



# **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-52/2025, Dated 28/11/2025

## **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.
2. Amended as per AC-52/2025, [Resolution No.5.1,(Annexure-17E)]; [Resolution No.5.8, (Annexure-24D)]; Dated 28/11/2025.

**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<sup>++</sup>" 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 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 through 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 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 Dialysis Technology Duration 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](http://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 find out 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 multidisciplinary sectors 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 daily practices and research in respective areas of specialization
PO8	Develop lifelong learning attitude and values for enhancement of professional and social skills for an 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 high standard 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

<b>MMDT 101 T &amp; MMDT 104 P</b>	<b>Anatomy (Nephroanatomy &amp; Histology)</b>	<b>Mapped PO</b>	<b>Teaching- Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	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
<b>CO2</b>	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
<b>CO3</b>	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
<b>MMDT 102 T &amp; MMDT 105 P</b>	<b>Physiology (Nephrophysiology)</b>	<b>Mapped PO</b>	<b>Teaching- Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	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
<b>CO2</b>	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
<b>MMDT 103 T</b>	<b>Nephrogenetics &amp; Pharmacology</b>	<b>Mapped PO</b>	<b>Teaching- Learning Methodology</b>	<b>Assessment Tools</b>

<b>CO1</b>	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
<b>CO2</b>	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
<b>CC 001 T &amp; CC 001 P</b>	<b>Research Methodology &amp; Biostatistics (Core Course)</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	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
<b>MMDT 106 CP</b>	<b>MMDT Directed Clinical Education-I</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	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
<b>CO2</b>	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
<b>CO3</b>	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**

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

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

<b>MMDT 113 CP</b>	<b>MMDT Directed Clinical Education II</b>	<b>Mapped PO</b>	<b>Teaching- Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	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.	<b>PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8</b>	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
<b>CO2</b>	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.	<b>PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8</b>	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
<b>CO3</b>	Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams.	<b>PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8</b>	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
<b>SEC 001 T</b>	<b>Innovation and Entrepreneurship</b>	<b>Mapped PO</b>	<b>Teaching- Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Students will grasp the concepts of innovation, its ecosystem, and the role of various stakeholders such as government policies, startups, and innovation hubs.	<b>PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8</b>	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
<b>CO2</b>	Cultivating an entrepreneurial mindset and leadership qualities necessary for driving innovation and leading ventures	<b>PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8</b>	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
<b>CO3</b>	Understanding the intersection of technology and innovation	<b>PO1, PO2, PO3, PO4,</b>	Lecture, Assignment, Case	Internal assessment, University exam, Theory exam, Practical

	and leveraging emerging technologies for entrepreneurial ventures.	<b>PO5, PO6, PO7, PO8</b>	Study, PBL, Seminar	exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
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### 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
<b>Discipline Specific Core Theory</b>														
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
<b>Discipline Specific Core Practicals</b>														
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
<b>Total</b>		<b>12</b>	<b>0</b>	<b>8</b>	<b>15</b>	<b>21</b>	<b>180</b>	<b>0</b>	<b>120</b>	<b>225</b>	<b>525</b>	<b>80</b>	<b>470</b>	<b>550</b>

Resolution No. 5.8 of Academic Council (AC-52/2025):

The Academic Council resolved to approve the continuation of SWAYAM/NPTEL elective courses for postgraduate students, wherever applicable to their respective programmes. Accordingly, students admitted from the Academic Year 2025-26 onwards shall be permitted to choose any one approved elective course. The Council further approved the inclusion of 2 and 3 credit courses in the index. This approach is in alignment with the current NCAHP curriculum guidelines, which recommend flexibility for open electives through recognized national platforms.

Accordingly, the names of individual elective courses shall be removed from the existing syllabi. The links of SWAYAM/NPTEL courses ([https://swayam.gov.in/nc\\_details/NPTEL](https://swayam.gov.in/nc_details/NPTEL)) shall be incorporated in the syllabus index under the existing course code SEC-002 T, titled: "NPTEL/SWAYAM (Name of the Course Chosen by the Student)"

In alignment with Resolution No. 3.1 of the Academic Council (AC-51/2025), the detailed syllabi of individual courses shall be removed and replaced with the approved links of SWAYAM/NPTEL or common reference pool courses. The complete course content shall remain accessible on the official SWAYAM/NPTEL portals. Students may select any one course from the provided links, in alignment with the credit requirements mentioned in their respective syllabi, as per Annexures 24A, 24B, 24C, 24D, 24E, 24F, 24G, 24H, 24I, 24J, 24K, 24L, 24M, 24N, and 24O.

## 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	
<b>Discipline Specific Core Theory</b>															
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	
<b>Discipline Specific Core Practicals</b>															
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		
<b>Skill Enhancement Course</b>															
SEC 001 T	Innovation and Entrepreneurship	3	-	-	-	3	45	-	-	-	45	-	100	100	
SEC 002 T	NPTEL Swayam (Course Selected as per Below List)														
<b>Total</b>		<b>14</b>	<b>0</b>	<b>6</b>	<b>15</b>	<b>22</b>	<b>210</b>	<b>0</b>	<b>90</b>	<b>225</b>	<b>525</b>	<b>100</b>	<b>550</b>	<b>650</b>	

