

Practical Microbiology

**Cihan University
Medical Laboratory Analysis**

Lab 1: Introduction, laboratory guides, and course syllabus

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MSc: Microbiology & Animal Cell Culture

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Introduction

- Microbiology is a science that deals with the study of microscopic organisms including unicellular such as bacteria, multicellular such as fungi and acellular such as virus and prion.
- Microbes are ubiquitous and effect on all aspects of our life which may have:
 - Beneficial effects in industry and biotechnology.
 - Harmful effects such as those can cause diseases in human and animals.



Course objectives

- ✓ This course focus on different aspects of microorganisms' life concerning:
- ✓ Habitats, cultivation, isolation and their general characteristics.
- ✓ Detailed information about their growth requirements, cultivation media, growth characteristics.
- ✓ Enzymatic activities and biochemical properties.
- ✓ Additionally, this course will explain all techniques and practices related to laboratory safety, isolation techniques, handling, management, culturing and preservation of microorganisms.
- ✓ Microbial enumeration.
- ✓ Antibiotics and antimicrobial assay.
- ✓ Methods in their identifications such as staining and culturing techniques.

General guidelines in practical Microbiology lab safety

- Treat all microorganisms as potential pathogens especially unknown cultures so aseptic techniques must be followed every times.
- Wear appropriate clothing, gloves and shoes to the laboratory.
- Shoes must completely cover the feet to provide protection from air-born microbes, broken glass and spills.



General guidelines in practical Microbiology lab safety

- Wash your hands thoroughly with antibacterial soap or ethanol before beginning the lab session.
- Wipe your work area with disinfectant, and allow to air-dry before beginning the lab session.
- If you accidentally spill a culture, or any reagents cover the spill with a paper towel, flood it with disinfectant, and notify your laboratory instructor.



General guidelines in practical Microbiology lab safety

- Do not perform any activities in the lab until you are given instructions by your laboratory instructor.



General guidelines in practical Microbiology lab safety

➤ Do not eat, drink, smoke, or apply makeup while working in the laboratory.



General guidelines in practical Microbiology lab safety

- If you cut or burn yourself while working, report this immediately to your laboratory instructor.



General guidelines in practical Microbiology lab safety

- Broken glassware should be immediately brought to the attention of your laboratory instructor.
- Broken glass should be placed in a special sharps container for disposal and not in the trash container.



General guidelines in practical Microbiology lab safety

- If using a Bunsen burner, tie back long hair.
- When in use, always be aware of the flame.
- Do not lean over the countertop.
- Keep flammable items away from the flame.
- Turn off the burner when not in use.



General guidelines in practical Microbiology lab safety

- Before leaving the lab, make sure all items have been returned to their appropriate location.
- Do not remove any item from the lab unless you have been directed to do so by the laboratory instructor.
- Place all books, backpacks, purses, etc., in an area designated by your laboratory instructor.
- Carry to your work area only the items you will use in the lab.

General guidelines in practical Microbiology lab safety

- After your work area is clear, wipe down your countertop with disinfectant before leaving.
- Wash your hands thoroughly with soap or ethanol before leaving the lab.



Additional biosafety guidelines

- ✓ Do not put anything into your mouth when working with cultures.
- ✓ Do not pipette by mouth; use a pipette aid instead. Keep your hands, pencil, pen, etc., away from your mouth, eyes, and nose.
- ✓ When inoculating cultures, sterilize the loop or needle before placing it on the counter.
- ✓ Always keep tubes in test tube racks when working with liquid media. Do not stand them up or lay them down on the countertop where they may spill.
- ✓ Place all used culture media, paper towels, gloves, etc., into the waste container designated by your laboratory instructor.
- ✓ A separate waste container for sharps (slides, pipettes, swabs, broken glass, etc.) will also be provided.
- ✓ All this waste will be autoclaved before disposal or reuse (Do not throw any of these items into the trash container).

Syllabus

Topics
Lab 1: introduction, laboratory safety and course syllabus
Lab 2: microbiological laboratory equipment and & microbial growth control methods
Lab 3: Culture Media, preparation, and their physical, chemical and functional types
Lab 4: Microbial growth requirements & isolation techniques
Lab 5: Culture characteristic of microbes (colony morphology, texture and topography)
Lab 6: Microscopic examination of bacteria, smear preparation & simple staining
Lab 7: differential staining (Gram staining technique)
First exam
Lab 8: differential staining (Acid-fast staining (Ziehl–Neelsen stain) & spore staining)
Lab 9: microbial counting methods (viable or standard plate count, direct microscopic count & spectrophotometric method)
Lab 10: Enzymatic activities of bacteria (catalase, coagulase, oxidase & urease)
Lab 11: IMViC tests (Indole test, Methyl Red test, Voges Proskauer test and Citrate utilization test)
Lab 12: Antimicrobial agents, Antibiotics & antimicrobial sensitivity assays (disk diffusion method, well diffusion method & broth microdilution method)

Grade assessment

Practical Session		
Quiz	-	4
Lab. Report	-	8
Lab. Presentation or assignment	-	4
Lab. Attitude	-	2
Attendance	-	2
Total		20
Final Exam		
Practical Examination	1	20