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)

(with effect from 2025-26 Batches)

Curriculum for

M.Sc. Medical Dialysis Technology

Amended as per AC-51/2025, Dated 29/04/2025

Amended History

1. Amended as per AC-51/2025, [Resolution No.3.1,(Annexure-3.5)], [Resolution No.3.5, (Annexure-7)]; Dated 29/04/2025.

Resolution No. 3.1 of Academic Council (AC-51/2025):
Resolved to approve the CBCS syllabus, including Program Outcomes (POs), Course Outcomes (COs), and PO-CO Mapping for 15 two-year postgraduate programs under MGMSBS for Semesters I and II. These include: M.Sc. Medical Biotechnology , M.Sc. Medical Genetics , M.Sc. Clinical Embryology , M.Sc. Clinical Nutrition , **M.Sc. Medical Dialysis Technology** , M.Sc. Molecular Biology , M.Sc. Medical Radiology & Imaging Technology , M.Sc. Cardiac Care Technology , M.Sc. Operation Theatre and Anaesthesia Technology , M.Sc. Emergency and Trauma Care, M. Optometry, Master in Hospital Administration, Master of Public Health, M.Sc . Health Informatics & M.Sc. Clinical Research to be effective from batch admitted in Academic Year 2025-26 onwards [ANNEXURE-3.1 to 3.30].

Annexure-3.5 of AC-51/2025

MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI
(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
Sector 1, Kamothe Navi Mumbai-410209, Tel.No.022-27437631, 27437632
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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M.Sc. Medical Dialysis 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 though meaningful and ethical research.

Vision

By the year 2022, 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 andbenevolence, 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. Reformations 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 Dialysis TechnologyDuration of Study:

The duration of the study for M.Sc. Medical Dialysis Technology will be of 2 years.

Eligibility Criteria:

B.Sc. Dialysis Tech: These candidates are by far the most eligible as they have been trained in this very field for 3 years followed by a year of internship.

MBBS
These candidates are exposed to nephrology and dialysis during their course curriculum, albeit for a lesser duration. However, this will give those candidates an opportunity to specialize, who do not want to spend 6 more years through the conventional academic route.

B.Sc. Nursing: These candidates too have been exposed to Nephrology and dialysis during their graduation and hence are eligible.

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

M.Sc. MEDICAL DIALYSIS TECHNOLOGY

Program Outcome

Program Code	Program Objective
PO1	Nurture the scientific and/or clinical knowledge and skills for development of health care practices, industrial/ community applications and entrepreneurship.
PO2	Develop the ability of critical thinking to analyze, interpret problems in health care and to findout systematic approach for solution
PO3	Impart decision making capability for handling various circumstances in their respective areas
PO4	Demonstrate research skills for planning, designing, implementation and effective utilization of research findings for community.
PO5	Develop an ability to function as an efficient leader as well a team player in multidisciplinarysectors for effective outcomes demonstrating managerial skills
PO6	Demonstrate an effective written and oral communication skills to communicate effectively in health care sector, industries, academia and research.
PO7	Inculcate code of ethics in professional and social circumstances to execute them in dailypractices and research in respective areas of specialization
PO8	Develop lifelong learning attitude and values for enhancement of professional and social skills foran overall development

Program Specific Outcome

Program Code	Program Objective
PO1	The primary goal of the Master of Science in Medical Dialysis Technology program is to prepare accomplished professionals in Dialysis Technology with a specific emphasis on clinical skills and technical knowledge along with professional research.
PO2	Students will acquire the research-based knowledge and procedural skills necessary to deliver a highstandard of care to the patients with chronic kidney disease requiring renal replacement therapy.
PO3	This course involves all aspects of care for patients undergoing chronic hemodialysis.
PO4	Overall goal of this training is to foster the student's development into an independent care provider and researcher in the field of dialysis.
PO5	The program intends for its post graduates to contribute to a new generation of academic dialysis professional equipped to address the challenging problems in renal replacement therapy

Course Outcomes
Semester I

MMDT 101 T & MMDT 104 P	Anatomy (Nephroanatomy & Histology)	Mapped PO	Teaching-Learning Methodology	Assessment Tools
CO1	Apply to clinical scenarios the concepts and knowledge of the general terminology, cell structure and function, histology, gross anatomy, and physiology of urinary system	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Students will be able to describe and analyze tissue types and organ structure & know the topics of fundamental anatomy and histology	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Students will know and be able to describe the urinary system of the human body, will be able to describe their structure, location, will be able to explain the main regularities of functions.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
MMDT 102 T & MMDT 105 P	**Physiology (Nephrophysiology)**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	To understand the functions of important physiological systems including the urinary systems.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Students will acquire knowledge on physiology related to Nephrology & Physiology applied to dialysis.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
MMDT 103 T	**Nephrogenetics & Pharmacology**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**

CO1	This course gives a general knowledge and application part of the drugs or medicines used for renal problems	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Knowledge of renal, cardio vascular, respiratory, Central Nervous System & corticosteroids to be able to manage renal patients under supervision of a nephrologists and assist a nephrologists	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CC 001 T & CC 001 P	**Research Methodology & Biostatistics (Core Course)**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis, interpretation & reporting of results and use of statistical software.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station exercise/OSCE/OSPE, Viva-voce, Assignment, MCQ
MMDT 106 CP	**MMDT Directed Clinical Education-I**	**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	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment
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	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment
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	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment

SEMESTER II

MMDT 107 T	Aetio-Pathology of Renal Disease	Mapped PO	Teaching-Learning Methodology	Assessment Tools
CO1	The scope of this course is to provide overall information of the pathology, structural abnormalities and symptoms of kidney diseases.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	To have knowledge of common medications used in dialysis, its administration & side effects	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	To know total patient care during dialysis & dietary management.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation,
MMDT 108 T & MMDT 111 P	**Clinical Nephrology**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	The students are provided with adequate knowledge of patient assessment in renal diseases.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	The students are trained to apply knowledge of laboratory & imaging investigations for diagnosing renal diseases.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
MMDT 109 T &	**Dialysis Equipment**	**Mapped PO**	**Teaching-Learning**	**Assessment Tools**

MMDT 112 P			Methodology	
CO1	To understand the principle of working, construction, operation, uses, cleaning, handling, care, common trouble shooting, maintenance etc. of the hemodialysis & peritoneal dialysis equipment	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	To conduct routine equipment management procedures including preventative maintenance, faultfinding, calibration and verifying of equipment prior to clinical use.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
MMDT 110 T	**Water Treatment**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	Different types of water source and methods of treatment employed by water supply companies	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation,
CO2	Ground sources and surface sources and the classification of contaminants	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Potable water regulations	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation,
CO4	Necessity to treat potable water for use in dialysis.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO5	Need for chemical limits	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation,
CO6	Evaluation of feed water quality, including hardness	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO7	Monitoring & disinfection of water treatment	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation,

MMDT 113 CP	MMDT Directed Clinical 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**	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment
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**	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment
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**	Lecture, Practical, Demonstration, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Practical exam, Station Exercise/OSCE/OSPE, Viva-voce, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment
SEC 001 T	**Innovation and Entrepreneurship**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	Students will grasp the concepts of innovation, its ecosystem, and the role of various stakeholders such as government policies, startups, and innovation hubs.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Cultivating an entrepreneurial mindset and leadership qualities necessary for driving innovation and leading ventures	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Internal assessment, University exam, Theory exam, Practical exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Understanding the intersection of technology and innovation	**PO1, PO2, PO3, PO4,**	Lecture, Assignment, Case	Internal assessment, University exam, Theory exam, Practical

	and leveraging emerging technologies for entrepreneurial ventures.	**PO5, PO6, PO7, PO8**	Study, PBL, Seminar	exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
SEC 002 T	**One Health (NPTEL)**	**Mapped PO**	**Teaching-Learning Methodology**	**Assessment Tools**
CO1	A comprehensive understanding of One Health's role in global health challenges, emphasizing interconnectedness among human, animal, and environmental health.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Online NPTEL MCQ test
CO2	Topics include research ethics, disease surveillance, and successes in controlling emerging infectious diseases.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Online NPTEL MCQ test
CO3	Students explore disease emergence, transmission, antimicrobial resistance, and food safety, gaining insights into effective public health strategies.	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8**	Lecture, Assignment, Case Study, PBL, Seminar	Online NPTEL MCQ test

OUTLINE OF COURSE CURRICULUM

M.Sc. Medical Dialysis Technology

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														
MMDT 101 T	Anatomy (Nephroanatomy & Histology)	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 102 T	Physiology (Nephrophysiology)	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 103 T	Nephrogenetics & Pharmacology	3	-	-	-	3	45	-	-	-	45	20	80	100
CC 001 T	Research Methodology & Biostatistics (Core Course)	3	-	-	-	3	45	-	-	-	45	-	50	50
Discipline Specific Core Practicals														
MMDT 104 P	Anatomy (Nephroanatomy & Histology)	-	-	2	-	1	-	-	30	-	30	10	40	50
MMDT 105 P	Physiology (Nephrophysiology)	-	-	2	-	1	-	-	30	-	30	10	40	50
MMDT 106 CP	MMDT Directed Clinical Education - I	-	-	-	15	5	-	-	-	225	225	-	50	50
CC 001 P	Research Methodology & Biostatistics (Core Course)	-	-	4	-	2	-	-	60	-	60	-	50	50
Total		**12**	**0**	**8**	**15**	**21**	**180**	**0**	**120**	**225**	**525**	**80**	**470**	**550**

OUTLINE OF COURSE CURRICULUM

M.Sc. Medical Dialysis Technology

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														
MMDT 107 T	Aetio-Pathology of Renal Disease	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 108 T	Clinical Nephrology	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 109 T	Dialysis Equipment	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 110 T	Water Treatment	2	-	-	-	2	30	-	-	-	30	20	80	100
Discipline Specific Core Practicals														
MMDT 111 P	Clinical Nephrology	-	-	4	-	2	-	-	60	-	60	10	40	50
MMDT 112 P	Dialysis Equipment	-	-	2	-	1	-	-	30	-	30	10	40	50
MMDT 113 CP	MMDT Directed Clinical Education - II	-	-	-	15	5		-	-	225	225	-	50	50
Skill Ehancement Course														
SEC 001 T	Innovation and Entrepreneurship	3	-	-	-	3	45	-	-	-	45	-	100	100
SEC 002 T	One Health (NPTEL)													
Total		**14**	**0**	**6**	**15**	**22**	**210**	**0**	**90**	**225**	**525**	**100**	**550**	**650**

