

Providing Medical Education and Training to All without International Borders®

Masters in Clinical Cardiology (MCC) Non Invasive

2015 Curriculum

**International University School of Medicine
(IUSOM) – Michigan Clinical Campus**

6050 Greenfield Road, Dearborn, 48126 Michigan, USA
www.InternationalUniversity-SchoolOfMedicine.org
www.ArkMedicalCenter.com

International Course Director: Prof. Dewa N Ramlu MD
Course Inquiries: +1-734-223-9245
Email: prof_dewa_ramlu@internationaluniversity-schoolofmedicine.org

Table of Contents

<i>Preface</i>	5
<i>Summary</i>	6
<i>Introduction</i>	7
<i>Award & Teaching Institutions</i>	8
<i>Aims & Objectives</i>	9
<i>Learning Objectives</i>	10
<i>Teaching and Learning Strategies</i>	11
<i>Semester 1</i>	11
<i>Semester 2</i>	12
<i>Semester 3</i>	13
<i>Semester 4</i>	13
<i>Semester 5</i>	14
<i>Semester 6</i>	14
<i>Teaching and Learning Methods</i>	15
<i>Adults learn by:</i>	15
<i>Experiential Learning Opportunities</i>	15
<i>Training in Practical Procedures</i>	16
<i>Small Group Learning Opportunities</i>	16
<i>One-to-One Teaching</i>	16
<i>Formal Training</i>	16
<i>Personal Study</i>	16
<i>Teaching Others</i>	17
<i>Clinical Research</i>	17

Learning Venues/Activities	17
Scheduled Conferences	17
Cardiology Ward Service/Coronary Care Unit	17
Schedule 1 Monday through Friday	18
Weekends and Holidays	18
Cardiology Consultation Service	18
Schedule 2 Monday through Friday	18
Cardiology Clinic:	18
Elective Rotations	18
Learning Resources	19
Educational Goals – Ward Service/Coronary Care Unit	19
Patient Care:.....	19
Medical Knowledge:.....	19
Educational Goals – Consultation Service	20
Patient Care.....	20
Medical Knowledge	20
Practice-Based Learning and Improvement	21
Interpersonal and Communication Skills.....	21
Professionalism	21
Practice-based Learning and Improvement	21
Systems-based Practice.....	22
Evaluation Methods	22
Assessment	22
Admission Requirements	24
Application Processing	24
IUSOM - Michigan Clinical Campus Academic Calender	24
Admission Application Forms for MCC Degree Program	25
Fees	25

Preface

This document presents a complete curriculum for the Masters in Clinical Cardiology (MCC) (Non Invasive) Degree Program being offered by the International University School of Medicine (IUSOM) – Michigan Clinical Campus (in Dearborn, Michigan, USA) at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals located in Michigan, USA along with at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia; which is the result of several years' careful thinking, hard work, expert advices and suggestions of medical professionals and educationalists at the health sciences faculties and schools as well as at both academic and non-academic hospitals all located in Asia, Australia, USA, Canada, and EU including The Netherlands and Caribbean Netherlands. This IUSOM – Michigan Clinical Campus's MCC curriculum document was eventually prepared by Prof. Hamid Sattar (Chief Cardiologist), MD, FACC, FSCAI, Vice President – Clinical Sciences at IUSOM – Michigan Clinical Campus (Overall Responsible for MCC Degree Program), by Prof. Dewa Ramlu, MD, IMD, PhD, MPH, AFCHSE, MACRP (International MCC Degree Course Director), and by Prof. Vivek Gupta, MD, DM.

In this document, after brief Introduction to MCC Degree Curriculum; Award & Teaching Institutions; Aims & Objectives; and Learning Objectives are cited. Thereafter, Teaching and Learning Strategies for Semester 1 (covering Basic Sciences and Clinical Cardiology (including Research Methodology)), Semester 2 (covering Research Methodology), Semester 3 (covering Non Invasive Cardiology), Semester 4 (covering Principles of Diagnostic and Invasive Cardiology), Semester 5 (covering Pacing and Electrophysiology), and Semester 6 (covering Research Project) are mentioned. During all 6 Semesters, Teaching and Learning Methods; Experiential Learning Opportunities; Training in Practical Procedures; Small Group Learning Opportunities; One-to-One Teachings; Formal Training; Personal Study; Teaching Others; and Clinical Research shall be focused. In this regard, Learning Venues/Activities describes Scheduled Conferences; Clinical Cardiology Ward Service/Coronary Care Unit; Schedule 1 Monday through Friday; Weekends and Holidays; Cardiology Consultation Service; Schedule 2 Monday through Friday ; and Cardiology Clinic. Elective Rotations; and Learning Resources are also narrated in this document. Educational Goals – Ward Service/Coronary Care Unit (involving Patient Care and Medical Knowledge); and Educational Goals – Consultation Service (involving Patient Care and Medical Knowledge) are then mentioned. Practice-Based Learning and Improvement includes Interpersonal and Communication Skills; Professionalism; Practice-Based Learning and Improvement; and Systems-Based Practice. Evaluation Methods of the MCC Degree Course being offered by IUSOM at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals located in Michigan, USA as well at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia are described, too. For MCC Degree Program, Information on Application Processing and Fees are also included in this document.

In brief, in order to acquire a Masters in Clinical Cardiology (MCC) Degree via IUSOM – Michigan Clinical Campus, USA, a medical student is required to complete a 36 months (6 semesters; each semester consisting of 6 months) full-time course at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals located in Michigan, USA along with at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia

This extensive curriculum has been constructed not only to enable students to achieve a MCC Degree via IUSOM – Michigan Clinical Campus in USA through Theory & Clinical Training at AMC and at AMC-Affiliated Hospitals in Michigan, USA together with at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia but also to convert trainee-doctors (already in possession of minimum qualification of MD or MBBS (Upper Second Class Pass) or Arts (Dutch Degree in Medicine) or an equivalent overseas qualification acceptable to IUSOM) into Fully-Experienced Cardiologists enabling them to impart Clinical Cardiology Services to Heart & Cardiovascular Patients in their choice of country where they wish to continue to practice a Medical Profession.

