



MANIPAL
ACADEMY of HIGHER EDUCATION

(Deemed to be University under Section 3 of the UGC Act, 1956)

Manipal College of Health Professions

Manipal Academy of Higher Education, Manipal

Outcome-Based Education (OBE) Framework

**Two Years Full Time
Postgraduate Program
(Choice - Based Credit System)**

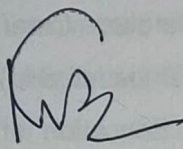
**Master of Science in Echocardiography
(MSc. ECHO)**

With effect from July 2021

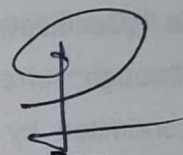


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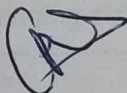
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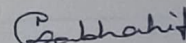
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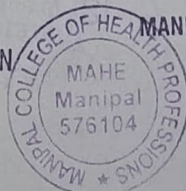
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 MANIPAL ACADEMY OF HIGHER EDUCATION
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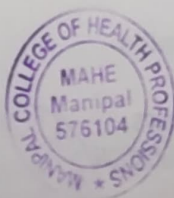


1. NATURE AND EXTENT OF THE PROGRAM

Echocardiography (ECHO) is a Master program (MSc) which is a specialization under the department of Cardiovascular Technology (CVT) in which students are trained with a wide spectrum of knowledge in cardiovascular diseases and its non-invasive diagnostic procedures as a cardiac sonographer. Every candidate is well trained in handling and performing various non - invasive techniques of imagining modalities to evaluate cardiac diseases independently. As in whole "cardiovascular technology" deals with both non-invasive and invasive field of work.

The scope for such allied health workers is boundless in today's medical sectors and near future. The mode of study is firm to be a full time program, with four semester following an 'outcome based educational' system. We aim to keep up our objectives in training the candidates with knowledge of Clinical Cardiology, Electrocardiograms, Cardiac Stress Testing, Ambulatory BP and Holter Monitoring, Cardiovascular Medicine, Ultrasound Doppler principles, Cardiac Embryology, Role of echo in Cardiac Pacemakers and Devices, Ethics & Pedagogy, Biostatistics and Research Methodologies, Echocardiography involving all recent advancing techniques used in day to day practices with other customary.

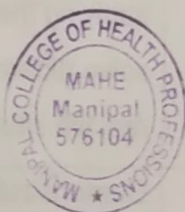
The candidate applying for admission to MSc ECHO program should have passed BSc in Cardiac Care /Cardiovascular Technology (3+1year of internship) on regular basis (Candidates passing B.Sc. in Cardiac Care/ Cardiovascular Technology through correspondence course will not be eligible) examination or equivalent, conducted by the University Board of Education of Government of respective State. At the time of entry/admission to the first year MSc ECHO program the candidate should be of age 21 years or above OR as per rules of the respective universities with regard to the entry age.



2. PROGRAM EDUCATION OBJECTIVES (PEOs)

The overall objective of the learning outcome-based curriculum framework (LOCF) for MSc Echocardiography are as follows:

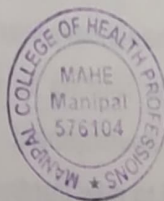
PEO No.	Education Objective
PEO1	Students will be able to use their fundamental knowledge and clinical competence in various scientific aspects of performing cardiac non invasive imaging
PEO2	Students will demonstrate strong and well defined clinical / practical skills in performing various skill based activities in echocardiography
PEO3	Students will be able to practice the profession with highly professional and ethical attitude, strong communication skills, and to work in an inter-disciplinary team so as to achieve professional excellence
PEO4	Students will be able to use interpersonal and collaborative skills to identify, assess and formulate problems and execute the solution to assess the capability of performing and reporting cases independently.
PEO5	Students will be able to imbibe the culture of research, innovation, entrepreneurship and incubation through evidence-based to uplift the knowledge in recent techniques and methods in echocardiography.
PEO6	Students will be able to participate in lifelong learning process for a highly productive career and will be able to relate the concepts of trends and issues in the discipline of non - invasive cardiac imaging skills



