

BIOL 2420
Microbiology for Non-Science Majors

Western Texas College

- I. Basic Course Information
 - A. Lecture—This course covers basic microbiology and immunology and is primarily directed at pre-nursing, pre-allied health, and non-science majors. It provides an introduction to historical concepts of the nature of microorganisms, microbial diversity, the importance of microorganisms and acellular agents in the biosphere, and their roles in human and animal diseases. Major topics include bacterial structure as well as growth, physiology, genetics, and biochemistry of microorganisms. Emphasis is on Medical microbiology, infectious diseases, and public health.
 - B. Lab—the required laboratory activities will cover basics of culture and identifications of bacteria and microbial ecology. This course is primarily directed at pre-nursing and other pre-allied health majors and covers basics of microbiology. Emphasis is on Medical microbiology, infectious diseases, and public health.
 - C. Any required prerequisites: None
 - D. Required grade for enrolling in the next course in this sequence: None
- II. Student Learning Outcomes
 - A. Lecture
 1. Describe distinctive characteristics and diverse growth requirements of prokaryotic organisms compared to eukaryotic organisms.
 2. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health, including biofilms.
 3. Distinguish between mechanisms of physical and chemical agents to control microbial populations.
 4. Explain the unique characteristics of bacterial metabolism and bacterial genetics.
 5. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships.
 6. Compare characteristics and replication of acellular infectious agents (viruses and prions) with characteristics and reproduction of cellular infectious agents (prokaryotes and eukaryotes).
 7. Describe functions of host defenses and the immune system in combating infectious diseases and explain how immunizations protect against specific diseases.
 8. Explain transmission and virulence mechanisms of cellular and acellular infectious agents.
 - B. Lab

1. Use and comply with laboratory safety rules, procedures, and universal precautions.
2. Demonstrate proficient use of a compound light microscope.
3. Describe and prepare widely used stains and wet mounts, and discuss their significance in identification of microorganisms.
4. Perform basic microbiology procedures using aseptic techniques for transfer, isolation and observation of commonly encountered, clinically significant bacteria.
5. Use different types of bacterial culture media to grow, isolate, and identify microorganisms.
6. Perform basic bacterial identification procedures using biochemical tests.
7. Estimate the number of microorganism in a sample using methods such as direct counts, viable plate counts, or spectrophotometric measurements.
8. Demonstrate basic identification protocols based on microscopic morphology of some common fungi and parasites.

III. Testing Requirements

- A. The Chapter Test and Final exam must be proctored by an approved testing organization. (Ask your instructor for more details.)
- B. Students are NOT allowed to use their book or notes of any kind while taken their proctored tests and exam.
- C. All Chapter Tests and the comprehensive Lab and Lecture Final Exams are timed

IV. Course Requirements

- A. Online
 1. 10 multiple-choice chapter quizzes
 2. 4 current science article write-ups and associated online forum discussions
 3. 3 non-cumulative multiple-choice chapter exams
 4. 1 cumulative multiple-choice final exam
 5. 1 Required On-Campus Wet Lab
 6. 12 Lab Assignments
 7. 1 cumulative lab final exam

V. Information on Books and Other Course Materials

- A. Required Book: *Microbiology with Diseases by Taxonomy Plus Mastering Microbiology 5th Edition* by Bauman ISBN 9780133948851
- B. Lab requires Hands-on-Labs Kit# SP-3008-MB1

VI. Grading Breakdown:

- A. Online

Articles.....	15%
Quizzes.....	10%
Lab Assignments.....	15%

Chapter Tests.....	25%
Lab Final Exam.....	10%
Final Exam.....	25%

VII. Other Policies, Procedures and important dates. Please refer to the WTC [Catalog](#) for the following

- A. Campus Calendar
- B. Final exam schedule
- C. How to drop a class
- D. Withdrawal information
- E. Student Conduct/Academic Integrity
- F. Students with disabilities