Finally, this document is open to constructive criticism and comments from prospective students, academic staff members, potential competitors and alliances, medical educational institutions, governmental and non-governmental organizations and any other such associations and societies, and it shall be time to time modified accordingly.

Bonaire, Caribbean Netherlands (Formerly Netherlands Antilles), February 1, 2015



Prof. Dr. Ghulam G. Choudhry, Ph.D., D.Sc., President, International University School of Medicine (IUSOM) Foundation

Summary

In order to obtain a Masters in Clinical Cardiology (MCC) (Non Invasive) Degree, at the International University School of Medicine (IUSOM) – Michigan Clinical Campus in Dearborn, Michigan, USA, the students are required to successfully complete 6 Semesters (duration of such each Semester being 6 months) covering Theory & Clinical Rotations/Clerkships at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals located in Michigan, USA as well at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia.

This Masters in Clinical Cardiology (MCC) Degree Program is available as a 36 months (six Semesters in total) full-time course. IUSOM – Michigan Clinical Campus Students will gain knowledge and experience in the theory and clinical application of evidence-based cardiology practice at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals in Michigan, USA together with at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia. The MCC Degree Program covers the complete spectrum of the management of cardiovascular diseases including full cardiac investigations and preventions. In this MCC Degree course, most of the learning occurs as a result of clinical experience (experiential learning and on-the-job learning) and self-directed study. The degree of self-direct learning will increase as IUSOM students become more experienced. Lectures and formal educational sessions make up only a small part of this course. Students will be able to interact with their tutors and fellow students via an online virtual learning environment. Clinical placements are completed across key areas of cardiology practice providing the opportunity for students to be immersed in the practicalities of provision of complete medical care rather than learning only about the theory.

IUSOM – Michigan Clinical Campus, AMC (Michigan, USA), MIOT Hospital (Chennai, India), and other Cardiology Hospitals & Institutes in Asia believe that their MCC Degree Course offers a truly unique and highly fulfilling student experience as we offer a comprehensive program that includes all aspects in the management of cardiovascular diseases and risk factors. This course encompasses both theory and clinical elements thereby developing skills and competences necessary for proper cardiac intervention. IUSOM – Michigan Clinical Campus's, AMC's, MIOT's, and other Asian Cardiology Hospitals' & Institutes' Faculty includes International and National Leaders in cardiology who have contributed to the development of guidelines on cardiovascular intervention.

IUSOM – Michigan Clinical Campus works and collaborates with Ark Medical Center in Michigan, USA, MIOT Hospital in Chennai, India, and other Cardiology Hospitals & Institutes in Asia which allows its students' access to clinical visits and observations of procedural treatments such as coronary intervention, peripheral vascular intervention, limb salvage, carotid artery stenting, diagnostic cardiac catheterization, intracoronary stenting, percutaneous transluminal coronary angioplasty, PFO/ASD closure, IVC filter, and pace maker placement. IUSOM – Michigan Clinical Campus's MCC Degree students also have access to cardiac testing and interpretation of echo, vascular, EKG, event monitor, holter monitor, and heart catheterization.

After successful completion of Masters in Clinical Cardiology (MCC) Degree Program at a Branch Campus, namely, International University School of Medicine (IUSOM) – Michigan Clinical Campus in USA with 36 months' Theory & Clinical Rotations at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals in Michigan, USA as well at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia, the International University School of Medicine (with its Head Quarters situated in Bonaire, Caribbean Netherlands) awards this MCC Degree to IUSOM students.

Introduction

The Masters in Clinical Cardiology (MCC) (Non Invasive) Degree course is aimed at physicians who are interested in undertaking specialist training in Cardiology. This course is run jointly between International University School of Medicine (IUSOM) – Michigan Clinical Campus and Cardiology Hospitals & Institutes in Asia. In order to obtain a MCC Degree at the IUSOM – Michigan Clinical Campus located in Dearborn, Michigan, USA and Cardiac Hospitals & Institutes in Asia, the trainees are required to successfully complete three years consisting of six semesters covering clinical attachments at Ark Medical Center (AMC) and at AMC-Affiliated Hospitals in Michigan, USA as well at Cardiology Hospitals & Institutes situated in Asia.

MCC Degree Program is available as a 36 months (6 semesters; each semester consisting of 6 months) full-time course at IUSOM – Michigan Clinical Campus and at Cardiology Hospitals & Institutes in Asia. The trainees will gain knowledge and experience in theory and clinical applications of evidence-based cardiology practice at AMC and AMC-Affiliated Hospitals in Michigan, USA and at Cardiology Hospitals & Institutes in Asia. This unique MCC Program covers the complete spectrum of cardiovascular disease interventions including cardiac investigations and preventions.

This MCC Degree course being offered by IUSOM encompasses both theory and clinical elements thereby developing skills and competences necessary for proper cardiac intervention. However, most of the learning in MCC program occurs through on-the-job training, clinical attachments, and self-directed learning; the degree of self-direct learning will increase as our trainees become more experienced. Formal lectures and educational sessions make up only a small part of this degree course; however, trainees will be able to interact with their tutors, fellow trainees, and senior cardiologists in many different learning environments. The trainees are placed across key areas of cardiology practice providing the opportunity for trainees to be immersed in the practicalities of provision of complete cardiac intervention rather than learning only about the theory.

IUSOM – Michigan Clinical Campus & AMC and Cardiac Hospitals and Institutes in Asia believe that their MCC Degree course offers a truly unique and highly fulfilling trainee experience as we offer a comprehensive program that includes all aspects in the intervention of cardiovascular diseases and risk factors. MCC Academic Board comprises of international and national leaders in cardiology who have contributed to the development of guidelines on cardiovascular intervention worldwide.