## Common Pool of Swayam/NPTEL Courses offered as elective option (SEC 002)

Course ID	Discipline	Course Name	Institute	Duration	Start date	End date	Exam date	Enrollment End date	Exam Registration End date	UG/PG	Click here to Join the course	NPTEL URL	NPTEL ID
noc25-bt06	Biotechnology and Bioengineering	BioInformatics: Algorithms and Applications	IIT Madras	12 Weeks	20-01-2025	11-04-2025	26-04-2025	27-01-2025	28-02-2025	UG/PG	<a href="https://onlinecourses.nptel.ac.in/noc25_bt06/preview">https://onlinecourses.nptel.ac.in/noc25_bt06/preview</a>	<a href="https://nptel.ac.in/courses/102106065">https://nptel.ac.in/courses/102106065</a>	<a href="https://nptel.ac.in/courses/102106065">https://nptel.ac.in/courses/102106065</a>
noc25-bt13	Biotechnology and Bioengineering	Computational Genomics	IISER Bhopal	12 Weeks	20-01-2025	11-04-2025	27-04-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_bt13/preview">https://onlinecourses.nptel.ac.in/noc25_bt13/preview</a>	<a href="https://nptel.ac.in/courses/102106339">https://nptel.ac.in/courses/102106339</a>	<a href="https://nptel.ac.in/courses/102106339">https://nptel.ac.in/courses/102106339</a>
noc25-bt29	Biotechnology and Bioengineering	Maternal Infant Young Child Nutrition	IIT Bombay	12 Weeks	20-01-2025	11-04-2025	26-04-2025	27-01-2025	28-02-2025	UG/PG	<a href="https://onlinecourses.nptel.ac.in/noc25_bt29/preview">https://onlinecourses.nptel.ac.in/noc25_bt29/preview</a>	<a href="https://nptel.ac.in/courses/102101091">https://nptel.ac.in/courses/102101091</a>	<a href="https://nptel.ac.in/courses/102101091">https://nptel.ac.in/courses/102101091</a>
noc25-ge05	Multidisciplinary	Biophotonics	IIT Kharagpur	12 Weeks	20-01-2025	11-04-2025	03-05-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_ge05/preview">https://onlinecourses.nptel.ac.in/noc25_ge05/preview</a>	<a href="https://nptel.ac.in/courses/127105225">https://nptel.ac.in/courses/127105225</a>	<a href="https://nptel.ac.in/courses/127105225">https://nptel.ac.in/courses/127105225</a>
noc25-ge07	Multidisciplinary	Comprehensive Molecular Diagnostics and Advanced Gene Expression Analysis	IIT Kharagpur	12 Weeks	20-01-2025	11-04-2025	03-05-2025	27-01-2025	28-02-2025	UG/PG	<a href="https://onlinecourses.nptel.ac.in/noc25_ge07/preview">https://onlinecourses.nptel.ac.in/noc25_ge07/preview</a>	<a href="https://nptel.ac.in/courses/127105391">https://nptel.ac.in/courses/127105391</a>	<a href="https://nptel.ac.in/courses/127105391">https://nptel.ac.in/courses/127105391</a>
noc25-ge25	Multidisciplinary	One Health	ICMR - Regional Medical Research Centre, Bhubaneswar	12 Weeks	20-01-2025	11-04-2025	03-05-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_ge25/preview">https://onlinecourses.nptel.ac.in/noc25_ge25/preview</a>	<a href="https://nptel.ac.in/courses/127106233">https://nptel.ac.in/courses/127106233</a>	<a href="https://nptel.ac.in/courses/127106233">https://nptel.ac.in/courses/127106233</a>
noc25-ge27	Multidisciplinary	Qualitative Research Methods and Research Writing	IIT Kharagpur	12 Weeks	20-01-2025	11-04-2025	27-04-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_ge27/preview">https://onlinecourses.nptel.ac.in/noc25_ge27/preview</a>	<a href="https://nptel.ac.in/courses/109105115">https://nptel.ac.in/courses/109105115</a>	<a href="https://nptel.ac.in/courses/109105115">https://nptel.ac.in/courses/109105115</a>
noc25-bt21	Biotechnology and Bioengineering	Host-Pathogen Interaction (Immunology)	IISER Bhopal	12 Weeks	20-01-2025	11-04-2025	04-05-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_bt21/preview">https://onlinecourses.nptel.ac.in/noc25_bt21/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_bt24/preview">https://onlinecourses.nptel.ac.in/noc24_bt24/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_bt24/preview">https://onlinecourses.nptel.ac.in/noc24_bt24/preview</a>
noc25-bt22	Biotechnology and Bioengineering	Human Physiology	IISER Pune	12 Weeks	20-01-2025	11-04-2025	26-04-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_bt22/preview">https://onlinecourses.nptel.ac.in/noc25_bt22/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_bt05/preview">https://onlinecourses.nptel.ac.in/noc24_bt05/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_bt05/preview">https://onlinecourses.nptel.ac.in/noc24_bt05/preview</a>
noc25-hs61	Humanities and Social Sciences	Patent Law for Engineers and Scientists	IIT Madras	12 Weeks	20-01-2025	11-04-2025	03-05-2025	27-01-2025	28-02-2025	UG/PG	<a href="https://onlinecourses.nptel.ac.in/noc25_hs61/preview">https://onlinecourses.nptel.ac.in/noc25_hs61/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_hs155/preview">https://onlinecourses.nptel.ac.in/noc24_hs155/preview</a>	<a href="https://onlinecourses.nptel.ac.in/noc24_hs155/preview">https://onlinecourses.nptel.ac.in/noc24_hs155/preview</a>
noc25-mg05	Management	AI in Human Resource Management	IIT Guwahati	12 Weeks	20-01-2025	11-04-2025	04-05-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_mg05/preview">https://onlinecourses.nptel.ac.in/noc25_mg05/preview</a>	<a href="https://nptel.ac.in/courses/110103626">https://nptel.ac.in/courses/110103626</a>	<a href="https://nptel.ac.in/courses/110103626">https://nptel.ac.in/courses/110103626</a>
noc25-hs70	Humanities and Social Sciences	Science Communication: Research Productivity and Data Analytics using Open Source Software	IIT Delhi	12 Weeks	20-01-2025	11-04-2025	03-05-2025	27-01-2025	28-02-2025	PG	<a href="https://onlinecourses.nptel.ac.in/noc25_hs70/preview">https://onlinecourses.nptel.ac.in/noc25_hs70/preview</a>	<a href="https://nptel.ac.in/courses/109102392">https://nptel.ac.in/courses/109102392</a>	<a href="https://nptel.ac.in/courses/109102392">https://nptel.ac.in/courses/109102392</a>
noc25-ag04	Agricultural and Food Engineering	Food Science and Technology	IIT Kharagpur	12 Weeks	20-01-2025	11-04-2025	26-04-2025	27-01-2025	28-02-2025	UG/PG	<a href="https://onlinecourses.nptel.ac.in/noc25_ag04/preview">https://onlinecourses.nptel.ac.in/noc25_ag04/preview</a>		

# FIRST YEAR

## M.Sc. Medical Dialysis Technology

### SEMESTER-I

<b>Code No.</b>	<b>Core Subjects</b>
<b>Discipline Specific Core Theory</b>	
MMDT 101 T	Anatomy (Nephroanatomy & Histology)
MMDT 102 T	Physiology (Nephrophysiology)
MMDT 103 T	Nephrogenetics & Pharmacology
CC 001 T	Research Methodology & Biostatistics (Core Course)
<b>Discipline Specific Core Practical</b>	
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)

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester I</b>
<b>Name of the Subject</b>	<b>Anatomy (Nephroanatomy &amp; Histology)</b>
<b>Subject Code</b>	<b>MMDT 101 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Apply to clinical scenarios the concepts and knowledge of the general terminology, cell structure and function, histology, gross anatomy, and physiology of urinary system.</li> <li>• Students will be able to describe and analyze tissue types and organ structure &amp; know the topics of fundamental anatomy and histology.</li> <li>• 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.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>Basic Nephrology:</b> Anatomy of the kidney, ureter, urinary bladder, urethra	<b>6</b>
2	<b>Blood supply &amp; Nerve supply:</b> Blood supply of urinary system & Nerve supply of urinary system	<b>6</b>
3	<b>Embryology:</b> Embryology of urinary system	<b>4</b>
4	<b>Peritoneal Cavity:</b> Peritoneum, folds & recesses	<b>4</b>
5	<b>Histology:</b> 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	<b>25</b>
<b>Total</b>		<b>45 hrs</b>

### **MMDT 104 P- Anatomy (Nephroanatomy & Histology)**

<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	Anatomy of urinary system	<b>5</b>
2	Embryology of urinary system	<b>5</b>
3	Histology	<b>20</b>
<b>Total</b>		<b>30 hrs</b>

**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](http://www.osmosis.org)

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

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>To understand the functions of important physiological systems including the urinary systems.</li> <li>Students will acquire knowledge on physiology related to Nephrology &amp; Physiology applied to dialysis.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>The body fluid compartments:</b> 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	<b>5</b>
2	<b>Formation of urine by the kidney:</b> 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 glomerular filtration rate and renal blood flow, Reabsorption of fluid by the peri-tubular capillaries	<b>5</b>
3	<b>Formation of urine by the kidney:</b> 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	<b>6</b>
4	<b>Renal associated mechanism for controlling extracellular fluid osmolality and sodium concentration, The mechanism for excreting excess water:</b> 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	<b>8</b>
5	<b>Renal regulation of Blood volume and extracellular fluid Volume:</b> Excretion and regulation of urea, potassium, and other substances, control of blood volume, control of extracellular fluid volume, urea excretion, Potassium excretion, Control of the extracellular concentrations of other ions	<b>5</b>
6	<b>Regulation of Acid-Base Balance:</b> Function of Acid – Base Buffers, Respiratory regulation of Acid – Base balance, Renal control of Hydrogen Ion concentration, Clinical abnormalities of Acid-Base Balance	<b>8</b>
7	<b>Renal Disease, Diuresis, and Micturition:</b> Renal Disease, Renal Function tests, Diuretics and mechanisms of their action, Micturition	<b>8</b>
<b>Total</b>		<b>45 hrs</b>

