HANDBOOK OF
MASTER OF MEDICAL PHYSICS
(M M ED PHYSICS)

An Institute of Physics and Engineering in Medicine (IPEM), United Kingdom, accredited programme
1. INTRODUCTION

Technological advances and development in medicine, particularly in radiology, radiotherapy and nuclear medicine have created a demand for qualified personnel to support the current progress in the country. In 1998 the University of Malaya launched the Master of Medical Physics programme to meet the growing need of qualified medical physicists. 25 graduates have come out from this program thus far.

Another proud achievement is the programme accreditation by the Institute of Physics and Engineering in Medicine (IPEM), United Kingdom. The course was accredited for a 5 year period (October 2002 - October 2007). This accreditation has made the University of Malaya programme to be the only one outside the British Isles (United Kingdom and Ireland) to receive such recognition.

Objective
- To provide postgraduate training in clinical applications of physics in medicine and biology.
- To train knowledgeable human resources in support of the rapid advances in high technology medicine.

This program trains and equips students to take up professional positions in education, research and service orientated positions in hospitals, government agencies, laboratories, medical industry and nuclear technology industry.

Duration
One calendar year, beginning July.

Medium of instruction
English is used during lectures, tutorials and practical sessions.

Entry requirement
Good Bachelor of Science honours degree in physics or related fields from recognized universities or equivalent qualifications.

Program structure
Coursework and dissertation or dissertation.
2. COURSES

Summary (total 40 credits)

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ANATOMY AND PHYSIOLOGY

Objective
- To provide foundational understanding of general principles of anatomy.
- To understand basic physiological processes which takes place in the human body.

Content

Suggested text
BIOSTATISTICS

Objective
- To provide adequate understanding of biostatistical methodology and its application in medical physics and medicine.

Content

Suggested text

COMPUTING AND MEDICAL INFORMATICS

Objective
- To lay the foundation for the applications of computers in medicine.

Content

Suggested text
APPLIED RADIATION PHYSICS AND DOSIMETRY

Objective
- To provide basic concepts and understanding on the principles in radiation physics and dosimetry.

Content

Suggested text

RADIOBIOLOGY AND RADIATION PROTECTION

Objective
- To introduce the concepts and processes involved in the interaction of radiation with living matter.
- To provide an understanding of the principles behind various radiation protection recommendations.

Content

Suggested text
NON-IONISING RADIATION IN MEDICINE

Objective
- To provide basic concepts and understanding of non-ionising radiation in medicine.
- To introduce the applications of non-ionising radiation in diagnosis and therapy.

Content

Suggested text

MEDICAL IMAGING

Objective
- To provide basic concepts and understanding in medical imaging.
- To provide the theoretical basis needed for the clinical practice of medical imaging.

Content

Suggested text
RADIOThERAPY PHYSICS

Objective
- To provide basic concepts and understanding in radiotherapy physics.
- To provide the theoretical basis needed for the practice of medical physics in radiotherapy.

Content

Suggested text

NUCLEAR MEDICINE

Objective
- To provide basic concepts and understanding in imaging and non-imaging nuclear medicine procedures.

Content
Physiological basis of nuclear medicine. Imaging techniques and instrumentation, including scintillation detectors, rectilinear scanner and Gamma camera. Production and properties of radionuclides and generators. Clinical radiochemistry. Static and dynamic imaging. Dual photon absorptiometry. SPECT and PET. Quality assurance and data processing.

Suggested text
**DISSEPTION**

**Objective**
- To introduce the techniques and philosophy of research in medical physics.
- To provide a deeper understanding of the practice of medical physics.
- To provide an opportunity for students to interact with other medical specialists.

Clinically-oriented dissertation in one sub-speciality.

**CLINICAL POSTING**

**Objective**
- To give an overview of the role of a medical physicist in Radiology, Nuclear Medicine and Clinical Oncology (radiotherapy).

Clinical postings in Radiology, Nuclear Medicine and Clinical Oncology (Radiotherapy) for the whole duration of the program.
3. FACILITIES

Library
There are 4 libraries available to the students.

a. The main University library
b. Medical library at the Medical Faculty
c. Library at the Department of Radiology
d. Library at the Clinical Oncology Unit (houses the IOMP library)

The 4 libraries are equipped with the recommended textbooks and journals. The relevant journals in the medical library include, amongst others:
   - Acta Radiologica
   - American Journal of Roentgenology
   - Australasian Radiology
   - British Journal of Radiology
   - European Journal of Radiology
   - European Radiology
   - Journal of Australasian Physical & Engineering Sciences in Medicine
   - Medical Physics
   - Physics in Medicine and Biology
   - Radiology
   - Radiotherapy and Oncology
   - Seminars in Roentgenology

Most online journals are also available.