IUSOM – Michigan delivers the clinical training in collaboration with Ark Medical Center in USA which allows its trainees access to clinical training and observations of procedural treatments such as coronary intervention, peripheral vascular intervention, limb salvage, carotid artery stenting, diagnostic cardiac catheterization, intracoronary stenting, percutaneous transluminal coronary angioplasty, PFO/ASD closure, IVC filter, and pace maker placement. The IUSOM MCC trainees also have access to cardiac testing and interpretation of echo, vascular, EKG, event monitor, holter monitor, and heart catheterization.

Award & Teaching Institutions

IUSOM – Michigan Clinical Campus in collaboration with AMC & AMC-Affiliated Hospitals in Michigan, USA and Cardiology Hospitals & Institutes in Asia provides the teaching and awards as tabulated below:

Awarding Institution	International University School of Medicine (IUSOM)
Teaching Institution	Ark Medical Center (AMC) & AMC-Affiliated Hospitals situated in Michigan, USA; and MIOT Hospital, Chennai (India), and other Cardiology Hospitals & Institutes located in Asia.
Name of Award	Masters in Clinical Cardiology (MCC) Degree
Name of Department	Post Graduate Medical Education
Name of Faculty	Cardiology
Mode of Study	Full-time
Language of Study	English
Date of Launching	May 2014

Aims & Objectives

The aim of the Masters in Clinical Cardiology (MCC) Degree course is to provide high level cardiology training to physicians wishing to become non-invasive cardiologist. The objective is to provide on-the-job clinical training, lectures, clinical intervention observations, workshops, seminars, and a research project or dissertation through highly experienced and successful cardiologists and researchers.

The aims and objectives are to:

- Attract highly motivated doctors both from the USA and overseas
- Produce graduates equipped to pursue careers in Clinical Cardiology
- Provide an internationally accepted Post Graduate Qualification
- Develop high level of knowledge and understanding in the management of cardiovascular diseases and cardiovascular risk factors
- Develop skills in the assessment and management of patients with cardiovascular diseases and cardiovascular risk factors
- Prepare graduates to perform detailed cardiovascular examination
- Prepare graduates to recognize and interpret common pathologic findings
- Prepare graduates to evaluate patients with chest pain appropriately
- Prepare graduates to assess patients with acute coronary syndrome
- Prepare graduates to manage systolic and diastolic heart failure
- Prepare graduates to manage atrial fibrillation
- Prepare graduates to order appropriate pharmacotherapy for chronic stable angina
- Prepare graduates to evaluate patients with syncope
- Prepare graduates to evaluate patients with acute myocardial infarction and interpret laboratory markers of cardiac disease
- Prepare graduates to manage patients with acute coronary syndrome
- Prepare graduates to select appropriate cardiac stress tests and myocardial imaging studies for various categories of patients
- Prepare graduates to identify the indications for pacemakers and implantable defibrillators
- Prepare graduates to order cardiac rehabilitation programs
- Prepare graduates to evaluate patients for cardiac transplantation
- Prepare graduates to recognize the electrocardiographic patterns in acute myocardial infarction
- Prepare graduates to differentiate systolic and diastolic heart failure and understand the pathophysiology of each
- Prepare graduates to recognize cardiac murmurs and their differential diagnosis
- Prepare graduates to understand the indications, evidence for expected benefits, and adverse effects of pharmacologic agents used in the management of congestive heart failure
- Prepare graduates to interpret echocardiogram reports appropriately
- Prepare graduates to understand the pathophysiology of chronic angina, acute coronary syndrome, and acute myocardial infarction
- Prepare graduates to understand the pathophysiology of neurocardiogenic syncope
- Prepare graduates to understand the pathophysiology of congestive heart failure
- Prepare graduates to interpret electrocardiography and telemetry rhythm strips appropriately
- Prepare graduates to understand the pathophysiology of valvular heart diseases
- Prepare graduates to understand the pathophysiology of adult congenital heart disease

- Prepare graduates to understand the pharmacokinetics, pharmacodynamics, indications, and adverse reactions to the following agents: Aspirin, clopidogrel, IIb-IIIa glycoprotein receptor inhibitors, antithrombin agents, thrombolytic agents, beta-adrenergic blocking agents, ACE inhibitors, nitrates, and statins
- Prepare graduates to understand the differential diagnosis of pericardial disease
- Prepare graduates to understand the pathophysiology of atrial fibrillation
- Prepare graduates to understand the pathophysiology and rationale for the treatment of ventricular arrhythmias
- Prepare graduates to understand the pathophysiology and rationale for treatment of bradyarrhythmias
- Prepare graduates to understand the differential diagnosis of right heart failure and pulmonary hypertension
- Prepare graduates to administer and interpret cardiac stress tests appropriately
- Prepare graduates to manage perioperative cardiac arrhythmias
- Prepare graduates for perioperative management of patients with coronary artery disease
- Prepare graduates to understand the indications for transesophageal echocardiography
- Prepare graduates to interpret cardiac nuclear imaging reports appropriately
- Prepare graduates to understand the cardiac risks of non-cardiac surgery
- Prepare graduates to research one or more key clinical question related to learning objectives under the Patient Care and Medical Knowledge competencies
- Prepare graduates to develop skills in interviewing patients with attention to culturally sensitive language
- Prepare graduates to develop skills in giving a focused presentation of clinical findings to the attending faculty
- Prepare graduates to develop skills at communicating findings and recommendations of consultations to primary physicians both verbally and in writing
- Prepare graduates to communicate appropriate information to patients to obtain informed consent for procedures performed by the specialty
- Prepare graduates to demonstrate a commitment to excellence and continuous professional development
- Prepare graduates to demonstrate punctuality and preparation for consultation rounds
- Prepare graduates to demonstrate courteous and professional behavior during encounters with patients and their families
- Prepare graduates to demonstrate appropriate professional relationships with colleagues, faculty, and other members of consultation team
- Prepare graduates to demonstrate respect for patients' primary physicians in discussions with patients and within the consult team.

