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Fall 9-1-2021

### BIOM 360.01: General Microbiology

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**General Microbiology (BIOM 360)**  
**Autumn Semester, 2021**

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**Lecture time:** 1:00 - 1:50 MWF  
**Lecture room:** Forestry 301 (in person)  
**Instructor:** Dr. Michael F. Minnick  
**Office hours:** *Open-door policy: drop in whenever you like*  
**Office location:** HS 509  
**Phone:** 406-243-5972  
**E-mail:** [mike.minnick@mso.umt.edu](mailto:mike.minnick@mso.umt.edu)

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**Chemistry (CHMY 123N or 143N) is a prerequisite for BIOM 360. Cell and Molecular Biology (BIOB 260) is a prerequisite or co-requisite.** *If you have not had these courses you must obtain instructor approval to enroll.*

**Resources-**

**e-textbook:** *Brock Biology of Microorganisms*, 16<sup>th</sup> ed. Madigan et al., 2021:

BIOM 360 has inclusive access, so you pay for the Pearson e-text and Mastering Microbiology upon registration.

- Use the RedShelf external tool in the course Moodle shell
- Textbook information and a code will appear for selection
- Follow the instructions to redeem the Pearson e-textbook code provided.

**Mastering Microbiology:** Mastering Microbiology is a valuable resource with practice quizzes, videos and additional course information.

-Log on to Pearson at: <https://www.pearsonmylabandmastering.com/northamerica/>

-The **course name is BIOM 360 Fall 2021** and the **course ID is minnick89063**.

-Once registered, you can access the e-text, assignments, and Mastering Microbiology via the URL above. If you need help registering with Pearson, refer to the "Student Registration Instructions" file in the Syllabus folder of the Moodle shell.

**Moodle:** Moodle will be used to archive *Powerpoint slides, current events and all course materials*. It will also have your grades available. Moodle will be updated as quickly as possible following each lecture.

**If you have problems online-** Contact the UC ([apeterson@montanabookstore.com](mailto:apeterson@montanabookstore.com)) with questions about Inclusive Access billing. Visit <https://solve.redshelf.com/hc/en-us> with issues regarding the e-text code, or contact [Pearson's support team](#) with questions about your Pearson account access.

**Performance-** A total of **400 points is possible from:** **a)** 100-point midterm exams, **b)** a 152-point final exam, and **c)** weekly online Mastering Microbiology assignments worth 48 points. The lowest midterm exam score will be dropped to calculate a final grade. (Caution- to drop a low-score midterm, you must have at least attempted the exam; the final exam cannot be dropped). *Four extra credit bonus points are possible on each exam and are based on current events discussed at the beginning of every class.* The *final exam* will consist of 53 points from the last 5 lectures plus 99 points of comprehensive, multiple-choice questions based on information from the midterms. *Make-up exams* will be available for excused and documented absences. *Performance* will be evaluated by a classical grading system of: A (90-100%); B (80-89%); C (70-79%); D (60-69%); F (<60%), based on a curve comparing your grade against peers.

**Exams-** Lecture notes, lecture slides, current events and class discussions are sources for test questions. Thus, although lecture attendance is not mandatory nor recorded, it is *essential to your success*.

**Assignments-** Four online Mastering Microbiology questions from relevant chapters will be assigned each Wednesday, except for the *first week (9/01/21) and during Thanksgiving week (9/24/21)*. Questions will be available online each Wednesday at 1 pm (EST) and *due the following Wednesday before 1 pm (EST)*. (e.g., assignment 1 will be available online at 1:00 pm on 9/08/21 and due by 12:59 pm on 9/15/21). In addition to helping you learn microbiology, these assignments are worth 12% of the grade and can *serve as a buffer against exam scores* (i.e., 4 points / week x 12 weeks = 48 points total)

**Accommodation and Accessibility-** UM assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact ODE at: 243-2243, [ode@umontana.edu](mailto:ode@umontana.edu), or visit [www.umt.edu/disability](http://www.umt.edu/disability) for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish.

**Academic misconduct-** Misconduct will be reported and handled as described in UM's Student Conduct Code. *Students must practice academic honesty. Academic misconduct is subject to academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the UM Student Conduct Code available online at: <http://www.umt.edu/student-affairs/community-standards/default.php>*

**Dropping course or changing grading status** will strictly follow UM policies and procedures, which are described in the catalog. Students cannot change to an audit after the 15th day of instruction. In addition, dropping the course or changing the grading status (to CR/NCR) are not automatically approved after the 30th day of the semester. These may be requested by petition, but the petition must be accompanied by documentation of extenuating circumstances. Requests to drop or change grading status to benefit a student's GPA will not be approved.

