

**THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY,
No.69, Anna Salai, Guindy, Chennai – 600 032.**

**D.M/ M.Ch
SUPER SPECIALTY DEGREE COURSE**



SYLLABUS AND CURRICULUM

2017-2018

D.M. - CARDIOLOGY

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI
Syllabus – D.M. CARDIOLOGY

1 AIMS:

The aim of the course is to impart thorough and comprehensive training to the candidate in the various aspects of cardiology so that at the end of the course he/she shall be able to perform the following Cognitive Domain:

1. Recognize the importance of Cardiology in the context of the health needs of the community and national priorities in the health sector.
2. Practice Cardiology ethically and in step with the principles of primary health care.
3. To be able to diagnose and manage cardiovascular diseases on the basis of clinical assessment, and appropriately selected and conducted investigations.
4. To be able to carry out efficient management of all types of cardiovascular Emergencies after quickly assessing the patient and synthesizing available clinical and Investigational information.
5. To be able to identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive, and promotive measures/strategies.
6. To keep abreast of the current knowledge and recent advances in the field by self learning and /or participating in Continuing Medical Education Programmes.
7. To organize and manage administrative responsibilities for routine day to day work as well as emergent /urgent situations
8. Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.
9. To understand the functional principles of various biomedical equipments used in invasive and non invasive cardiology.
10. To develop understanding and working knowledge of the sophisticated and routine equipments and consumables used in Cardiology.
11. Demonstrate competence in basic concepts of research methodology, epidemiology and publication.
12. To be able to critically analyse relevant published research literature and use them appropriately to influence practice of cardiovascular medicine.

13. Develop skills in using educational methods and techniques as applicable to the teaching of medical/paramedical students/staff, general physicians and paramedical health workers. To be able to develop learning resource material for courses in cardiology.

14. To develop reasonable understanding of the recent advances in the allied specialties in the institution and be able to offer consultations to the other departments

2.OBJECTIVES:

Goal : The goal of DM Cardiology program is to provide specialized training in Cardiology to produce competent super specialists. These specialists will be capable of providing care of the highest order to the cardiac patients in the community as well as clinical tertiary care centres. They would subsequently serve as teachers, trainers, consultants, researchers and leaders in the field of Cardiology. They shall recognize the health needs of the community, carry out professional obligations ethically, in keeping with the objectives of the National Health Policy.

Learning Objectives: In general, the course is designed to train post graduates in DM (Cardiology) in major areas of cardiology like Clinical Cardiology, Coronary care, Paediatric Cardiology, Preventive Cardiology, Electrophysiology, Invasive diagnostic and therapeutic cardiac procedures and various non invasive diagnostic techniques and research activities.

OVERVIEW AND OBJECTIVES:

Clinical Cardiology training

Candidates shall be trained specifically in the art of bed side diagnosis. Curriculum is aimed to improve the overall clinical acumen in problem solving. Candidates will gain specific and focal management skills in all common clinical cardiology problem solving.

Specific skills

Candidates after completion of course will gain medical communication and presentation skills, will have knowledge about Bio informatics with specific reference to cardiology. Candidates will be encouraged to develop skill in organizing workshops, CMEs and conferences. They will be encouraged to attend national cardiology conferences and take part in competitive exams conducted by national and other academic bodies. They will be encouraged to use computer freely for internet access to cardiology journals, take part in cardiology journal club and to utilise Microsoft office tools for powerful presentation. They will be allowed to take part in group discussion and panel discussion to gain confidence and develop skill in discussing cardiology related topics.

Candidates will gain knowledge about organization and management of coronary care unit. They will be encouraged to undertake research activities and will be given proper training in bio statistics and in writing scientific papers.

Affective Skills: Attitude and values

Candidates will learn to work as a team, work as a subordinate as well as a leader as the situations demand

Candidates will learn to treat patient as a whole human being and demonstrate sympathy and humane approach in dealing with patient and relatives.

Candidates will learn to give the appropriate investigations as required ethically and rationally.

Candidates will understand and practice ethical practices in dealing with patients, colleagues, subordinates, superiors and health care workers.
Candidates will learn to take rationale decision in the face of ethical dilemmas in cardiac diseases.

NATIONAL OBJECTIVES**At the end of the course the candidate.**

Will be able to work in any hospital in India with minimum of facilities and should be able to diagnose and treat cardiac disease swiftly and efficiently both on an elective and emergency basis.

Will be able to start a Cardiac Unit with effective functioning with minimum inputs.

Will be able to work effectively in National Programmes for the Prevention or Eradication of Heart Diseases.

