	"	
March 13	F	19	Antibiotics	Chapter 9	No Homework
March 23	M	20	Viruses	Chapters 6, 27 & 38 (excepting 611-623)	
<b>March 24</b>	<b>T</b>		<b>Exam #2 (AG 5030)</b>		
March 25	W		"	"	
March 27	F	21	Taxonomic Approaches to Classification and Identification	Chapter 19	Homework set #6

Date	Day	Lecture	Topic	Reading Assignment	Homework assignment
March 30	M		"	"	Homework set #7
April 1	W	22	<i>Archaea</i>	Chapter 4 and 20	
April 3	F		"	"	
April 6	M	23	<i>Bacteria</i>	Chapters 21-25 (selections as covered in lecture)	<i>Poster Presentation: Abstract</i>
April 8	W	24	"	Chapter 30 (ONLY pp. 662-664)	
April 10	F		"		
April 13	M	25	Eukaryotic Microorganisms	Chapter 25	Homework set #8
April 15	W		"		
April 17	F	26	Microbial Ecology: Habitats	Chapter 28 and 29 (selections as covered in lecture)	
April 20	M		Microbial Ecology: Biogeochemical cycles	"	No Homework
<b>April 21</b>	<b>T</b>		<b>Exam #3 (AG 5030)</b>		
April 22	W		"	"	
April 24	F		Microbial Ecology: Symbiotic Associations		Homework set #9
April 27	M		Food Microbiology	Chapter 41 (selections as covered in lab)	
April 29	W		Environmental Microbiology	Chapter 43 (selections as covered in lab)	
May 1	F		Principles of Infectious Disease and Epidemiology	Chapter 37 (selections as covered in lecture)	<i>Post-test and Knowledge Survey</i> Homework set #10
May 4	M	27	Microbial Mechanisms of Pathogenicity	Chapter 35 (selections as covered in lecture)	
<b>May 4</b>	<b>M</b>		<b>Final Exam Distributed (Due Monday, May 11<sup>th</sup>)</b>		
May 6	W	28	Immunology: Innate Host Resistance	Chapter 33	No Homework
May 8	F	29	Adaptive Immunity & Immunological Disorders	Chapter 34	
<b>FINAL EXAM: Monday, May 11<sup>th</sup> (10:15am – 12:15pm)</b>				<i>Poster presentation:</i>	