**\*\*COURSE SCHEDULE- (tentative, flexible and highly optimistic):**

Date	Chapt.	Topic(s)
M Aug 30		Introduction and Great Expectations
W Sep 01	1	The Microbial World
F Sep 03	1	The Microbial World
<b>M Sep 06</b>		<b>HOLIDAY- Labor Day</b>
W Sep 08	2	Microbial Cell Structure and Function
F Sep 10	2	Microbial Cell Structure and Function
M Sep 13	2	Microbial Cell Structure and Function
W Sep 15	3	Microbial Metabolism
F Sep 17	3	Microbial Metabolism
M Sep 20	3	Microbial Metabolism
W Sep 22	4, 8	Microbial Growth and its Control
F Sep 24	4, 8	Microbial Growth and its Control
<b>M Sep 27</b>		<b>EXAM 1</b>
W Sep 29	4, 8	Microbial Growth and its Control
F Oct 01	6	Molecular Information Flow
M Oct 04	6	Molecular Information Flow
W Oct 06	6	Molecular Information Flow
F Oct 08	7	Microbial Regulatory Systems
M Oct 11	7	Microbial Regulatory Systems
W Oct 13	7	Microbial Regulatory Systems
F Oct 15	7	Microbial Regulatory Systems
M Oct 18	9	Genetics of Bacteria and Archaea
W Oct 20	9	Genetics of Bacteria and Archaea
F Oct 22	9	Genetics of Bacteria and Archaea
<b>M Oct 25</b>		<b>EXAM 2</b>
W Oct 27	10	Microbial Genomics and Other Omics
F Oct 29	10	Microbial Genomics and Other Omics
M Nov 01	13	Microbial Evolution and Genome Dynamics
W Nov 03	13	Microbial Evolution and Genome Dynamics
F Nov 05	15, 16	Diversity of Bacteria
M Nov 08	15, 16	Diversity of Bacteria
W Nov 10	15, 16	Diversity of Bacteria
F Nov 12	15, 16	Diversity of Bacteria
M Nov 15	17	Diversity of Archaea
W Nov 17	17	Diversity of Archaea
F Nov 19	18	Diversity of Microbial Eukarya
<b>M Nov 22</b>		<b>EXAM 3</b>
<b>W Nov 24-</b>		<b>No class- student travel day</b>
<b>F Nov 26-</b>		<b>HOLIDAY- Thanksgiving</b>
M Nov 29	18	Diversity of Microbial Eukarya
W Dec 01	18	Diversity of Microbial Eukarya
F Dec 03	5, 11	Virology
M Dec 06	5, 11	Virology
W Dec 08	5, 11	Virology
F Dec 10		Complete lectures, review, student evaluation
<b>W Dec 15</b>		<b>FINAL EXAM 1:10-3:10</b>

## LEARNING OUTCOMES-

TOPICS	LEARNING OUTCOMES
<b>Introduction</b> (1 lecture)	-professor and student introductions -familiarize students with course expectations, assessment tools, grading and learning resources -utilize pop quiz as a springboard for discussion
<b>Microbial World</b> (2 lectures)	-Review cell structure / function -Learn key differences between prokarya and eukarya -Introduction to basic phylogeny and the dominance of unicellular life-forms
<b>Microbial Cell Structure and Function</b> (3 lectures)	-Learn essentials of microbial cell structure / function: <ul style="list-style-type: none"> <li>• Morphologies</li> <li>• Why are prokaryotes small?</li> <li>• The unit membrane and transport</li> <li>• The cell wall and its chemistry</li> <li>• Microbial structures- spores, inclusions, etc.</li> <li>• Locomotion</li> </ul>
<b>Microbial Metabolism</b> (3 lectures)	-become familiar with nutrients and their roles -learn basic types of growth media -learn about bioenergetics, catalysis, redox -learn catabolism with a focus on glycolysis, TCA cycle and electron transport system -become familiar with metabolic diversity
<b>Microbial Growth and its Control</b> (3 lectures)	-Learn how bacteria grow- <ul style="list-style-type: none"> <li>• binary fission</li> <li>• growth cycle</li> <li>• physical parameters affecting growth</li> <li>• osmolarity, oxygen need and pH</li> </ul>
<b>Molecular Information Flow</b> (3 lectures)	-Learn how genes are arranged -Flow of information -Learn Chromosomal architecture -Understand translation
<b>Microbial Regulatory Systems</b> (3 lectures)	-Learn basic feedback mechanisms -Repression versus induction -learn how bacteria and archaea regulate expression of genes: <ul style="list-style-type: none"> <li>• <i>arg</i> operon</li> <li>• <i>lac</i> operon</li> <li>• Catabolite repression</li> <li>• Nitrogen assimilation in archaea</li> </ul> Learn global response mechanisms: <ul style="list-style-type: none"> <li>• Stringent response</li> <li>• Attenuators</li> <li>• 2-component regulators</li> <li>• Quorum sensing</li> </ul>
<b>Genetics of Bacteria and Archaea</b> (3 lectures)	-Learn basic terminology -learn about mutations -understand recombination -Learn lateral gene transfer mechanisms: transformation, transduction, conjugation -mobile elements and plasmids -Learn about restriction modification and CRISPR-Cas
<b>Microbial Genomics and Other Omics</b> (2 lectures)	-Survey the diversity of prokaryotic genomes -understand why there is a range in size -understand gene content as a function of

	organism's lifestyle -learn about genomes of organelles
<b>Microbial Evolution and Genome Dynamics</b> (2 lectures)	-Appreciate the evolutionary timescale -Understand early-earth physiology -Learn about the appearance of O <sub>2</sub> -Learn microbial phylogeny -Understand concepts of species / speciation
<b>Diversity- Bacteria, Archaea and Eukaryotic Microbes</b> (8 lectures)	--Survey / learn diversity of bacteria- natural history and physiological adaptations --Survey / learn diversity of archaea- natural history and physiological adaptations --Survey / learn diversity of eukaryotic microbes- natural history and physiological adaptations
<b>Virology</b> (2 lectures)	-Learn basic virology terms -Understand the virus "life" cycle -Learn different strategies of replication based upon genome content -Learn the different outcomes of a virus infection