

TECHNO INDIA UNIVERSITY, WEST BENGAL

EM 4, Sector 5, Salt Lake, Kolkata-700091

SCHOOL OF ALLIED HEALTH SCIENCES

Department of Medical Laboratory Science



MASTERS OF MEDICAL LABORATORY SCIENCE

2-YEAR POSTGRADUATE PROGRAMME

(w.e.f. Academic Year 2026-2027)

Based on

National Commission for Allied and Healthcare Profession (NCAHP, 2021)

CURRICULUM OUTLINE

Semester I – Common for all specializations

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Medical Laboratory Management	4	0	0	4	60
Cell and Molecular Biology	4	0	0	4	60
Research Methodology & Biostatistics	2	0	0	2	30
Advanced Molecular Diagnostic Techniques	4	0	0	4	60
Digital Health Technologies	2	0	0	2	30
Elective Course*	0	0	2	2	60
Research Methodology & Biostatistics Practical	0	0	2	2	60
Advanced Molecular Diagnostic Techniques Practical	0	0	2	2	60
TOTAL	16		6	22	420

* To be decided by respective institute

Semester II Medical Biochemistry

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Bioorganic & Biophysical Chemistry	4	0	0	4	60
Instrumentation in Biochemistry	4	0	0	4	60
Enzymology & Nutrition	4	0	0	4	60
Intermediary Metabolism	4	0	0	4	60
Bioorganic & Biophysical Chemistry Practical	0	0	4	2	60
Instrumentation Practical	0	0	4	2	60
Clinical posting	0	0	4	2	90
TOTAL	16	0	12	22	450

Semester II Medical Microbiology

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Essential and Applied Microbiology	3	1	0	4	60
Systematic Bacteriology	3	1	0	4	60
Systematic Bacteriology practical	0	0	4	2	60
Medical Entomology and Parasitology	3	1	0	4	60
Medical Entomology and Parasitology practical	0	0	4	2	60
Immunology and Immunodiagnostics	3	1	0	4	60
Immunology and Immunodiagnostics practical	0	0	4	2	60
TOTAL	16	4	12	22	420

Semester II Haematology and Transfusion Medicine

Course name	Lecture	Tutorial	Practical	Credits	Contact Hours
Haematology and Haematological Disorders	4	0	0	4	60
Haemostatic Disorders	4	0	0	4	60
Applied Immunopathology in Haematology	4	0	0	4	60
Clinical Pathology	2	0	0	2	30
Haematology and Haematological Disorders Practical	0	0	2	2	60
Haemostatic Disorders Practical	0	0	2	2	60
Applied Immunopathology in Haematology Practical	0	0	2	2	60
Clinical Pathology Practical	0	0	2	2	60
Total	14	0	8	22	450

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Translational Anatomy and Cell Dynamics	4	0	0	4	60
Essentials of Histology	4	0	0	4	60
Essentials of Cytopathology	4	0	0	4	60
Cancer epidemiology and Digital Pathology	2	0	0	2	30
Translational Anatomy and Cell Dynamics Practical	0	0	0	2	60
Essentials of Histology Practical	0	0	0	2	60
Essentials of Cytopathology Practical	0	0	0	2	60
Cancer epidemiology and Digital Pathology Practical	0	0	0	2	60
Total	14	0	8	22	450

Semester III- Medical Biochemistry

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Clinical Biochemistry I	4	0	0	4	60
Clinical Biochemistry II	4	0	0	4	60
Immunology	4	0	0	4	60
Endocrinology & Biochemistry of aging	4	0	0	4	60
Clinical Biochemistry I Practical	0	0	2	2	60
Clinical Biochemistry II Practical	0	0	2	2	60
Immunology Practical	0	0	2	2	60
TOTAL	16	0	6	22	420

Semester III Medical Microbiology

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Medical Virology	3	1	0	4	60
Medical Mycology	3	1	0	4	60
Medical Mycology & Virology practical	0	0	4	2	60
Public Health Microbiology	3	1	0	4	60
Public Health Microbiology practical	0	0	4	2	60
Advances in Microbial Informatics	3	1	0	4	60
Clinical posting	0	0	4	2	90
TOTAL	12	4	12	22	450

Semester III- Haematology and Transfusion Medicine

Course Name	Lecture	Tutorial	Practical	Credits	Contact Hours
Blood Banking and Immunohematology	4	0	0	4	60
Transfusion Medicine	4	0	0	4	60
Molecular Hematology	4	0	0	4	60
Advanced Haematological Techniques	2	0	0	2	30
Blood Banking and Immunohematology Practical	0	0	2	2	60
Transfusion Medicine Practical	0	0	2	2	60
Molecular Hematology Practical	0	0	2	2	60
Advanced Haematological Techniques Practical	0	0	2	2	60
Total	14	0	8	22	450

