

American University of Beirut
Faculty of Health Sciences
Introduction to Bacteriology
MLSP 203 (3 credits)
Fall Semester (AY 2023/2024)

Instructor: **Dr. Mirna Bou Hamdan**
Van Dyck Rm 319
Office Hours: by appointment
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Time and Place: MR: 11:00-11:50 am, VD Auditorium
Lab Lecture: M 10:00-10:50 am, VD Auditorium
Lab Section 1: TW 8:00-9:59 am, VD 403
Lab Section 2: TW 10:00-11:59 am, VD 403

Course Description

The course is a 3-credit course offered to Medical Laboratory Sciences (MLS) undergraduate students in their junior year. This course introduces students to the microbial world with emphasis on bacterial taxonomy, host-pathogen interactions, bacterial growth, bacterial genetics as well as antimicrobial susceptibility testing and concepts of bacterial resistance. Throughout the course, the lectures will be aligned with laboratory sessions introducing students to basics of bacterial identification including microscopy, bacterial culture and susceptibility testing.

Course Learning Outcomes (LOs)

Upon completion of this course, students should be able to:

1. Describe the microbial anatomy and pathogenesis of both Prokaryotic and Eukaryotic cells.
2. Define the various mechanisms of bacterial metabolism, growth and microbial-host interactions including virulence factors and concepts of host immunological responses.
3. Understand modes of action of antibiotics and concepts of antimicrobial resistance.
4. Apply laboratory safety techniques including disinfection and antiseptics.
5. Implement various types of techniques used in bacterial isolation and laboratory identification.
6. Identify and differentiate gram positive and gram negative bacteria.

Course Material and Readings

Suggested Reference Book: Diagnostic Microbiology; Bailey and Scott's; 15th Ed.

The course material will include lecture handouts and reading assignments. The lecture handouts, PowerPoint Presentations and recordings will be posted on Moodle.

Course Format

Information will be delivered to students in the form of Moodle handouts and assigned readings from the suggested reference book. Quizzes on the covered material will be conducted to evaluate students.

Assessment Methods

	Tentative Date	LOs Covered	Percentage
Midterm Exam	12/10/2023	LOs 1-2	30%
The Midterm Exam will be conducted after the 6 th week to assess the students' understanding and critical thinking. It will include MCQ and subjective questions based on given lectures and assigned readings.			
Final Exam	TBD	LOs 1- 6	40%
The Final Exam will include questions based on lectures and required readings / handouts. It will test students on lectures given between the 6 th and 12 th week. The exam will also include MCQ questions as well as subjective questions to assess students' critical thinking and their ability to link information.			
Laboratory	TBD (check separate syllabus)	LOs 4-6	25%
The laboratory part introduces students to the principles and basic laboratory methods for bacterial identification. It includes lectures / handouts on Moodle. Students' performance will be assessed through conducting experiments and sitting for written exams.			
Attendance and Participation			5%

*Failing final course grade (below 60) requires a student to repeat the MLSP 203 course.

Course Outline

Week / Date	Lecture	Topic/ Activity	Required Readings
Week 1 8/28/2023	Lecture 1	History of Microbiology and Introduction to the Microbial World	Chapter 1: Microbial Taxonomy p: 1-4.
	Lecture 2	Bacterial Anatomy and Classification (Prokaryotes vs. Eukaryotes)	Chapter 1: Microbial Taxonomy p: 1-4. Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22.
Week 2 9/4/2023	Lecture 3	Bacterial Anatomy and Classification (Prokaryotes vs. Eukaryotes)	Chapter 1: Microbial Taxonomy p: 1-4. Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22.
	Lecture 4	Microbial Ecology and Natural Habitats (Microbial ecology and their natural habitats with emphasis on human normal flora)	Chapter 3: Host-Microorganism Interaction p: 22-39.
Week 3 9/11/2023	Lecture 5	Microbial Ecology and Natural Habitats (Microbial ecology and their natural habitats with emphasis on human normal flora)	Chapter 3: Host-Microorganism Interaction p: 22-39.
	Lecture 6	Microbial Virulence Factors and Microbial-Host Interaction	
Week 4 9/18/2023	Lecture 7	Microbial Virulence Factors and Microbial-Host Interaction	Chapter 3: Host-Microorganism Interaction p: 22-39.
	Lecture 8	Principles of Disease and Epidemiology including Habitant and Methods of Transmission	
Week 5 9/25/2023	Lecture 9	Principles of Disease and Epidemiology including Habitant and Methods of Transmission	Chapter 3: Host-Microorganism Interaction p: 22-39.

