



**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. Cardiac Care Technology**

**Semester I & II**

## DIRECTOR'S MESSAGE

### Welcome Message from the Director

Dear Postgraduate Students,

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

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

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

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

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

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

We look forward to witnessing your achievements and contributions!

**Dr. Mansee Thakur**

Director, MGM School of Biomedical Sciences  
MGM Institute of Health Sciences, Navi Mumbai

## **ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES**

### **Mission**

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

### **Vision**

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

### **About – School of Biomedical Sciences**

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

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well-equipped labs. The school encompasses 24 courses each with its own distinct, specialized body of knowledge and skill. This includes 8 UG courses and 16 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. Reformatations 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. Cardiac Care Technology**

**Duration of Study:**

The duration of the study for M.Sc. Cardiac Care Technology will be of 2 years.

**Eligibility Criteria:**

BSc Cardiac Care/Cardiovascular Technology OR 2 years of Diploma in Cardiovascular Technology (post regular general BSc) with minimum of 3 year experience.

**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. CARDIAC CARE TECHNOLOGY

### Program Outcome

Program Code	Program Objective
PO1	<b>Knowledge and skill:</b> Nurture the scientific and/or clinical knowledge and skills for development of industrial applications, health care practices and entrepreneurship.
PO2	<b>Critical Thinking &amp;problem solving:</b> Develop the ability of critical thinking to analyse, interpret problems and to find out systematic approach for solution.
PO3	<b>Decision making:</b> Impart decision making capability for handling various circumstances in their respective areas
PO4	<b>Research skill:</b> Demonstrate research skills for planning, designing, implementation and effective utilization of research findings for community.
PO5	<b>Individual and team work:</b> Develop an ability to function as an efficient individual and team player in multidisciplinary sectors for effective outcomes
PO6	<b>Communication skills:</b> Demonstrate effective written and oral communication skills to communicate effectively in health care sector, industries, Academia and research.
PO7	<b>Code of ethics:</b> Inculcate code of ethics in professional and social circumstances to execute them in daily practices and research in respective areas of specialization
PO8	<b>Lifelong learning:</b> Develop lifelong learning attitude and values for enhancement of professional and social skills for an overall development

## Program Specific Outcome

Program Code	Program Objective
SPO1	The course aims to provide students with the requisite clinical assessment, decision-making skills and management for a range of cardiology conditions and stroke including pharmacological and non-pharmacological therapeutic interventions.
SPO2	This course offers the opportunity to study all aspects of clinical cardiology including expert assessment and management of a range of cardiac conditions, cardiac interventions, interpretation and practical skills.
SPO3	Includes hyper acute stroke, thrombolysis, interpretation of cardiac CT and MRI, TIA management, maximising stroke care, rehabilitation and long term.
SPO4	The programme can be regarded as vital training for the early stages of cardiology or stroke specialist training with clear learning objectives.

## COURSE OUTCOME

### SEMESTER –I

<b>MCCT 101 T &amp; MCCT 104 P</b>	<b>Introduction to Clinical Cardiology</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	<b>Student should Understand the Anatomy &amp; Physiology of the Heart:</b> Describe the structure, function, and conduction system of the heart. Identify common symptoms and examination techniques for cardiovascular diseases.	<b>PO1-PO8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO2</b>	<b>Cardiovascular Examination Techniques</b> Students should Assess general and detailed physical appearance for signs of heart disease. Examine arterial pulses, jugular veins, and peripheral veins for diagnostic insights. Measure blood pressure and evaluate its physical determinants.	<b>PO1-PO8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO3</b>	<b>Students Analyze Cardiovascular Diagnostic Tests:</b> Interpret ECG, echocardiography, cardiac catheterization, and stress testing results. Use chest roentgenograms (X-rays) to assess cardiac conditions.	<b>PO1-PO8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO4</b>	To understand the role of Cardiac Care technologist while assisting the Cardiologist as well as when performing individually	<b>PO1-PO8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>MCCT 102 T &amp; MCCT 105 P</b>	<b>Fundamentals of Cardiac Diagnostic Procedures and Investigations</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	To educate and train students to understand, interpret and complex diagnostic cardiac investigations.	<b>P1-P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO2</b>	<b>Prepare for Emergencies in the Cardiac Cath Lab</b>	<b>P1-P8</b>	Lecture, Demonstration,	Internal Exam, University

	Identify major and minor complications during cardiac catheterization. Apply Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) algorithms in emergencies.		Group Discussion, Quiz, Assignment, Seminar	Exam (Theory Exam), Seminar, Assignment
<b>MCCT 103 T</b>	<b>Introduction to Pacing and Electrophysiology Study Techniques</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	Identify indications for cardiac pacing based on international guidelines	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>CO2</b>	Identify indications for electrophysiological studies with/ without ablation in cases of complex arrhythmias.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>CO3</b>	<b>Develop Expertise in Cardiac Pacing &amp; Pacemaker Therapy</b> Describe normal cardiac conduction and the need for pacing. Interpret NBG codes for pacemakers and their application. Differentiate indications for temporary vs. permanent pacing. Understand the components and functioning of pacemakers.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>CC 001 T &amp; CC 001 P</b>	<b>Research Methodology &amp; Biostatistics (Core Course)</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</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.	<b>P1,P2,P4,P5,P6,P7,P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>MCCT 106 CP</b>	<b>MCCT Directed Clinical Education-I</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</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>P1-P8</b>	Practical, Clinical Posting, Demonstration, Internship, Case-study, Clinical Simulation	Practical Exam, Station Exercise, Viva-voce
<b>CO 2</b>	Emphasize hands-on training, ensuring proficiency in clinical procedures, diagnostic techniques, and the use of	<b>P1-P8</b>	Practical, Clinical Posting, Demonstration,	Practical Exam, Station



	advanced medical equipment. This practical exposure will bridge the gap between theory and practice, enhancing students' confidence and competence in delivering quality patient care.		Internship, Case-study, Clinical Simulation	Exercise, Viva-voce
<b>CO 3</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>P1-P8</b>	Practical, Clinical Posting, Demonstration, Internship, Case-study, Clinical Simulation	Practical Exam, Station Exercise, Viva-voce