Semester III- Histology and Cytology

Course name	Lecture	Tutorial	Practical	Credits	Contact Hours
Diagnostic Histopathology	4	0	0	4	60
Cytological Techniques	4	0	0	4	60
Immunohistochemistry & Diagnostic Markers	4	0	0	4	60
Molecular Techniques in Histopathology & Cytology	2	0	0	2	30
Diagnostic Histopathology Practical	0	0	0	2	60
Cytological Techniques Practical	0	0	0	2	60
Immunohistochemistry & Diagnostic Markers Practical	0	0	0	2	60
Molecular Techniques in Histopathology & Cytology Practical	0	0	0	2	60
Total	14	0	8	22	450

Semester IV –COMMON FOR ALL SPECIALIZATION

S. No	SEMESTER IV	Credits	Contact Hours
1	Dissertation	22	990
	Total	22	990

Marks Distribution

MMLS Semester I (Common for All Specialisations)

S. No	Course Name	Continuous Assessment	End Semester Examination	Total
1	Medical Laboratory Management	30	70	100
2	Cell and Molecular Biology	30	70	100
3	Research Methodology & Biostatistics	30	70	100
4	Advanced Molecular Diagnostic Techniques	30	70	100
5	Digital Health Technologies	30	70	100
6	Elective Course*	30	70	100
7	Research Methodology & Biostatistics practical	30	70	100
8	Advanced Molecular Diagnostic Techniques	30	70	100
	TOTAL			800

Semester II Medical Biochemistry

S. No	Course Name	Continuous Assessment	End Semester Examination	Total
1	Bioorganic & Biophysical Chemistry	30	70	100
2	Instrumentation	30	70	100
3	Enzymology & Nutrition	30	70	100
4	Intermediary Metabolism	30	70	100
5	Bioorganic & Biophysical Chemistry Practical	30	70	100
6	Instrumentation Practical	30	70	100
7	Clinical posting – log book and viva	30	70	100
	TOTAL			700

Semester II Medical Microbiology

S. No	Course Name	Internal	External (ESE)	Total
1	Essential and Applied Microbiology	30	70	100
2	Systematic Bacteriology	30	70	100
3	Systematic Bacteriology practical	30	70	100
4	Medical Entomology and Parasitology	30	70	100
5	Medical Entomology and Parasitology practical	30	70	100
6	Immunology and Immunodiagnostics	30	70	100
7	Immunology and Immunodiagnostics practical	30	70	100
	TOTAL			700

Semester II Haematology and Transfusion Medicine

S. No	Course Name	Continuous Assessment	End Semester Examination	Total
1	Haematology and Haematological Disorders	30	70	100
2	Haemostatic Disorders	30	70	100
3	Applied Immunopathology in Haematology	30	70	100
4	Clinical Pathology	30	70	100
5	Haematology and Haematological Disorders Practical	30	70	100
6	Haemostatic Disorders Practical	30	70	100
7	Applied Immunopathology in Haematology Practical	30	70	100
8	Clinical Pathology Practical	30	70	100
	Total			700

Semester II Histology and Cytopathology

S NO	Course Name	Continuous assessment	End Semester Examination	Total
1	Translational Anatomy and Cell Dynamics	30	70	100
2	Essentials of Histology	30	70	100
3	Essentials of Cytopathology	30	70	100
4	Cancer epidemiology and Digital Pathology	30	70	100
5	Translational Anatomy and Cell Dynamics Practical	30	70	100
6	Essentials of Histology Practical	30	70	100
7	Essentials of Cytopathology Practical	30	70	100
8	Cancer epidemiology and Digital Pathology Practical	30	70	100
	TOTAL			800

Semester III Medical Biochemistry

S. No	Couse name	Continuous assessment	End Semester Examination	Total
1	Clinical Biochemistry I	30	70	100
2	Clinical Biochemistry II	30	70	100
3	Immunology	30	70	100
4	Endocrinology & Biochemistry of aging	30	70	100
5	Clinical Biochemistry I Practical	30	70	100
6	Clinical Biochemistry II Practical	30	70	100
7	Immunology Practical	30	70	100
	TOTAL			700

Semester III Medical Microbiology

S. No	Course Name	Internal	External (ESE)	Total
1	Medical Virology	30	70	100
2	Medical Mycology	30	70	100
3	Medical Mycology & Virology practical	30	70	100
4	Public Health Microbiology	30	70	100
5	Public Health Microbiology practical	30	70	100
6	Advances in Microbial Informatics	30	70	100
7	Clinical posting – log book and viva	30	70	100
	TOTAL			700

Semester III Haematology and Transfusion Medicine

Course Name	Continuous Assessment	End Semester Examination	Total
Blood Banking and Immunohematology	30	70	100
Transfusion Medicine	30	70	100
Molecular Hematology	30	70	100
Advanced Haematological Techniques	30	70	100
Blood Banking and Immunohematology Practical	30	70	100
Transfusion Medicine Practical	30	70	100
Molecular Hematology Practical	30	70	100
Advanced Haematological Techniques Practical	30	70	100
Total			800