3.THEORY SYLLABUS:**SYLLABUS/ COURSE CONTENT:**

1. Applied Anatomy: Heart and great vessels, congenital anomalies; development of heart.
2. Applied physiology: Cardiac cycle, cardiac output, pressure and volume loops, cardiac contractility, pulmonary circulation, coronary circulation, blood pressure, cardiac failure, acid base balance. Autonomic control of heart and vasculature, pulmonary function tests and their application to cardiology, interpretation of data on PET.
3. All aspects of normal/Abnormal cardiac Biochemistry
4. Applied Pathology: Congenital heart disease, rheumatic fever and lesions, myocarditis, cardiomyopathies, pericarditis, constrictive pericarditis, infective endocarditis, coronary artery disease including myocardial infarction, hypertensive heart disease, pulmonary embolism, cardiac tumors.
5. Applied pharmacology: cardiac glycosides, anti-hypertensives, diuretics, drugs for coronary artery, betablockers, calcium channel blockers, inotropic

agents, antibiotics, antiarrhythmic agents, metabolic modulators, antiarrhythmics, recent advances in pharmacology pertaining to cardiology.

6. Cardiac Microbiology including cardiac molecular biology, relevant aspects of Rheumatic fever, infective endocarditis.
7. Cardiovascular Imaging: Chest x-ray, ECG, Echo, Nuclear medicine imaging, MRI, CT scan, PET scan.
8. Hemodynamics and interventions: Cardiac catheterization, oxymetry, hemodynamics, angiogram, interventional procedures in cardiology practice.
9. Clinical Cardiology: General Evaluation of Coronary artery disease, Rheumatic heart disease, Congenital heart disease and other paediatric cardiac disorders, Cardiac arrhythmias, Heart failure, Peripheral vascular disorders, pulmonary thromboembolism and pulmonary hypertension. Systemic hypertension, Systemic diseases involving heart, Heart muscle diseases, pericardial diseases, Traumatic heart disease, Tropical cardiac conditions, Tumors of heart, Genetics, molecular biology and immunology related to cardiology, Geriatric heart disease, General anaesthesia and non cardiac surgery in patients with heart disease, pregnancy and heart disease, Epidemiology and preventive cardiology.

Bioethics

1. Respect human life and the dignity of every individual.
2. Refrain from supporting or committing crimes against humanity and condemn all such acts.
3. Treat the sick and injured with competence and compassion and without prejudice and apply the knowledge and skills when needed.
4. Protect the privacy and confidentiality of those for whom we care and breach that confidence only when keeping it would seriously threaten their health and safety or that of others.
5. Work freely with colleagues to discover, develop, and promote advances in medicine and public health that ameliorate suffering and contribute to human well being.
6. Educate the public about present and future threats to the health of humanity.
7. Advocate for social, economic, educational and political changes that ameliorate suffering and contribute to human well being.
8. Teach and mentor those who follow us, for they are the future of our caring profession.

4. CLINICAL TRAINING:

The Students will be clinically trained in parent department during the 3 years course.

- Cardiac surgery -1 month
- Nuclear Cardiology- 1 month
- Pediatric Cardiology- 1 month
- Coronary care unit- 6 months
- Cardiac imaging like CT, PCT, MRI- 1 month
- Electrocardiology like EPS, CRT-15 days

Candidates will manage patients with acute coronary syndromes and assist in primary angioplasties.

During II year, students are encouraged to undergo special postings for learning new advanced techniques / Procedure / Skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

5. SKILL TRAINING:

NON-INVASIVE TECHNIQUES

To perform and interpret various non invasive techniques including:

1. Electrocardiography.
2. Radiology- routine and spealized areas like CT and MRI.
3. Stress testing- tread mill test, stress related and other nuclear techniques.
4. Holter monitoring for arrhythmias and ischaemic disorders.
5. Head up tilt test.
6. Echocardiography- M mode, Two Dimensional, Doppler, Colour flow imaging, Transoesophageal Echocardiography and Echo directed Haemodynamic studies.
7. Pace maker follow up and interpretation of Pacemaker ECGs and trouble shooting.
8. Interpretation of results of nuclear cardiac imaging, CT angiograms and cardiac MRI.

INVASIVE CARDIOLOGY

1. Experience in cardiac catheterization to calculate and interpret various haemodynamic parameters.
2. Right and left heart cath and coronary angiography procedure in adults and children.
3. To perform temporary pacemaker insertion.
4. To assist in various intervention including valvuloplasty, permanent pacemaker implantation, Angioplasty, device implantation and interventions in congenital heart disease.
5. Electrophysiology: To interpret electrophysiology data and assist in electrophysiology procedure, permanent pacemaker implantation.

Biomedical aspects

To understand the functional principles of various biomedical equipments used for the invasive and non invasive cardiology.