FIRST YEAR

M.Sc. Medical Dialysis Technology

SEMESTER-I

Code No.	Core Subjects
Discipline Specific Core Theory	
MMDT 101 T	Anatomy (Nephroanatomy & Histology)
MMDT 102 T	Physiology (Nephrophysiology)
MMDT 103 T	Nephrogenetics & Pharmacology
CC 001 T	Research Methodology & Biostatistics (Core Course)
Discipline Specific Core Practical	
MMDT 104 P	Anatomy (Nephroanatomy & Histology)
MMDT 105 P	Physiology (Nephrophysiology)
MMDT 106 CP	MMDT Directed Clinical Education – I
CC 001 P	Research Methodology & Biostatistics (Core Course)

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**Anatomy (Nephroanatomy & Histology)**
Subject Code	**MMDT 101 T**

Course Outcome	• Apply to clinical scenarios the concepts and knowledge of the general terminology, cell structure and function, histology, gross anatomy, and physiology of urinary system. • Students will be able to describe and analyze tissue types and organ structure & know the topics of fundamental anatomy and histology. • Students will know and be able to describe the urinary system of the human body, will be able to describe their structure, location, will be able to explain the main regularities of functions.

Sr. No.	Topics	No. of Hrs.
1	**Basic Nephrology:** Anatomy of the kidney, ureter, urinary bladder, urethra	**6**
2	**Blood supply & Nerve supply:** Blood supply of urinary system & Nerve supply of urinary system	**6**
3	**Embryology:** Embryology of urinary system	**4**
4	**Peritoneal Cavity:** Peritoneum, folds & recesses	**4**
5	**Histology:** T.S. of a human kidney, Photomicrograph of renal cortex, Photomicrograph of the blood supply to the kidney cortex, Photomicrograph of the renal corpuscle, Microscope of the visceral epithelium, Microscope of a peripheral portion of a renal corpuscle, Electron microscope of glomerular filtration barrier, Diagram of a lobule of glomerular capillaries, Juxta glomerular complex, Renal cortex, Renal cortex showing the proximal convoluted tubule & distal convoluted tubule, Proximal convoluted tubule, Renal medulla, Renal papilla, Collecting tubule, Deep cortical area & outer medulla, Kidney cortex the JG apparatus, Kidney Medulla- papilla, Papilla adjacent to a calyx, T.S. of ureter, Ureter wall T.S., Urinary bladder T.S., Urinary bladder mucosa	**25**
Total		**45 hrs**

MMDT 104 P- Anatomy (Nephroanatomy & Histology)

Sr. No.	Topics	No. of Hrs.
1	Anatomy of urinary system	**5**
2	Embryology of urinary system	**5**
3	Histology	**20**
Total		**30 hrs**

Reference Text Books:

1. Manipal Manual of Anatomy for Allied Health Sciences courses: Madhyastha S.
2. G.J. Tortora & N.P Anagnostakos: Principles of Anatomy and Physiology
3. B.D. Chaurasia: Handbook of General Anatomy

Reference books or related websites:www.osmosis.org

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**Physiology (Nephrophysiology)**
Subject Code	**MMDT 102 T**

Course Outcome	• To understand the functions of important physiological systems including the urinary systems. • Students will acquire knowledge on physiology related to Nephrology & Physiology applied to dialysis.

Sr. No.	Topics	No. of Hrs.
1	**The body fluid compartments:** extracellular and intracellular fluids interstitial fluid & edema, Body fluid compartments, Constituents of extracellular and intracellular fluids, Osmotic equilibria and fluid shifts between the extracellular and intracellular fluids, Changes in the volumes and osmolality of the extracellular and intracellular fluid compartments in abnormal states, Edema fluids in the potential spaces of the body	**5**
2	**Formation of urine by the kidney:** Renal blood flow, Glomerular filtration and their control. physiologic anatomy of the kidney, Basic theory of nephron function, Renal blood flow and pressures, Glomerular filtration and the glomerular filtrate, Control of the glomerularfiltration rate and renal blood flow, Reabsorption of fluid by the peri-tubular capillaries	**5**
3	**Formation of urine by the kidney:** Processing of the filtrate in the tubules, effect of tubular load and tubular transport maximum on urine constituents, the concept of Plasma Clearance its use in assessing renal function	**6**
4	**Renal associated mechanism for controlling extracellular fluid osmolality and sodium concentration, The mechanism for excreting excess water:** Excretion of a dilute urine, The mechanism for excreting excess solutes: The countercurrent mechanism for excreting a concentrated urine, Control of extracellular fluid osmolality and sodium concentration, Sodium excretion and its control by aldosterone	**8**
5	**Renal regulation of Blood volume and extracellular fluid Volume:** Excretion and regulation of urea, potassium, and other substances, control of blood volume, control of extra cellular fluid volume, urea excretion, Potassium excretion, Control of the extracellular concentrations of other ions	**5**
6	**Regulation of Acid-Base Balance**: Function of Acid – Base Buffers, Respiratory regulation of Acid – Base balance, Renal control of Hydrogen Ion concentration, Clinical abnormalitiesof Acid-Base Balance	**8**
7	**Renal Disease, Diuresis, and Micturition:** Renal Disease, Renal Function tests, Diuretics and mechanisms of their action, Mictu rition	**8**
Total		**45 hrs**