Semester III Histology and Cytopathology

Course Name	Continuous assessment	End Semester Examination	Total
Diagnostic Histopathology	30	70	100
Cytological Techniques	30	70	100
Immunohistochemistry & Diagnostic Markers	30	70	100
Molecular Techniques in Histopathology & Cytology	30	70	100
Diagnostic Histopathology Practical	30	70	100
Cytological Techniques Practical	30	70	100
Immunohistochemistry & Diagnostic Markers Practical	30	70	100
Molecular Techniques in Histopathology & Cytology Practical	30	70	100
TOTAL			800

S. No	Course Name	Continuous assessment	End Semester Examination	Total
1	Dissertation viva	100	200	300
2	Dissertation Logbook	100	200	300
	Total			600

MMLS SEMESTER IV (COMMON FOR ALL SPECIALIZATION)

Credit Distribution: Each semester would consist of a minimum of 22 credits. The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:

Credit Details:

Lecture / Tutorial: 1 credit = 15 hours; Practical: 1 credit = 30 hours; Clinical/ Lab Posting: 1 credit = 45 hours

Credit Includes: L – Lectures, T- Tutorials, P- Practical

Post graduate Program Requirements: A minimum of **88** credits is required for the MMLS A program of 2 years duration, inclusive of six months research dissertation.

Promotion Criteria to higher semesters:

The eligibility for promotion to the next academic year is subject to securing the minimum academic performance as specified below

- First to second year: a minimum of 70% of the credits at the end of the first year (includes first and second semester)
- Students will be eligible for internship research dissertation only after successful completion of the entire coursework, i.e. 100% credits to be accrued by the end of the third semester.

The student must complete all the coursework requirements within a maximum of double the program duration. For example, in a 2-year program, all the academic coursework needs to be completed within 4 years. Failure to do so will result in exit.

The Master of Medical Laboratory Science (MMLS) is specifically aimed at those pursuing a professional career in medical laboratory science. It is designed to provide specialized training both in basic scientific principles of modern laboratory science and in the application of these principles to laboratory diagnosis and management. It is designed as a higher degree program suitable for graduates having experience in Medical Laboratory Science. The program aims to enhance the scientific skills of non-medical graduates with insight into clinical problems that will allow them to work in multidisciplinary teams.

LEARNING OBJECTIVES:

Upon successful completion of the Masters' program, students will

1. **Demonstrate proficiency in a comprehensive range of laboratory procedures**, including advanced techniques in haematology, clinical chemistry, and microbiology.
2. **Identify and troubleshoot issues across all phases of laboratory testing**—pre-analytical, analytical, and post-analytical—to ensure accuracy and reliability of results.
3. **Operate, maintain, and troubleshoot sophisticated laboratory instrumentation**, applying best practices for quality assurance and control.
4. **Interpret complex laboratory data** within the context of pathophysiology and clinical decision-making, with a sound understanding of diagnostic principles related to various organ systems.
5. **Contribute to the innovation and development of diagnostic techniques and laboratory methodologies**, supporting the advancement of evidence-based clinical practice.

Program Learning Outcomes for Master of Medical Laboratory Science (MMLS)

Following outcomes reflect the expected competencies and professional capabilities of a graduate upon completion of the program:

Core Program Learning Outcomes:

1. **Advanced Laboratory Competence** Apply advanced knowledge and technical skills in areas such as clinical chemistry, haematology, microbiology, immunology, transfusion science, molecular diagnostics, and histopathology.
2. **Critical Thinking and Problem-Solving** Critically evaluate laboratory data, troubleshoot complex testing procedures, and apply evidence-based practices in laboratory decision-making.
3. **Research and Innovation** Design, conduct, and interpret research studies; contribute to scientific knowledge through research dissemination and potential innovation in diagnostic techniques.

4. **Quality Management and Accreditation** Demonstrate understanding of quality assurance systems, accreditation processes (e.g., ISO 15189), laboratory safety, and regulatory compliance in clinical laboratory operations.
5. **Leadership and Management** Exhibit leadership, strategic planning, and effective resource management in laboratory settings; supervise personnel and contribute to operational excellence.
6. **Interdisciplinary Collaboration** Collaborate with healthcare professionals to provide accurate diagnostic information, participate in interdisciplinary teams, and support patient-centered care.
7. **Ethical and Professional Practice** Adhere to ethical principles, legal frameworks, and professional standards in all aspects of laboratory science and research.
8. **Communication Skills** Effectively communicate scientific and clinical information to peers, healthcare providers, patients (where applicable), and the broader scientific community.
9. **Continuous Learning and Development** Engage in lifelong learning and professional development to stay current with advances in medical laboratory science and emerging diagnostic technologies.
10. **Global and Societal Impact Awareness** Understand the role of medical laboratory science in public health, global health challenges, and the social determinants of health.