

Welcome to BIOL 351: Microbiology:

Course description: Microbiology (BIOL 351) is targeted toward those sophomore and junior students with interests in microbiology, cell, molecular and integrative biology and who have strong backgrounds in biology and chemistry. This course can be divided into three parts. The first part provides in-depth coverage of microbiology including: history of microbiology, microbiological methods, prokaryotic cell structure and function, and prokaryotic genetics. The second part of the course goes into the details of microbial diversity including: taxonomy and phylogeny of bacteria, archaea, and viruses; biochemical pathways that are unique to bacteria including aerobic and anaerobic metabolism, phototrophy, and chemolithotrophy; and microorganisms' roles in biogeochemical cycles. The third part of the course focuses on human/microbe interactions including virology, human-microbe interactions, immunology, and the molecular/cellular basis of pathogenesis. Three hours lecture and three hours laboratory. Credit not allowed in both BIOL 251 and 351. Prerequisites: BIOL 189, BIOL 196, BIOL 197, CHEM 121. 4 credits.

Course objectives: As a result of taking this course students should:

- Gain a broad knowledge of microbiology, including microbial cell structure, molecular biology, genetics, and physiology of major groups of microorganisms and the roles of microorganisms in ecology and human health
- Understand and appreciate the unique aspects microorganisms particularly Bacteria, Archaea, and viruses
- Master basic language and concepts pertaining to microbiology and molecular biology with the general goal of being able to communicate (reading, writing and speaking) with both scientists and lay people
- Build a foundation in microbiology that can serve students' future academic and career aspirations

Learning Outcomes for the course: The School of Life Sciences requires that all students graduating with either a major or minor degree in Biological Sciences;

Understand the nature of scientific knowledge; 1b & d
Understand cell structures and functions; 2a & e

Understand the physical nature of genetic information; 3a, b, d & e
Understand that all organisms are genetically related, have evolved and are evolving; 4a, c & d
Understand the metabolic complexities of cells and organisms; 5a, b, c & d
Understand the complex interplay of how organisms respond to and interact with each other and their environment; 6c, d, & f
Effectively communicate complex biological concepts in orally and in writing; 7a

The numbers & letters after each major learning outcome indicate specific learning outcomes associated with Biol 351. These specifics can be found in the full list of outcomes provided on the School of Life Sciences webpage.

<http://www.unlv.edu/lifesciences/academic-programs>

Biol 351 also teaches students to explain the diversity and similarity of microbes, including their physiology, mechanisms of pathogenesis and host defenses, and unique ecology.

Biol 351 provides students with opportunities to develop many of the broadly applicable professional skills that are included in the University Learning Outcomes, including Intellectual Breadth and Lifelong Learning Skills, Inquiry and Critical Thinking Skills & Written Communication Skills.

Lectures: Tuesday and Thursday 11.30-12:45 pm, WHI 197

Course materials:

Required text: Brock Biology of Microorganisms, 14th edition, Madigan, Martinko, Dunlap and Clark.

Required laboratory book: Microbiology Laboratory Theory and Application; 4th edition. Leboffe MJ, & Pierce BE. 2015. Morton Publishing, Engelwood, CO.

Grades:

Lecture: 70% of your final grade (700 points) will come from the lecture section.

Lecture grades will be determined by performance on 3 midterms (154pts each) and a comprehensive final exam (238pts).

Lab: 30% of your final grade (300 points) will be based on performance in lab:

Notebooks (150 points), lab quizzes (130 points total), lab conduct (20 points), Lab exam (150 points), and a report on an unknown organism (150 points). The total (600points) will be divided by 2 and then added to points earned in the lecture.

The total number of points earned will be divided by the total number possible (1000 points) and multiplied by 100% to determine the final grade: A, 100-90%; A-, 89-87%; B+, 86-83%; B, 82-80; B-, 79-77; C+, 76-73%; C, 72-70; C- 69-67%; D, 66-57%; and F, <57%.

UNLV Policies

Academic Misconduct — Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at:
<https://www.unlv.edu/studentconduct/student-conduct>.

Copyright — The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at:
<http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) — The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy — Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching — The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:

<https://www.unlv.edu/provost/teachingandlearning>

<https://www.unlv.edu/provost/transparency>

Incomplete Grades — The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

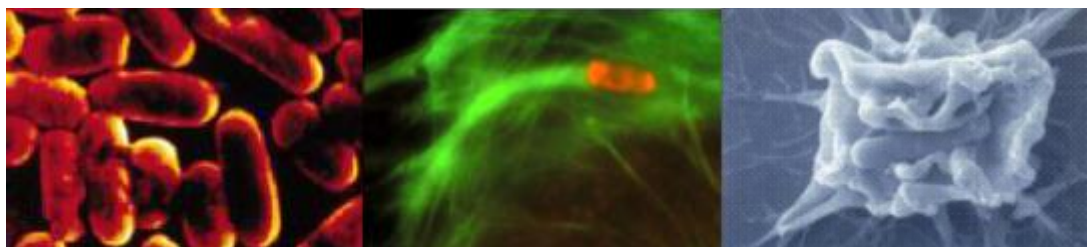
Tutoring and Coaching — The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895- 3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center — One-on- one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.

Rebelmail — By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always **@unlv.nevada.edu**. **Emailing within WebCampus is acceptable.**

Library Resources — Students may consult with a librarian on research needs. For this class, the subject librarian is https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Final Examinations — The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.