Learning Objectives

On successful completion of the Masters in Clinical Cardiology (MCC) Degree course, the trainees will be able to:

- Demonstrate a comprehensive background theoretical knowledge, including physiology, biochemistry and anatomy, of the cardiovascular system in health and disease
- Demonstrate a detailed knowledge of the epidemiology, clinical manifestations and treatment options both pharmacological and non pharmacological for common and less common cardiovascular conditions
- Outline the physics and safety principles underlying specific cardiac investigative technologies including electrocardiography, ultrasonography, radionuclide imaging, MRI, CT and angiography
- Read, interpret and advise appropriate management based on cardiac investigations including electrocardiograms (resting, exercise and ambulatory ECG's), non invasive electrophysiological investigations, echocardiography and cardiac catheterisation
- Demonstrate the technical skills necessary to perform diagnostic quality echocardiography and interpret transthoracic and transesophageal echo studies
- Apply evidence based medicine to clinical practice scenarios and critically appraise the medical literature
- Design and conduct and write a report on a research study pertinent to the MSc in Cardiology.

Teaching and Learning Strategies

Semester 1

Basic Sciences and Clinical Cardiology (Including Research Methodology)

The Masters in Clinical Cardiology (MCC) Degree course will provide a comprehensive theoretical knowledge of cardiovascular pathophysiology as a foundation for advanced development in subspecialty of non-invasive cardiology. Trainees will be guided through a structured approach to acquiring comprehensive experience and technical knowledge in relevant cardiological investigations and procedures and will be enabled to complete a dissertation demonstrating a critical understanding and application of research methodology pertinent to cardiology.

On successful completion of this semester, trainees will be able to:

- Describe basic cardiovascular physiology at organ and cellular level; and to outline the physiological measurements of clinical use in acute and chronic cardiovascular conditions, limitations in their measurement and how they can impact on prognosis and management
- Outline the pathophysiological basis of atherosclerotic coronary disease including the inflammatory hypothesis of arterial disease
- Describe the pathophysiology, including serum markers, of myocardial ischemia and infarction, the subsequent complications of infarction; and to identify the diagnostic tools available to determine the timing and consequences of infarction and associated prognosis
- Describe the epidemiology of atherosclerosis, coronary and cerebrovascular disease; and to explain the changes in epidemiology which have occurred over the past 50 years in industrialized nations
- Identify the targets for preventative strategies to combat cardiovascular disease; and to discuss the merits of population level interventions as well individual lifestyle and pharmacological interventions

- Outline the biochemistry and physiology of lipid and glucose metabolism and hypertension; and using this knowledge to explain the mechanisms of action of lipid lowering drug therapy, diabetic agents and hypertensive agents and summarise the major clinical outcomes research which underpins pharmacological interventions for hyperlipidaemia and hypertension
- Describe the involvement of the heart in systemic disease
- Describe the pharmacology of acute coronary syndromes, chronic coronary disease, anti arrhythmics, and heart failure therapy
- Demonstrate knowledge of the anatomy and embryology of the heart , in particular the relation of normal anatomy to surface markings and the implications of embryological development to congenital heart diseases
- Describe the genetics of cardiovascular disease as pertains to the polygenic forms of cardiovascular disease such as atherosclerosis right through to single gene defects with particular reference to hypertrophic cardiomyopathy, LQTS, ARVD, CPVT, the muscular dystrophies and Anderson fabry's disease
- Categorise the various forms of cardiomyopathy dilated, restrictive, constrictive, and ischaemic; and to explain the rationale for pharmacological treatments tailored to aetiology
- Describe the epidemiology, pathophysiology, clinical presentations and treatment of endocarditis, myocarditis and pericarditis
- Compare the currently available treatment modalities for the management of coronary artery disease, optimal medical therapy, surgical revascularisation or percutaneous intervention in light of recent
- Describe cardiogenic and neurocardiogenic causes of syncope; and to outline how they are investigated and treated
- Describe the clinical features, complications, and treatment of atrial fibrillation including stroke prevention
- Describe the surgical techniques available for valve repair and replacement, and the indications for repair or replacement in aortic or mitral valve disease; to compare the existing data on surgical techniques with data emerging on newer percutaneous techniques for the management of structural heart disease.

Semester 2

Research Methodology

The aims of this Masters in Clinical Cardiology (MCC) Degree course are to provide the trainees with an in depth knowledge of the methodology employed in Research and to apply the information gained to the critical appraisal of research. Overall the aim of this module is enable the trainee to carry out successful research in a field of cardiology, through (a) the review, analysis, and evaluation of literature, (b) the planning and implementation of a research project, (c) the efficient and correct analysis of data, (d) the production of a research report

On successful completion of this semester, the trainees will be able to:

- Discuss the ethical implications of biomedical research
- Differentiate between qualitative and quantitative research
- Compare the advantages and disadvantages of various research designs
- Justify the use of various research designs
- Analyse and evaluate published research

- Formulate a research question
- Instigate a research plan
- Implement a research project
- Statistically analyse data effectively and efficiently
- Analyse the findings and report accordingly.

Semester 3

Non Invasive Cardiology

On successful completion of this semester pertaining to the Masters in Clinical Cardiology (MCC) Degree course, the trainees will be able to:

- Define commonly used physical descriptors of medical images and medical image quality
- Describe the basic technology of ultrasound and Magnetic Resonance Imaging (MRI) systems; and to relate these physical phenomena to the process of image formation and image contrast in echocardiographic imaging and MRI
- Describe the process of image formation and the basic technology of a range of medical imaging modalities including CT and Gamma Cameras with particular application to cardiac imaging
- Use echocardiography for evaluating left and right ventricular function and valvular pathology with particular reference to identifying criteria for surgical intervention
- Demonstrate competence in acquiring and interpreting echocardiographic images
- Compare and contrast cardiac MR, CT nuclear cardiology techniques and echocardiography as diagnostic tools
- Evaluate the currently available cost effectiveness data supporting the use of different modalities in different clinical scenarios.

