



MGM SCHOOL OF BIOMEDICAL SCIENCES

(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

(Deemed to be University u/s 3 of UGC Act 1956)

Grade “A⁺⁺” Accredited by NAAC

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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M.Sc. Medical Laboratory Technology

Semester I & II

DIRECTOR'S MESSAGE

Welcome Message from the Director

Dear Postgraduate Students,

Welcome to **MGM School of Biomedical Sciences (MGMSBS)**, **MGMIHS**, a premier institution dedicated to advancing allied and health sciences education. As you embark on this transformative academic journey, you are joining a community that fosters excellence in research, clinical expertise, and innovation.

MGMIHS, accredited with NAAC 'A⁺⁺' Grade (CGPA 3.55, 2022) and recognized as a **Category I Institution by UGC**, offers an ecosystem that nurtures both academic and professional growth. With **NIRF (151-200 rank band) recognition, NABH-accredited hospitals, NABL-accredited diagnostic labs, and JCI accreditation for MGM New Bombay Hospital**, we uphold global benchmarks in education and healthcare.

At MGMSBS, our **15 postgraduate programs** are meticulously designed to align with the National Commission for Allied and Healthcare Professionals (**NCAHP**) standards, National Education Policy (**NEP**) 2020, and the National Credit Framework (**NCrF**). We have implemented the **Choice-Based Credit System (CBCS)** to provide academic flexibility while ensuring rigorous training in clinical and technical skills. Our state-of-the-art research laboratories, digital classrooms, and the Central Research Laboratory (CRL) foster an environment that encourages innovation and evidence-based learning.

Postgraduate education at MGMSBS goes beyond theoretical learning—our curriculum integrates **hands-on clinical training, interdisciplinary collaboration, and exposure to real-world healthcare challenges**. We emphasize **research-driven education**, encouraging students to actively participate in **scientific discoveries, publications, and international collaborations**.

Beyond academics, we believe in **holistic development**, with initiatives such as the **AARAMBH Science and Wellness Club**, which promotes **mental well-being, leadership, and professional networking**.

As you step into this **next phase of academic and professional growth**, we encourage you to explore new ideas, engage in impactful research, and contribute meaningfully to the **healthcare ecosystem**. We are confident that your journey at MGMSBS will shape you into **skilled, compassionate, and visionary professionals**, ready to lead in the ever-evolving healthcare landscape.

We look forward to witnessing your achievements and contributions!

Dr. Mansee Thakur

Director, MGM School of Biomedical Sciences

MGM Institute of Health Sciences, Navi Mumbai

ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES

Mission

To improve the quality of life, both at individual and community levels by imparting quality medical education to tomorrow's doctors and medical scientists and by advancing knowledge in all fields of health sciences through meaningful and ethical research.

Vision

By the year 2020, MGM Institute of Health Sciences aims to be top-ranking Centre of Excellence in Medical Education and Research. Students graduating from the Institute will have the required skills to deliver quality health care to all sections of the society with compassion and benevolence, without prejudice or discrimination, at an affordable cost. As a research Centre, it shall focus on finding better, safer and affordable ways of diagnosing, treating and preventing diseases. In doing so, it will maintain the highest ethical standards.

About – School of Biomedical Sciences

MGM School of Biomedical Sciences is formed under the aegis of MGM IHS with the vision of offering basic Allied Science and Medical courses for students who aspire to pursue their career in the Allied Health Sciences, teaching as well as research.

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well equipped labs. The school encompasses 23 courses each with its own distinct, specialized body of knowledge and skill. This includes 8 UG courses and 15 PG courses. The college at its growing years started with mere 100 students has recorded exponential growth and is now a full-fledged educational and research institution with the student strength reaching approximately **800** at present.

Our consistent theme throughout is to encourage students to become engaged, be active learners and to promote medical research so that ultimately they acquire knowledge, skills, and understanding so as to provide well qualified and trained professionals in Allied Health Sciences to improve the quality of life.

As there is increased need to deliver high quality, timely and easily accessible patient care system the collaborative efforts among physicians, nurses and allied health providers become ever more essential for an effective patient care. Thus the role of allied health professionals in ever-evolving medical system is very important in providing high-quality patient care.

