

ANNEXURE D

FACULTY OF LIFE SCIENCES

SYLLABUS

of

**Bachelor of Science (Honours) (Medical Laboratory Technology)
(Semester: III-IV)**

(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 Science (Honours) (Medical Laboratory Technology)
Semester -III
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-3064	Introduction to Bacteriology and Virology	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3064	Introduction to Bacteriology and Virology Lab	DSC	0-0-1	-	-	2	50	-	35	15	3
BMLL-3065	Basic of Microbiology-I	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3065	Basic of Microbiology-I Lab	DSC	0-0-1	-	-	2	50	-	35	15	3

DSC: Discipline Specific Course

SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Honours) (Medical Laboratory Technology)
Semester -IV
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-4064	Basic Microbiology-II	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-4064	Practicals in Basic Microbiology-II Lab	DSC	0-0-1	-	-	2	50	-	35	15	3

DSC: Discipline Specific Course

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III

Session: 2026-27

Course Title: Introduction to Bacteriology and Virology

Course Code: BMLL-3064

(Theory)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn the history of microbiology and fundamental microbiology techniques

CO 2: Learn the classification, morphology, pathogenicity, and lab diagnosis of clinically important bacteria.

CO 3: Learn the structure, replication, and detection methods of viruses.

CO 4: Learn the growth, culture, effects, and diagnosis of viral infection.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III

Session: 2026-27

Course Title: Introduction to Bacteriology and Virology

Course Code: BMLL-3064

(Theory)

Time: 3 Hours

Max. Marks: 100

L-T-P: 3-0-0

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-I

Brief history of microbiology with special reference to the contributions of Louis Pasteur, Robert Koch and others. Morphology and growth requirements of bacteria. Sterilization and disinfection procedures. Stains – Gram's Stain, ZN Stain and special stain. Cultivation methods, isolation and identification of bacteria. Antibiotic susceptibility testing and antibiotic resistance mechanisms in bacteria.

Unit-II

Study (Classification, morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused and lab diagnosis) of clinically important bacteria- *Staphylococcus*, *Streptococcus*, *Neisseria*, *Corynebacterium*, *Mycobacterium*, *Clostridium*, *E. coli*, *Klebsiella*, *Salmonella*, *Proteus*, *Pseudomonas*, *Vibrio* and Spirochaetes (*Treponema*, *Borrelia* and *Leptospira*), *Mycoplasma*, *Helicobacter pylori*

Unit-III

Brief history of virology. Virus: general characteristics, Morphology: envelope, capsid and nucleic acid. Bacteriophages. Lytic and lysogenic cycle. Detection of virus: Complement fixation test, haemagglutination, serological and molecular based methods. Electron microscopic techniques for visualization of virus

Unit-IV

One step growth curve for virus. Culture of animal virus. Cytopathogenic effects of virus infection. Symptoms, transmission, pathogenesis, detection and treatment of viral diseases: Influenza, Dengue, Hepatitis and AIDS.

Recommended Books:

1. Pelczar, M.J. Chan, E.C.S. and Krieg, N.R. 1986, Microbiology, 5th Ed. McGraw Hill.
2. Woolverten C. J. and Sherwood L. 1990. Prescott's Microbiology. 10th Ed. WCB Publishers.
3. Cann, Allan J. 1997. Principles of Molecular Virology, Academic Press London.
4. E.K. Wagner and M.J. Hewlet. 2004. Basic virology (2nd Ed) Blackwell publisher.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III
Session: 2026-27
Course Title: Introduction to Bacteriology and Virology Lab
Course Code: BMLP-3064
(Practical)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn the preparation of culture media and apply various cultural and staining techniques for bacterial identification.