BIOL 351: Microbiology (Lecture schedule - subject to change)

Date	Description	Book Chapter	Supplementary material posted on webcampus
Lecture 1 Jan 19 (Tu)	Syllabus discussion with Dr. Wing. Microbiology; what it is and why we study it?	Chapter 1; 1-12 Chapter 2; 32-35	Cells alive: How big???
Lecture 2 Jan 21 (Th)	Microbiology; what it is and why we study it?	As above	Student Resources: Undergrad Research Opportunities
Jan 25 (M)	Final day to drop from class with 100% refund		
Lecture 3 Jan 26 (Tu)	Fundamentals of Microbiology – microscopy, aseptic technique, sterilization, germ theory, Koch's postulates, enrichment of micro-organisms by cultivation	Chapter 1; 13-22 Chapter 2; 26-32	Light & Electron Microscopy Staining Pasteur Sw an neck experiment, Aseptic Technique, Streak Plate
Lecture 4 Jan 28 (Th)	Overview of Bacterial and Archaeal cell structure; Membranes - structure & function. Transport.	Chapter 2; 35-38 Chapter 3 Pg 74-78	Membrane permeability, Membrane Structure & Active transport: Overview
Lecture 5 Feb 2 (Tu)	Cell walls - structure & function. Gram stains, penicillin and lysozyme Cell surface structures – capsules, fimbriae and flagella.	Chapter 2 38-48	
Lecture 6 Feb 4 (Th)	Bacterial locomotion. The cell interior (protein, storage material, gas vesicles and magnetosomes). Bacterial endospores	Chapter 2	
Lecture 7 Feb 9 (Tu)	Bacterial locomotion. The cell interior (protein, storage material, gas vesicles and magnetosomes). Bacterial endospores	Chapter 2 & 3	
Feb 11 (Th)	EXAM 1		
Feb 15 (M)	President's Day Recess		
Lecture 8 Feb 16 (Tu)	Nutrition and metabolism. Essentials of energy production (cont.). Bioenergetics, enzymes, redox reactions,	Chapter 3	Animation: Glycolysis: Overview & Steps Fermentation Kreb's Cycle: Overview & Steps Electron Transport: The process & Factors effecting ATP yield
Lecture 9 Feb 18 (Th)	Electron carriers, energy storage and high energy compounds. Energy generating pathways focusing on chemoorganotrophs– Comparison of Fermentation and	Chapter 3	Animation: All under heading Microbial Nutrition & grow th

	Respiration - Glycolysis, Kreb's Cycle, Electron transport chains, PMF & ATP synthesis		
Lecture 10 Feb 23 (Tu)	Wrap up of last lecture. Overview of Chemoorganotrophy (Aerobic & anaerobic Respiration) Chemolithotrophy & Phototrophy. Growth of Microorganisms. Prokaryotic cell division & Growth of Bacterial Populations	Chapter 3 & 5	
Lecture 11 Feb 25 (Th)	Growth of bacterial populations (cont); Measuring microbial growth. Environmental factors impacting growth of microbial cells	Chapter 5	
Feb 26 (Fr)	Final day to drop from class with 50% refund		
Lecture 12 Mar 1 (Tu)	Environmental factors impacting growth of microbial cells (cont). Review of DNA structure and function	Chapter 5 & 4	Animation: All 4 under DNA replication See above
Lecture 13 Mar 3 (Th)	DNA supercoiling and DNA replication	Chapter 4	Animation: Transcription
Lecture 14 Mar 8 (Tu)	Transcription	Chapter 4	Animation: Translation
Mar 10 (Th)	EXAM 2		
Lecture 15 Mar 15 (Tu)	Translation & Gene regulation	Chapter 7	Animation: Attenuation
Lecture 16 Mar 17 (Th)	Gene regulation	Chapter 7	
Mar 21-26	SPRING BREAK		
Lecture 17 Mar 29 (Tu)	Gene regulation & Virology	Chapter 7 & 8	
Lecture 18 Mar 31 (Th)	Virology	Chapter 8 & 9	Animation with Quizzes Lambda: a Temperate phage
Apr 1 (Fr)	Final Day to drop from Class		
Lecture 19 Apr 5 (Tu)	Virology & Bacterial genetics	Chapter 8 & 9; some 10 & 11	Online tutorials: Molecular Basis of Mutation (Chap11.2) Animation with Quizzes Mutagens, Mutagenesis: Types & Repair
Lecture 20 Apr 7 (Th)	Bacterial Genetics	Chapter 10	
Lecture 21 Apr 12 (Tu)	Bacterial Genetics (& Genetic Engineering)	Chapter 10 & 11	
Apr 14 (Th)	EXAM 3		
Lecture 22 Apr 19 (Tu)	Microbial Evolution & Systematics	Chapter 12	
Lecture 23 Apr 21 (Th)	Microbial Evolution & Systematics ; The Proteobacteria.	Chapter 12; 13, 14 15, 17 & 18	
Lecture 24 Apr 26 (Tu)	The Proteobacteria & The Gram positive phyla.	Chapter 13, 14 15	
Lecture 25 Apr 28 (Th)	Archaeal diversity.	Chapter 16	
Lecture 26 May 3 (Tu)	Microbial Ecology, Major microbial ecosystem & Microbial Interactions with plants	Chapter 18, 19 22	
Lecture 27	Microbial Interactions with plants (cont).	Chapter 22,	

May 5 (Th)	Bioremediation. Microbial interactions with humans & 1 case study of disease	23, 29 & 31	
May 12	10:10AM-12:10PM 2hr Comprehensive final exam Worth 238 pts		

SAMPLE