Laboratory
There are 4 laboratories available to the students, which are at the Department of Radiology, Clinical Oncology Unit, Nuclear Medicine Unit and Physics Department.

Computing facilities
Students have access to computers in various departments and libraries. An imaging laboratory of networked PCs and workstations for imaging-related research and practical at the Department of Radiology.

Clinical equipment
The following equipments are available for students to carry out their research and training.

- 1.5 Tesla Magnetic Resonance Imaging (MRI)
- 3D treatment planning system
- Computed radiography (CR)
- Conventional simulator
- CT simulator
- Digital Cardiac Imaging (DCI)
- Digital mammography
- Digital Subtraction Angiography (DSA)
- Direct digital radiography (DR)
- Dual Energy X-ray Absorptiometry (DEXA) system
- High-dose rate brachytherapy
- Linear accelerators
- Low-dose rate brachytherapy
- Medical ultrasound scanners
- Multi-slice Computed Tomography (CT) scanners
- Single Photon Emission Computed Tomography (SPECT) systems
- Stereotactic radiotherapy / radiosurgery system
- Thermoluminescent dosimetry
- Ultrasound bone densitometer
4. FACULTY MEMBERS

Honorary (Adjunct) Professor

Dr. Perry Sprawls, PhD, PE, FACR, FAAPM, DABR, DABMP, CCE
Professor of Radiology and Radiation Oncology
Director of Medical Physics Education
Department of Radiology, Emory University School of Medicine, Atlanta, USA

Department of Radiology

Prof. Dr. Basri JJ Abdullah, MBBS, FRCR, AM - Head
Prof. Dr. Martin Lovat Wastie, MA, MBBChir, FRCP, FRCR
Prof. Dr. Ng Kwan Hoong, PhD, FIPM, MIPEM, DABMP, CSci, AM
Associate Prof. Dr. Fatimah Moosa, MBBS, FRCR, AM
Associate Prof. Dr. Gnana Kumar, MBBS, MMed (Rad), FRCR, AM
Associate Prof. Dr. John George, MBBS, DMRD, FRCR, AM
Associate Prof. Dr. Norlisah Mohd Ramli, MBBS, FRCR
Associate Prof. Dr. Roziah Muridan, MBBS, MRad
Associate Prof. Datin Dr. Sazilah Ahmad Sarji, MBBS, FRCR, AM
Associate Prof. Dr. Shaik Ismail Bux, MD, MRad, AM
Associate Prof. Dr. Yang Faridah Abdul Aziz, MBBS, MRad
Dr. Amir Fuad Hussain, MBBS, MRad
Dr. Anushya Vijayanathan, MBBS, MRad
Mr. Azlan Che Ahmad, BBEng, MMedPhysics
Dr. Khairul Azmi Abd Kadir, MBBS, MRad
Mr. Muhammad Shahrun Nizam A Daman Huri, BSc (Hons), MMedPhysics
Dr. Ouzreiah Nawawi, MBBS, MRad, FRCR
Mr. Tan Li Kuo, BEng, MEng
Dr. Tok Chung Hong, MBBS, MRad

Nuclear Medicine Division
Dr. Dharmendra Harichandra, MBBS, MMed (Int Med)

Ms. Azleen Mohd Zain, BSc (Hons)

Clinical Oncology Unit

Dr. Anita Zarina Bustam, MBBCh, FRCR - Head

Mr. Ung Ngie Min, BBEng, MMedPhysics

Department of Physiology

Prof. Dr. Ruby Husain - Head

Prof. Dr. Mohd. Afandi Muhamad

Prof. Dr. Lam Sau Kuen

Associate Prof. Dr. Rosnah Ismail

Dr. Badariah Ahmad

Dr. Raji Subramanian

Dr. Saadia Mohd. Hidir

Dr. Naguib Salleh

Department of Molecular Medicine

Associate Prof. Dr. Maude Phipps

Clinical Investigation Centre

Dr. Esmond Yeoh - Manager

Department of Social and Preventive Medicine

Associate Prof. Dr. Atiya Abdul Sallam - Head
Department of Physics

Prof. Dr. Yusoff Mohd. Amin - Head

Associate Prof. Dr. Kwek Kuan Hjang

University of Nottingham Malaysia Campus

Associate Prof. Dr. Michel Bister

Ministry of Health, Engineering Division

Mr. Ahmad Shariff Hambali

Atomic Energy Licensing Board

Ms. Monalija Kostor

Malaysian Institute for Nuclear Technology Research

Dr. Noriah Mod Ali

Mr. Taiman Kadni

Visiting Lecturer

Dr. Adrian Perry, DPhil, FInstP, FIPEM
Head of Radiotherapy Physics Section, Royal Perth Hospital, AUSTRALIA

