

ANNEXURE E

FACULTY OF LIFE SCIENCES

SYLLABUS

of

Bachelor of Medical Laboratory Science

(Under Credit Based Continuous Evaluation Grading System)

Session: 2026-27



**The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
Bachelor of Medical Laboratory Science
Semester -II
Session: 2026-27

Course Code	Course Title	Course Type	Total Credits (L-T-P)	Credit Hours			Total Marks	Marks			Exam Time in Hours
				L	T	P		L	P	CA	
BMLL-2065	Fundamentals of Microbiology	DSC	4-0-0	4	-	-	100	70	-	30	3
BMLP-2065	Fundamentals of Microbiology Lab	DSC	0-0-2	-	-	4	50	-	35	15	3

DSC: Discipline Specific Course

Bachelor of Medical Laboratory Science
Semester-II
Session: 2026-27
Course Title: Fundamentals of Microbiology
Course Code: BMLL-2065
(Theory)

COURSE OUTCOME:

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

CO1: Explain the concepts of microbiology, microscopy, bacterial structure, staining, and physiology.

CO2: Apply the principles of bacterial genetics, sterilization, disinfection, culture media, and cultivation techniques.

CO3: Analyze bacterial identification methods, taxonomy, biochemical tests, automated diagnostic systems, and antimicrobial susceptibility testing.

CO4: Evaluate microbial infections, host–microbe interactions, microbiome, epidemiology, and antimicrobial susceptibility data for infection control and clinical decision-making.

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(Theory)

Time: 3 Hours

L-T-P: 4-0-0

Max. Marks: 100

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 14 marks

UNIT 1

Historical Development of Microbiology: Infection and Contagion, Discovery of Microorganisms, Conflict over Spontaneous Generation, Role of Microorganisms in Diseases, Scientific Development of Microbiology - Louis Pasteur, Joseph Lister, Robert Koch, Paul Ehrlich, Edward Jenner, Ignaz Semmelweis, Antony van Leeuwenhoek.

Microscopy: Light Microscopy, Bright-field microscopy, Dark- ground microscopy, Phase-contrast microscopy, Fluorescence microscopy, Electron microscopy.

Morphology of Bacteria: Comparison of Prokaryotic Cells– Eukaryotic cells, size of bacteria, arrangement of bacterial cells, Anatomy of the bacterial cell- the structure, function, and clinical significance of - Cell wall, Cell membrane, Cell surface appendages, Bacterial Capsule, Cell organelles, plasmid, Spore. Principles of staining - Simple staining, Negative staining, Differential staining, Gram's and acid-fast staining, Albert's, Flagella staining, Capsule staining, Endospore staining

UNIT 2

Physiology of Bacteria: generation time of bacteria, bacterial growth curve, bacterial nutrition, bacterial metabolism.

Bacterial Genetics: Different gene transfer methods: Transformation, Transduction, Lysogenic conversion, Conjugation.

Sterilisation and Disinfection: Classify sterilisation methods - Dry heat sterilisation, Moist heat sterilisation, Radiation, Filtration. Disinfection- Classify disinfectants, general features of disinfectants - Alcohols and aldehydes, Dyes, halogens and phenols - Gases, surface active agents and metallic salts, Testing of disinfectants - Rideal Walker method, Chick Martin test, Disinfectant kill time test, Kelsey-Sykes test, In-use test, Advanced techniques in Sterilisation of Heat-Sensitive Articles.

UNIT 3

Culture Media and Methods: Culture Media- common ingredients of culture media, classification of media. Culture Methods- Methods of bacterial culture, aerobic culture, anaerobic culture, methods of anaerobiosis, methods of isolating pure cultures

Identification of Bacteria: Methods used to identify bacteria, phenotypic characteristics, genomic characterisation, Bacterial Taxonomy-Taxonomy, Identification, classification systems, Identification of Bacteria by biochemical tests and automated systems: - Bac T alert and BACTEC systems, -VITEK and Phoenix systems - RTPCR, MALDI-TOF.