Semester 4

Principles of Diagnostic and Invasive Cardiology

On successful completion of this semester pertaining to the Masters in Clinical Cardiology (MCC) Degree course, the trainees will be able to:

- Describe the physics of X-ray generation and the technology used in medical X-ray generation
- Relate the interactions of ionising radiation with tissue in commonly used imaging modalities to the resulting images features including contrast, scatter and resolution.
- Describe the radiation safety safeguards observed in the cardiac catheterisation lab and the factors to be considered in using fluoro and digital x-ray equipment
- Describe the physiological basis and clinical indications for intracardiac measurement of FFR, Doppler coronary Flow rates, and intravascular ultrasound
- Demonstrate knowledge of the indications, potential complications and management for Intra-aortic Balloon pumps
- Discuss the factors to be considered when undertaking percutaneous interventions for more unusual structural indications including LAA occlusion, ASD, VSD or PFO closure, or TAVI
- Observe aseptic technique in preparing for invasive diagnostic and therapeutic procedures
- Gain femoral or radial arterial access for the purpose of diagnostic coronary angiography

- Demonstrate a knowledge of the available equipment including different catheters and sheaths to facilitate direct coronary cannulation
- Observe coronary angiography and interpret the images obtained appropriately in the context of clinical presentation.

Semester 5

Pacing and electrophysiology

On successful completion of this semester pertaining to the Masters in Clinical Cardiology (MCC) Degree course, the trainees will be able to:

- Identify indications for cardiac pacing based on international guidelines
- Recognise common problems post pacemaker insertion including pacemaker syndrome, pacemaker mediated tachycardia, and lead dislodgement
- Interpret pacemaker interrogation at pacing checks; and to identify indications to reposition, to replace or otherwise to modify pacemaker settings
- Identify indications for ICD and biventricular pacemaker implantation based in international guidelines
- Interpret ICD interrogation at pacing checks; and to troubleshoot commonly encountered problems through modifying ICD/ pacemaker settings
- Demonstrate awareness of the factors important in optimising cardiac efficiency in biventricular pacing
- Recognise common and life-threatening arrhythmias on ECG and demonstrate knowledge of appropriate treatment
- Identify the indications for electrophysiological studies +/- ablation in cases of SVT.

Semester 6

Research Project

On successful completion of this semester pertaining to the Masters in Clinical Cardiology (MCC) Degree course, the trainees will be able to:

- Demonstrate knowledge and practical proficiency in selected experimental methodologies used to answer research questions in the biomedical sciences
- Analyze and to critically evaluate published information; and to present it in written format
- Apply an experimental approach to problem solving
- To present and to critically evaluate their work in written format; and to discuss in the context of current published work on the related topic
- Recognise the value of scientific enquiry; and to demonstrate an understanding of the ethical responsibility of scientists
- Show proficiency in searching literature databases, to review literature, to analyze literature for answering questions, and to present the report.

Teaching and Learning Methods

Adults Learn By:

- Reflecting and building upon their own experiences
- Identifying what they need to learn
- Being involved in planning their education and training
- Evaluating the effectiveness of their learning experiences.

For cardiovascular medicine trainees to maximize their learning opportunities it is important that they work in a ‘good learning environment’. This includes encouragement for self-directed learning as well recognizing the learning potential in all aspects of day to day work. There should be a positive attitude to training with learning from peers being encouraged. There should be active involvement in group discussion as this is an important way for doctors to share their understandings and experiences. A supportive open atmosphere should be cultivated for questions to be answered.

The bulk of learning occurs as a result of clinical experience (experiential learning and on-the-job learning) and self-directed study. The degree of self-direct learning will increase as the trainees become more experienced. Lectures and formal educational sessions make up only a small part of the postgraduate training in cardiovascular medicine.

The list of learning opportunities cited below offers guidance only, as there are other opportunities for learning that are not listed here. The trainees will learn in different ways according to their level of experience. In this regard, the trainees should regularly update their personal portfolio to keep a personal record, and be able to present to others, the evidence of the learning methods used.

Experiential Learning Opportunities

- Every patient seen, on the ward or in out-patients, provides a learning opportunity that will be enhanced by following the patient through the course of their illness. Patients seen should provide the basis for critical reading around clinical problems.
- Each time a trainee observes another doctor, consultant or fellow trainee, seeing a patient or their relatives there is an opportunity for learning.
- Ward-based learning including ward rounds, including those post-take, should be led by a consultant and include feed-back on clinical and decision making skills.
- Supervised consultations in outpatient clinics – the trainees should have the opportunity to assess both new and follow-up patients and discuss each case with the supervisor so as to allow feedback on diagnostic skills and gain the ability to plan investigations.
- The trainees need to learn to make increasingly independent decisions on diagnosis, investigations, and treatment consistent with their level of experience and competence and with maintaining patient safety. These decisions should be reviewed with the trainees’ supervising consultant.
- There are many situations where clinical problems are discussed with clinicians in other disciplines, such as cardiac surgical multidisciplinary meetings. Such discussions provide excellent opportunities for observation of clinical reasoning.

Training in Practical Procedures

Observing practical procedures in Cardiology with a consultant or more senior trainee, including the care and counseling of the patient/carers before and after the procedure, is the key method of gaining competence in these aspects of the curriculum (apprenticeship learning). Also with advances in technology, the use of simulators will play an increasing part in the training of practical procedures. The trainees should maintain a logbook of experience. Where it is appropriate, the curriculum for the Masters in Clinical Cardiology (MCC) Degree course indicates the likely minimum number of procedures thought necessary to encompass a sufficiently broad spectrum of clinical experience to define performance.

Small Group Learning Opportunities

- Case presentations and small group discussion, particularly of difficult cases, including presentations at clinical and academic meetings, which should include critical incident analysis.
- Small group bedside teaching, particularly covering problem areas identified by trainees.
- Small group sessions of data interpretation, particularly covering problem areas identified by trainees and including participation in audit meetings, journal clubs, research presentations, etc.