**MMDT 105 P: - Physiology (Nephrophysiology)**

<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
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: Excretion and regulation of urea, potassium, and other substances. Regulation of Acid-Base Balance.	14
<b>Total</b>		<b>30 hrs</b>

**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.

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester I</b>
<b>Name of the Subject</b>	<b>Nephrogenetics &amp; Pharmacology</b>
<b>Subject Code</b>	<b>MMDT 103 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>This course gives a general knowledge and application part of the drugs or medicines used for renal problems.</li> <li>Knowledge of renal, cardio vascular, respiratory, Central Nervous System &amp; corticosteroids to be able to manage renal patients under supervision of a nephrologists and assist a nephrologists.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1.	<b><u>Nephrogenetics:</u></b> <b>Introduction:</b> Structure and function of the cell, DNA structure & function, replication, RNA structure and function, protein synthesis, post translational modifications, structure and function of Eukaryotic genes and genome. Genes involved in apoptosis	<b>5</b>
2.	<b>Transmission Pattern:</b> Principles of Mutations and types, detection of various mutations, population variations, polymorphisms, Inheritance pattern, consanguinity in Human population,	<b>5</b>
3.	<b>Genetic Variation:</b> Basic concepts of formal genetics, mitochondrial gene and inheritance, Genetic counseling: principles and ethics in dealing with genetic disorders and treatment. Gene therapy	<b>5</b>
4.	<b><u>Pharmacology:</u></b> <b>Introduction to Pharmacology:</b> Principles of Drug Actions, Adm. and Drug Calculations.	<b>4</b>
5.	<b>Renal Drugs:</b> Common medications used in the dialysis patient, Principle of action, Administration, Precaution and side effects.	<b>6</b>
6.	<b>Cardiovascular Drugs:</b> Common drugs used, Administration, Precaution and side effects.	<b>3</b>
7.	<b>Respiratory Drugs:</b> Common drugs used, Administration, Precaution and side effects.	<b>3</b>
8.	<b>Corticosteroids and other Immunosuppressant:</b> Drugs used, Principle of action, Administration, Precaution and side effects.	<b>4</b>
9.	<b>CNS Drugs:</b> Common drugs used, Administration, Precaution and side effects	<b>3</b>
10.	<b>Anticoagulant:</b> Heparin, low molecular weight heparin, protomine etc	<b>5</b>
11.	<b>Miscellaneous</b>	<b>2</b>
<b>Total</b>		<b>45 hrs</b>

**Recommended Text Books:**

1. Essentials of Medical Pharmacology – Tripathi

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

<b>Teaching Objective</b>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>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 &amp; reporting of results and use of statistical software.</li> </ul>

<b>Sr. No.</b>	<b>Topic</b>	<b>No. of Hrs.</b>
<b>A</b>	<b>Research Methodology:</b>	<b>23</b>
1	<b>Scientific Methods of Research:</b> Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology	4
2	<b>Research Designs:</b> 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	<b>Sampling Designs:</b> 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	<b>Measurement in research:</b> Measurement Scales, Sources of Error in Measurement,	3
5	<b>Methods of Data Collection:</b> Types of data, Collection of Primary Data, Observation Method, Interview Method	4
6	Research Ethics and plagiarism	2
<b>B</b>	<b>Biostatistics</b>	<b>22</b>
7	<b>Data Presentation:</b> 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	<b>Measures of Central Tendency and Dispersion:</b> 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	<b>Testing of Hypotheses:</b> Definition, Basic Concepts, Procedure for Hypothesis Testing, power of test, Normal distribution, Parametric Tests including Z-test, t-test,	4

	and ANOVA	
10	<b>Chi-square Test:</b> Chi-square as a Non-parametric Test, Applications.	2
11	<b>Measures of Relationship:</b> Correlation and Simple Regression Analysis	3
12	<b>Non-parametric test:</b> 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	<b>Vital Health Statistics:</b> rate, crude rate, age specific rate, Measurement of fertility, Rate, Measures of mortality.	4
<b>Total</b>		<b>45 hrs</b>

### CC 001 P–Research Methodology & Biostatistics

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

#### 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**

<b>Subject</b>	<b>Book Name</b>	<b>Author</b>
<b>Biostatistics &amp; Research Methodology</b>	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**

<b>Course Outcome</b>	<ul style="list-style-type: none"><li>• 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.</li><li>• 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.</li><li>• Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams.</li></ul>
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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

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

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

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• The scope of this course is to provide overall information of the pathology, structural abnormalities and symptoms of kidney diseases.</li> <li>• To have knowledge of common medications used in dialysis, its administration &amp; side effects.</li> <li>• To know total patient care during dialysis &amp; dietary management.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>Acute renal failure:</b> 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	<b>Chronic Renal Failure:</b> Etiology, Pathology & pathogenesis, clinical features, diagnosis and management.	4
3	<b>Glomerular Diseases:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
4	<b>Tubulo-Interstitial Diseases:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
5	<b>Renal hypertension:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
6	<b>Renal stone:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active)	4
7	<b>Hypertension:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
8	<b>Diseases of Urogenital Tract:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
9	<b>Malignancies of Urinary system:</b> Pathogenesis, Clinical features, related investigations and management (Conservative and active).	4
10	<b>Renal Transplant:</b> 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
<b>Total</b>		<b>45 hrs</b>

**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

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester II</b>
<b>Name of the Subject</b>	<b>Clinical Nephrology</b>
<b>Subject Code</b>	<b>MMDT 108 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• The students are provided with adequate knowledge of patient assessment in renal diseases.</li> <li>• The students are trained to apply knowledge of laboratory &amp; imaging investigations for diagnosing renal diseases.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>Medical Abbreviations:</b> Common medical abbreviations.	2
2	<b>Introduction to the patient and chart:</b> Patient encounter, Interview and history taking of patient.	3
3	<b>Vital signs:</b> 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	<b>Inspection:</b> 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	<b>Palpation and percussion:</b> Palpation – Method for palpation. Percussion - Resonance, hyper-resonance and dullness.	2
6	<b>Auscultation:</b> Heart sounds & murmurs & any other abnormal body sound.	2
7	<b>Common findings in disease:</b> Glomerular Diseases, Tubulo-Interstitial Diseases, Diseases of Urogenital Tract, Malignancies of Urinary system.	3
8	<b>Patient assessment in:</b> Acute & Chronic Renal Failure.	2
9	<b>Examination of gastrointestinal system</b>	1
10	<b>Examination of Nervous system</b>	1
11	<b>Routine hematology:</b> WBC (Normal values, Leucocytoses, Leukopenia), RBC, Hematocrit, Hemoglobin, Blood indices.	3
12	<b>Blood chemistry profiles:</b> 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	<b>Routine Sputum examination</b>	3
14	<b>Routine Urine examination:</b> Physical & Microscopic characteristic of urine in different pathological condition	3
15	<b>Arterial Blood Gases Analysis:</b> Acid-base Chemistry ( $H^+$ concentration, Moles, Milli moles, nano moles, Exponent system, Logarithm scale, Concept of pH), Henderson-Hasselbach Equation for Arterial Blood, $HCO_3^- / H_2CO_3^-$ 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 <sup>+</sup> - H <sup>+</sup> relationship, Effect on ECG, Other causes, Treatment). ABGs in Chronic Lung Diseases - Chronic Ventilatory Failure, Acute Ventilatory. Failure superimposed on Chronic Failure, Acute hyperventilation superimposed on Chronic Failure.	
16	<b>Renal Radiography:</b> 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.	<b>5</b>
<b>Total</b>		<b>45 hrs</b>

