

**Department of Environmental Health
Faculty of Health Science
American University of Beirut
ENHL 227 (3crs): Environmental Microbiology
Spring Semester 2019-2020
Course Syllabus**

1. Course Instructor:

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Office Hours: Mondays & Wednesdays from 12:00 to 13:00 or by appointment

2. Class Time and Location:

Monday & Wednesday from 16:00 to 16:50, Room #203

3. ENHL 227 Course Description:

A- Microbiology

The first part introduces the student to the world of Microorganisms and specifically 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. It also sheds the light on antimicrobial resistance, a startling phenomenon spreading at an alarming pace.

B- Environmental & Applied Microbiology

The second part covers the environmental & applied microbiology. The course discusses several positive functions and roles that microbes perform in the environment (Bioremediation, Biodegradation, production of medicines ...), 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.

4. Course Learning Objectives (LOs):

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

LO1: Classify different types of MO

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

LO3: Categorize MO according to their metabolic pathway

LO4: Identify pathogens responsible for infectious diseases, their modes of transmission, and antimicrobial drugs used.

LO5: Define and understand the phenomenon of antimicrobial resistance

LO6: Define and describe the beneficial and harmful activities of MO in the environment and their mechanisms of pathogenicity

LO7: Identify the benefits and the harmful activities of MO in food and water.

LO8: Apply suitable methods and conditions in applied microbiology.

5. Course Content:

Week	Topic	Course LOs	Assessment of LOs
Week 1	Chapter 1: Introduction to Environmental Microbiology: - 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 2-3	Chapter 2: Growth and Nutrition of Microorganisms - 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
Week3- 4	Chapter 3: The control of microbial growth	LO 2 & 3	Multiple choice & matching questions, Lab work

	<ul style="list-style-type: none"> - Terminology of bacterial growth control - Microbial death curve - Physical methods of microbial control - Chemical methods of microbial control 		
Week 5	<p>Chapter 4: Principles of Infectious diseases</p> <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 6	<p>Chapter 5: Microbial mechanisms of pathogenicity</p> <ul style="list-style-type: none"> - How microbes enter a host? - Portals of entry (respiratory tract, gastro intestinal tract, genitourinary system, skin...) - How do bacterial pathogens penetrate host defenses -Resistance mechanisms in bacteria - Difference between exo and endo-toxins 	LOs 4 & 5	Multiple choice & matching questions

Weeks 7-8	Chapter 6: Food microbiology - 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 9-10-11	Chapter 7: Water & Wastewater microbiology - 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 & 8	Multiple choice questions , lab work & case studies
Week 12	Chapter 8: Soil microbiology - Habitats provided by soils - Carbon cycle - Nitrogen cycle - Sulfur cycle	LOs 5 & 7-8	Multiple choice questions, lab work & case studies

<p>Week 13</p>	<p>Chapter 9: Air microbiology - 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</p>	<p>LOs 5 & 7</p>	<p>Multiple choice questions, lab work & case studies</p>
<p>Week 14</p>	<p>Chapter 10: Industrial Microbiology - 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</p>	<p>LOs 5 & 7</p>	<p>Multiple choice questions, lab work & case studies</p>
<p>Week 15</p>	<p>Chapter 11: Bioremediation and Biodegradation - Environmental Pollutants - Mechanisms of Bioremediation - Mechanisms of Biodegradation - Applications of Bioremediation & Biodegradation</p>	<p>LOs 5 & 7</p>	<p>Multiple choice questions, lab work & case studies</p>

6. Course Evaluation

F1.	Attendance & participation	5 %
F2.	Drop Quizzes	15 %
F3.	Midterm	20 %
F4.	Final	30 %
F5.	Lab work	30 %
Total		100%

7. 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. However, some assigned readings are also concluded.

Midterm: TBA

Final Exam: TBA

8. Attendance

Attendance is a must, based on AUB Rules & Regulations. Missing more than one fifth of the course sessions during the first 10 weeks of the semester and without valid reasons would result in automatic withdrawal. (AUB Catalogue p. 43)

9. 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.

10. Academic Integrity

The American University of Beirut has a strict anti-cheating and anti-plagiarism policy. So please review the “Student Code of Conduct” on:

(<http://www.aub.edu.lb/pnp/generaluniversitypolicies/Documents/StudentCodeConduct/StudentCodeConduct.pdf>)

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.

11. Resources

Jafet & Sciences Libraries

Writing Center, West Hall, writing@aub.edu.lb : writing skills

Student Handbook: Rules & Regulations

Good Luck and Enjoy the Course.