EXPERIENCE TO BE GAINED:

1. Echocardiography- Transthoracic 1000 cases.
2. Transesophageal echocardiography- 25 cases.
3. Temporary pacing- 20 cases.
4. Diagnostic coronary angiography- 50 cases.
5. Right heart catheterization – 10 cases.

6. Number of Holter ECGs analysed- 50 cases.
7. Number of permanent pacemaker assisted- 5 cases.
8. Number of angioplasty assisted.10 cases

6.TEACHING METHODOLOGY:

- Ward/ OPD patient management.
- Long and short topic presentations.
- Clinicocardiological and clinicopathological conferences.
- Inter-departmental Periodical meeting on relevant topics with Department of Anatomy, Physiology, Bio-chemistry and Microbiology.
- Journal club.
- Research review.
- Problem solving sessions.
- Guest and in-house lectures, Conference, seminars and CME's.
- Participation in workshops, etc.
- Teaching undergraduates/ postgraduates/ paramedical staff.
- Weekly medical audit (patient care review meeting).
- Biomedical equipments use and maintenance.

7.RESEARCH WORK:

The candidate will be trained in the ability to

- Frame a research question.
- Plan a study to answer the question.
- Collect the relevant information and
- Evaluate appropriately the collected data to draw a conclusion.

The candidate should become conversant with the reporting of these results as a research paper, in journals and as a presentation in conferences.

The students will be encouraged to do oral/poster presentation in International conference.

Students should compulsorily attend Research Methodology workshop conducted by the University within first six months of D.M.Course.

8.LOG BOOK:

MAINTENANCE OF HAND WRITTEN LOG BOOK

- a) Every Post-graduate candidate shall maintain a record of skills he/she has acquired during the training period certified by the various Heads of Departments where he/she has undergone training including outside the Institution.

- b) When the candidates are sent for external posting the Log Book should be certified for that particular period by the concerned Head of the Department. At the end of the course, the candidate should summarise the contents and get the hand written log book certified by the head of the departments.
- c) The candidate should also be required to participate in the teaching and training programme of Post-graduate and intern students.
- d) In addition the heads of departments shall involve their post graduate candidates in seminars, journal clubs, group discussions and participation in clinical, clinico pathological conferences, training in medical audit, health information system.
- e) Certified Hand written log books should be submitted at the time of practical examination for the scrutiny of the board of examiners.
- f) The hand written log book should contain journal club detail, clinical case presentations, procedures assisted and done independently and papers published.

The Post Graduate student of a Post Graduate Degree Course in Super specialties shall maintain Log Book of the work carried out by them and training including details of surgical operations assisted or done independently.

The Log Book shall be checked and assessed by the faculty members imparting the training.

Periodical evaluation of Log Book to be done by the Head of the Department as per 52nd SAB.

The Evaluation of the candidates in both theory and practical aspects will help the candidate in the improvement of his/her knowledge skills & attitude.

9.COMPETENCY ASSESSMENT:

Overall:

1. Communication / Commitment / Contribution /

Compassion towards patients and Innovation	-	10 Marks
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2. Implementation of Newly learnt techniques	-	10 Marks
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3. Documentation of case sheets / discharge Summary / Review	-	10 Marks
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4. Number of cases presented in Clinical Meetings/ Journal

Clubs / Seminars / Papers presented in Conference	-	10 Marks
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5. No. Of Medals/ Certificates won in the conference / Quiz

competitions and other academic meetings with details.	-	10 Marks
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Total	----- 50 Marks -----
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Assessment I - February - First year
 II - August - First year
 III - February - Second Year
 IV - August - Second year
 V - February - Third Year
 VI - May - Third Year

VIVA INCLUDING COMPETENCY ASSESSMENT – 100 Marks (50+50)

10. THEORY EXAMINATION:

Paper I Basic sciences
 Paper II Clinical Cardiology
 Paper III Haemodynamics, Therapeutics and Interventions
 Paper IV Recent Advances

Each paper will contain:

1. Essay questions (2)	-	2 X 15 = 30 Marks
2. Short Notes (10)	-	10 X 7 = 70 Marks
Total		----- 100 Marks -----

11. CLINICAL EXAMINATION:

Particulars	Time for candidate to examine the cases	Time for examiners to question candidates	Maximum Marks
Long Case	1 Case x 60 Minutes	60 Minutes	100
Short Case	2 Cases x 15 Minutes	30 Minutes	100
Ward Rounds	3 Patients x 10 Minutes	30 Minutes	100
OSCE	5 Stations x 3 Minutes	15 Minutes	50
Viva Voce		15 Minutes	100
Log Book			50
Total			500

As per Medical council of India Post Graduate Medical Education Regulations 2000 (amended upto 10th August 2016)clause 13.9 A Postgraduate student of a Postgraduate degree Course in broad specialities / Super Specialities would be required to present one poster presentation ,to read one paper at a National /State conference and to present one Research paper which should be published /accepted for

publication /sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the Postgraduate Degree Examination.