VIII. Course Content

Lecture		Laboratory Activities
Chapters Covered	Sections Covered	
1 – A Brief History of Microbiology	Early microbiology, the golden era of microbiology, modern microbiology	Laboratory Safety
2 – The Chemistry of Microbiology	Atoms, chemical bonds, chemical reactions, acids and bases, macromolecules	Microbiology Laboratory Preparation
3 – Cell Structure and Function	Processes of life, external structures of bacterial cells, bacterial cell walls, bacterial cytoplasmic membranes, cytoplasm of archaea, external structures of eukaryotic cells, eukaryotic cell walls and cytoplasmic membranes, cytoplasm of eukaryotes	Aseptic Technique and Culturing microbes
4 – Microscopy, Staining, and Classification	Units of measurement, microscopy, staining, classification and identification of microorganisms	Bacterial Enumerations: Dilutions and plate Counts
5 – Microbial Metabolism	Basic chemical reactions underlying metabolism, carbohydrate catabolism,	Antibiotic Sensitivity Kirby Bauer Diffusion Test

	other catabolic pathways, photosynthesis, other anabolic pathways, integration and regulation of Metabolic Functions	
6 – Microbial Nutrition and Growth	Growth requirements, culturing microorganisms, growth of microbial populations	Biochemical Testing for Microbial Identification; MR-VP and Catalase
7 – Microbial genetics	The structure and replication of genomes, gene function, mutations of genes, genetic recombination and transfer	Microscopy for Microbiology – Use and Function
8 – Recombinant DNA Technology	Role of recombinant DNA technology, tools and techniques, applications of rDNA technology, ethics and safety	Bacterial Morphology and Staining Techniques
9 – Controlling Microbial Growth in the Environment	Basic principles of microbial growth, microbial selection models, physical methods of microbial control, chemical methods of microbial control	Biochemical Testing for Microbial Identification; Carbohydrate Fermentation
10 – Controlling Microbial Growth in the Body: Antimicrobial Drugs	History of antimicrobial drugs, mechanisms of antimicrobial action, clinical considerations in prescribing antimicrobial drugs	Microbial Identification Through Functional Media – Motility Testing
11 – Characterizing and Classifying Prokaryotes	General characteristics of prokaryotes, modern prokaryotic classification, survey of archaea, survey of bacteria	Environmental Influences on Microbial Growth – Salt Tolerance and pH Testing
12 – Characterizing and Classifying Eukaryotes	General characteristics of eukaryotes, protozoa, fungi, algae, water molds	Fomite Transmission
13 – Characterizing and Classifying Viruses, Viroids, and Prions	Characteristics and classification of viruses, viral replication, role of viruses in cancer, cultivating viruses, viroids and prions	Food Safety

14 – Infection, Infectious Diseases, and Epidemiology	Symbiotic relationships, reservoirs of infectious diseases, infection, nature of infectious disease, exit of pathogens, modes of transmission, classification and epidemiology of infectious diseases	
15 – Innate Immunity	First lines of defense, second lines of defense	
16 – Adaptive Immunity	Overview and elements of adaptive immunity, cell-mediated immune responses, antibody-mediated immune responses, types of acquired immunity	
17 – Immunization and Immune Testing	Immunization, serological tests	
18 – Immune Disorders	Hypersensitivities, autoimmune diseases, immunodeficiency diseases	
19 – Pathogenic Gram-Positive Bacteria	Staphylococcus, Streptococcus, Enterococcus, Bacillus, Clostridium, Listeria, Mycoplasmas, Corynebacterium, Mycobacterium, Propionibacterium, Nocardia, Actinomyces	
20 – Pathogenic Gram-Negative Cocci and Bacilli	Neisseria, facultatively anaerobic bacilli, aerobic bacilli, anaerobic bacilli	
21 - Rickettsias, Chlamydias, Spirochetes, and Vibrios	Rickettsias, Chlamydias, Spirochetes, pathogenic gram-negative Vibrios	
22 – Pathogenic Fungi	Medical mycology, pathogenic and opportunistic fungi, fungal intoxications and allergies	

23 – Parasitic Protozoa, Helminths, and Arthropod Vectors	Parasitology, arthropod vectors, protozoan human parasites, helminthic human parasites	
24 – Pathogenic DNA Viruses	Poxviridae, Herpesviridae, Papillomaviridae, Polyomaviridae, Adenoviridae, Hepadnaviridae, Parvoviridae	
25 – Pathogenic RNA Viruses	ssRNA viruses, enveloped and naked RNA viruses, dsRNA viruses	
26 – Applied and Environmental Microbiology	Food microbiology, industrial microbiology, environmental microbiology, biological warfare and bioterrorism	

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