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PROFESSIONAL BOARD

FOR

MEDICAL SCIENCE

MINIMUM ACADEMIC, PRACTICAL

AND

INSTITUTIONAL REQUIREMENTS

FOR

TRAINING OF MEDICAL PHYSICISTS

MINIMUM ACADEMIC, PRACTICAL AND INSTITUTIONAL REQUIREMENTS FOR TRAINING OF MEDICAL PHYSICISTS

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REQUIREMENTS FOR REGISTRATION OF MEDICAL PHYSICISTS

1. INTRODUCTION

The minimum requirements for an institution to be recognised as a training centre (academic and/or in-service training) for the training of Medical Physicists are given below. The institution must apply to the Professional Board for recognition as a training institution.

The Instructions, Rules for Registration of Medical Physicists in Training, Medical Physicists and application forms are given in a separate document. The Rules for Registration of a Medical Physicists is based on the Minimum Requirements set out in this document.

2 MINIMUM ACADEMIC AND PRACTICAL TRAINING REQUIREMENTS.

1. The council may register as a medical physicist; any applicant who satisfies the professional board and the council that he/she complies with the requirements set out in rules 1(1) and rule 1(2) or 2(1) and 2(2):

He/she shall hold the following qualifications in Medical Physics and undergone the following in-service practical training:

He shall hold one of the following qualifications:

- 1(1) An honours degree in Medical Physics (or equivalent thereof), or higher degree in Medical Physics, both following upon a bachelor's degree with Physics as a major subject and conferred after examination by a university approved by resolution of the professional board and the council: Provided that the content of such honours degree in Medical Physics shall comprise of at least one third medical physics subjects as well as at least one third basic physics subjects. The following medical physics subjects must be included in the course

- (i) medical physics for diagnostic radiology
- (ii) medical physics for radiation oncology;
- (iii) medical physics for nuclear medicine;
- (iv) radiation protection

See **Addendum 1** for a model syllabus

- 1(2) Subsequent to having obtained the qualification prescribed in rule 1(1), he/she must complete two years of experiential training in an institution approved for this purpose by the professional board and the council under supervision of a medical physicist registered with the council for not less than three years: Provided that, of the two years training prescribed in this paragraph, one year of training may be at the discretion of the professional board and the Council, be completed while such applicant was enrolled part-time for an honours degree mentioned in rule 1(1).

Practical in-service training will take place in an approved institution where the applicant has a full-time position. At least six months practical in-service training must be in the Medical Physics of Radiation Oncology. At least two months full-time practical in-service training must be in each of the following: Medical Physics of Diagnostic Radiology; Medical Physics for Nuclear Medicine; Radiation Protection.

See **Addendum 2** for the recommended requirements of practical training.

- 2(1) Any honours degree in Physics approved by the professional board and the council, and a certificate from a university mentioned in paragraph 1(1) that he/she has completed the following additional subjects:
- (i) medical physics for diagnostic radiology
 - (ii) medical physics for radiation oncology;
 - (iii) medical physics for nuclear medicine;
 - (iv) radiation protection

See **Addendum 1** for a model syllabus.

- 2(2) Subsequent to having obtained the certificate prescribed in rule 2(1), he/she must complete two years of experiential training in an accredited institution approved for this purpose by the professional board and the Council under supervision of a medical physicist registered with the Council for not less than three years: Provided that the two years experiential training prescribed in this paragraph, may be completed simultaneously if an applicant was enrolled part-time for the certificate referred to in rule 2(1).

Practical in-service training will take place in an approved institution where the applicant has a full-time position. At least six months practical in-service training must be in the Medical Physics of Radiation Oncology. At least two months full-time practical in-service training must be in each of the following: Medical Physics of Diagnostic Radiology; Medical Physics for Nuclear Medicine; Radiation Protection.

See **Addendum 2** for recommended requirements of practical training.

3. Notwithstanding anything contained in the above rules it shall be lawful for the professional board and the council to register a person as medical physicist (Ionising Radiation) who submits satisfactory documentary evidence that he holds academic qualifications and has completed training in Medical Physics which, in the opinion of the professional board and the council, comply with the requirements of the above rules.