### MMDT 111 P- Clinical Nephrology

Sr. No.	Topics	No. of Hrs.
1	<b>Laboratory Exercises (Practical):</b> 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.	<b>60</b>
<b>Total</b>		<b>60 hrs</b>

**Books Recommended:**

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

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester II</b>
<b>Name of the Subject</b>	<b>Dialysis Equipment</b>
<b>Subject Code</b>	<b>MMDT 109 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>To understand the principle of working, construction, operation, uses, cleaning, handling, care, common trouble shooting, maintenance etc. of the hemodialysis &amp; peritoneal dialysis equipment</li> <li>To conduct routine equipment management procedures including preventative maintenance, faultfinding, calibration and verifying of equipment prior to clinical use.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
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.	<b>5</b>
22	Type and range of samples that is required for QA.	
23	Relevant sampling techniques and how to apply them.	
<b>Total</b>		<b>45 hrs</b>

### MMDT 112 P- Dialysis Equipment

Sr. No.	Topics	No. of Hrs.
1	<b>Machine Service And Repair:</b> 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.	<b>8</b>
2	<b>Dialysate and dialysate delivery system:</b> preparation, Delivery system – batch type and proportioning type, Drake Willock, Centry, Gambrom, Fresenius etc., Maintenance and trouble shooting, Acetate, Bicarbonate.	<b>7</b>
3	<b>Dialysate supply subsystems:</b> Water pre-treatment – Water pressure regulation – Temperature control – Temperature sensors – Chemical proportioning – Degassing 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.	<b>10</b>
4	<b>Dialysis machine maintenance:</b> Maintenance / - Repairing and servicing / - Drake-Winlock proportioning unit	<b>5</b>
<b>Total</b>		<b>30 hrs</b>

#### 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

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester II</b>
<b>Name of the Subject</b>	<b>Water Treatment</b>
<b>Subject Code</b>	<b>MMDT 110 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Different types of water source and methods of treatment employed by water supply companies.</li> <li>• Ground sources and surface sources and the classification of contaminants.</li> <li>• Potable water regulations.</li> <li>• Necessity to treat potable water for use in dialysis.</li> <li>• Need for chemical limits.</li> <li>• Evaluation of feed water quality, including hardness.</li> <li>• Monitoring &amp; disinfection of water treatment</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
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 of 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
<b>Total</b>		<b>30 hrs</b>

**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**

<b>Course Outcome</b>	<ul style="list-style-type: none"><li>• 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.</li><li>• 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.</li><li>• Focus on developing professionalism, empathy, ethical conduct, teamwork, and communication skills—key traits for holistic patient care and effective collaboration in interdisciplinary healthcare teams.</li></ul>
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Trainees acquire the knowledge and procedural skills necessary to deliver a high standard of care to the patients with chronic kidney disease requiring renal replacement therapy. **(Total- 225 hrs.)**

## SKILL ENHANCEMENT COURSES

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester II</b>
<b>Name of the Subject</b>	<b>Innovation and Entrepreneurship</b>
<b>Subject Code</b>	<b>SEC 001 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Students will grasp the concepts of innovation, its ecosystem, and the role of various stakeholders such as government policies, startups, and innovation hubs.</li> <li>• Cultivating an entrepreneurial mindset and leadership qualities necessary for driving innovation and leading ventures.</li> <li>• Understanding the intersection of technology and innovation and leveraging emerging technologies for entrepreneurial ventures.</li> </ul>
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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 & Intellectual Property, Scaling and Growth Strategies, sustainability & Social Innovation	15
<b>Total</b>		<b>45 hrs</b>

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester II</b>
<b>Name of the Course</b>	<b>NPTEL Swayam</b>
<b>Course Code</b>	<b>SEC 002 T</b>

**Note:** The links of SWAYAM/NPTEL courses ([https://swayam.gov.in/nc\\_details/NPTEL](https://swayam.gov.in/nc_details/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	
<b>Total</b>				<b>80 Marks</b>

### 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
<b>Total</b>				<b>50 Marks</b>

### 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
<b>Total</b>				<b>100 Marks</b>

**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
<b>Total</b>		<b>40 Marks</b>

**Practical exam pattern Research Methodology & Biostatistics (Core course)****Total 50-mark distribution:**

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

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
<b>Total</b>	<b>20 Marks</b>

**Breakup of practical IA calculation:**

Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
<b>Total</b>	<b>20 Marks</b>

**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.	
<b>Clinical Teaching</b>		
a. Demonstrate beginning competency in technical skills.	10	
<b>Independent Work by Student guided by faculty</b>		
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	
<b>Hands on practical work by students</b>		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
<b>Independent work by student</b>		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
<b>Log book</b>	10	
<b>Viva</b>	10	
<b>Attendance</b>	05	
<b>Total</b>	<b>50 Marks</b>	

Sign of Internal Examiner: \_\_\_\_\_

Sign of External Examiner: \_\_\_\_\_

**Resolution No. 5.1 of Academic Council (AC-52/2025):**

Resolved to approve the CBCS syllabus, including Program Outcomes (POs) and Course Outcomes (COs), for Postgraduate (PG) 2-year programs under MGMSBS (semester III & IV) for 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, Masters in Hospital Administration, Masters of Public Health, M.Sc. Health Informatics, M.Sc. Medical Laboratory Technology, M.Sc. Clinical Research, to be effective from batch admitted in the Academic Year 2025-26 onwards. Guidelines for selected programmes as per National Commission for Allied & Healthcare Professions will be adopted for the given programmes from academic year 2026-27 onwards [ANNEXURE-17A, 17B, 17C, 17D, 17E, 17F, 17G, 17H, 17I, 17J, 17K, 17L, 17M, 17N, 17O & 17P and ANNEXURE-18A, 18B, 18C, 18D, 18E, 18F, 18G, 18H, 18I, 18J, 18K, 18L, 18M, 18N, 18O & 18P].

**Annexure-17E of AC-52/2025**

# **MGM SCHOOL OF BIOMEDICAL SCIENCES**

**(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**

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

Grade "A<sup>++</sup>" Accredited by NAAC

Sector 1, Kamothe, Navi Mumbai-410209, Tel.No.:022-27437631,27437632,27432890

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## **CHOICEBASEDCREDITSYSTEM(CBCS)**

**(Academic Year 2025 - 26)**

**Curriculum for**

**M.Sc. Allied Health Sciences**

**M.Sc. Medical Dialysis Technology**

**Semester III & IV**

## Course Outcomes

### Semester III

MMDT 114 T	Concepts of Kidney Diseases	Mapped PO	Teaching- Learning Methodology	Assessment Tools
CO1	Perform systematic patient assessment and identify renal involvement.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Explain and differentiate renal diseases and related clinical syndromes.	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Diagnose and manage acute, chronic kidney diseases, hypertension, and diabetes.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO4	Analyze and interpret acid–base, fluid, and electrolyte disorders for effective patient care.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment,Case Study,Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments,CasestudypresentationJ ournalclub,Skillassessment,MCQ
MMDT 115 T	Dialysis Technology	Mapped PO	Teaching- Learning Methodology	Assessment Tools
CO1	Demonstrate knowledge of extracorporeal and peritoneal dialysis therapies, their principles, and clinical applications.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Identify and explain the components, alarms, and safety mechanisms of hemodialysis, CRRT, and automated peritoneal dialysis machines	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Apply critical thinking and decision-making skills in selecting and managing appropriate dialysis modalities and solutions for patients	PO1,PO2, PO3,PO5,P O6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO4	Exhibit teamwork, communication, ethical practice, and continuous learning while handling dialysis procedures in clinical settings	PO1,PO2, PO3,PO5,P O6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ

<b>MMDT 116 T</b>	<b>Renal Transplantation &amp; Co-ordination</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Demonstrate knowledge of transplantation history, immune system basics, and the legal–ethical framework governing organ donation and transplantation	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO2</b>	Evaluate donors and recipients, including immune-related assessments, to support safe and effective transplantation	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Analyze transplantation surgery, complications, immunosuppressive therapy, and graft rejection to support clinical decision-making	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit teamwork, ethical practice, communication, and lifelong learning in multidisciplinary transplant care	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>MMDT 117 T</b>	<b>Imaging Science of the Urinary System</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Demonstrate knowledge of renal function tests, urinalysis, hematological, and biochemical evaluations for diagnosing renal ailments	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO2</b>	Interpret radiological investigations such as ultrasound, CT, MRI, urography, angiography, and radionuclide studies for urinary system evaluation	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Apply skills in renal biopsy and histopathology techniques for clinical and research purposes	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit critical thinking, communication, ethical practice, and teamwork in interpreting and applying diagnostic findings in nephrology	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>MMDT 118</b>	<b>Research Project/Dissertation</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>

<b>CO1</b>	Demonstrate the ability to identify research problems, review literature, and apply scientific/clinical knowledge to healthcare and community needs.	PO1,PO2, PO3,PO4, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO2</b>	Plan, design, and conduct research projects using appropriate methodologies, statistical tools, and systematic approaches	PO1,PO2, PO3,PO4, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Present, interpret, and critically analyze research data to derive meaningful conclusions and propose healthcare solutions.	PO1,PO2, PO3,PO4, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit ethical conduct, teamwork, leadership, and lifelong learning in carrying out and presenting research/dissertation work.	PO1,PO2, PO3,PO4, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>MMDT 119 P</b>	<b>Concepts of Kidney Diseases</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Perform systematic patient assessment including history, clinical examination, and identification of renal and urological problems.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO2</b>	Apply knowledge of renal and systemic diseases (AKI, CKD, HTN, DM, glomerular & non-glomerular disorders) to practical diagnosis and management	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Analyze and interpret acid–base balance, fluid–electrolyte disorders, and related investigations for appropriate patient care decisions.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Demonstrate ethical practice, teamwork, communication skills, and continuous learning in managing nephrology patients in clinical settings.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Casestudypresentation Journalclub, Skillassessment, MCQ
<b>MMDT 120 CP</b>	<b>MMDT Directed Clinical Education - III</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Apply scientific and clinical knowledge in real-time patient care and community/industrial health settings to improve healthcare practices	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ

<b>CO2</b>	Demonstrate critical thinking and decision-making skills in diagnosing, managing, and providing systematic solutions to clinical and healthcare problems.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Perform clinical research activities such as planning, data collection, interpretation, and applying findings for community health benefits.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit professional behavior, communication, teamwork, and ethical practices while functioning effectively in multidisciplinary healthcare environments.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ

## SEMESTER IV

MMDT 121 T	Nutrition in Renal Disease	Mapped PO	Teaching- Learning Methodology	Assessment Tools
CO1	Apply fundamental knowledge of nutrition and metabolism (macro- and micronutrients, energy balance, body composition) to assess dietary needs and promote health across different life stages and lifestyles.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Demonstrate critical thinking and problem-solving skills in assessing nutritional status (anthropometric, biochemical, clinical, dietary) and planning individualized diet care for both health and disease conditions.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Implement evidence-based medical nutrition therapy in renal diseases and other clinical conditions through diet modification, enteral/parenteral feeding, and nutrition counseling.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO4	Exhibit professional, communication, and ethical skills in delivering nutritional care, working in multidisciplinary teams, and engaging in lifelong learning for community and clinical health improvement.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
MMDT 122 T	Recent Advances in Dialysis and Nephrology	Mapped PO	Teaching- Learning Methodology	Assessment Tools
CO1	Apply advanced scientific and clinical knowledge of hemodialysis, peritoneal dialysis, vascular access, and renal transplantation to improve patient care practices.	PO1,PO2, PO3, PO5,PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO2	Analyze and critically evaluate recent advances in dialysis technologies and transplantation methods to identify systematic approaches for clinical problem-solving.	PO1,PO2, PO3,PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
CO3	Demonstrate research and evidence-based skills by integrating new findings in dialysis monitoring, vascular access innovations, and	PO1,PO2, PO3,PO5,P O6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study

	transplant care into clinical practice.			presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit professional leadership, communication, and ethical competence while working in multidisciplinary healthcare teams and adapting lifelong learning in nephrology care.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>MMDT 123 CP</b>	<b>MMDT Directed Clinical Education-IV</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Apply advanced scientific and clinical knowledge in multidisciplinary healthcare practice to provide safe, evidence-based, and effective patient care.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO2</b>	Demonstrate critical thinking and decision-making skills in solving complex clinical problems and adapting systematic approaches in varied healthcare situations.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO3</b>	Perform clinical research and data interpretation for planning, implementing, and evaluating patient care strategies with direct application to community health	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>CO4</b>	Exhibit professionalism, teamwork, communication, and ethical values while functioning effectively in clinical and research environments, fostering leadership and lifelong learning.	PO1, PO2, PO3, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignments, Case study presentation Journal club, Skill assessment, MCQ
<b>MMDT 118</b>	<b>Research Project/Dissertation</b>	<b>Mapped PO</b>	<b>Teaching-Learning Methodology</b>	<b>Assessment Tools</b>
<b>CO1</b>	Demonstrate the ability to identify research problems, review literature, and apply scientific/clinical knowledge to healthcare and community needs	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignment, MCQ
<b>CO2</b>	Plan, design, and conduct research projects using appropriate methodologies, statistical tools, and systematic approaches	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignment, MCQ
<b>CO3</b>	Present, interpret, and critically analyze research data to derive meaningful conclusions and propose healthcare solutions.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignment, MCQ

<b>CO4</b>	Exhibit ethical conduct, teamwork, leadership, and lifelong learning in carrying out and presenting research/dissertation work.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Case Study, Seminar	Internal assessment, University exam, Theory exam, Log book, Seminar presentation, Assignment , MCQ
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**OUTLINE OF COURSE CURRICULUM**

**M.Sc. Medical Dialysis Technology**

**Semester III**

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
<b>Discipline Specific Core Theory</b>														
MMDT 114 T	Concepts of Kidney Diseases	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 115 T	Dialysis Technology	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 116 T	Renal Transplantation & Co-ordination	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 117 T	Imaging Science of the Urinary System	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 118	Research Project/ Dissertation	-	-	10	-	5	-	-	150	-	150	50	-	50
<b>Discipline Specific Core Practical</b>														
MMDT 119 P	Concepts of Kidney Diseases	-	-	2	-	1	-	-	30	-	30	10	40	50
MMDT 120 CP	MMDT Directed Clinical Education - III	-	-	-	12	4	-	-	-	180	180	-	50	50
<b>Total</b>		<b>12</b>	<b>0</b>	<b>12</b>	<b>12</b>	<b>22</b>	<b>180</b>	<b>0</b>	<b>180</b>	<b>180</b>	<b>540</b>	<b>140</b>	<b>410</b>	<b>550</b>