Last but by no means least, School of Biomedical Sciences envisions to continuously grow and reform. Reforms are essential to any growing institution as it fulfills our bold aspirations of providing the best for the students, for us to serve long into the future and to get ourselves updated to changing and evolving trends in the health care systems.

Name of the Degree: M. Sc. Medical Laboratory Technology

Duration of Study: The duration of the study for M.Sc. Medical Laboratory Technology will be of 2 years

Program pattern:

- First Semester: July
- Second Semester: January
- Third Semester: July
- Fourth Semester: January

Eligibility Criteria:

B.Sc. in Medical Laboratory Technology with a minimum 50% mark.

Selection of eligible candidates: Selection to the M.Sc. MLT course shall be on the performance in interview conducted by MGM School of Biomedical Sciences, Navi Mumbai.

Attendance and Monitoring Progress of Study:

A candidate shall study in concerned department of the institute for the entire period as a full time student. No candidate is permitted to work in any other laboratory/college/hospital etc while studying. No candidate should join any other course of study or appear for any other degree examination conducted by this university or any university in India or Abroad during the period of registration.

A candidate who has put in a minimum of 75% of attendance in theory and practical separately and who has fulfilled other requirements of the course shall be permitted to appear for University Examination.

Clinical Training Evaluation:

Students shall be deputed to Pathology, Biochemistry, Microbiology & Blood Bank department wherein they shall undergo practical training of handling patients, processing of different types of samples.

Medium of Instruction:

English shall be the Medium of Instruction for all the Subjects of study and for examinations.

For any query visit the website: www.mgmsbsnm.edu.in

Program Outcome

| Program Outcome | M.Sc. Medical Laboratory Technology |
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| PO1 | Advanced Knowledge in Medical Laboratory Science: Acquire thorough knowledge of pathology, microbiology, biochemistry, hematology, immunology, and molecular biology with its applications to demonstrate expertise in clinical laboratory techniques, diagnostic methodologies, and biomedical sciences. |
| PO2 | Proficiency in Laboratory Techniques and Instrumentation: Expertise to perform, utilize and troubleshoot modern diagnostic instruments and technologies in medical laboratory with accuracy and precision. |
| PO3 | Integration of Laboratory Science in Healthcare: Collaborate with healthcare teams for accurate diagnosis and evidence-based laboratory practices for clinical decision-making in real-world situations. |
| PO4 | Quality Assurance and Laboratory Management: Implement quality control and quality assurance measures in laboratory settings. Gain knowledge about application of laboratory accreditation, biosafety, and bioethics in clinical practice. |
| PO5 | Data Analysis and Interpretation: Develop skills for analysis of laboratory data using statistical tools and their interpretation for clinical conditions. |
| PO6 | Professional Ethics and Compliance: Establish an in-depth understanding of professionalism, ethics, legal regulations and safety in laboratory procedures to guarantee compliance with medical laws, patient privacy, and integrity of test results. |
| PO 7 | Research and Innovation: Develop research-oriented thought process by learning about research methodology, innovation incubation and conducting independent / collaborative research in medical laboratory sciences. |
| PO8 | Leadership and Communication Skills: Demonstrate effective leadership, teamwork, and interpersonal communication in laboratory settings with students, laboratory personnel, and healthcare professionals |
| PO9 | Lifelong Learning and Professional Development: Engage in continuous education, professional training and scientific contributions, to stay updated with advancements in the field of diagnosis and healthcare. |

| SEMESTER – I | | | | |
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| MMLT 101 T | Introduction to Medical Laboratory Technology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Comprehend the importance of medical laboratory technology in diagnosing, monitoring, and treating diseases. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos | Internal Assessment, Theory exam, Seminar, |
| CO2 | Learn the ethical and legal responsibilities of a medical laboratory professional, including patient confidentiality, consent, and reporting of results. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos | Internal Assessment, Theory exam, Seminar, |
| CO3 | Understand and demonstrate fundamental laboratory techniques, such as sample collection, preparation, and analysis. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos | Internal Assessment, Theory exam, Seminar, |
| CO4 | Explain the different branches of medical laboratory technology, such as clinical chemistry, microbiology, hematology, immunology, blood banking, and molecular diagnostics. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos | Internal Assessment, Theory exam, Seminar, |
| MMLT 102 T | Haematology and Clinical Pathology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Student should be know the basic concepts in hematology and clinical pathology | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Understand importance of tests like Blood Clotting Factor & Bone marrow | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Should understand clinical | PO1, PO2, | Lecture, Practical, | Internal Assessment, |