One-to-One Teaching

- Review of out-patients, ward referrals or in-patients with supervising consultant.
- Review/case presentations with educational supervisor including selected notes, letters, and summaries.
- Critical incident analysis.
- Discussion between trainee and trainer of knowledge of local protocols.
- Feedback following assessments provides excellent teaching opportunities.

Formal Training

Formal training is organized both locally and internationally. The trainees will be required to plan so that they can attend these formal training sessions and they will also be expected to provide feedback on this training so that the quality of the training can be assessed and consequently its format and content be modified. The details of feedback should be recorded in the trainee's portfolio. The trainees must attend two-thirds of formal training sessions both locally and internationally in order to progress through the training program.

Personal Study

- Personal study including computer-based learning.
- Practice examination questions and subsequent reading.
- Reading journals.
- Writing reviews and other teaching material.

Teaching Others

- Teaching undergraduate medical students and students in allied health professions and postgraduate doctors provides excellent learning opportunities for the trainees.
- Presenting cases at grand rounds or similar clinical meetings provides the opportunity to review the literature relating to the clinical case. This provides the opportunity for in depth study of one clinical problem as well as learning important critical thinking and communication skills.
- Journal club presentations allow development of critical thinking and in depth study of particular areas.

Clinical Research

Development of research competencies forms an important part of this Cardiology curriculum for the Masters in Clinical Cardiology (MCC) Degree course as they are an essential set of skills for effective clinical practice. Undertaking research helps to develop critical thinking and the ability to review medical literature. Clinical research also allows development of particular expertise in one area of cardiovascular medicine allowing more in depth knowledge and skills and helping to focus long term career aims and interests.

Learning Venues/Activities

Scheduled Conferences

Tuesday 7:30 a.m.	Cardiac Catheterization/ Morbidity and Mortality Conference
Wednesday 7:30 a.m.	Clinical case conferences or didactic lectures/videotapes on core curriculum topics
Thursday 7:30 a.m.	Clinical case conferences, journal clubs, ECG/echo conferences, or research conferences
Last Friday of each month	Combined Cardiology and Cardiothoracic surgery clinical case conference

Cardiology Ward Service/Coronary Care Unit

The Cardiology inpatient team cares for patients admitted to both the Cardiology Ward Service and the Coronary Care Unit. The students will be assigned to these services and work closely with subspecialty fellow and faculty attending cardiologists. Patient care responsibilities are similar to those of General

Medicine ward teams, but details of the process of care will be determined by the attending cardiologists and the fellow. The Chief of Cardiology and Program Director will set limits on the number of patients that may be assigned to these teams. The students assigned to the Cardiology team must attend Morning Report and in addition may attend conferences of the Cardiology section.

Schedule 1 Monday through Friday

7:00 – 8:00 a.m.	Work rounds (exact time set by resident and fellow)
8:00 – 9:00 a.m.	Morning report
9:30 – 11:30 a.m.	Attending rounds (exact time set by attending Cardiologists)
12.00 – 1.00 p.m.	Noon conference
1.00 – 5.00 p.m.	Ward responsibilities and Continuity clinic as scheduled

Weekends and Holidays

The attending fellow and upper level resident will set time of rounds.

Cardiology Consultation Service

The attending faculty cardiologist assigned to the service will determine students' schedule and responsibilities. In addition to answering consultations and working in the Stress Lab, the students also attend conferences.

Schedule 2 Monday through Friday

8.00 a.m. – 12.00 noon	Perform stress tests
12.00 – 1.00 p.m.	Noon conference (Department of Medicine)
1.00 – 5.00 p.m.	Consult rounds/Heart Station activities (including, but not limited to interpreting stress tests, electrocardiograms, echocardiograms, and ambulatory electrocardiograms) and Continuity clinic as scheduled

Cardiology Clinic:

Wednesday 1:00 – 4:30 p.m., Medicine Specialty Clinic, students may attend if there is no conflict with their Continuity Clinic or Consultation Service rounds.

Elective Rotations

Students, who have completed the standard rotation Consultation Service rotation, may request an elective rotation that focuses on any aspect of the clinical activities of the Cardiology Section.

Requests must be approved by the Chief of the Cardiology or the Program Director. All prerequisites for approval of electives must be fulfilled.

Learning Resources

- Standard medical and Cardiology textbooks
- Consensus guidelines of the American Heart Association/American College of Cardiology, available through the websites of these organizations:
<http://americanheart.org>
<http://www.acc.org>
- ECG Wave-Maven Self-Assessment Program for Students and Clinicians
<http://ecg.bidmc.harvard.edu/maven/mavenmain.asp>
- References for articles and reading lists will be distributed during orientation.

Educational Goals – Ward Service/Coronary Care Unit

Patient Care:

Patient care includes to:

- Learn to perform a detailed cardiovascular examination properly; and to recognize and to interpret common pathologic findings including murmurs
- Learn to evaluate patients with chest pain appropriately
- Learn to assess patients with acute coronary syndrome appropriately
- Learn to manage systolic and diastolic heart failure appropriately
- Learn to manage atrial fibrillation appropriately
- Learn to order appropriate pharmacotherapy for chronic stable angina
- Learn the appropriate focused evaluation of patients with syncope
- Learn to evaluate patients with acute myocardial infarction appropriately, and interpret laboratory markers of cardiac disease properly
- Learn to manage patients with acute coronary syndrome appropriately
- Learn to select appropriate cardiac stress tests and myocardial imaging studies or various categories of patients
- Learn the indications for pacemakers and implantable defibrillators
- Learn to order cardiac rehabilitation programs appropriately
- Learn to evaluate patients for cardiac transplantation appropriately.