**OUTLINE OF COURSE CURRICULUM**

**M.Sc. Medical Dialysis Technology**

**Semester IV**

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
<b>Discipline Specific Core Theory</b>														
MMDT 121 T	Nutrition in Renal Disease	3	-	-	-	3	45	-	-	-	45	20	80	100
MMDT 122 T	Recent Advances in Dialysis and Nephrology	2	-	-	-	2	30	-	-	-	30	20	80	100
<b>Discipline Specific Core Practical</b>														
MMDT 123 CP	MMDT Directed Clinical Education - IV	-	-	-	12	4	-	-	-	180	180	-	50	50
MMDT 118	Research Project/ Dissertation	-	-	22	-	11	-	-	330	-	330	-	200	200
<b>Total</b>		<b>5</b>	<b>0</b>	<b>22</b>	<b>12</b>	<b>20</b>	<b>75</b>	<b>0</b>	<b>330</b>	<b>180</b>	<b>585</b>	<b>40</b>	<b>410</b>	<b>450</b>

# SECOND YEAR

## M.Sc. Medical Dialysis Technology

### SEMESTER-III

<b>Code No.</b>	<b>Core Subjects</b>
<b>Discipline Specific Core Theory</b>	
MMDT 114 T	Concepts of Kidney Diseases
MMDT 115 T	Dialysis Technology
MMDT 116 T	Renal Transplantation & Co-ordination
MMDT 117 T	Imaging Science of the Urinary System
MMDT 118	Research Project/Dissertation
<b>Discipline Specific Core Practical</b>	
MMDT 119 P	Concepts of Kidney Diseases
MMDT 120 CP	MMDT Directed Clinical Education - III

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Name of the Course</b>	<b>Concepts of Kidney Diseases</b>
<b>Course Code</b>	<b>MMDT 114 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Perform systematic patient assessment and identify renal involvement.</li> <li>• Explain and differentiate renal diseases and related clinical syndromes.</li> <li>• Diagnose and manage acute, chronic kidney diseases, hypertension, and diabetes.</li> </ul> <p>Analyze and interpret acid–base, fluid, and electrolyte disorders for effective patient care.</p>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	Patient Assessment (Patient History, General Physical Examination, Systemic Examination, Investigations, Functional Assessment)	2
2	Clinical Syndromes (Nephritic Syndrome, Nephrotic Syndrome, Rapidly Progressive Glomerulonephritis-RPGN/ Crescentic GN, Acute Kidney Injury, Chronic Kidney Disease, Asymptomatic Urinary Abnormalities, Urinary Tract Infection/ Pyelonephritis, Renal Tubular Syndromes)	1
3	Glomerular Diseases (Introduction, Pathophysiology, Clinical Syndromes, Patient Assessment, Management, Role of Dialysis, Patient Education & Counseling, Case-Based Learning)	4
4	Non – glomerular Parenchymal Renal Diseases (Introduction, Classification, Pathophysiology, Clinical Features, Diagnosis, Management, Dialysis Aspects, Patient Education & Counseling, Case-Based Teaching)	4
5	Acute Kidney Injury (Introduction, Etiology & Classification, Clinical Features, Patient Assessment, Management, Role of Dialysis / RRT, Patient Monitoring, Prognosis & Outcomes, Case-Based Learning)	7
6	Chronic Kidney Disease (Introduction, Etiology / Causes, Pathophysiology, Clinical Features, Investigations, Management, Dialysis-Specific Considerations, Patient Education & Counseling, Case-Based Learning)	7
7	Hypertension (Introduction, Etiology, Pathophysiology, Clinical Features, Investigations, Management, Patient Education & Counseling, Case-Based Learning)	4
8	Diabetes Mellitus (Introduction, Pathophysiology, Clinical Features, Patient Assessment, Management, Patient Education & Counseling, Case-Based Learning)	4
9	Acid-Base Disorders (Introduction, Types, Pathophysiology, Clinical Features, Investigations, Dialysis Considerations, Patient Education & Counseling)	4
10	Fluid and Electrolyte Disorders (Introduction, Classification, Pathophysiology, Clinical Features, Investigations, Dialysis Considerations, Patient Education & Counseling)	4
11	Urological Diseases (Introduction, Etiology / Common Urological Diseases, Pathophysiology, Clinical Features, Investigations, Management, Dialysis Considerations, Patient Education & Counseling)	4
<b>Total</b>		<b>45 hrs.</b>

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Name of the Course</b>	<b>Concepts of Kidney Diseases</b>
<b>Course Code</b>	<b>MMDT 119 P</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Perform systematic patient assessment including history, clinical examination, and identification of renal and urological problems.</li> <li>• Apply knowledge of renal and systemic diseases (AKI, CKD, HTN, DM, glomerular &amp; non-glomerular disorders) to practical diagnosis and management</li> <li>• Analyze and interpret acid–base balance, fluid–electrolyte disorders, and related investigations for appropriate patient care decisions.</li> <li>• Demonstrate ethical practice, teamwork, communication skills, and continuous learning in managing nephrology patients in clinical settings.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	Vascular Access Procedures (Arteriovenous Fistula Creation, AV Graft Placement, Central Venous Catheter Insertion, Tunneled Hemodialysis Catheter Insertion)	4
2	Dialysis Procedures (IHD, CRRT, PD)	4
3	Diagnostic Procedures (Blood Sampling & Monitoring, Urine Collection & Analysis, Renal Biopsy)	5
4	Fluid & Electrolyte Management Procedures (Ultrafiltration monitoring, Dialysate adjustments, Calculation of ultrafiltration, dialysate composition, and real-time monitoring)	4
5	Patient Monitoring & Support (Blood pressure and vital signs monitoring, Weight monitoring, Signs of complications)	4
6	Infection Control Procedures (Hand hygiene, aseptic technique, catheter care, Disinfection of dialysis machines and surfaces, Preventing bloodstream infections, maintaining patient safety)	5
7	Patient Education Procedures (Training patients for home dialysis, Dietary and fluid management counseling, Monitoring adherence and self-care techniques)	4
<b>Total</b>		<b>30 hrs.</b>

**Reference Text Books:**

1. Harrison's Principles of Internal Medicine, 20e
2. Manual of Nephrology, Robert Schrier

**Reference books or related websites: Oxford Handbook of Nephrology, 2e**

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Name of the Course</b>	<b>Dialysis Technology</b>
<b>Course Code</b>	<b>MMDT 115 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of extracorporeal and peritoneal dialysis therapies, their principles, and clinical applications.</li> <li>• Identify and explain the components, alarms, and safety mechanisms of hemodialysis, CRRT, and automated peritoneal dialysis machines</li> <li>• Apply critical thinking and decision-making skills in selecting and managing appropriate dialysis modalities and solutions for patients</li> <li>• Exhibit teamwork, communication, ethical practice, and continuous learning while handling dialysis procedures in clinical settings</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1.	Intermittent and Continuous Extracorporeal Therapies (Introduction, Principles, Indications, Procedure Overview, Complications, Student Role, Patient Monitoring & Safety)	3
2.	Peritoneal Dialysis (Introduction, Principles, Types, Indications, Procedure Overview, Complications, Patient Education & Counseling, Dialysis Technologist Role)	3
3.	Components of the hemodialysis machine (Introduction, Major Components of a Hemodialysis Machine, Additional Components)	3
4.	Dialysate Proportioning System of Hemodialysis Machine (Introduction, Principles of Dialysate Proportioning, Components, Functioning of the system, Common Troubleshooting)	6
5.	Alarms and Pressure gauges of Hemodialysis Machine (Introduction, Types of Pressure Gauges, Types of Alarms, Common Causes & Responses)	3
6.	Hemodialysis Solutions for Intermittent and Continuous Therapies (Introduction, Types, Principles of Dialysate / Solution Use, Preparation and Delivery, Monitoring During Therapy, Complications Related to Solutions)	6
7.	Components of CRRT Machine (Introduction, Major Components of a CRRT Machine)	6
8.	Components of Automated Peritoneal Dialysis Machine (Introduction, Major Components of a Automated Peritoneal Dialysis Machine)	3
9.	Peritoneal Dialysis Fluids (Introduction, Composition of PD Fluids, Types, Indications for Different Fluids, Principles of Action, Monitoring During PD, Complications Related to PD Fluids)	6
10.	Other Extracorporeal Therapies (Introduction, Common Extracorporeal Therapies, General Components Across Extracorporeal Therapies, Complications Across Therapies)	6
<b>Total</b>		<b>45 hrs</b>