Online Teaching

Dr. Perry Sprawls, PhD, PE, FACR, FAAPM, DABR, DABMP, CCE
Professor, Department of Radiology, Emory University School of Medicine, USA

Dr. Milton Woo, PhD, FCCPM, PEng
Assistant Professor, Department of Medical Biophysics, University of Toronto
Senior Medical Physicist, Cancer Care Ontario, CANADA
**External Examiners**

*Dr. Larry A. DeWerd*, PhD, FAAPM (1998-2000)
Professor and Director, Radiation Calibration Laboratory
University of Wisconsin, USA

*Dr. Gary D. Fullerton*, PhD, FAAPM, FACR, FISMRM, DABR (2000-2002)
Professor and Chief, Radiological Sciences Division
University of Texas Health Science Center, USA

Professor and Dean, Graduate School of Biomedical Sciences
Medical College of Wisconsin, USA

*Dr. Timothy Van Doorn*, PhD (2003)
Associate Professor, University of Adelaide
Chief Physicist, Department of Medical Physics, Royal Adelaide Hospital, AUSTRALIA

*Dr. David J. Dowsett*, PhD (2004)
Lecturer, University College Dublin
Director, Medical Physics Consultants, Dublin, IRELAND

*Dr. Roger M. Harrison*, PhD, CPhys, CSci, FIPEM, FInstP (2004-2006)
Lecturer, University of Newcastle-upon-Tyne
Head, Radiation Physics Section, Newcastle General Hospital, UNITED KINGDOM

**Programme Coordinator**

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**Head of Department**

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**Department Secretary**

Ms. Norlela Yob
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Master of Medical Physics

1. Course Registration
   (1) Programme by coursework and dissertation
       (a) Registration for the courses shall commence the week prior to the start of the relevant semester.
       (b) A candidate is required to register for at least nine credit hours in any semester except -
           (i) in the final semester of his programme of study where he may register for less than the number of credits hours stated above
           or
           (ii) where the candidate has been permitted to withdraw from the semester concerned.
       (c) A candidate may only register for Part II of the programme of study after he has obtained at least nine credit hours.
   (2) Programme of dissertation
       Except where he has been permitted to withdraw from the semester concerned, a candidate for the programme by dissertation who is required to follow or follow and pass such course or courses shall be required to register for the course or courses in the semester the course or courses is or are offered.

2. Supervision
   (1) Programme by coursework and dissertation
       (a) The supervisor for a candidate shall be appointed when the area of research is approved.
       (b) The co-supervisor and/or consultant may be appointed at any time when required.
   (2) Programme by dissertation
(a) The supervisor for a candidate shall be appointed when the area of research is approved.

(b) The co-supervisor and/or consultant may be appointed at any time when required.

3. **Determination of Area of Research**

   (1) **Programme by coursework and dissertation**

   The area of research for the dissertation shall be determined before the candidate commences the research part of his programme of study.

   (2) **Programme by dissertation**

   The area of research for the dissertation shall be determined when the candidate is accepted for admission to the programme of study.

4. **Submission**

   (1) **Programme by coursework and dissertation**

   (a) A candidate is permitted to submit his dissertation after he has obtained at least twenty eight (28) credit hours.

   (b) A candidate is required to submit his dissertation before the end of his maximum period of candidature.

   (2) **Programme by dissertation**

   (a) A candidate is permitted to submit his dissertation after twelve (12) months of research from the date of initial registration of his programme of study.

   (b) A candidate who is required to follow such course or courses as determined by the Faculty shall not be permitted to submit his dissertation until the Dean of the Faculty confirms that he has followed the course or courses to his satisfaction.

   (c) A candidate who is required to follow and pass such course or courses as determined by the Faculty shall not be permitted to submit his dissertation unless he has passed such course or courses.

   (d) A candidate is required to submit his dissertation before the end of his maximum period of candidature.