Medical Knowledge:

In this regard, Medical Knowledge includes to:

- Recognize the electrocardiographic patterns in acute myocardial infarction
- Learn to differentiate systolic and diastolic heart failure and to understand the pathophysiology of each
- Recognize cardiac murmurs and their differential diagnosis
- Understand the indications, evidence for expected benefits, and adverse effects of pharmacologic agents used in the management of congestive heart failure
- Learn to interpret echocardiogram reports appropriately
- Understand the pathophysiology of chronic angina, acute coronary syndrome, and acute myocardial infarction
- Understand the pathophysiology of neurocardiogenic syncope
- Understand the pathophysiology of congestive heart failure
- Interpret electrocardiography and telemetry rhythm strips appropriately
- Understand the pathophysiology of valvular heart diseases
- Understand the pathophysiology of adult congenital heart disease
- Understand the pharmacokinetics, pharmacodynamics, indications, and adverse reactions to the following agents or classes of agents: Aspirin, clopidogrel, IIB-IIIa glycoprotein receptor inhibitors, antithrombin agents, thrombolytic agents, beta- adrenergic blocking agents, ACE inhibitors, nitrates, and statins
- Understand the differential diagnosis of pericardial disease
- Understand the pathophysiology of atrial fibrillation
- Understand the pathophysiology and rationale for treatment of ventricular arrhythmias
- Understand the pathophysiology and rationale for treatment of bradyarrhythmias
- Understand the differential diagnosis of right heart failure and pulmonary hypertension

Educational Goals – Consultation Service

Many of the problems and disease processes encountered in the Cardiology Ward Service will also be seen in the Consultation Service. Therefore, the educational goals of both rotations overlap. The trainees assigned to this rotation should review and be guided by the applicable ward service goals. Educational goals specific to the Consultation services are as follows:

Patient Care

In this regard, Patient Care includes to:

- Learn to administer and interpret cardiac stress tests appropriately
- Learn to manage perioperative cardiac arrhythmias appropriately
- Learn the appropriate perioperative management for patients with coronary artery disease.

Medical Knowledge

Medical Knowledge includes to:

- Understand the indications for transesophageal echocardiography

- Learn to interpret cardiac nuclear cardiac imaging reports appropriately
- Understand the cardiac risks of non-cardiac surgery

Practice-Based Learning and Improvement

- To conduct on Research one or more key clinical question related to a learning objective under the Patient Care and Medical Knowledge competencies

Interpersonal and Communication Skills

Interpersonal and Communication Skills include to:

- Develop skill in interviewing patients with problems in the scope of the subspecialty, with attention to education and culturally-sensitive language.
- Develop skill in giving a focused presentation of clinical findings to the attending faculty.
- Develop skill at communicating findings and recommendations of consultations to primary physicians, both verbally and in writing.
- Learn to communicate appropriate information to patients who are seen in consultation; and to obtain informed consent for procedures performed by the subspecialty.

Professionalism

Professionalism includes to:

- Demonstrate a commitment to excellence and continuous professional development.
- Demonstrate punctuality and preparation for consultation rounds.
- Demonstrate courteous and professional behavior during encounters with patients and families.
- Demonstrate appropriate professional relationships with colleagues, faculty, and other members of consultation team.
- Demonstrate respect for patients' primary physicians in discussions with patients and within the consult team.
- Demonstrate a habit of evaluating consultations patients and that of conveying information in a timely manner.

Practice-Based Learning and Improvement

Practice-Based Learning and Improvement includes to:

- Demonstrate a pattern of self-evaluation of performance; to identify gaps in medical knowledge during the evaluation and management of patients; and to incorporate feedback into performance.
- Demonstrate a pattern of replicating the effective clinical decision making of faculty and fellows.

- Demonstrate a pattern of independent reading and study related to the diseases encountered in the clinics and through hospital consultations.
- Demonstrate a pattern of using library and Internet resources to appraise the literature related to problems encountered during the rotation, and that of applying evidence to patient care.
- Learn to critically appraise articles in the subspecialty.

Systems-Based Practice

System-Based Practice includes to:

- Develop an understanding of the hospital resources available to the evaluation and management of patients with problems encountered by the subspecialty.
- Demonstrate sensitivity to health care costs, and insight into balancing costs and quality care.
- Demonstrate sensitivity in working with case managers, clinical coordinators, technicians, and other paramedical personnel to enhance the effectiveness of patient care.
- Demonstrate a knowledge of and commitment to the rules governing confidentiality of patient information.

Evaluation Methods

The internal examiner system and Boards of Examiners are central to the process by which IUSOM monitors the reliability and validity of its assessment procedures and academic standards focusing:

- Global faculty evaluation at end of rotation (all competencies)
- Clinical evaluation exercises: interviewing skills, examination skills, counseling skills
- Specific medical knowledge, medical knowledge, and diagnostic interpretation exercises may focus on, but are not limited to:
 - Electrocardiogram interpretation
 - Cardiac enzyme interpretation

Assessment

The students must achieve overall pass marks/grades.

The course will be assessed in six semesters as follows:

1. Basic Sciences & Clinical Cardiology
2. Research Methodology
3. Non-Invasive Cardiology
4. Principles of Diagnostic and Invasive Cardiology
5. Pacing and Electrophysiology
6. Research Dissertation.

A dissertation relevant to the Masters in Clinical Cardiology (MCC) Degree must be submitted; and which will be assessed by Internal and External Examiners. The dissertation must establish that a significant piece of research has been performed and reported to an acceptable standard, i.e. suitable for publication in an established, peer-reviewed journal.

The trainees must achieve a pass mark in both course work (assessed through written examination, logbook submission and supervisors report) and in their Dissertation in order for the Masters in Clinical Cardiology (MCC) Degree to be awarded.

Compensation between Semesters may be possible in the written examinations. Supplementary examinations will be held for each Trimester. Incompletion of the course work and the dissertation will result in failure. INTERNAL AND EXTERNAL EXAMINERS appointed by IUSOM – Michigan will assess all the components of the course.

