

ARIZONA WESTERN COLLEGE
SYLLABUS

BIO 205 MICROBIOLOGY/GE

Credit Hours: 4 Lec 3 Lab 4

General Education Course: G (Global Awareness)

PREREQUISITE: BIO 181 or BIO 156 or pass an AWC biology challenge exam and complete ENG 101 or 107. CHM 130 or CHM 151 highly recommended.

COURSE DESCRIPTION

Study of microorganisms including their morphology, metabolism, genetics, classification, and effects on human life and the environment. Laboratory sessions cover basic procedures in microbiology culminating in the identification of unknown bacterial samples.

1. COURSE GOAL

- 1.1 Discuss how microbiology has contributed to our current knowledge of living things and processes.
- 1.2 List several contributions of microorganism to our lives, the lives of other organisms, and the world around us.
- 1.3 Apply concepts learned in order to make intelligent decisions concerning problems and ethical issue of modern life: antibiotic use, food production, new technologies in medicine, and genetic engineering.
- 1.4 Write effectively to communicate the concepts learned in this course.

2. OUTCOMES

Upon satisfactory completion of this course, students will be able to:

- 2.1 discuss the historical development of microbiology as a science, especially in relationship to the development of medicine and industry.
- 2.2 describe the overall approach that scientists take to observing the world and trying to make sense of it through controlled experimentation.
- 2.3 describe the basic operating principles and use of several different types of microscopes such as bright-field, dark-field, phase-contrast, fluorescence, and electron in the field of microbiology.
- 2.4 list the taxonomic levels in hierarchical order.
- 2.5 apply the scientific rules of binomial nomenclature to the naming of microorganisms.
- 2.6 describe the three domains and five kingdoms used to classify all living things.
- 2.7 compare and contrast the overall cell structure of prokaryotes and eukaryotes.
- 2.8 summarize the differences in cell wall structure of Gram-positive, Gram-negative, archaea, and mycoplasmas.
- 2.9 describe the chemical reactions of and list some products of fermentation.
- 2.10 list the function of the cellular structures of prokaryotes and eukaryotes.
- 2.11 describe the mechanisms of enzyme action and inhibition.
- 2.12 summarize the processes of aerobic respiration.
- 2.13 identify the nutritional category given a description.
- 2.14 draw the growth curve and summarize what is occurring at each phase.
- 2.15 estimate the number of microorganisms in a sample.
- 2.16 summarize the role microbes play in biogeochemical cycles such as the carbon, nitrogen, and sulfur cycles.

- 2.17 describe the effects of microbial control agents on prokaryotes, eukaryotes, and viruses.
- 2.18 summarize the processes of DNA replication and protein synthesis.
- 2.19 discuss how natural transformation, transduction, and conjugal DNA transfer can induce genetic exchange and diversity in prokaryotes.
- 2.20 describe the chemical and physical structure of a virus.
- 2.21 list and describe the steps of viral multiplication by animal viruses and bacteriophages.
- 2.22 describe the non-specific structural and chemical mechanisms that make-up the innate defense response.
- 2.23 explain the roles of B and T lymphocytes in cellular and humoral divisions of specific immune response.
- 2.24 explain why microbes are vital to life on earth.
- 2.25 perform basic microbiology laboratory techniques including use of a bright-field microscope, aseptic technique, inoculation, sub-culturing, staining, and interpretation of biochemical reactions.
- 2.26 practice safe microbiology, using appropriate protective and emergency procedures.