MMDT 105 P: - Physiology (Nephrophysiology)

Sr. No.	Topics	No. of Hrs.
1	Formation of urine by kidney	**4**
2	Renal associated mechanism for controlling extracellular fluid osmolality and sodium concentration	**12**
3	Renal regulation of Blood volume and extracellular fluid Volume: Excretionand regulation of urea, potassium, and other substances. Regulation of Acid-Base Balance.	**14**
Total		**30 hrs**

Reference Text Books:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – Devasis Pramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
5. Textbook of Physiology Volume I & II – Dr. A. K. Jain.
6. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**Nephrogenetics & Pharmacology**
Subject Code	**MMDT 103 T**

Course Outcome	• This course gives a general knowledge and application part of the drugs or medicines used for renal problems. • Knowledge of renal, cardio vascular, respiratory, Central Nervous System & corticosteroids to be able to manage renal patients under supervision of a nephrologists and assist a nephrologists.

Sr. No.	Topics	No. of Hrs.
1.	**Nephrogenetics:** **Introduction:** Structure and function of the cell, DNA structure& function, replication, RNA structureand function, protein synthesis, post translational modifications, structure and function of Eukaryotic genes and genome. Genes involved in apoptosis	**5**
2.	**Transmission Pattern:** Principles of Mutations and types, detection of variousmutations, population variations, polymorphisms, Inheritance pattern, consanguinity in Human population,	**5**
3.	**Genetic Variation:** Basic concepts of formal genetics, mitochondrial gene and inheritance, Genetic counseling: principles and ethics in dealing with genetic disorders and treatment. Gene therapy	**5**
4.	**Pharmacology:** **Introduction to Pharmacology:** Principles of Drug Actions, Adm. and Drug Calculations.	**4**
5.	**Renal Drugs:** Common medications used in the dialysis patient,Principle of action, Administration, Precaution and side effects.	**6**
6.	**Cardiovascular Drugs:** Common drugs used, Administration, Precaution and side effects.	**3**
7.	**Respiratory Drugs:** Common drugs used, Administration, Precaution and side effects.	**3**
8.	**Corticosteroids and other Immunosuppressant:** Drugs used, Principle of action, Administration, Precaution and side effects.	**4**
9.	**CNS Drugs:** Common drugs used, Administration, Precaution and side effects	**3**
10.	**Anticoagulant:** Heparin, low molecular weight heparin, protomine etc	**5**
11.	**Miscellaneous**	**2**
Total		**45 hrs**

Recommended Text Books:

1. Essentials of Medical Pharmacology – Tripathi

Name of the Program	M.Sc. Medical Dialysis Technology
Semester	Semester - I
Name of the Course	Research Methodology & Biostatistics (Core Course)
Course Code	CC 001 T

Teaching Objective	• The course is intended to give an overview of research and statistical models commonly used in medical and bio-medical sciences. The goal is to impart an intuitive, understanding and working knowledge of research designs and statistical analysis. The strategy would be to simplify, analyse the treatment of statistical inference and to focus primarily on how to specify and interpret the outcome of research.
Learning Outcomes	• Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis, interpretation & reporting of results and use of statistical software.

Sr. No.	Topic	No. of Hrs.
A	**Research Methodology:**	**23**
1	**Scientific Methods of Research**: Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology	4
2	**Research Designs**: Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case – Control Studies, Cross-sectional studies, Intervention studies.	5
3	**Sampling Designs**: Census and Sample Survey, Need and importance for Sampling, Implications of a Sample Design, Different Types of Sample Designs (Probability sampling and non-probability sampling), Systematic sampling, Stratified sampling, Cluster sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	5
4	**Measurement in research**: Measurement Scales, Sources of Error in Measurement,	3
5	**Methods of Data Collection**: Types of data, Collection of Primary Data, Observation Method, Interview Method	4
6	Research Ethics and plagiarism	2
B	**Biostatistics**	**22**
7	**Data Presentation**: Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, scatter plots, line graphs	3
8	**Measures of Central Tendency and Dispersion**: Mean, Median, Mode, Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits).	3
9	**Testing of Hypotheses**: Definition, Basic Concepts, Procedure for Hypothesis Testing, power of test, Normal distribution, Parametric Tests including Z-test, t-test,	4

	and ANOVA	
10	**Chi-square Test**: Chi-square as a Non-parametric Test, Applications.	2
11	**Measures of Relationship**: Correlation and Simple Regression Analysis	3
12	**Non-parametric test**: Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test, Kruskal Walli's test, Friedman's test, and Spearman Rank correlation test.	3
13	**Vital Health Statistics**: rate, crude rate, age specific rate, Measurement of fertility, Rate, Measures of mortality.	4
Total		**45 hrs**

CC 001 P–Research Methodology & Biostatistics

Sr. No.	Topics	No. of Hrs.
A	**Research Methodology**	
1	Research Article Presentation (Seminar)	**5**
B	**Biostatistics**	
2	Data Presentation	**4**
3	Measures of Central Tendency and Dispersion	**6**
4	Testing of Hypotheses	**16**
5	Chi-square Test	**4**
6	Measures of Relationship	**6**
7	Analysis of Variance	**5**
8	Non parametricor Distribution-free Tests	**8**
9	Computer Application Using Statistical Software including SPSS	**6**
Total		**60 hrs**

Reference Books:

1. Daniel WW. Biostatistics: A foundation for analysis in the health sciences. 10th ed. Wiley; 2013.

2. Gupta SC, Kapoor VK. Fundamentals of mathematical statistics. Sultan Chand & Sons; 2020 Sep.

3. Kothari CR, Garg G. Research methodology: Methods and techniques.2019.

4. Mahajan BK. Methods in biostatistics for medical students and research workers. 7th ed. Jaypee Brothers Medical Publishers; 2010.