Semester	Core Track	Assessment Method
Semester 1	Basic Sciences & Clinical Cardiology	MCQ (Multiple Choice Question) Examination
Semester 2	Introduction to Research and Research Methodology	MCQ Examination Dissertation
Semester 3	Non-Invasive Cardiology	Written Exam: Essay Paper Data Interpretation Logbook (Echo & Clinical) Supervisor Assessment
Semester 4	Principles of Diagnostic & Invasive Cardiology	Written Exam/MCQ Essay Paper Data Interpretation Logbook (Echo & Clinical) Supervisor Assessment
Semester 5	Pacing & Electrophysiology	Written Exam: Essay Paper Data Interpretation
Semester 6	Research Project	Dissertation

Core pass requirements:

- > 49% in the MCQ
- > 49% in written paper (combination of essays and data interpretation)
- > 49% on Logbook /Supervisor Assessment
- > 49% on Dissertation

The final mark will be weighted as follows:

MCQ	15%
Data interpretation	15%
Essay paper	10%
Logbook/supervisor assessment	
• non-invasive	15%
• invasive	15%
Dissertation	30%

Admission Requirements

For acquiring an admission for the Masters in Clinical Cardiology (MCC) Degree Program at International University School of Medicine USA (IUSOM) – Michigan Clinical Campus situated in Dearborn, Michigan, USA, the minimum qualification requirements include Doctor of Medicine (MD) or Upper Second Class Pass in Bachelor of Medicine, Bachelor of Surgery (MBBS) or Arts (Dutch Degree in Medicine) or an equivalent overseas qualification acceptable to IUSOM – Michigan. All applicants must normally be registered or certified in USA or in their country of origin/residency. All applicants must have two suitable references and required proficiency in English. The applicants can enroll at IUSOM – Michigan Clinical Campus **without** TOEFL, IELTS, SAT, ACT, or MCAT or any other Equivalent Standardized Test; such tests are **not** required **at all**.

Application Processing

Expedited Review of Applications

IUSOM – Michigan Clinical Campus in Dearborn, Michigan, USA and MIOT Hospital Chennai (India) and other Cardiology Hospitals & Institutes situated in Asia accepts applications for MCC Degree Program for processing throughout the calendar year for prompt evaluation by IUSOM Admissions Committee. Thus, IUSOM – Michigan Clinical Campus does not maintain strict deadlines for submission of applications assuring that all applications receive full and timely evaluation. Also by virtue of this method, the Admissions Committee is free to expedite reviews, thereby permitting admission on a last-minute basis in exceptional cases.

Routine Review of Applications

At IUSOM – Michigan Clinical Campus in Dearborn, Michigan, USA and MIOT Hospital in Chennai (India) and other Cardiology Hospitals & Institutes situated in Asia, all applications are screened on the basis of the required academic criteria (cited above). Prospective students, whose applications meet the criteria, will be invited to participate in an admissions interview, either in person or by phone. The Director of IUSOM – Michigan Clinical Campus for Admissions of the Masters in Clinical Cardiology (MCC) Degree Program prepares a report to the Admissions Committee that provides recommendations as to academic, vocational, personality and emotional maturity. Acceptance or non-acceptance is at the sole discretion of IUSOM – Michigan Clinical Campus Admissions Committee. The Committee may require additional information and/or schedule additional interviews. The Committee reserves the right to determine the applicability of any special circumstances and whether the candidate demonstrates the personal qualities of a good physician. Letters of acceptance and non-acceptance are mailed within one week of the decision reached by IUSOM Admissions Committee for MCC Program.

IUSOM – Michigan Clinical Campus Academic Calendar

Masters Certification requires successful completion of Masters in Clinical Cardiology (MCC) Degree Program over a period of 36 months (six Semesters) full-time. MCC Program is being offered by IUSOM – Michigan Clinical Campus in Dearborn, Michigan, USA at Ark Medical Center (AMC) and at

AMC-Affiliated hospitals located in Michigan, USA and at other Cardiology Hospitals & Institutes in Asia. This Masters course uses Multi-Faceted Learning Modules. This course has a rolling start, i.e., it can commence anytime of the year but will run for 36 months in total. The MCC Program is based on a series of lectures, ward rounds, clinical observations, clinical assessments, interactive seminars, tutorials, and case presentations. Each component is assessed and contributes to the final result.

Admission Application Forms for MCC Degree Program

For receiving an Admission Application Forms for MCC Degree Program for following medical education at IUSOM – Michigan Clinical Campus in Michigan, USA and at MIOT Hospital in Chennai (India) and at other Cardiology Hospitals & Institutes situated in Asia please, either send an E.-Mail to IUSOM at: info@InternationalUniversity-SchoolOfMedicine.org or download the on-line/electronically fill-in version of this form by clicking at: http://www.InternationalUniversity-SchoolOfMedicine.org/files/IUSOM_MCC_ADMISSION_APPLICATION_FORM.pdf which then can electronically be filled-in on-line, be signed, be saved on a computer, and then be emailed (along with supporting documents) to IUSOM using its E.-Mail address given on the top of page 1 of this form.

Fees

Students are required to pay all IUSOM – Michigan Clinical Campus’s fees and related expenses (if applicable) 30 days prior to the start of MCC Degree Program at IUSOM. All IUSOM Tuition Fees and other IUSOM Fees are Non-Refundable. Financial Information concerning IUSOM – Michigan Clinical Campus’s MCC Degree Program is detailed below:

Masters in Clinical Cardiology (MCC) Degree Program Fees (Semesters 1 through 6)

Description (All fees are in US dollars)	Scholarship Fees*	Normal Fees*
Tuition Fee per semester	\$5,000.00	\$23,000.00
Liability Insurance per semester	TBA	\$ 600.00
Application Fee - one time only	NA	\$50.00
Examination Fee per semester	\$100.00	\$100.00
TOTAL (per semester)	\$5,100.00	\$23,750.00

*All fees are non-refundable

Non-Refundable IUSOM – Michigan Clinical Campus’s Admission Application Fee of US\$50.00 for MCC Degree Program and all other Fees in US dollars be paid to International University School of Medicine either via a Demand Draft and preferably via a Wire Transfer to IUSOM Bank Account.