CO 2: Learn and perform bacterial isolation, enumeration, and cultivation using streaking, spreading, pour plating, and serial dilution methods

CO 3: Learn and conduct biochemical tests for bacterial characterization and perform antibiotic susceptibility testing using the Kirby-Bauer method

CO 4: Learn the estimation of blood sugar and perform immunological assays like the haemagglutination test.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III

Session: 2026-27

Course Title: Introduction to Bacteriology and Virology Lab

Course Code: BMLP-3064

(Practical)

Credits: 0-0-1

Total marks: 50

Practical Marks: 35

Time: 3 Hours

CA:15

Experiments:

1. Composition and preparation of culture media and Cultural characterization of bacteria
2. Isolation and enumeration of bacteria using serial dilution method
3. To perform various biochemical tests: IMViC test.
4. Antibiotic susceptibility test by Kirby Bauer Method
5. Estimation of blood sugar
6. Haemagglutination assay
7. Quantification of virus in infected plant leaves by protein estimation
8. Detection of purified/semi purified virus preparation by UV spectrophotometer

Recommended Books:

1. Cappuccino J and Sherman N. Microbiology: A laboratory manual. 10thEd. Pearson Learning.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III
Session: 2026-27
Course Title: Basics of Microbiology-I
Course Code: BMLL-3065
(Theory)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn the historical developments in microbiology, classification of microorganisms, and concepts like biogenesis, fermentation, and germ theory of disease

CO 2: Learn basic microbiological techniques and media preparation.

CO3: To learn methods for obtaining and maintaining pure cultures, identifying cultural characteristics, and preserving microbial strains.

CO 4: Learn the nutritional and physical conditions required for microbial growth and the factors influencing it

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III

Session: 2026-27

Course Title: Basics of Microbiology-I

Course Code: BMLL-3065

(Theory)

Time: 3 Hours

Max. Marks: 100

L-T-P: 3-0-0

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-I

Historical aspects and discovery of microorganisms in the living world (Haeckels kingdom Protista, Prokaryotes and Eukaryotes, Whittaker's five kingdom concept, Koch's postulates) groups of microorganisms, distribution in nature, spontaneous generation verses biogenesis, fermentation, germ theory of disease. Identification of microorganisms

Unit-II

Microscopy and staining, microbiological techniques, pour plating, spreading, streaking serial dilution, methods of sterilization, media preparation, types of media (synthetic, natural, enrichment, selective)

Unit-III

Pure cultures and cultural characteristics: Mixed culture, selective methods, natural selection of microorganisms, maintenance and preservation of cultures, culture collection and cataloging of pure cultures, colony characteristics and characteristics of broth cultures.

Unit-IV

Nutritional requirements for growing microorganisms: Physical conditions required for growth: Temperature, gaseous, pH, miscellaneous, factors affecting growth.

Books Recommended:

1. Stanier, R.Y. Adelberg, A. and Ingraham, J. L. (1984), General Microbiology, IV edn. Mac Millan Press.
2. Pelczar, M.J.Chan, E.C.S. and Krieg, N.R (1986), Microbiology, V Ed. McGraw Hill.
3. Prescott. L.M. Harley J.P.and L.Kreig D.A (1990). Microbiology, WCB Publishers.
4. Rosenberg, E & Cohen I. R. (1983). Microbial Biology. H.S. International Editions.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III

Session: 2026-27

Course Title: Basics of Microbiology-I Lab

Course Code: BMLP-3065

(Practical)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn the use and handling of basic laboratory apparatuses and compound microscope in microbiology.

CO 2: Learn various sterilization techniques and preparation of culture media and agar slants/deeps.

CO 3: Learn and perform serial dilution techniques for enumeration of microorganisms.

CO 4: Learn and apply cultural techniques like pour plating, spreading, and streaking for microbial cultivation.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-III
Session: 2026-27

Course Title: Basics of Microbiology-I Lab
Course Code: BMLP-3065
(Practical)

Credits: 0-0-1

Total marks: 50

Practical Marks: 35

Time: 3 Hrs.

CA:15

Experiments:

1. To study different lab apparatuses used in microbiology.
2. To study compound microscope.
3. To study various techniques of sterilization.
4. To prepare media and its sterilization.
5. To prepare agar slants/deeps.
6. Serial dilution for enumeration of microorganisms.
7. To study various cultural techniques like pour plating, spreading and streaking.