5. Murthy MN. Sampling theory and methods. Statistical Publishing Society; 1967.

6. Singh YK. Fundamental of research methodology and statistics. New Age International; 2006.

Resolution No. 3.5 of Academic Council (AC-51/2025):

Resolved to approve the submitted list of recommended books for M.Sc. Clinical Nutrition and the course on **Biostatistics and Research Methodology** [ANNEXURE-7].

Annexure-7 of AC-51/2025

Biostatistics & Research Methodology Books List

Subject	Book Name	Author
Biostatistics & Research Methodology	Biostatistics: A Foundation for Analysis in the Health Sciences (10th ed.)	Daniel WW.
	Biostatistical Analysis (5th ed.)	Zar JH.
	Research Methodology: Methods and Techniques	Kothari CR, Garg G.
	Methods in Biostatistics for Medical Students and Research Workers (7th ed.)	Mahajan BK.
	Sampling Theory and Methods	Murthy MN.
	Fundamentals of Research Methodology and Statistics	Singh YK.
	Fundamentals of Biostatistics (8th ed.)	Rosner B.
	An Introduction to Medical Statistics (4th ed.)	Bland M.

Course code- MMDT 106 CP: MMDT Directed Clinical Education – I

Course Outcome	• 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. • 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. • Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams.

Students will gain additional skills in dialysis procedures, renal science and recent advancements. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. **(Total-225 hrs.)**

FIRST YEAR

M.Sc. Medical Dialysis Technology

SEMESTER-II

Code No.	Core Subjects
Discipline Specific Core Theory	
MMDT 107 T	Aetio-Pathology of Renal Disease
MMDT 108 T	Clinical Nephrology
MMDT 109 T	Dialysis Equipment
MMDT 110 T	Water Treatment
Discipline Specific Core Practical	
MMDT 111 P	Clinical Nephrology
MMDT 112 P	Dialysis Equipment
MMDT 113 CP	MMDT Directed Clinical Education-II
Skill Enhancement Course	
SEC 001 T	Innovation and Entrepreneurship
SEC 002 T	One Health (NPTEL)

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester II**
Name of the Subject	**Aetio-Pathology of Renal Disease**
Subject Code	**MMDT 107 T**

Course Outcome	• The scope of this course is to provide overall information of the pathology, structural abnormalities and symptoms of kidney diseases. • To have knowledge of common medications used in dialysis, its administration & side effects. • To know total patient care during dialysis & dietary management.

Sr. No.	Topics	No. of Hrs.
1	**Acute renal failure:** Etiology, Pathology & pathogenesis, clinical features, diagnosis and management. Causes of renal failure. Outline the consequences of renal failure. Common diseases and causes of renal failure, including infections, autoimmune disorders, renal carcinomas, obstructive and congenital disorders. Difference between acute and chronic renal failure.	**7**
2	**Chronic Renal Failure:** Etiology, Pathology & pathogenesis, clinical features, diagnosis and management.	**4**
3	**Glomerular Diseases:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
4	**Tubulo-Interstitial Diseases:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
5	**Renal hypertension:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
6	**Renal stone:** Pathogenesis, Clinical features, related investigations and management (Conservative and active)	**4**
7	**Hypertension:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
8	**Diseases of Urogenital Tract:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
9	**Malignancies of Urinary system:** Pathogenesis, Clinical features, related investigations and management (Conservative and active).	**4**
10	**Renal Transplant:** Role of transplantation. Different types of donor organ. History of transplantation. Cadaveric, related and unrelated live donation of organs. Retrieval, transport and storage of organs.	**6**
Total		**45 hrs**

Recommended Text Books:

1. Diseases of Kidney
2. Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varghese

Reference books or related websites:

1. National Kidney foundation,
2. NANT

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester II**
Name of the Subject	**Clinical Nephrology**
Subject Code	**MMDT 108 T**

Course Outcome	• The students are provided with adequate knowledge of patient assessment in renal diseases. • The students are trained to apply knowledge of laboratory & imaging investigations for diagnosing renal diseases.