Apart from Poster/Oral paper presentation in National/State conferences, the Research paper published by the candidate in the University Journal of Medical Sciences will be considered as equivalent to the Research Paper as mentioned in 13.9. clause. Case Reports can also be published in University Journal of Medical Sciences but case reports will not be considered as Research Paper.

The candidate can also present Research Paper as per Clause 13.9 of Post Graduate Education Regulation 2000, and if the article sent for publication by the candidate as primary author or corresponding author which has not yet been published/accepted for publication, the candidate should submit a letter from the HOD, stating that the article sent for publication is of publishable merit and the proof of the Research Article submitted to the Journal for publication should be sent to the university forwarded through the HOD [as per 53rd SAB]

The student can submit articles for the University journal anytime from the time of registration in the University till 6 months prior to theory examination.

12. OSCE:5 Stations

1. Electrocardiography
2. Echocardiography
3. Angiocardiology
4. CT/MRI/PET
5. Complex cardiac patient

13. RECOMMENDED BOOKS:

1. Perloff's Clinical Recognition of Congenital Heart Disease, 6th Edition.
2. Essentials of Cardiac Physical Diagnosis; Jonathan Abrams.
3. Bedside Approach in the Diagnosis of Congenital Heart Disease. Author: Rajendra Tandon.
4. The Echo Manual ; Jae K. Oh. 3rd edition.
5. Physical diagnosis pages of 4th edition Hurst text book "THE HEART"
6. Textbook of Clinical Echocardiography; Catherine M Otto. 5th edition.
7. Feigenbaum's Echocardiography; Armstrong. 7th edition.
8. ASE's Comprehensive Echocardiography; Roberto Lang. 2nd Edition.
9. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine, 2-Volume Set, 10th Edition; Douglas L. Mann MD.
10. Hurst's the Heart, 14th Edition: Two Volume Set 14th Edition; Valentin Fuster.
11. Marriott's Practical Electrocardiography; by Galen S. Wagner- 12th edition.

12. Leoschamroth: An Introduction to Electro Cardiography; Calambur Narasimhan. 8th adapted edition.
13. Clinical Electrocardiography: A Textbook- 4th Edition. Antoni Bayes de Luna.
14. Clinical Arrhythmology 1st Edition; Antoni Bayes de Luna.
15. The 12 Lead ECG in ST Elevation Myocardial Infarction: A Practical Approach for Clinicians 1st Edition; Antoni Bayes de Luna.
16. Grossman & Baim's Cardiac Catheterization, Angiography, and Intervention; Mauro Moscucci; 8th edition.
17. Interventional Cardiology 1st Edition - Spencer B. King III.
18. Transradial Access: Techniques for Diagnostic Angiography and Percutaneous Intervention 1st Edition; Howard A. Cohen.
19. Cardiac Catheterization Handbook, 6th Edition; Morton J. Kern.
20. Practical Handbook of Advanced Interventional Cardiology: Tips and Tricks; Thach Nguyen and Dayi Hu – 4th edition.
21. Interventions in Structural, Valvular and Congenital Heart Disease, Second Edition; Horst Sievert (Editor), Shakeel A. Qureshi.
22. Cardiovascular Therapeutics - A Companion to Braunwald's Heart Disease, 4th Edition; Elliott M. Antman.
23. Cardiovascular Physiology: Mosby Physiology Monograph Series, 10th edition (Mosby's Physiology Monograph) Achilles J. Pappano PhD.
24. Netter's Cardiology (Netter Clinical Science); Runge. 2nd edition.
25. Josephson's Clinical Cardiac Electrophysiology; 5th edition. Mark E. Josephson.
26. Clinical chemistry in Diagnosis and Treatment 3rd Edition; Joan F Zilva.
27. Cardiovascular Physiology; Robert M. Berne. 8th edition.
28. Paediatric Cardiology, 3rd Edition; Robert H. Anderson.
29. Moss & Adams' Heart Disease in Infants, Children, and Adolescents, Including the Fetus and Young Adult ; 9th edition.
30. TextBook of Structural Interventions from Pediatrics to Geriatrics-
Dr.I.B.Vijayalakshmi

****Note:** The editions are as applicable and the latest editions shall be the part of the syllabi.

14. JOURNALS:

1. Indian Heart Journal
2. Journal of American College of Cardiology
3. Circulation
4. European Heart Journal
5. Circulation Research
6. American Heart Journal
7. JACC: Cardiac Interventions

8. Heart
9. New England Journal Of Medicine
10. International Journal of cardiology
11. American Journal of Cardiology
12. JACC: Heart failure
13. Journal of Thoracic and cardiovascular Surgery
14. PACE
15. EuroPACE
