



Microbiology Academic Laboratory User Handbook

**Department of Microbiology
Brahmanbaria Medical College
Ghatura, Brahmanbaria**

Department of Microbiology
Brahmanbaria Medical College
Microbiology Teaching Laboratory, User Handbook

Name of the Lab: Microbiology Teaching Laboratory, BMC.

Name of Lab. In-charge: Prof. Dr. Md. Zakiur Rahman.

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Introduction

The Microbiology Teaching Laboratory is an integral component of the undergraduate MBBS curriculum, providing students with practical knowledge and essential laboratory skills in diagnostic Microbiology, Immunology, Parasitology, and Mycology. The laboratory sessions are designed to complement theoretical teaching by enabling students to observe microorganisms, perform basic microbiological procedures, and interpret laboratory findings relevant to patient care.

During practical sessions, students will gain hands-on experience in microscopy, staining techniques, specimen processing culture methods, antimicrobial susceptibility testing, sterilization and disinfection procedures, and selected immunological and molecular diagnostic methods. Emphasis is placed on the principles of biosafety, aseptic techniques, quality assurance, infection prevention, and ethical laboratory practice.

This laboratory manual serves as a guide for students throughout their practical training. It outlines the objectives, laboratory protocols, practical exercises, assessment methods, and essential safety measures to ensure a productive and safe learning environment. By successfully completing the laboratory course, students will acquire the competencies required to understand, perform, and interpret common microbiological investigations and apply these skills appropriately in clinical practice.

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Objectives

The student will be able to

- plan necessary laboratory investigations selecting appropriate clinical samples at the right time, using the right method of their collection and interpret the results of these laboratory investigations to arrive at laboratory diagnosis of microbial and immunological diseases.
- carryout media preparation, bacterial culture and antimicrobial sensitivity tests.
- perform simple laboratory tests available in Upazila Health Complex.
- Interpret the results of tests and can treat the patients accordingly.
- carryout the techniques of asepsis, antisepsis and sterilization in day-to-day procedures.
- undertake universal precautions in laboratory and clinical practices.

Faculty

Name	Designation	Role
Prof. Dr. Md. Zakiur Rahman	Professor and Head	Lab. In-charge
Prof. Dr. Md. Arifur Rahman	Professor	Supervisor
Dr. Maksurat Zereen Khan	Assistant Professor	Observer
Dr. Tanzina Rahman	Lecturer	Demonstrator
Dr. Shahidul Islam Mani	Lecturer	Demonstrator
Dr. Anamika Banik Reya	Lecturer	Demonstrator
Nawjin Jahan Rima	Lab. Technologist	Maintenance
Mosharrof Hossain	Lab. Technologist	Maintenance
Lucky Dutta	Lab. Technologist	Maintenance
Md. Eidnan Sarkar	Lab. Assistant	Maintenance

List of competencies to acquire:

Students will be able to:

- perform and interpret Gram's stain, Z-N stain and Albert stain.
- observe the common bacteriological media with growth of *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli*, *Salmonella*, *Shigella*, *Klebsiella*, *Proteus*, *Pseudomonas* and MTB.
- observe the drug sensitivity test of bacteria.
- prepare stool smear and examine under microscope.
- observe cyst/trophozoites of intestinal and luminal protozoa.
- observe ova of *A. lumbricoides*, *T. trichiuria*, Hook worms and others.
- observe pus cell, macrophage and RBC in stool sample.
- examine blood slide under microscope for demonstration of *Plasmodium* species and microfilaria.
- examine bone marrow smear for LD body.
- Observe and interpret the results of immunological tests.
- Observe skin scrapping for fungus.
- observe pus cells, RBCs, casts and parasites in urine.
- Know about slit skin smear for *M. leprae*.

Consolidated teaching hours in Phase II and Phase III:

Phase II (3rd year): 13 hours

Phase III (4th year): 32 hours

Practical Class Schedule:

One 60 minutes session per month will be held in every 3rd week in 3rd year and two 120 minutes sessions per month will be held in every 2nd and 4th week in 4th year.

