BIO 242E Applied Microbiology

Course Description

This course is an introduction for students to basic concepts and unifying principles of Microbiology, with strong emphasis on the roles of microbes as disease-causing agents. It provides general information on the biology of microorganisms, and the most relevant clinical aspects of infectious diseases, and the impact of microbes on the environment.

Course Goals and Methodology

The goals of this course are to provide the student with an understanding of basic bacterial laboratory techniques and the general concepts in Microbiology, as well as inform about the general practices used to identify and treat the most common infectious agents. The course is oriented towards the clinical aspects of Microbiology, but does introduce significant discoveries to convey important topics. The labs are designed to familiarize students with aseptic methods of microbiological techniques and with their applications in clinical and environmental Microbiology.

The course is structured in lecture and lab sessions. Prior to each session, students are expected to have read the textbook chapters and lab protocols before the corresponding lectures and labs. PowerPoint presentations, lab protocols and other course materials will be posted on Blackboard at least one day prior to the lectures and labs.

Lecture sessions will include lecturing and discussion. Homework assignments will include online quizzes for the contents of the lectures to be posted on Blackboard.

Lab sessions will include the discussion of the results from the previous session, presentation of the experimental procedures and experimental work. General lab safety rules must be kept at all times. A quiz per 2-3 lab sessions will be posted on Blackboard.

Learning Objectives

Upon successful completion of the course students will be able to:

1. Define basic structure/function of microorganisms, with emphasis on their relationships to human disease and treatment of such disease.
2. Identify bacterial/fungal toxic and invasive factors and their relationship to disease.
3. Describe the clinical manifestations associated with common bacterial, viral, fungal, and parasitic diseases.
4. Classify the mechanisms of antibiotic (antibacterial/antifungal) and antiviral activity, as well as resistance strategies employed by target microorganisms.
5. Successfully use basic bacteriological skills in a laboratory or clinical setting.

Required Texts

Textbook purchase is not necessary, but I highly recommend the following textbook:

- *Microbiology: A Systems Approach.* Marjorie Kelly Cowan, 5th edition. 2017. McGraw-Hill Publishing.

Other useful Microbiology manuals:

- *Prescott's Microbiology*. Joanne Willey, Linda Sherwood, Christopher J. Woolverton. 10th edition. 2016. McGraw-Hill Publishing.
- *Brock Biology of Microorganisms*. Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, David A. Stahl, Thomas Brock (Author). 14th edition. Pearson.

Course Requirements and Grading

Four in-class exams (the lowest score of the four is dropped) will be held during the semester, and a final cumulative exam will be held on the final week of the program. A final lab exam will be held on the last lab session.

Lecture and lab quizzes will be graded automatically and the highest grade of two attempts will count towards the students' grade.

Participation will be evaluated on the basis of the students' contribution to in class and online discussion of the proposed topics and case studies

Grading will be as follows:

• Each in-class exam	15% (drop lowest score)
• Final exam (cumulative)	20%
• Lecture quizzes	10%
• Active participation in classroom and online discussions	10%
• Laboratory quizzes	5%
• Laboratory exam (cumulative)	10%
Total	**100%**

Grade conversion scale:

Spanish grade	10	9.5 - 9.9	9.0 - 9.4	8.5 - 8.9	8.0 - 8.4	7.5 - 7.9	7.0 - 7.4	6.5 - 6.9	6.0 - 6.4	5.5 - 5.9	5.0 - 5.4	0.0 - 4.9
U.S. grade	A+	A	A-	B+	B	B	B-	C+	C	C	C-	F

General Course Policies

Leaving the classroom: Leaving the classroom on repeated occasions is disturbing to both your professor and your classmates and may adversely affect your participation grade. Please make use of the 10-minute breaks in between classes to fill up your water bottle, use the restroom, etc.

Punctuality and tardiness: Arriving late to class is disruptive to both the professor and your classmates. Please be punctual as your professor may count your late arrival as half of an absence or simply close the door, not let any late students in and consider it as one full absence.

Communicating with instructor: Please allow at least 48 hours for your instructor to respond to your emails. The weekend is not included in this timeframe. If you have an urgent request or question for your professor, be sure to send it during the week.

Attendance and Absentee Policy

Attendance is mandatory at all classes. As we understand that you might fall ill or be unable to come to class (e.g. due to a religious holiday, a flight delay, a family wedding/ reunion, a graduation, a job interview, etc.) at some point during the semester, you are allowed up to 4 absences. You will be responsible for the material covered and any work missed. You will not need to justify your absences (up to 4) in any way unless you miss an exam, a presentation, a quiz, etc. In this case, you must present a doctor's note (signed, stamped and dated) to be able to reschedule the exam, etc. It will still count as an absence but you will be allowed to retake the exam, etc. We don't encourage you to use all 4 days unless you really need them as your participation grade may suffer if you are not in class. If used unwisely and you get sick late in the semester, the following penalties will apply:

- On your 5th absence, 1 point will be taken off of your final Spanish grade
- On your 6th absence, 3 points will be taken off of your final Spanish grade
- On your 7th absence, 5 points will be taken off of your final Spanish grade

For classes that meet once a week, each absence counts as two. For classes that meet daily, the penalties outlined above apply if you go over 6 absences (7th absence=5th absence above). Exams missed due to an excused absence must be made up within a week of returning to classes. Talk to your professor immediately after your return.

Academic Honesty

Academic integrity is a guiding principle for all academic activity at Pablo de Olavide University. Cheating on exams and plagiarism (which includes copying from the Internet) are clear violations of academic honesty. A student is guilty of plagiarism when he or she presents another person's intellectual property as his or her own. The penalty for plagiarism and cheating is a failing grade for the assignment/exam and a failing grade for the course. Avoid plagiarism by citing sources properly, using footnotes and a bibliography, and not cutting and pasting information from various websites when writing assignments.

Learning accommodations

If you require special accommodations, you must stop by the International Center to speak to the Faculty coordinator (mcaroro@acu.upo.es) to either turn in your documentation or to confirm that our office has received it. Marta will explain the options available to you.

Behavior Policy

Students are expected to show integrity and act in a professional and respectful manner at all times. A student's attitude in class may influence his/her participation grade. The professor has a right to ask a student to leave the classroom if the student is unruly or appears intoxicated. If a student is asked to leave the classroom, that day will count as an absence regardless of how long the student has been in class. Cell phone use is not allowed and animals (except seeing-eye dogs) are not permitted in the classrooms.

Course contents	
Content units (lectures)	Content units (labs)
1. Main themes of Microbiology 2. Methods for studying microorganisms 3. The Bacteria and Archaea 4. Eukaryotic cells and microorganisms 5. An introduction to the viruses 6. Microbial nutrition, ecology and growth 7. Microbial metabolism 8. Microbial genetics 9. Physical and chemical control of microbes 10. Elements of chemotherapy 11. Microbe-human interactions 12. Host defenses I: non-specific defenses 13. Host defenses II: specific immunity and immunization 14. Infectious diseases affecting the skin and eyes 15. Infectious diseases affecting nervous system 16. Infectious diseases affecting the cardiovascular and lymphatic systems 17. Infectious diseases affecting the respiratory system 18. Infectious diseases affecting the gastrointestinal tract 19. Infectious diseases affecting the genitourinary system	1. Hygiene and safety in the Microbiology lab 2. Microbiological methods (I) 3. Microbiological methods (II) 4. Microbiological methods (III) 5. Measuring microbial growth 6. Microbial genetics (I) 7. Microbial genetics (II) 8. Testing antimicrobial susceptibility 9. Identification of microorganisms