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| | significance urine, Semen, different body fluid analysis | PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 105 P | Hematology and Clinical Pathology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Perform and analyze tests like all hematology & Blood Clotting Factor | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Should perform urine, Semen, different body fluid analysis experiments under guidance | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Perform lab test for bone marrow | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 103 T | Basics of Microbiology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Provide the student with the study of normal flora and pathogenic microorganisms. Methods for recovery, identification of pathogens, culture techniques, procedures, and antibiotic testing and sterilization techniques. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Should understand Molecular identification of bacterial pathogens. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand- | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / |

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| | | | on training, Industrial visits/Camps, Problem-Based Learning | OSCE |
| MMLT 106 P | Basics of Microbiology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Should perform test for identification of pathogens, culture techniques, procedures, and antibiotic testing and sterilization techniques. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Should perform Molecular identification of bacterial pathogenes. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 104 T | Essentials of Biochemistry and Laboratory Techniques | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Understand the Classification, Functions and Metabolism of Biomolecules - Carbohydrates, Proteins, Lipids and Nucleic acids with their significance in homeostasis and related disorders | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Viva-voce, Log Book, Station exercise / OSCE |
| CO2 | Understand the role of Enzymes and biochemical processes of Cellular Respiration involved in energy production | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Viva-voce, Log Book, Station exercise / OSCE |
| CO3 | In depth knowledge of Principle and applications of Good Laboratory Practices. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Viva-voce, Log Book, Station exercise / OSCE |
| CO4 | Proficiency in handling Instruments used in | PO1, PO2, PO3, PO4, | Lecture, Demonstration, Group Discussion, | Internal Assessment, Theory exam, Viva- |

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| | Biochemistry laboratory and their applications in clinical diagnosis. | PO6, PO7, PO8, PO9 | Assignment, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | voce, Log Book, Station exercise / OSCE |
| CO5 | Competent knowledge of collection and analysis of various body fluid used for diagnostics | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Viva-voce, Log Book, Station exercise / OSCE |
| CO6 | Comprehension of applications of Basic Biochemical Laboratory Techniques with accuracy | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Viva-voce, Log Book, Station exercise / OSCE |
| MMLT 107 P | Essentials of Biochemistry and Laboratory Techniques | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Demonstration and analysis of various Body fluids in diagnosis | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Proficiency in calibration and application of Basic Instruments used in the Biochemistry laboratory | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CC 001 T | Research Methodology & Biostatistics (Core Course) | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Describe types of research (qualitative, quantitative, experimental, observational). | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO2 | Understand sampling methods | PO1, PO2, | Lecture, Group | Internal Assessment, |

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| | (random, stratified, systematic) and their applications in lab-based studies. | PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Theory exam, Seminar |
| CO3 | Learn hypothesis testing methods (t-tests, chi-square tests, ANOVA) in medical research. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO4 | Understand the structure of scientific reports, theses, and research papers. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CC 001 P | Research Methodology & Biostatistics (Core Course) | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Identify research problems related to medical laboratory technology. Develop appropriate research questions, objectives, and hypotheses. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce |
| CO2 | Conduct a systematic literature review using databases like PubMed, Google Scholar, and Scopus. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce |
| CO3 | Use Excel, SPSS, or R for data entry, statistical calculations, and analysis | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce |
| CO4 | Create tables, graphs, and charts to summarize research findings. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce |
| MMLT 108 CP | MMLT Clinical Directed Education I | Mapped PO | Teaching-Learning Methodology | Assessment Tools |

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| CO1 | Build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Clinical Posting in Different Department | Clinical postings, Viva-voce, Seminar, Log Book, |
| CO2 | Emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Clinical Posting in Different Department | Clinical postings, Viva-voce, Seminar, Log Book, |
| CO3 | Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Clinical Posting in Different Department | Clinical postings, Viva-voce, Seminar, Log Book, |

| SEMESTER – II | | | | |
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| MMLT 109 T | Immunohematology & Blood Transfusion | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Understand antigen-antibody reactions and their role in blood group identification. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Understand ABO and Rh blood group systems, their genetics, and clinical significance, Cell separation and components. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Should Know blood donation procedures, donor selection criteria, and screening tests. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 112 P | Immunohematology & Blood Transfusion | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Demonstrate ABO and Rh blood grouping using forward and reverse typing. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |

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| | | | Problem-Based Learning | |
| CO2 | Perform major and minor crossmatching using saline, enzyme, and AHG methods, Conduct Direct and Indirect Antiglobulin Tests (DAT & IAT). | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Demonstrate proper phlebotomy techniques for blood donation, basic steps in blood component separation | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 110 T | Immunology and Serology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Understand the structure and function of the immune system, including primary and secondary lymphoid organs | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Understand antigen-antibody reactions and their significance in immunity and disease diagnosis, hypersensitivity reactions (Type I–IV), their mechanisms, and clinical implications. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Understand the principles of graft rejection, HLA typing, and immunosuppressive therapy. applications of | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, | Lecture, Practical, Demonstration, Group Discussion, Assignment, Flip | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, |

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| | immunotherapy, CRISPR gene editing, and emerging trends in immunology | PO9 | classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Journal, Clinical postings, Station exercise / OSCE |
| MMLT 113 P | Immunology and Serology | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Demonstrate agglutination and precipitation techniques for detecting antigen-antibody interactions | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Maintain biosafety measures and quality control standards in immunology testing. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Able to perform Analyze Hypersensitivity Reactions | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 111 T | Advances in Clinical Biochemistry and Quality Control | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Comprehensive knowledge of Principle and applications of Quality Control and Automation in Biochemistry Laboratory | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Analyse the Role of Vitamins, Minerals and Electrolytes in Human Health with respect to | PO1, PO2, PO3, PO4, PO7, PO8, | Lecture, Demonstration, Group Discussion, | Internal Assessment, Theory exam, Practical exam, Viva-voce, |

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| | biochemical functions and deficiency manifestations | PO9 | Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical Postings, Case-study, Workshops | Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO3 | Understand the different types of plasma proteins and its related disorders specifically Jaundice and Hemoglobinopathies | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical Postings, Case-study, Workshops | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO4 | Explore Biochemistry of Hormones and their mechanism of action. | PO1, PO2, PO3, PO4, PO5, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical Postings, Case-study, Workshops | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO5 | Mastery to Analyse and Interpret Biochemical Laboratory Tests to assess organ dysfunction and disease progression. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Demonstration, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO6 | Insightful knowledge of advanced Biochemistry Techniques with their applications in Diagnosis | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Demonstration, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Clinical postings, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Theory exam, Practical exam, Viva-voce, Seminar, Log Book, Journal, Clinical postings, Station exercise / OSCE |

| MMLT 114 P | Advances in Clinical Biochemistry | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
|--------------------|--|---|--|---|
| CO1 | Proficiency in estimation and interpretation of various Biochemical tests for diagnosis | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning, Case-study | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| CO2 | Demonstration of principle, working and applications of advanced Biochemical techniques | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Practical, Demonstration, Clinical postings, Hand-on training, Industrial visits/Camps, Problem-Based Learning | Internal Assessment, Practical exam, Viva-voce, Log Book, Journal, Clinical postings, Station exercise / OSCE |
| MMLT 115 CP | MMLT Clinical Directed Education II | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Build a robust theoretical foundation, enabling students to understand healthcare practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8 | Practical, Clinical Posting, Demonstration, Case-study, Clinical Simulation | Practical Exam, Station Exercise, Viva-voce, Case- Study |
| CO2 | Emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8 | Practical, Clinical Posting, Demonstration, Case-study, Clinical Simulation | Practical Exam, Station Exercise, Viva-voce, Case- Study |
| CO3 | Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8 | Practical, Clinical Posting, Demonstration, Case-study, Clinical Simulation | Practical Exam, Station Exercise, Viva-voce, Case- Study |