**Reference Text Books:**

1. John T. Daugirdus, Handbook of Dialysis, 7e,
2. Nisnonsen, Handbook of Dialysis
3. Henrich, Textbook of Dialysis, 5e

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Name of the Course</b>	<b>Renal Transplantation &amp; Co-ordination</b>
<b>Course Code</b>	<b>MMDT 116 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of transplantation history, immune system basics, and the legal–ethical framework governing organ donation and transplantation</li> <li>• Evaluate donors and recipients, including immune-related assessments, to support safe and effective transplantation</li> <li>• Analyze transplantation surgery, complications, immunosuppressive therapy, and graft rejection to support clinical decision-making</li> <li>• Exhibit teamwork, ethical practice, communication, and lifelong learning in multidisciplinary transplant care.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	History of Transplantation	3
2.	Introduction to the immune system	5
3.	Tissue and Human Organs Act and Rules	5
4.	Evaluation of the donor	5
5.	Evaluation of the recipient	5
6.	Immune related evaluation of donor and recipient	5
7.	Deceased donor renal transplantation	4
8.	Transplant surgery + potential complications	5
9.	Immunosuppressive therapy	4
10.	Graft rejection	4
<b>Total</b>		<b>45 hrs.</b>

**Reference Text Books:**

1. Danovitch, Manual of Renal Transplantation, 6e,
2. Peter Morris, Renal Transplantation. 9e

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Name of the Course</b>	<b>Imaging Science of the Urinary System</b>
<b>Course Code</b>	<b>MMDT 117 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of renal function tests, urinalysis, hematological, and biochemical evaluations for diagnosing renal ailments</li> <li>• Interpret radiological investigations such as ultrasound, CT, MRI, urography, angiography, and radionuclide studies for urinary system evaluation</li> <li>• Apply skills in renal biopsy and histopathology techniques for clinical and research purposes</li> <li>• Exhibit critical thinking, communication, ethical practice, and teamwork in interpreting and applying diagnostic findings in nephrology</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	Evaluation of renal function and diagnostic tests	5
2	Ultrasound of the urinary system	5
3	Computed Tomography of The Kidney	5
4	Urography	5
5	Magnetic Resonance Imaging	5
6	Renal Angiography	4
7	Radionuclide Studies of Urology	4
8	Renal Biopsy and histopathology techniques	4
9	Hematological and Biochemical evaluation of renal ailments	4
10	Urinalysis – Physical, biochemical and microbiological	4
<b>Total</b>		<b>45 hrs.</b>

**Reference Text Books:** Sutton, Textbook of Radiology and Imaging, 7e

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Course Code</b>	<b>MMDT 118</b>
<b>Name of the Course</b>	<b>Research Project/Dissertation</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"><li>• Demonstrate the ability to identify research problems, review literature, and apply scientific/clinical knowledge to healthcare and community needs.</li><li>• Plan, design, and conduct research projects using appropriate methodologies, statistical tools, and systematic approaches</li><li>• Present, interpret, and critically analyze research data to derive meaningful conclusions and propose healthcare solutions.</li><li>• Exhibit ethical conduct, teamwork, leadership, and lifelong learning in carrying out and presenting research/dissertation work.</li></ul>
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**\*The Dissertation work will begin from 3<sup>rd</sup> Semester, and will continue through the 4<sup>th</sup> Semester. (150hrs)**

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester III</b>
<b>Course Code</b>	<b>MMDT 120 CP</b>
<b>Name of the Course</b>	<b>MMDT Directed Clinical Education-III</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"><li>• Apply scientific and clinical knowledge in real-time patient care and community/industrial health settings to improve healthcare practices.</li><li>• Demonstrate critical thinking and decision-making skills in diagnosing, managing, and providing systematic solutions to clinical and healthcare problems.</li><li>• Perform clinical research activities such as planning, data collection, interpretation, and applying findings for community health benefits.</li><li>• Exhibit professional behavior, communication, teamwork, and ethical practices while functioning effectively in multidisciplinary healthcare environments.</li></ul>
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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-180 hrs.)**

**Second Year****M.Sc. Medical Dialysis Technology****SEMESTER-IV**

<b>Code No.</b>	<b>Core Subjects</b>
<b>Discipline Specific Core Theory</b>	
MMDT 121 T	Nutrition in Renal Disease
MMDT 122 T	Recent Advances in Dialysis and Nephrology
<b>Discipline Specific Core Practical</b>	
MMDT 123 CP	MMDT Directed Clinical Education-IV
MMDT 118	Research Project/ Dissertation

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester IV</b>
<b>Name of the Course</b>	<b>Nutrition in Renal Disease</b>
<b>Course Code</b>	<b>MMDT 121 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Apply fundamental knowledge of nutrition and metabolism (macro- and micronutrients, energy balance, body composition) to assess dietary needs and promote health across different life stages and lifestyles.</li> <li>• Demonstrate critical thinking and problem-solving skills in assessing nutritional status (anthropometric, biochemical, clinical, dietary) and planning individualized diet care for both health and disease conditions.</li> <li>• Implement evidence-based medical nutrition therapy in renal diseases and other clinical conditions through diet modification, enteral/parenteral feeding, and nutrition counseling.</li> <li>• Exhibit professional, communication, and ethical skills in delivering nutritional care, working in multidisciplinary teams, and engaging in lifelong learning for community and clinical health improvement.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>Basic concepts of nutrition:</b> Food groups, balanced diet, RDA through lifestyle, Food pyramid, Body composition,	6
2	<b>Macronutrients and Micronutrients:</b> types, functions, digestion absorption metabolism, functions, deficiency and toxicity. Carbohydrates, Protein, Fat, Vitamins and minerals, Water and electrolytes.	6
3	<b>Energy:</b> Components of energy requirements: BMR, thermic effect of feeding, physical activity. Factors affecting energy requirements, methods of measuring energy expenditure. Estimating energy requirements of individuals.	6
4	<b>Nutritional status assessment:</b> Methods of nutritional status assessment: importance, techniques, advantages and limitations, nutritional status assessment indices Anthropometric assessment Biochemical assessment Clinical assessment Dietary assessment	8
5	<b>Nutritional (and dietary) Care Process</b> A) In health - Depending on the state of growth & development of the individual - at various activity levels and socioeconomic status. B) In disease - Nutritional screening/ assessment and identification of nutritional problem - Nutritional Intervention and Diet Modification based on interpretation of - Patient data - clinical, biochemical and other relevant data - Nutrition Education and Counseling - Evaluation of Nutritional care 1 Delivery of Nutritional Support - Meeting nutritional needs A. Enteral tube feeding, Different Enteral feeding access routes, Practical Aspects B. Parenteral nutrition	9