3. GRADUATE ATTRIBUTES

S No.	Attribute	Description
1	Domain Knowledge	Demonstrate comprehensive knowledge, competency and understanding of one or more disciplines that form a part of a professional domain
2	Clinical / Hands-on skills	Demonstrate clinical / hands-on skills in order to deliver and manage quality health care services
3	Communication Skills	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups using appropriate media.
4	Team work	Demonstrate the ability to effectively and efficiently work and collaborate with diverse teams in the best interest of health care needs of the community
5.	Professional ethics	Demonstrate the ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in professional life.
6.	Research / Innovation-related Skills	A sense of inquiry and investigation for raising relevant and contemporary questions, synthesizing and articulating.
7.	Critical thinking and problem solving	Demonstrate capacity to think critically and extrapolate from what one has learned by applying their competencies and knowledge to solve different kinds of non-familiar problems in real life situations.
8	Information/Digital	Demonstrate capability to use ICT in a variety

S No.	Attribute	Description
	Literacy	of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis of data.
9	Multicultural Competence	Demonstrate knowledge of the values and beliefs of multiple cultures and a global perspective, effectively engage in a multicultural society, interact respectfully with diverse groups.
11.	Leadership qualities	Demonstrate leadership capability to formulate an inspiring vision, build a team, motivate and inspire team members to attain organizational vision
12.	Lifelong Learning	Demonstrate the ability to acquire knowledge and skills, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to demands of work place through knowledge/skill development/reskilling.



4. QUALIFICATION DESCRIPTORS:

- a) Demonstrate (i) a systematic, extensive and coherent knowledge and understanding of an academic field of study as a whole and its applications, and links to related disciplinary areas/subjects of study, including a critical understanding of the established theories, principles and concepts, and of a number of advanced and emerging issues/theories in the field of Echocardiography; (ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of study, including research and development, teaching and government and public service; (iii) skills in areas related to one's specialization and current developments in the academic field of Echocardiography, including a critical understanding of the latest developments in the area of specialization, and an ability to use established techniques of analysis and enquiry within the area of specialization Echocardiography.
- b) Demonstrate comprehensive knowledge about materials and methods, including professional literature relating to essential and advanced learning areas pertaining to the chosen disciplinary area(s) and field of study, and techniques and skills required for identifying/solving problems and issues relating to the disciplinary area and field of study.
- c) Demonstrate skills in identifying information needs, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, analysis and interpretation of data using methodologies as appropriate to the subject(s) for formulating evidence-based solutions and arguments.
- d) Use knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the field
- e) Communicate appropriately with all stakeholders, and provide relevant information to the members of the healthcare team
- f) Address one's own learning needs relating to current and emerging areas of study, making use of research, development and professional materials as appropriate, including those related to new frontiers of knowledge
- g) Apply one's domain knowledge and transferable skills that are relevant to some of the job trades, employment opportunities and seek solutions to real-life problems.



MANIPAL COLLEGE OF HEALTH PROFESSIONS MANIPAL

(A constituent unit of MAHE, Manipal)

The subject code equivalence for subjects mentioned in syllabus copy of course **M.Sc. Echocardiography** from the academic year **2021-22** onwards. These changes have been discussed in BOS meeting held on 13.12.2021 and subsequently approved in the 70th Academic Council meeting held on 14.01.2022.

SEMESTER I

Course Title	Old Course Code	Revised Course Code
Advanced Biostatistics and Research Methodology	ABS6101	ABS5101
Clinical Cardiology	CVT6101	CVT5101
Ultrasound, Doppler principles and Embryology	CVS6101	CVS5101
Diagnostic Imaging Modalities	CVS6102	CVS5102
Practicals - I	CVS6111	CVS5111
Clinics - I	CVS6131	CVS5131
Project - I	CVS6151	CVS5151