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|------------------|---|---|--|---|
| | interdisciplinary healthcare teams. | | | |
| SEC 001 T | Innovation and Entrepreneurship | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Define the role of innovation and entrepreneurship in the medical laboratory and healthcare industry. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO2 | Analyze current challenges in laboratory diagnostics and identify areas for innovation. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO3 | Explore opportunities in point-of-care testing (POCT), AI-driven diagnostics, and personalized medicine. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO4 | Learn how to take calculated risks and adapt to the evolving medical diagnostics field. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO5 | Understand funding options, including venture capital, angel investors, and government grants for healthcare innovations. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| SEC 002 T | One Health (NPTEL) | Mapped PO | Teaching-Learning Methodology | Assessment Tools |
| CO1 | Recognize the importance of a multidisciplinary approach in disease prevention and control. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |

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|-----|---|---|--|---|
| CO2 | Understand biosafety protocols and quality control measures in laboratory testing. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO3 | Utilize big data, AI, and digital health tools in disease tracking and diagnostics | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |
| CO4 | Apply laboratory research to develop vaccines, diagnostics, and disease control strategies. | PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9 | Lecture, Group Discussion, Assignment, Flip classroom, Seminar, E-learning, Posters / Videos, Problem-Based Learning | Internal Assessment, Theory exam, Seminar |

| OUTLINE OF COURSE CURRICULUM | | | | | | | | | | | | | | |
|--|---|--------------|--------------|---------------|--------------------------------|-------------------|--------------|--------------|---------------|--------------------------------|--------------|------------------------|-------------------------|-------|
| M.Sc Medical Laboratory Technology (MMLT) | | | | | | | | | | | | | | |
| Semester I | | | | | | | | | | | | | | |
| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| Discipline Specific Core Theory | | | | | | | | | | | | | | |
| MMLT 101 T | Introduction to Medical Laboratory Technology | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MMLT 102 T | Haematology and Clinical Pathology | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MMLT 103 T | Basics of Microbiology | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MMLT 104 T | Essentials of Biochemistry and Laboratory Techniques | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| CC 001 T | Research Methodology & Biostatistics (Core Course) | 3 | - | - | - | 3 | 45 | - | - | - | 45 | - | 50 | 50 |
| Discipline Specific Core Practical | | | | | | | | | | | | | | |
| MMLT 105 P | Haematology and Clinical Pathology | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 106 P | Basics of Microbiology | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 107 P | Essentials of Biochemistry and Laboratory Techniques | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 108 CP | MMLT Clinical Directed Education I | - | - | - | 9 | 3 | - | - | - | 135 | 135 | - | 50 | 50 |
| CC 001 P | Research Methodology & Biostatistics (Core Course) | - | - | 4 | - | 2 | - | - | 60 | - | 60 | - | 50 | 50 |
| Total | | 15 | 0 | 10 | 9 | 23 | 225 | 0 | 150 | 135 | 510 | 110 | 590 | 700 |
| OUTLINE OF COURSE CURRICULUM | | | | | | | | | | | | | | |
| M..Sc Medical Laboratory Technology (MMLT) | | | | | | | | | | | | | | |
| Semester II | | | | | | | | | | | | | | |
| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP) | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| Discipline Specific Core Theory | | | | | | | | | | | | | | |
| MMLT 109 T | Immunohematology & Blood Transfusion | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MMLT 110 T | Immunology and Serology | 3 | - | - | - | 3 | 45 | - | - | - | 45 | 20 | 80 | 100 |
| MMLT 111 T | Advnaces in Clinical Biochemistry and Quality Control | 4 | - | - | - | 4 | 60 | - | - | - | 60 | 20 | 80 | 100 |
| Discipline Specific Core Practical | | | | | | | | | | | | | | |
| MMLT 112 P | Immunohematology & Blood Transfusion | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 113 P | Immunology and Serology | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 114 P | Advances in Clinical Biochemistry and Quality Control | - | - | 2 | - | 1 | - | - | 30 | - | 30 | 10 | 40 | 50 |
| MMLT 115 L | MMLT Directed Clinical Education - II | - | - | - | 15 | 5 | - | - | - | 225 | 225 | - | 50 | 50 |
| Skill Ehancement Course | | | | | | | | | | | | | | |
| SEC 001 T | Innovation and Enterpreneurship | 3 | - | - | - | 3 | 45 | - | - | - | 45 | - | 50 | 50 |
| SEC 002 T | One Health (NPTEL) | | | | | | | | | | | | | |
| Total | | 13 | 0 | 6 | 15 | 21 | 195 | 0 | 90 | 225 | 510 | 90 | 460 | 550 |