3. AWC GENERAL EDUCATION (GE) OUTCOMES

- 3.1 DIGITAL LITERACY
 - Access the needed information effectively and efficiently
 - Creates content in a digital environment
- 3.2 COMMUNICATION
 - Write effectively and intelligently for a range of purposes and audiences in the English language (e.g., informing, persuading, advancing an argument, expressing, creating, etc.)
 - Produce scholarly or creative works that effectively employ the communication conventions and means of the major field
 - Provide writing that presents a clear, specific thesis and awareness of audience
- 3.3 QUANTITATIVE ANALYSIS
 - Identify and extract relevant data from given mathematical or contextual situations
 - Select known models or develop appropriate models that organize the data into: tables or spreadsheets (with or without technology); graphical representations (with or without technology); symbolic/equation format
 - Obtain correct mathematical results and state those results with appropriate qualifiers and use the results to: determine whether they are realistic in terms of original data/problem; determine whether the mathematical model/representation of data is appropriate; describe trends in a table, graph, or formula and make predications based on these trends; draw qualitative conclusions in written form; apply them to real world problems
- 3.4 SCIENTIFIC LITERACY
 - Distinguish between a scientific hypothesis and scientific theory
 - Describe the scientific method as a process
 - Utilize data to communicate and apply an understanding of scientific logic and/or quantitative reasoning
 - Analyze an article in popular literature that pertains to science and interpret the findings in terms of public policy, personal experience, or daily life
- 3.5 CIVIC DISCOURSE
 - Study of a scientific discipline that includes ecological and environmental interrelationships.

4. METHODS OF INSTRUCTION

- 4.1 Lectures
- 4.2 Laboratory exercises
- 4.3 Videos
- 4.4 Classroom demonstrations

- 4.5 Class discussions
- 4.6 Instructional technology
5. LEARNING ACTIVITIES
 - 5.1 Textbook reading
 - 5.2 Guest Speakers
 - 5.3 Field Trips
 - 5.4 Laboratory activities
 - 5.5 Writing assignments
6. EVALUATION
 - 6.1 Homework assignments
 - 6.2 Laboratory exercise
 - 6.3 Quizzes
 - 6.4 Exams
7. STUDENT RESPONSIBILITIES
 - 7.1 Under AWC Policy, students are expected to attend every session of class in which they are enrolled.
 - 7.2 If a student is unable to attend the course or must drop the course for any reason, it will be the responsibility of the student to withdraw from the course. Students who are not attending as of the 45th day of the course may be withdrawn by the instructor. If the student does not withdraw from the course and fails to complete the requirements of the course, the student will receive a failing grade.
 - 7.3 Americans with Disabilities Act Accommodations: Arizona Western College provides academic accommodations to students with disabilities through AccessABILITY Resource Services (ARS). ARS provides reasonable and appropriate accommodations to students who have documented disabilities. It is the responsibility of the student to make the ARS Coordinator aware of the need for accommodations in the classroom prior to the beginning of the semester. Students should follow up with their instructors once the semester begins. To make an appointment call the ARS front desk at (928) 344-7674 or ARS Coordinator at (928) 344-7629, in the College Community Center (3C) building, next to Advising.
 - 7.4 Academic Integrity: Any student participating in acts of academic dishonesty—including, but not limited to, copying the work of other students, using unauthorized “crib notes”, plagiarism, stealing tests, or forging an instructor’s signature—will be subject to the procedures and consequences outlined in AWC’s Student Code of Conduct.
 - 7.5 Texts and Notebooks: Students are required to obtain the class materials for the course.
 - 7.6 Arizona Western College students are expected to attend every class session in which they are enrolled. To comply with Federal Financial Aid regulations (34 CFR 678.21), Arizona Western College (AWC) has established an Attendance Verification process for “No Show” reporting during the first 10 days of each semester.

Students who have enrolled but have never attended class may be issued a “No Show” (NS) grade by the professor or instructor and receive a final grade of “NS” on their official academic record. An NS grade may result in a student losing their federal financial aid.

For online classes, *student attendance in an online class is defined as the following* (FSA Handbook, 2012, 5-90):

 - Submitting an academic assignment
 - Taking an exam, an interactive tutorial or computer-assisted instruction
 - Attending a study group that is assigned by the school
 - Participating in an online discussion about academic matters
 - Initiating contact with a faculty member to ask a question about the academic

subject studied in the course