Sr. No.	Topics	No. of Hrs.
1	**Medical Abbreviations:** Common medical abbreviations.	**2**
2	**Introduction to the patient and chart:** Patient encounter, Interview and history taking of patient.	**3**
3	**Vital signs:** Assessing Pulse - Radial, Brachial, Apical & Femoral Assessing Respiration - Normal rhythm and rate, Common disorders Assessing Blood Pressure - Normal values, Hyper and hypotension, Assessing Temperature - Methods, Common abnormalities.	**5**
4	**Inspection:** Inspection of whole body of the patient e.g. Chest, abdomen, pedal edema & Facial edema. Significance of edema as per the dialysis patient concern	**4**
5	**Palpation and percussion:** Palpation – Method for palpation. Percussion - Resonance, hyper-resonance and dullness.	**2**
6	**Auscultation:** Heart sounds & murmurs & any other abnormal body sound.	**2**
7	**Common findings in disease:** Glomerular Diseases, Tubulo-Interstitial Diseases, Diseases of Urogenital Tract, Malignancies of Urinary system.	**3**
8	**Patient assessment in:** Acute & Chronic Renal Failure.	**2**
9	**Examination of gastrointestinal system**	**1**
10	**Examination of Nervous system**	**1**
11	**Routine hematology:** WBC (Normal values, Leucocytoses, Leukopenia), RBC, Hematocrit, Hemoglobin, Blood indices.	**3**
12`	**Blood chemistry profiles:** Electrolytes (Sodium, Potassium, Chloride, Calcium) Blood glucose, Bilirubin, Blood Urea Nitrogen (BUN), Serum Creatinine. Cardiac markers – CPK, LDH, SGOT, Troponin I/T, Homocysteine.	**3**
13	**Routine Sputum examination**	**3**
14	**Routine Urine examination:** Physical & Microscopic characteristic of urine in different pathological condition	**3**
15	**Arterial Blood Gases Analysis:** Acid-base Chemistry (H^+ concentration, Moles, Milli moles, nano moles, Exponent system, Logarithm scale, Concept of pH), Henderson-Hasselbach Equation for Arterial Blood, HCO_3^- / H_2CO3^- ratio, Acidosis, Alkalosis, Compensatory Mechanism, Interpretation of ABGs, Causes of acid-base Disturbances, Acidosis (Respiratory, Metabolic, Alkalosis) , Respiratory acid-base Disorders (Hypoventilation, Hyperventilation, Underlying causes, Treatment) Metabolic Acid-base disorders (Metabolic Acidosis- Renal failure, Lactic Acidosis, Keto acidosis, Diarrhea.	**3**

	Treatment of each disorder, Metabolic Alkalosis – Hypokalemia, K^+- H^+ relationship, Effect on ECG, Other causes, Treatment). ABGs in Chronic Lung Diseases - Chronic Ventillatory Failure, Acute Ventillatory. Failure superimposed on Chronic Failure, Acute hyperventilation superimposed on Chronic Failure.	
16	**Renal Radiography:** Basic Assessment of X'Ray - Physics of X-Rays, Penetration and mediums- Air, Water, Bones, Metal, Common Radiologic evaluations and rationale- A-P view, PA view, Lateral, Other, CAT scan, MRI, Fluoroscopy. Common Terms in X-ray interpretations - Opacity, Translucency, Penetration, Patient position, Silhouette sign, Infiltrates, Bony Structures, Fatty mass, Tumors. Interpretation of X-rays - Normal film, renal Shadow, AP vs PA, hypo or hypertrophy, renal stone.	**5**
Total		**45 hrs**

MMDT 111 P- Clinical Nephrology

Sr. No.	Topics	No. of Hrs.
1	**Laboratory Exercises (Practical):** 1. Vital Signs (Pulse, Blood Pressure, Temperature, Respiratory Rate, Pulse Oximetry). 2. Examination of the Chest (Inspection, Percussion, Palpation, Auscultation). 3. Laboratory Tests - Reference ranges and interpretation of abnormal values, Arterial Blood Gases.	**60**
Total		**60 hrs**

Books Recommended:

1. Diseases of Kidney
2. Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varghese.

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester II**
Name of the Subject	**Dialysis Equipment**
Subject Code	**MMDT 109 T**

Course Outcome	• To understand the principle of working, construction, operation, uses, cleaning, handling, care, common trouble shooting, maintenance etc. of the hemodialysis & peritoneal dialysis equipment • To conduct routine equipment management procedures including preventative maintenance, faultfinding, calibration and verifying of equipment prior to clinical use.

Sr. No.	Topics	No. of Hrs.
1	Protocol for the equipment to be maintained/calibrated	**3**
2	Routine preventative maintenance checks and their frequency.	
3	Correct calibration of equipment for the intended activities	**4**
4	Range of tests and test equipment associated with maintenance and diagnosis of faults on dialysis equipment.	
5	Suitable tests to verify safety, accuracy and operational effectiveness of equipment, including electrical safety	**4**
6	Principles of operation, function and expected performance	
7	Methods of verifying the calibrations carried out.	**3**
8	The basis and methods behind electrical safety tests.	
9	Complete planned or preventive maintenance of equipment to specified schedule.	**5**
10	The calibrations and tests to be performed, including calibrating the UF, conductivity, temperature and flow control systems.	
11	Potential for maintenance-induced faults.	**4**
12	Diagnose routine or common faults in dialysis equipment and relevant corrective action	
13	Identify faults or risks outside of own area of expertise and initiate relevant action.	**5**
14	Common faults in dialysis equipment and relevant corrective action.	
15	Use of equipment and PC based diagnostic systems.	**5**
16	The risks associated with unsafe or non-maintained equipment.	
17	Perform routine maintenance checks on water treatment system.	**4**
18	Importance of microbiological and chemical monitoring and disinfection	
19	Obtain suitable samples for QA testing using appropriate sampling	**3**
20	Method of operation, maintenance, testing and trouble-shooting of water	

	treatment	
21	Sanitization procedures for the equipment.	**5**
22	Type and range of samples that is required for QA.	
23	Relevant sampling techniques and how to apply them.	
Total		**45 hrs**

