

Instructor: Tom Kieft

Office: Jones Annex 301; Lab: Jones Annex 302

Office Hours: Mon & Wed. 10-12 (I am often available at other times, too.)

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Prerequisite: Chemistry 122 **Co-requisite:** Biology 331 (Cell Biology)

Learning Objectives. Following the completion of this course, students should have an appreciation for and understanding of

1. the means by which microorganisms are classified into phylogenetic groups
2. structures of bacterial cells and the functions of these structures
3. microbial cultivation and the kinetics of microbial growth.
4. microbial responses to environmental parameters
5. energetics and metabolism of microorganisms
6. mechanisms of gene expression in microorganisms
7. structure and genetic systems of viruses
8. genetic transfer among bacteria
9. the human immune system
10. mechanisms of microbial pathogenesis

Textbook: Madigan, M. M., K.S. Bender, D.H. Buckley, W.M Sattley, and D.A. Stahl. 2018. *Brock Biology of Microorganisms*, 15th Edition, Pearson. (The 13^h and 14th editions are acceptable, but you'll be responsible for determining which chapters to read.)

Course materials on the web: Some course materials will be made available via Canvas (<https://nmt.instructure.com/>). These materials include old exams, PowerPoint files, homework assignments, and handouts.

Grading:

Your grade will be based on five exams and a combined single score for your attendance, homework, and quizzes, making six total scores, each counting equally. Your lowest of these six scores will be dropped. Your final grade will be based on the average of your five remaining scores, with each one being given equal weighting (20% each; 5 x 20% = 100%).

Tentative exam schedule:

	<u>Date</u>
First exam:	Sept. 10
Second exam:	Oct. 3
Third exam:	Oct. 29
Fourth exam:	Nov. 26
Fifth exam (comprehensive, 2-hour):	during finals week.

(The finals schedule is set by the Registrar; plan to be here throughout finals week.)

Course grades will be based on the following scale: 90-100% A, 80-89% B, 70-79% C, 60-69% D, ≤59% F. If necessary, the scale will be shifted down (curved) until the top 10% of students receive an A.

No make-up exams will be given. If a student misses one exam due to a bona fide illness or family emergency (must be documented via the Dean of Students), then the student's grade will be computed using the remaining exams. No extra-credit or alternative assignments will be given.

Exams will cover any and all material from lectures and reading assignments. The final will be comprehensive.

Academic Honesty is expected of all students. Consult New Mexico Tech's Academic Honesty Policy (page 79 of the 2017-2018 Catalog (<https://www.nmt.edu/registrar/2017-2018%20Course%20Catalog%20FINAL.pdf>)).

Turn off the ring tone on your phone. Put your phone away during class.

Attend class. Take notes. Ask questions. Read the textbook.

Schedule (tentative):

Date	Topic	Reading Material
8/20	Introduction: scope and history of microbiology	Ch. 1
8/22	Three evolutionary domains: Bacteria, Archaea, and Eukarya more reading in microbial evolution and systematics	Ch. 1 Ch. 13, Sect. III
8/24	Structure and function: gram negative vs. gram positive bacteria	Ch. 2
8/27	Bacterial and archaeal structure and function	Ch. 2
8/29	Bacterial endospores	Ch. 2
8/31	Microbial growth media	Ch. 5
9/5	Sterilization, disinfection	Ch. 5
9/7	Microbial growth, quantifying microbes	Ch. 5
9/10	<i>Exam #1</i>	
9/12	Growth kinetics	Ch. 5
9/14	Environmental parameters: temperature, pH, O ₂	Ch. 5
9/17	Environmental parameters: salinity, desiccation, radiation, etc	Ch. 5
9/19	Antimicrobial agents, antibiotics	Ch. 7, Sect. 7.10 Ch. 28, Sect. 28.1
9/21	Microbial energetics, oxidation and reduction	Ch. 3
9/24	Fermentation and aerobic metabolism	Ch. 3
9/26	Anaerobic respiration, chemoautotrophy, photoautotrophy	Chs. 3, 14
9/28	Microbial molecular biology	Ch. 4
10/1	Regulation of gene expression	Ch. 6
10/3	<i>Exam #2</i>	
10/5	Viruses	Ch. 8
10/8	Temperate phages, lysogeny, transduction	Ch. 8
10/10	Influenza viruses	Ch. 10, Sect. 10.9 (influenza only) Ch. 30, Sect. 30.8
10/12	Human immunodeficiency virus (HIV)/AIDS	Ch. 29, Sect. 29.8 (HIV only) Ch. 30, Sect. 30.5
10/15	Gene structure, mutations	Ch. 11
10/17	Recombination, plasmids	Ch. 11
10/22	Transformation, transduction, conjugation	Ch. 11
10/24	Techniques of bacterial genetics	Ch. 12
10/26	Human–microbe interactions, normal microbiota	Ch. 24
10/29	<i>Exam #3</i>	
10/31	Virulence factors: invasins and toxins	Ch. 25
11/2	Immunology – introduction, cells and organs of the immune system	Chs. 26 & 27
11/5	<i>Scientific paper discussion #1</i>	
11/7	Immunology – adaptive immunity, antigens, antibodies	Chs. 26 & 27
11/9	<i>Exam #4</i>	
11/12	Immunology – innate immunity	Chs. 26 & 27
11/14	Immunology	Chs. 26 & 27
11/16	<i>Scientific paper discussion #2</i>	
11/19	Medical microbiology, major diseases: Staph, Strep, others	Ch. 30
11/21	Medical microbiology, major diseases: STDs	Ch. 30
11/26	Medical microbiology, major diseases: food and water-borne diseases	Ch. 32
11/28	Medical microbiology, major diseases: food and water-borne diseases	Ch. 32
11/30	<i>Exam #5</i>	
12/3	Medical microbiology, vector-borne diseases	Ch. 31
12/5	<i>Scientific paper discussion #3</i>	
12/7	Review	