UNIT 4

Antibiotic susceptibility testing (AST):

A. Diffusion methods 1. Kirby–Bauer disk diffusion method 2. Stokes disk diffusion method

B. Dilution methods 1. Broth dilution method 2. Agar dilution method. Epsilometer or E-test, Minimum inhibitory concentration (MIC) and Minimum bactericidal concentration (MBC) of antibiotics

Human Normal Microbial Flora and Microbiome: Microbial Infections- Microorganisms and Host, Infection and Infectious Disease, Classification of Infections, Sources and Modes of Transmission of Infection, Epidemiological Terminologies.

BOOKS RECOMMENDED:

1. Mackie, T. J., McCartney, J. E., & Collee, J. G. (1996). *Mackie & McCartney practical medical microbiology*.
2. . Tille, P. M. (2013). *Bailey & Scott's Diagnostic Microbiology-E-Book: Bailey & Scott's Diagnostic Microbiology-E-Book*. Elsevier Health Sciences.
3. Ananthanarayan, R. (2006). *Ananthanarayan and Paniker's textbook of microbiology*. Orient Blackswan.
4. Kumar, S. (2015). *Essentials of microbiology*. JP Medical Ltd.
5. Parija, S. C. (2023). *Textbook of microbiology and immunology* (pp. 517-540). Singapore: Springer Nature Singapore.
6. Prescott, L. M., Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2018). *Microbiologie*. De Boeck Supérieur.
7. Sankar, S. A., Bhat, K. S., & Anand, J. (2016). *Essentials of Medical Microbiology*. Jaypee Brothers Medical Publishers (P) Ltd.
8. Godkar, P. B., & Godkar, D. P. (2006). *Textbook of medical laboratory technology*. Bhalani publishing house.

Bachelor of Medical Laboratory Science
Semester-II
Session: 2026-27
Course Title: Fundamentals of Microbiology Lab
Course Code: BMLP-2065
(Practical)

COURSE OUTCOME:

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

CO1: Explain the principles of microbiology laboratory safety, biosafety, sterilization methods, specimen collection, staining techniques, quality control procedures, and the operation of essential laboratory equipment.

CO2: Demonstrate the collection, transport, and processing of clinical specimens, and perform sterilization, preparation of culture media, reagents, disinfectants, and staining techniques following standard laboratory protocols.

CO3: Analyze microscopic observations, staining results, sterilization efficacy, and quality control outcomes to validate laboratory procedures, culture media, and the identification of microorganisms.

CO4: Perform and evaluate microbiology laboratory practices by applying biosafety measures, infection control guidelines, quality assurance practices, and standard operating procedures to ensure accurate and reliable laboratory investigations.

Bachelor of Medical Laboratory Science
Semester-II
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Course Code: BMLP-2065
(Practical)

Credits: 0-0-2

Total marks: 50

Practical Marks: 35

Time: 3 Hours

CA:15

1. Demonstrate the collection of various clinical specimens and their transport and processing.
2. Demonstration of safe laboratory practices in the Microbiology laboratory.
3. Cleaning of glassware and sterilization by physical and chemical methods.
4. Microscopic examination and processing of clinical specimens.
5. Operation of an autoclave and hot air oven, including efficacy testing of sterilization.
6. Sterilization of reagents and culture media using appropriate methods.
7. Sterilization of media and solutions by membrane filtration.
8. Preparation, dilution, and safe handling of commonly used disinfectants.
9. Simple staining of bacterial cells.
10. Gram staining and microscopic interpretation of bacteria.
11. Preparation of stains, reagents, and culture media; quality control of reagents and media; and sterility testing.
12. Identification and use of quality control (QC) strains for culture media validation.

SUGGESTED READING:

1. Mackie, T. J., McCartney, J. E., & Collee, J. G. (1996). Mackie & McCartney practical medical microbiology.
2. Tille, P. M. (2013). *Bailey & Scott's Diagnostic Microbiology-E-Book: Bailey & Scott's Diagnostic Microbiology-E-Book*. Elsevier Health Sciences.
3. Ananthanarayan, R. (2006). *Ananthanarayan and Paniker's textbook of microbiology*. Orient Blackswan.
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