MMDT 112 P- Dialysis Equipment

Sr. No.	Topics	No. of Hrs.
1	**Machine Service And Repair:** Repair techniques and procedures, Fault diagnostics, Computer aided maintenance Planned preventative maintenance, Hospital / Community, Decalcification, Cleaning Disinfection, Infection control, Dialysis Chairs, Other renal equipment, associated medical equipment.	**8**
2	**Dialysate and dialysate delivery system:** preparation, Delivery system – batch type and proportioning type, Drake Willock, Centry, Gambrom, Fresenius etc., Maintenance and trouble shooting, Acetate, Bicarbonate.	**7**
3	**Dailysate supply subsystems:** Water pre-treatment – Water pressure regulation – Temperature control – Temperature sensors – Chemical proportioning – Degasing flow and negative pressure control – Monitors. Conductivity cell – chemical concentration monitor – Temperature compensation – Temperature monitors – Pressure monitors – Flow - Rate monitors – Blood leak monitors – Readout devices – Alarms.	**10**
4	**Dialysis machine maintenance:** Maintenance / - Repairing and servicing / - Drake-Winlock proportioning unit	**5**
Total		**30 hrs**

Books Recommended:

1. Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.
2. Introduction to Biomedical Equipment Technology by Joseph J.Carr, John m. Brown

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**Water Treatment**
Subject Code	**MMDT 110 T**

Course Outcome	• Different types of water source and methods of treatment employed by water supply companies. • Ground sources and surface sources and the classification of contaminants. • Potable water regulations. • Necessity to treat potable water for use in dialysis. • Need for chemical limits. • Evaluation of feed water quality, including hardness. • Monitoring & disinfection of water treatment

Sr. No.	Topics	No. of Hrs.
1.	Describe different types of water source and methods of treatment employed by water supply companies.	**2**
2.	Ground sources and surface sources and the classification of contaminants. Potable water regulations. Necessity to treat potable water for use in dialysis Need for chemical limits. Evaluation of feed water quality, including hardness.	**3**
3.	National and international standards and limits applicable to water for dialysis.	**2**
4.	Treatment methods used in the treatment of water for dialysis.	**2**
5	Different types of sediment filtration including pressure differentials and filter performance.	**2**
6.	Principle of adsorption in activated carbon, ion exchange and de-ionization	**2**
7.	Function of UV systems.	**2**
8.	Principles of membrane technology, including Reverse Osmosis. Suitability of materials to be used for pipe work in dialysis water systems. Flow characteristics od distribution systems.	**3**
9.	Direct and indirect loops.	**2**
10.	Prevention of microbiological contamination Commonly used microbiological control methods. Understanding microbial dynamics in water and the prevention of microbial contamination. The potential effect of chemical and microbiological contaminants on dialysis patients. Ultra filters at point of use.	**5**
11.	Describe methods of sanitization of the water treatment system. Reason and method for testing for residual agents Cleaning and sanitization of water systems including disinfection and cleaning agents used concentrations and contact times. Rinsing protocols	**5**
Total		**30 hrs**

Books Recommended:

1. Water quality in hemodialysis by E.Bonnie-Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
2. Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
3. Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.

Course Code- MMDT 113 CP: MMDT Directed Clinical Education – II

Course Outcome	• 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. • 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. • Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams.

Trainees acquire the knowledge and procedural skills necessary to deliver a high standard of care to thepatients with chronic kidney disease requiring renal replacement therapy. **(Total- 225 hrs.)**

SKILL ENHANCEMENT COURSES

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**Innovation and Entrepreneurship**
Subject Code	**SEC 001 T**

Course Outcome	• Students will grasp the concepts of innovation, its ecosystem, and the role of various stakeholders such as government policies, startups, and innovation hubs. • Cultivating an entrepreneurial mindset and leadership qualities necessary for driving innovation and leading ventures. • Understanding the intersection of technology and innovation and leveraging emerging technologies for entrepreneurial ventures.

Sr. No.	Topics	No. of Hrs.
1	Innovation and Innovation Eco-System, The Policy Framework, Startup Landscape and Innovation Hubs, - Digital India and Make in India, - Linking Innovation with Intellectual Property Rights, Raising Finance for Startups in India, Innovation in Indian Context, Writing a business plan	**15**
2	Creativity and Research, Converting Researches to Innovation: Innovation Types and Models, Product Development, IPR and its Commercialisation, Support System to Develop Culture of Research and Innovation, Commercialisation of research and innovation, Fund raising – Research and Innovation, Envisioning Innovation and Scenario Building	**15**
3	Introduction to Innovation in Entrepreneurship, Idea Generation and Validation, Design Thinking in Entrepreneurship, Business Model Innovation, Technology and Innovation, Funding Innovation, Entrepreneurial Mindset, Leadership & amp; Intellectual Property, Scaling and Growth Strategies, sustainability & amp; Social Innovation	**15**
Total		**45 hrs**

Name of the Program	**M.Sc. Medical Dialysis Technology**
Semester	**Semester I**
Name of the Subject	**One Health (NPTEL)**
Subject Code	**SEC 002 T**