## SEMESTER-II

<b>MCCT 107 T &amp; MCCT 109 P</b>	<b>Introduction to Non-Invasive Techniques in Cardiology</b>	<b>Mapped POs</b>	<b>Teaching- Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	Identify indications for non-invasive techniques based on international guidelines.	<b>P1-P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO2</b>	Develop Expertise in non-invasive techniques. ECG, Echocardiography, Stress Test,	<b>P1-P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>MCCT 108 T &amp; MCCT 110 P</b>	<b>Invasive Cardiology</b>	<b>Mapped POs</b>	<b>Teaching- Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	To enable students to not only be a helping hand to those just starting out in the specialty but also to serve as a reference for those who have been working in Invasive field for some time	<b>P1-P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO2</b>	In-depth knowledge of cardiac diagnostic and interventional procedures, focusing on contrast media, intravascular imaging, coronary interventions, assist devices, peripheral angiography, and cardiac pharmacology.	<b>P1-P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>MCCT 111 CP</b>	<b>MCCT Directed Clinical Education-II</b>	<b>Mapped POs</b>	<b>Teaching- Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	Build a robust theoretical foundation, enabling students to understand health care practices, disease management, and patient care, thereby empowering them to make informed decisions and adapt to evolving medical technologies.	<b>P1-P8</b>	Practical, Clinical Posting, Demonstration, Internship, Case- study, Clinical Simulation	Practical Exam, Station Exercise, Viva-voce
<b>CO 2</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	<b>P1-P8</b>	Practical, Clinical Posting, Demonstration, Internship, Case- study, Clinical Simulation	Practical Exam, Station Exercise, Viva-voce

	students' confidence and competence in delivering quality patient care.			
<b>CO 3</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>P1-P8</b>	Practical, Clinical Posting, Demonstration, Internship, Case-study, Clinical Simulation	Practical Exam, Station Exercise, Viva-voce
<b>SEC 001 T</b>	<b>Innovation and Entrepreneurship</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</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>P1,P2,P4,P5,P6,P7,P8</b>	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
<b>CO2</b>	Cultivating an entrepreneurial mindset and leadership qualities necessary for driving innovation and leading ventures.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>CO3</b>	Understanding the intersection of technology and innovation and leveraging emerging technologies for entrepreneurial ventures.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>SEC 002 T</b>	<b>One Health (NPTEL)</b>	<b>Mapped POs</b>	<b>Teaching-Learning Methodologies</b>	<b>Assessment Tools</b>
<b>CO1</b>	A comprehensive understanding of One Health & role in global health challenges, emphasizing interconnectedness among human, animal, and environmental health.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental), Viva-Voice
<b>CO2</b>	Topics include research ethics, disease surveillance, and successes in controlling emerging infectious diseases.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental) Viva-Voice
<b>CO3</b>	Students explore disease emergence, transmission, antimicrobial resistance, and food safety, gaining insights into effective public health strategies.	<b>P1-P8</b>	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Experimental) Viva-Voice

OUTLINE OF COURSE CURRICULUM														
M.Sc.Cardiac Care Technology														
Semester I														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCCT 101 T	Introduction to Clinical Cardiology	2	-	-	-	2	30	-	-	-	30	20	80	100
MCCT 102 T	Fundamentals of Cardiac Diagnostic Procedures and Investigations	2	-	-	-	2	30	-	-	-	30	20	80	100
MCCT 103 T	Introduction to Pacing and Electrophysiology Study Techniques	3	-	-	-	3	45	-	-	-	45	20	80	100
CC 001 T	Research Methodology & Biostatistics (Core Course)	3	-	-	-	3	45	-	-	-	45	-	50	50
Discipline Specific Core Practical														
MCCT 104 P	Introduction to Clinical Cardiology	-	-	4	-	2	-	-	60	-	60	10	40	50
MCCT 105 P	Fundamentals of Cardiac Diagnostic Procedures and Investigations	-	-	4	-	2	-	-	60	-	60	10	40	50
MCCT 106 CP	MCCT Directed Clinical Education-I	-	-	-	12	4	-	-	180	180	-	50	50	
CC 001 P	Research Methodology & Biostatistics (Core Course)	-	-	4	-	2	-	-	60	-	60	-	50	50
Total		10	0	12	12	20	150	0	180	180	510	80	470	550

OUTLINE OF COURSE CURRICULUM														
M.Sc.Cardiac Care Technology														
Semester II														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCCT 107 T	Introduction to Non-Invasive Techniques in Cardiology	4	-	-	-	4	60	-	-	-	60	20	80	100
MCCT 108 T	Invasive Cardiology	4	-	-	-	4	60	-	-	-	60	20	80	100
Discipline Specific Core Practical														
MCCT 109 P	Introduction to Non-Invasive Techniques in Cardiology	-	-	4	-	2	-	-	60	-	60	10	40	50
MCCT 110 P	Invasive Cardiology	-	-	4	-	2	-	-	60	-	60	10	40	50
MCCT 111 CP	MCCT Directed Clinical Education-II	-	-	-	15	5	-	-	-	225	225	-	50	50
Skill Enhancement Course														
SEC 001 T	Innovation and Entrepreneurship	3	-	-	-	3	45	-	-	-	45	-	50	50
SEC 002 T	One Health (NPTEL)													
Total		11	0	8	15	20	165	0	120	225	510	60	340	400