Contents of Practical

SL No.	Contents	Teaching Hours
1.	Gram's staining	4
2.	Z-N staining, Albert stain, Auramin-Rhodamine stain	4
3.	Demonstration of culture media	5
4.	Demonstration of colony morphology of common bacteria	3
5.	Demonstration of inoculation, incubation and plate reading.	2
6.	Demonstration of biochemical tests	4
7.	Demonstration of in vitro antibiotic sensitivity test by disk diffusion method	4
8.	Demonstration of sterilization by chemical agents autoclaving and hot air oven	2
9.	Demonstration of donning and doffing, wearing PPE, hand washing/sanitization	1
10.	Preparation of disinfectants	1
11.	Microscopic examination of stool	4
12.	Microscopic examination of urine	2
13.	Examination of blood smear for malarial parasites	1
14.	Examination of bone marrow smear for LD body	1
15.	Immunological tests	1
16.	Microscopic examination of skin scrapping	1
17.	Microscopic examination of Gram stain smear of throat swab, wound swab, urethral discharge	1
18.	Examination of throat swab by Albert stain	1
19.	Microscopic examination of sputum and urine by Z-N stain for AFB	1
20.	Modified Z-N stain for Cryptosporidium in stool	1
21.	PCR and RT-PCR	1

Laboratory Protocol

All students are required to strictly follow the laboratory protocols to ensure personal safety, maintain laboratory discipline, prevent contamination, and obtain reliable results.

1. Students must attend the laboratory in a clean laboratory coat, wearing closed shoes and carrying the required practical notebook.
2. Hands should be washed or sanitized before entering and after leaving the laboratory.
3. Eating, drinking, smoking, chewing gum, and the use of mobile phones are strictly prohibited inside the laboratory.
4. Students must follow all biosafety precautions and treat every clinical specimen as potentially infectious.
5. Personal protective equipment (PPE) including gloves, masks, and eye protection, should be used whenever indicated.
6. Laboratory benches must be disinfected before and after each practical session.
7. Students should carefully read the practical exercise before beginning any experiment and follow the instructor's directions at all times.
8. No culture, reagent, or laboratory equipment should be used without permission from the teacher or laboratory personnel.
9. Microscopes and other laboratory instruments should be handled carefully and returned to their designated places after use.
10. Proper aseptic techniques must be maintained during specimen handling, staining, inoculation, and culture procedures.
11. Sharps, contaminated materials, and biological waste must be disposed of in designated containers according to biomedical waste management guidelines.
12. Any spill, injury, breakage of glassware, needle stick injury, or laboratory accident must be reported immediately to the laboratory instructor.
13. Students should accurately record observations, results, and interpretations in their practical notebooks during each session.
14. Unauthorized removal of specimens, cultures, reagents, instruments, or laboratory records is strictly prohibited.
15. Students must switch off microscopes, burners, and electrical equipment after use and leave the workplace clean and organized before leaving the laboratory.
16. Regular attendance, punctuality, discipline, and adherence to laboratory safety regulations are mandatory for successful completion of the practical course.

List of Instruments:

- Bino-ocular and teaching microscope
- Bunsen burner
- Slide & cover slip
- Pipette and Micro pipette
- Centrifuge machine
- Colorimeter, Spectrophotometer
- Incubator
- Balance
- Water bath
- Cell Counter
- Autoclave
- Hot air oven
- Computer
- ELISA reader
- Petri dish
- Inoculating wire loop
- Automated blood culture machine
- PCR machine

Reagent List:

- Gram staining reagents
- Acid fast staining reagents
- Leishman staining reagents
- Normal saline
- Hydrogen peroxide
- Media bases

Marks distribution of practical in 3rd professional MBBS examination

OSPE and Traditional Practical Examination:

Total Marks: 100

Pass Marks: 60

Marks distribution	Marks
OSPE (10 Stations: 8 question stations, 2 procedure stations)	50
Traditional method	40
Practical notebook	05
Assignment on integrated teaching	05
Total	100

Guidelines for OSPE and Traditional Practical

Guidelines for OSPE:

Number of Station: 10 (5 from Term I and 5 from Term II)

Time for each station: 3 minutes.

Marks in each station: 5

Contents of OSPE

No.	Task	Marks
1.	Two procedure stations (arranged on day of exam.)	5*2=10
2.	One microbiological slide	5*1=5
3.	One Instrument	5*1=5
4.	Two bacteriological culture media	5*2=10
5.	Identification of a structure from diagram	5*4=20

Guidelines for Traditional Practical

No.	Task	Marks
1.	A fixed smear is supplied. Do the steps of Gram staining and write down the findings with diagram.	10
2.	A fixed smear is supplied. Do the steps of Ziehl-Neelsen staining and write down the findings with diagram.	10
3.	A centrifuged deposit of urine sample is supplied. Do the microscopic examination and record your findings with diagram.	10
4.	A sample of stool is supplied. Examine it microscopically and record your findings with diagram.	10