Course Outcomes	• A comprehensive understanding of One Health's role in global health challenges, emphasizing interconnectedness among human, animal, and environmental health. • Topics include research ethics, disease surveillance, and successes in controlling emerging infectious diseases. • Students explore disease emergence, transmission, antimicrobial resistance, and food safety, gaining insights into effective public health strategies.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to One Health :** • Introduction to the One Health One Medicine Concept and National & International health/public health agencies • Global Health vs One Health • Basics of Research Ethics • Integrated human and animal disease surveillance systems • Recent success of One Health in control of emerging infectious diseases and the application of One Health in the control of endemic zoonoses in resource-poor communities	**5**
2	**Emerging Infectious Diseases and Antimicrobial Resistance:** • Emerging infectious diseases • Process of disease emergence and assessment of the risk factors • Mechanisms of pathogen cross over across species boundaries and emerging infectious disease transmission, and its relevance in the 21st century • Importance of disease detection, Identification and monitoring in public health and the gaps in current health systems approaches and importance of Genome Sequencing • Introduction to disease vectors and basics of Medical Entomology • The factors influencing an emerging disease (whether is controlled or becomes endemic/epidemic as illustrated by different emerging diseases -STDs, HIV/AIDS, avian influenza, SARS, Ebola) • Antimicrobial resistance a global threat and Importance of antibiotic stewardship program • Introduction of Food Safety and Food Borne Diseases	**10**
3	**One Health Application in Management of Zoonotic Diseases:** • What are zoonotic diseases & its role in our changing world • Understanding of bacterial, viral and parasitic zoonotic diseases; critical evaluation of its control measures, awareness of local, national and global factors and Influences • Biogeography of zoonosis • The integration of human, animal and ecosystem health in the control and prevention of these diseases • Community engagement for zoonotic disease control in humans and animals through	**10**

	One Health	
4	**Applied Epidemiology & Public Health in One Health Research:** • Basics of Epidemiological Studies • Rapid Response system, Disaster Management and Outbreak Investigation Plans • Basic statistical methods and their application and the measurement of disease frequency • Principles of survey design and the concepts of sampling • Mixed method research	**5**
5	**One Health and Health Policy:** • Introduction to health policy • Political and institutional challenges in implementing One Health and the importance of a unified policy to address the shared health threats of humans and animals	**5**
6	**Media & Community engagement for One Health**: • Risk Communication and Pandemic Preparedness • How ICMR and other Public Health Institutes tackled and managed pandemic situation in the country • Role of community in disease control & ways for community engagement • Uses of different types of media for communication and impact of the media on public attitudes to disease	**10**
Total		**45 hrs**

***Note:** Attaint the NPTEL Course with title and course code as "**One Health (Course Code: noc25-ge25) (NPTEL)"**

Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

Question		**Marks distribution**	**Marks allotted per section**	**Marks**
Sec: A	MCQ	10 x 1 M = 10	10	**10**
Sec: B	SAQ	3/4x 5 M = 15	15	**35**
Sec: B	LAQ	2/3 x 10 M = 10	20	
Sec: C	SAQ	3/4x 5 M = 15	15	**35**
Sec: C	LAQ	2/3x 10 M = 10	20	
Total				**80 Marks**

Marks Scheme for the University Examination (50 Marks)

Final theory marks will be 50 marks University Theory exam pattern Research Methodology & Biostatistics (Core course)

Question	**Question No.**	**Question Type**	**Marks Distribution**	**Marks**
Sec: A	1.	LAQ (2 out of 3)	2 X 10 Marks = 20	20
Sec: B	2.	SAQ (6 out of 8)	6 X 05 Marks = 30	30
Total				**50 Marks**

Marks Scheme for the University Examination (100 Marks)

Final theory marks will be 100 marks University Theory exam pattern Elective Course

Question	**Question No.**	**Question Type**	**Marks Distribution**	**Marks**
Sec: A	1.	LAQ (10 out of 12)	10 X 10 Marks = 100	100
Total				**100 Marks**

Practical exam pattern: Total 40 marks with following breakup:

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x15=15 M
Q No 2	Station exercise	2x5M=10 M
Q No 3	VIVA	10 M
Q No 4	Journal	5M
Total		**40 Marks**

Practical exam pattern Research Methodology & Biostatistics (Core course)

Total 50-mark distribution:

Exercise	Description	Marks
Q No 1	**Practical/Problem-Solving:** These questions can assess statistical analysis, research design, hypothesis testing, or interpretation of data etc.	2 × 10 marks each) = **20 marks**
Q No 2	Identification of study designs, Critical appraisal of research papers, Application of biostatistical tools, Sampling techniques etc.	(4 × 5 marks each) = **20 marks**
Q No 3	**Viva Voce (Oral Examination)** Assessing conceptual clarity, application of research methodology, and statistical reasoning.	**10 marks**
Total		**50 Marks**

Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

Breakup of theory IA calculation for 20 marks

Description	Marks
Internal exam (at department)	15 marks
Seminar	5 marks
Total	**20 Marks**

Breakup of practical IA calculation:

Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
Total	**20 Marks**

Note –20 marks to be converted to 10 marks weightage for submission to the university.

Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

Core Competencies	Marks allotted	Marks obtained
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.		
Clinical Teaching		
a. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	**50 Marks**	

Sign of Internal Examiner: _____
Sign of External Examiner: _____

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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