6	<p><b>Medical nutrition therapy for renal diseases:</b></p> <p>Nutrition in Renal Diseases and Disorders –          Physiology and function of normal kidney          – A brief review          - Classification of kidney diseases</p> <p>a). Glomerulo-Nephritis          Etiology, characteristics Objectives, Principles of dietary treatment and management</p> <p>b). Nephrotic Syndrome Etiology, Objectives, Principles of dietary treatment and management</p> <p>c). Uremic Renal Failure</p> <p>i) History, General importance of protein nutrition in renal failure and uremia</p> <p>ii) Causes and Dietary management in Acute Renal Disease</p> <p>iii) Causes and Dietary management in Chronic Renal Disease</p> <p>iv) Dietary modification in chronic renal disease with complications</p> <p>v) Sodium and Potassium Exchange list</p> <p>d) Types of dialysis and their nutritional care– Hemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis)</p> <p>e) Renal Transplant and its nutritional care</p> <p>f) Nephrolithiasis- etiology, types of stones and nutritional care (acid &amp; alkaline ash diet)</p> <p>g) Chronic renal disease in Children</p>	10
<b>Total</b>		<b>45 hrs.</b>

**Recommended learning Resources/Text Books:**

1. Jelliffe, D. B.: Assessment of the Nutritional Status of the Community; World Health Organization.
2. Mahan, L.K. and Escott- Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
3. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
4. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester IV</b>
<b>Name of the Course</b>	<b>Recent Advances in Dialysis and Nephrology</b>
<b>Course Code</b>	<b>MMDT 122 T</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Apply advanced scientific and clinical knowledge of hemodialysis, peritoneal dialysis, vascular access, and renal transplantation to improve patient care practices.</li> <li>• Analyze and critically evaluate recent advances in dialysis technologies and transplantation methods to identify systematic approaches for clinical problem-solving.</li> <li>• Demonstrate research and evidence-based skills by integrating new findings in dialysis monitoring, vascular access innovations, and transplant care into clinical practice.</li> <li>• Exhibit professional leadership, communication, and ethical competence while working in multidisciplinary healthcare teams and adapting lifelong learning in nephrology care.</li> </ul>
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<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	Online Clearance Monitoring	6
2	Recent Advances in Hemodialysis	6
3	Recent Advances in Vascular Access	6
4	Recent Advances in Peritoneal Dialysis	6
5	Recent Advances in Renal Transplantation	6
<b>Total</b>		<b>30 hrs.</b>

**Reference Text Books:**

1. Daugridas J. T. Handbook of dialysis technology, 7e
2. Danovitch, Handbook of Renal Transplantation, 6e

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester IV</b>
<b>Name of the Course</b>	<b>MMDT Directed Clinical Education–IV</b>
<b>Course Code</b>	<b>MMDT 123 CP</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Apply advanced scientific and clinical knowledge in multidisciplinary healthcare practice to provide safe, evidence-based, and effective patient care.</li> <li>• Demonstrate critical thinking and decision-making skills in solving complex clinical problems and adapting systematic approaches in varied healthcare situations.</li> <li>• Perform clinical research and data interpretation for planning, implementing, and evaluating patient care strategies with direct application to community health.</li> <li>• Exhibit professionalism, teamwork, communication, and ethical values while functioning effectively in clinical and research environments, fostering leadership and lifelong learning.</li> </ul>
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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-180 hrs.)**

<b>Name of the Program</b>	<b>M.Sc. Medical Dialysis Technology</b>
<b>Semester</b>	<b>Semester IV</b>
<b>Course Code</b>	<b>MMDT 118</b>
<b>Name of the Course</b>	<b>Research Project/ Dissertation</b>

<b>Course Outcome</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to identify research problems, review literature, and apply scientific/clinical knowledge to healthcare and community needs.</li> <li>• Plan, design, and conduct research projects using appropriate methodologies, statistical tools, and systematic approaches</li> <li>• Present, interpret, and critically analyze research data to derive meaningful conclusions and propose healthcare solutions.</li> <li>• Exhibit ethical conduct, teamwork, leadership, and lifelong learning in carrying out and presenting research/dissertation work.</li> </ul>
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1. Dissertation/Project work should be carried out as an individual Dissertation and actual bench work.
2. The students will carry independent project work under the supervision of the staff of Department on an advanced topic assigned to him/her. In house projects are encouraged. Students may be allowed to carry out the project work in other Departmental laboratories/ Research institutes / Industries as per the availability of Infrastructure.
3. Co guides from the other institutions maybe allowed.
4. The Dissertation/ Project work will begin from 3<sup>rd</sup> Semester, and will continue through the 4<sup>th</sup> Semester.
5. The Dissertation/ Project report (also work book shall be presented at the time of presentation and viva voce) will be submitted at the end of the 4<sup>th</sup> Semester and evaluated.
6. Five copies of the project report shall be submitted to the Director, SBS.
7. For the conduct of the End Semester Examination and evaluation of Dissertation/ Project work the University will appoint External Examiners.
8. Since the dissertation is by research, Dissertation/ Project work carries a total of 250 marks and evaluation will be carried out by both internal and external evaluators.
9. The student has to defend his/her Dissertation/Project Work in a seminar which will be evaluated by an internal and external experts appointed by the University.
10. The assignment of marks for Project/ Dissertation is as follows: Part I -  
Topic Selection, Review of Literature, Novelty of works-50 marks Part II-
  - a. Continuous Internal Assessment, Novelty, Overall Lab Work Culture- 100Marks
  - b. Dissertation/ Project work book: 50 Marks
  - c. Viva- Voce: 50 Marks

## 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	
<b>Total</b>				<b>80 Marks</b>

### 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
<b>Total</b>		<b>40 Marks</b>

**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**

<b>Description</b>	<b>Marks</b>
Internal exam (at department)	15 marks
Seminar	5 marks
<b>Total</b>	<b>20 Marks</b>

**Breakup of practical IA calculation:**

<b>Description</b>	<b>Marks</b>
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
<b>Total</b>	<b>20 Marks</b>

**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.	
<b>Clinical Teaching</b>		
a. Demonstrate beginning competency in technical skills.	10	
<b>Independent Work by Student guided by faculty</b>		
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	
<b>Hands on practical work by students</b>		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
<b>Independent work by student</b>		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
<b>Log book</b>	10	
<b>Viva</b>	10	
<b>Attendance</b>	05	
<b>Total</b>	<b>50 Marks</b>	

Sign of Internal Examiner: \_\_\_\_\_

Sign of External Examiner: \_\_\_\_\_

**Evaluation for Semester III – Dissertation (PG) (Internal Assessment)**

<b>Dissertation/Project Proposal : overall performance of the student</b>	<b>Marks allotted</b>	<b>Marks Obtained</b>
Open mindedness/ Receptivity to feedback Integrates feedback	5 Marks	
Meets deadlines / Regularity in meeting / Consistency in communication	10 Marks	
<b>Continuous Internal evaluation (CIE)</b>		
Interest shown in selecting topic	5 marks	
Appropriate review	10 marks	
Discussion with guide and other faculty	10 marks	
Quality of protocol	5marks	
Preparation of proforma / log book / daily reports	5marks	
<b>TOTAL</b>	<b>Out of 50</b>	

**Evaluation for Semester IV - Evaluation parameter (ResearchProject / Dissertation)**

Evaluation parameter (Semester IV)	Continuous Internal Evaluation (CIE) Guide	Semester End Evaluation (SEE)	
		Internal examiner	External examiner
Thesis preparation, Novelty, Overall Lab Work Culture	25	-	-
Dissertation/Project work book	25	25	25
Evaluation of thesis including Viva Voce	-	50	50
Total	50	75	75
<b>Overall Total = 200</b>			

# 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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