

Environmental Health Department
Faculty of Health Science
American University of Beirut
ENHL 227 (3crs) : Environmental Microbiology
Spring Semester AY 2023-2024
Course Syllabus

I. Course title

Environmental Microbiology ENHL 227.

II. Course Instructor:

Name: Rola Ajib

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Office: Van Dyck 4th FL (Environmental Health Department), Rm. 404

Ext: 4626

Office Hours: Mondays & Fridays from 11:00 am to 12:00 noon scheduled by appointment.

III. Class Time and Location:

Monday & Friday from 12:00 noon to 12:50 pm Room #201

IV. ENHL 227 Course Description:

A- Microbiology

The 1st part introduces the student to the world of Microorganisms and especially to the world of Bacteria. It also provides an overview on fundamental aspects of microbiology techniques including all aseptic cultivation techniques, staining & microscopy, microbial metabolism, growth & nutrition as well as on the control of their growth as means for prevention of the spreading of infectious diseases.

B- Environmental & Applied Microbiology

This 2nd part covers the environmental & applied microbiology. The course discusses several positive function microbes perform in the environment (Bioremediation, Biodegradation, ...), it will also provide an indication on soil, air, water, food, & industrial microbiology. However, the laboratory section exposes students to principles of microbiological quality assessment by applying standard analytical techniques and emphasizing quality control protocols

V. Course Learning Outcomes (LOs):

At the end of the course, students should be able to:

LO1: Classify different types of MO

LO2: Identify the growth and nutrition of bacteria as well as the control of microbial growth

- LO3: Categorize MO according to their metabolic pathway
 LO4: Identify infectious diseases, their mode of transmission, and antimicrobial drugs used
 LO5: Define and describe the beneficial and harmful activities of MO in the environment, and their mechanisms of pathogenicity
 LO6: Identify the harmful activities of MO in food and water and their beneficial uses
 LO7: Apply suitable methods & conditions in applied microbiology

VI. Course Content:

<u>Week</u>	<u>Topic</u>	<u>Course LOs</u>	<u>Assessment of LOs</u>
Week 1	Chapter 1: Introduction to Environmental Microbiology: <ul style="list-style-type: none"> - Important groups of microorganisms (MO) - General characteristics of MO & nomination - Functional anatomy of prokaryotic & Eukaryotic cells - MO: Human welfares and human diseases 	LO 1	Multiple choice questions & Lab Work
Week 2	Chapter 2: Growth and Nutrition of Microorganisms <ul style="list-style-type: none"> - Binary fission and budding - Standard bacterial growth curve - Factors affecting bacterial growth: physical & chemical - Types of culture media - Measurement of bacterial growth 	LO 2	Multiple choice & matching questions, Lab work
Week 3	Chapter 3: The control of microbial growth <ul style="list-style-type: none"> - Terminology of bacterial growth control - Microbial death curve - Physical methods of microbial control - Chemical methods of microbial control 	LOs 2 & 3	Multiple choice & matching questions, Lab work
Week 4	Chapter 4: Principles of Infectious diseases <ul style="list-style-type: none"> - Normal microbiota - Etiology of infectious diseases - Classifying infectious diseases - Patterns of diseases - Nosocomial infections 	LOs 4 & 5	Multiple choice & matching questions
Week 5	Chapter 5: Microbial mechanisms of pathogenicity <ul style="list-style-type: none"> - How microbes enter a host? - Portals of entry (respiratory tract, gastrointestinal tract, genitourinary system, skin...) - How do bacterial pathogens penetrate host defenses? - Difference between exo and endotoxins 	LOs 4 & 5	Multiple choice & matching questions

Weeks 6-7	Chapter 6: Food microbiology <ul style="list-style-type: none"> - Intrinsic & extrinsic parameters of food that affect microbial growth - MO in foods - Microbial spoilage of foods - MO in food industry - Food poisoning 	LOs 5, 6 & 7	Multiple choice questions, lab work & case studies
Weeks 8-9	Chapter 7: Water & Wastewater microbiology <ul style="list-style-type: none"> - Vocabulary of water microbiology - Environmental classification of water and excreta-related communicable diseases - Appropriate control strategies to reduce the water related diseases - Emerging waterborne pathogens - Bacterial Pathogens - Water purity and indicator MO - Water treatment in brief 	LOs 5, 6 & 7	Multiple choice questions, lab work & case studies
Week 10-11	Chapter 8: Soil microbiology <ul style="list-style-type: none"> - Habitats provided by soils - Carbon cycle - Nitrogen cycle - Sulfur cycle 	LOs 5 & 7	Multiple choice questions, lab work & case studies
Week 12-13	Chapter 9: Air microbiology <ul style="list-style-type: none"> - MO found in air - Distribution of MO in air - Factors affecting air microflora - Air microflora significance in human health - Major diseases transmitted by air - Control of airborne MO 	LOs 5 & 7	Multiple choice questions, lab work & case studies
Week 14	Chapter 10: Industrial Microbiology <ul style="list-style-type: none"> - Choice of a suitable MO - Preservation of MO - MO growth in controlled environment - Major products of industrial microbiology - Microbial growth in complex natural environments - Fuels and MO 	LOs 5 & 7	Multiple choice questions, lab work & case studies
Week 15	Chapter 11: Bioremediation and Biodegradation <ul style="list-style-type: none"> - Environmental Pollutants - Mechanisms of Bioremediation - Mechanisms of Biodegradation - Applications of Bioremediation & Biodegradation 	LOs 5 & 7	Multiple choice questions, lab work & case studies

PS: Kindly Note that 3 of the lab sessions will be extended as per the Registrar's office recommendation to make up for the 3 Holidays

VII. Course Evaluation

	Type of Evaluation	Course Learning Outcome Assessment	
A.	Attendance & Participation		5 %
B.	Quizzes	LOs 1,2,3,4,5 &6	10 %
C.	Midterm	LOs 1,2,3,4 &5	25 %
D.	Final	LOs 5, 6 &7	30 %
E.	Lab work	LOs 1,4,5 6 & 7	30 %
			100%

VIII. Exams

All covered material is equally important. Exams will be a combination of multiple choice and matching questions and case studies essentially based on lectures.

Midterm: March 2023 (March 6- March 10)

Final Exam: TBA

IX. AUB/FHS policies

Attendance

Students who miss more than one-fifth of the sessions of any course in the first ten weeks of the semester (five weeks in the case of the summer term) are dropped from the course.

Students with Special Needs

'AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314.

Code of Conduct

Based on the rules & regulations of AUB, any attempt of cheating or plagiarism or moral misconduct would result in severe disciplinary actions against the student.

If you're in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know.

So please review the "Student Code of Conduct" on:

<https://aub.policytech.edu/dotNet/documents/?docid=147&public=true>

Non-Discrimination – Title IX – AUB

"AUB is committed to facilitating a campus free of all forms of discrimination including Sex/ gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Ms. Mitra Tauk at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com".

X. References

- 1.** Tortora, B. Funke, and C. Case, 2016. Microbiology: an introduction 12th edition. Benjamin Cummings. London.
- 2.** L.M. Prescott, J.P. Harley and D.A. Klein, 2005. Microbiology 6th edition. Mc Graw-Hill. New York.
- 3.** M. Waites et al 2001. Industrial Microbiology. An Introduction. Blackwell science. London

Enjoy your semester & Good Luck