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (2014). Microbiology: A Laboratory Manual 10th Edition, Pearson Education India.
2. Dubey R.C. and Maheshwari (2012). Practical Microbiology 5th edition: S. Chand and company ltd. New Delhi.
3. Leooffee, M.J. and Pierce, B.E. (2015). Microbiology: Laboratory Theory and Application, 3rd Edition, Morton Pub. Co.
4. Sastry, A.S. and Bhat, S. (2018). Essentials of Practical microbiology. Jaypee Brothers Medical Publishers.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-IV
Session: 2026-27
Course Title: Basics of Microbiology-II
Course Code: BMLL-4064
(Theory)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn the morphology, fine structure, and growth patterns of bacteria, fungi, protozoa, and viruses

CO 2: Learn the physical methods used to control microorganisms and factors affecting microbial death.

CO 3: Learn the chemical control of microbes, including types, properties, and evaluation of antimicrobial agents.

CO 4: Learn the properties and action of antibiotics, mechanisms of drug resistance, antibiotic sensitivity testing, and normal microbial flora of the human body

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-IV
Session: 2026-27
Course Title: Basics of Microbiology-II
Course Code: BMLL-4064
(Theory)

Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-0

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-I

General account of Bacteria: Morphology and fine structure, Mode of cell division, growth curve of bacteria mathematical expression of growth, quantitative measurement of bacterial growth, Structure of fungi, protozoa, viruses.

Unit-II

Fundamentals of control of microorganisms, the rate of death of bacteria, conditions influencing antimicrobial action, Control of microbes by physical agents: temperature, desiccation, osmotic pressure, radiation, filtration

Unit-III

Control of microbes by chemical agents: characteristics of ideal chemical agents, major group of antimicrobial agents and mode of action, evaluation of antimicrobial agents.

Unit-IV

Antibiotics: properties and mode of action. Drug resistance and its significance. Antibiotic Sensitivity test. Microbial flora of healthy human host

Books Recommended:

1. Stanier, R.Y. Adelberg E. A and Ingraham, J.L. (1984), General Microbiology, IV edn. Mac Millan Press.
2. Pelczar, M.J. Chan, E.C.S and Krieg, N.R. (1986), Microbiology, VEd. McGraw Hill.
3. Prescott. L.M. Harley J.P. and L. Kreig D.A.(1990). Microbiology, WCB Publishers.
4. Rosenberg, E & Cohen I. R (1983). Microbial Biology. H.S. International Editions.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-IV

Session: 2026-27

Course Title: Basics of Microbiology-II Lab

Course Code: BMLP-4064

(Practical)

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO 1: Learn and perform staining techniques to observe the morphology and cell structure of microorganisms

CO 2: Learn to count microorganisms using a hemocytometer and measure bacterial size using a micrometer

CO 3: Learn and perform key biochemical tests for microbial identification and characterization.

CO 4: Develop practical skills in handling microbial samples and interpreting laboratory results.

Bachelor of Science (Honours) (Medical Laboratory Technology) Semester-IV

Session: 2026-27

Course Title: Basics of Microbiology-II Lab

Course Code: BMLP-4064

(Practical)

Credits: 0-0-1

Total marks: 50

Practical Marks: 35

Time: 3 Hours

CA:15

Experiment:

1. To study the morphology cell structure of microorganisms through staining procedures.
 - a. Simple staining
 - b. Gram staining
 - c. Negative staining
2. To count the number of microorganisms by hemocytometer. Measure size of bacteria using micrometer.
3. To perform various biochemical tests: Acid gas production, nitrate reduction test, gelatin, catalase production, oxidase production.

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (2014). Microbiology: A Laboratory Manual 10th Edition, Pearson Education India.
2. Dubey R.C. and Maheshwari (2012). Practical Microbiology 5th edition: S. Chand and company ltd. New Delhi.
3. Leoeffee, M.J. and Pierce, B.E. (2015). Microbiology: Laboratory Theory and Application, 3rd Edition, Morton Pub. Co.
4. Sastry, A.S. and Bhat, S. (2018). Essentials of Practical microbiology. Jaypee Brothers Medical Publishers.