SEMESTER II

Course Title	Old Course Code	Revised Course Code
Ethics & Pedagogy	EPG6201	EPG5201
Cardiovascular medicine	CVT6201	CVT5201
Ischemic and Valvular Heart Disease	CVS6201	CVS5201
Practicals - II	CVS6211	CVS5211
Clinics - II	CVS6231	CVS5231
Project - II	CVS6251	CVS5251

SEMESTER III

Course Title	Old Course Code	Revised Course Code
Congenital Heart Diseases	CVS7101	CVS6101
Cardiac pacemakers and defibrillators	CVS7102	CVS6102
Practicals - III	CVS7111	CVS6111
Clinics - III	CVS7131	CVS6131
Project - III	CVS7151	CVS6151
Program Elective:		
ICD Devices	CVT7021	CVT6021
Advance Echocardiography	CVS7011	CVS6011

SEMESTER IV

Course Title	Old Course Code	Revised Course Code
Miscellaneous Diseases	CVS7201	CVS6201
Recent Advances in Cardiac Imaging	CVS7202	CVS6202
Practicals - IV	CVS7211	CVS6211
Clinics - IV	CVS7231	CVS6231
Project - IV	CVS7251	CVS6251

HOD

Head

Manipal College of Health Professions

MAHE, Manipal - 576104

Dept. of Cardiovascular Technology
Manipal College of Health Professions

MAHE, Manipal - 576104

DEAN
Dean

DEPUTY-REGISTRAR
ACADEMICS

Deputy Registrar - Academics
MANIPAL ACADEMY OF HIGHER EDUCATION

MANIPAL - 576 104

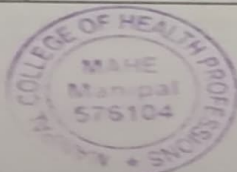
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5. PROGRAM OUTCOMES (POs):

After successful completion of Masters / MSc Echocardiography program students will be able to:

PO No.	Attribute	Competency
PO1	Domain knowledge	Possess and acquire scientific knowledge to work as a health care professional
PO2	Clinical/ Hands-on skills	Demonstrate and possess clinical and hands-on skills to provide quality health care services
PO3	Team work	Demonstrate team work skills to support shared goals with the interdisciplinary health care team to improve societal health
PO4	Ethical value & professionalism	Possess and demonstrate ethical values and professionalism within the legal framework of the society
PO5	Communication	Communicate effectively and appropriately with the interdisciplinary health care team and the society
PO6	Evidence based practice	Demonstrate high quality evidence based practice that leads to excellence in professional practice
PO7	Life-long learning	Enhance knowledge and skills with the use of advancing technology for the continual improvement of professional practice
PO8	Entrepreneurship, leadership and mentorship	Display entrepreneurship, leadership and mentorship skills to practice independently as well as in collaboration with the interdisciplinary health care team



PROGRAM ELECTIVE

Program elective is credited and choice based. The student makes a choice from the pool of electives offered by the department. The ESE is conducted for 50 marks.

Semester	Course Code	Course Title	Credit(s) Distribution (L,T,P,CL are hours/week)				
			L	T	P	CL	CR
III	CVT7011	Heart Failure Devices	3	-	-	-	3
	CVT7021	ICD Devices	3	-	-	-	3
	CVS7011	Advance Echocardiography	3	-	-	-	3

OVERALL CREDIT DISTRIBUTION

SEMESTER	Credit distribution				Total Credit	Marks Distribution		
	L	T	P	CL/PW		IAC	ESE	Total
I - SEMESTER	9	5	4	12	20	430	270	700
II - SEMESTER	7	5	4	18	20	450	150	600
III - SEMESTER	9	4	4	15	20	450	250	700
IV - SEMESTER	6	4	8	18	20	300	300	600
Grand Total	31	18	20	63	80	1630	970	2600

INTERNAL ASSESSMENT COMPONENT (IAC) WEIGHTAGE DISTRIBUTION

Theory		Practical	
Components	%	Components	%
Mid semester exam	60	Mid semester exam	60
Class seminar	20	Record submission	20
Assignments/Quiz	20	Competency in bench mark	20