	Lecture 10	Introduction to Bacterial Genetics	Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22. Chapter 8: Nucleic Acid-Based Analytic Methods for Microbial Identification and Characterization p: 106-133.
Week 6 10/2/2023	Lecture 11	Introduction to Bacterial Genetics	Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22. Chapter 8: Nucleic Acid-Based Analytic Methods for Microbial Identification and Characterization p: 106-133.
	Lecture 12	Microbial Metabolism and Microbial Growth Factors (The Microbial metabolism of bacteria and the requirements needed for microbial growth)	Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22. Chapter 7: Traditional Cultivation and Identification p: 81-106.
Week 7 10/9/2023	Lecture 13	Microbial Metabolism and Microbial Growth Factors (The Microbial metabolism of bacteria and the requirements needed for microbial growth)	Chapter 2: Bacterial Genetics, Metabolism, and Structure p: 4-22. Chapter 7: Traditional Cultivation and Identification p: 81-106.
10/12/23	Midterm (Lectures 1-11)		
Week 8 10/16/2023	Lectures 14 and 15	Antimicrobial Drugs Part I (The principles and mechanisms of antimicrobial modes of action)	Chapter 11: Principles of Antimicrobial Action & Resistance p: 153-168. Chapter 12: Laboratory Methods and Strategies for Antimicrobial Susceptibility Testing p: 168-193.

Week 9 10/23/2023	Lectures 16 and 17	Antimicrobial Drugs Part II (The development of antimicrobial resistance and dilution tests used to detect MIC, and MBC of various antibiotics (e.g. E-test, broth dilution method, agar dilution method))	Chapter 11: Principles of Antimicrobial Action & Resistance p: 153-168. Chapter 12: Laboratory Methods and Strategies for Antimicrobial Susceptibility Testing p: 168-193.
Week 10 10/30/2023	Lectures 18 & 19	Antimicrobial Drugs Part II (The development of antimicrobial resistance and dilution tests used to detect MIC, and MBC of various antibiotics (e.g. E-test, broth dilution method, agar dilution method))	Chapter 11: Principles of Antimicrobial Action & Resistance p: 153-168. Chapter 12: Laboratory Methods and Strategies for Antimicrobial Susceptibility Testing p: 168-193.
Week 11 11/6/2023	Lecture 20 & 21	Introduction to Medically Important Bacteria Gram-Positive Cocci (Catalase-Positive) (<i>Staphylococcus aureus</i> and <i>Coagulase-negative Staphylococcus</i>)	Chapter 14: <i>Staphylococcus</i> , <i>Micrococcus</i> , and Similar Organisms p: 232-247.
Week 12 11/13/2023	Lecture 22 & 23	Gram-Positive Cocci (Catalase-Negative) (<i>Streptococcus pneumoniae</i> , <i>Enterococcus spp.</i> , and <i>Beta-hemolytic Streptococci</i>)	Chapter 15: <i>Streptococcus</i> , <i>Enterococcus</i> , and Similar Organisms p: 247-265.
Week 13 11/20/2023	Lectures 24 & 25	Gram-Negative Cocci and Coccobacilli (<i>Neisseria spp.</i> , <i>Moraxella catarrhalis</i> and <i>Acinetobacter spp.</i>)	Chapter 21: <i>Acinetobacter</i> , <i>Stenotrophomonas</i> , and Similar Organisms p: 329-335. Chapter 28: <i>Moraxella</i> and Related Organisms p: 383-387. Chapter 40: <i>Neisseria</i> and <i>Moraxella catarrhalis</i> p: 449-458.
Week 14 11/27/2023	Review Sessions + Case Studies		
TBD	Final Exam		

Course Requirements

- **Attendance:** Attendance will be taken during each session. Students are urged to attend all classes. In case of absence, you will be responsible of the material missed and for any announcements made. **Students who miss more than one-fifth of class sessions are subject to withdrawing from the course with a W-grade (AUB catalogue).**
- **Examination:** Students must take the quizzes, unknowns and final exams on the set date. Make-up exams will be given only in case of emergencies or major illness. Only authorized medical reports will be accepted.
- **Dress Code:** Students will be expected to follow a dress code at the laboratory that follows the safety measures.
- **Academic Integrity:** Cheating and plagiarism will not be tolerated. Review the student Code of Conduct in the student handbook and familiarize yourself with definitions and penalties. If you are in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know. The American University of Beirut has a strict anti-cheating policy. Penalties include failing marks on the assignment in question, suspension or expulsion from University and a permanent mention of the disciplinary action in student's records.
- **Students with Disabilities:** AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (including learning difficulties, mental health, chronic or temporary medical conditions), please inform the instructor immediately or kindly register with the Accessible Education Office (AEO) (accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314') in order to ensure that you receive the support you need and to facilitate a smooth accommodation process.
- **Non-Discrimination – Title IX – AUB:** In line with its commitment to the principle of equal opportunity in education and employment, AUB policies protect you from discrimination on the basis of protected characteristics, including discriminatory harassment and sexual harassment. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination, discriminatory harassment, or sexual harassment, we encourage you to inform the Equity/Title IX Coordinator, Mitra Tauk at 01-350000 ext. 2514, titleix@aub.edu.lb, report to a Title IX deputy at your faculty or at any other faculty (www.aub.edu.lb/titleix), or report online (www.aub.edu.lb/icspoint.com). Reports may be submitted anonymously or not.