3. ACCREDITATION OF INSTITUTIONS FOR EXPERIENTIAL TRAINING: MEDICAL PHYSICISTS

The following institutions have been accredited for experiential training:

University of Cape Town, Medical Faculty
University of the Free State, Medical Faculty
University of Pretoria, Medical Faculty
Medical University of Southern Africa
University of Stellenbosch, Medical Faculty and Science Faculty
University of the Witwatersrand, Science Faculty
Addington Hospital

4. MINIMUM REQUIREMENTS FOR TRAINING INSTITUTIONS APPLYING TO BE ACCREDITED FOR EXPERIENTIAL TRAINING.

The recommended minimum requirements to be accredited as a Training Institution for experiential training of Medical Physicists are given in **Addendum 3**.

5. MINIMUM REQUIREMENTS FOR THE NUMBER AND EXPERIENCE OF TRAINING STAFF FOR EXPERIENTIAL TRAINING.

A training institution must have a minimum of two registered Medical Physicists (Ionising radiation), registered with the council for not less than 3 years, unless alternative arrangements are approved by the Professional Board.

RECOMMENDED MINIMUM ACADEMIC TRAINING REQUIREMENTS FOR MEDICAL PHYSICIST.

ADDENDUM 1

PROPOSED MINIMUM MODEL SYLLABUS.

1. RADIATION PHYSICS AND RADIATION PROTECTION

Atomic theory, detection of radiation, external beam dosimetry, internal dosimetry, radiation protection.

2. MEDICAL PHYSICS FOR DIAGNOSTIC RADIOLOGY

Conventional X-ray imaging, nuclear magnetic resonance, X-ray computed tomography, ultrasonic imaging: characteristics of PE crystals, characteristics of ultrasound beams, interaction with matter, imaging, Doppler techniques, electronic matrix scanning.

3. MEDICAL PHYSICS FOR NUCLEAR MEDICINE

Radiation detection and imaging equipment. The scintillation camera, the scintillation crystal, collimator theory, evaluation and quality assurance of imaging equipment, computers, clinical planar image processing, principles and application of single photon emission tomography and positron emission tomography, principles of tracer techniques.

4. MEDICAL PHYSICS FOR RADIATION ONCOLOGY

High energy machines, measurement of radiation, interaction of single beams (photons and particles) with a scattering medium, treatment planning, brachytherapy, acceptance testing and quality control, radiobiology.

ADDENDUM 2

MINIMUM REQUIREMENTS FOR TRAINING INSTITUTIONS APPLYING TO BE ACCREDITED FOR THE EXPERIENTIAL TRAINING OF MEDICAL PHYSICISTS.

1. REQUIREMENTS FOR MEDICAL PHYSICS OF NUCLEAR MEDICINE

Measurement of radioactivity and gamma spectrum analysis: Principles and clinical application of spectrum analysis for gamma counting systems.

Scintillation camera: Quality control of scintillation cameras.

Computer processing: Principles and processing of planar and tomographic Nuclear Medicine studies.

Quality assurance in radiopharmacy: Principle of operation and quality control of source calibrator.

Radiation protection: Internal radiation dosimetry (MIRD), be on par with all aspects of radiation protection in Nuclear Medicine including safe handling of radioactive substances and decontamination procedures.

2. REQUIREMENTS FOR MEDICAL PHYSICS OF DIAGNOSTIC RADIOLOGY

Conventional X-ray imaging: Be on par with the practical implementation of all aspects of the quality assurance programme.

Computed tomography systems: Be on par with the practical implementation of all aspects of the quality assurance programme.

Radiation protection: Perform dose estimate calculations for different types of examinations especially for pregnant woman, be on par with all aspects of radiation protection in Diagnostic Radiology.

3. REQUIREMENTS FOR MEDICAL PHYSICS OF RADIATION ONCOLOGY

Dosimetry: The use and application of the following equipment or methods i.e. different ionisation chambers, thermoluminescent dosimeters, film dosimetry, water phantom systems.

Radiation protection: Design of treatment rooms, calculation of shielding and monitoring of radiation levels for teletherapy units, simulators, CT scanners and after loading systems.

Teletherapy treatment systems: Acceptance testing and complete calibration of accelerators, cobalt units and kilovolt units, quality assurance including field flatness, symmetry, energy measurement and isocenter.

Brachytherapy and after loading systems: Treatment planning, acceptance testing, and quality assurance.

Treatment planning: Input of accelerator data; know principles of planning algorithms; dose calculation and verification of treatment plans; verification of immobilisers, shielding blocks and compensators; quality assurance.

ADDENDUM 3

PROPOSED MINIMUM REQUIREMENTS FOR ACCREDITATION AS AN INSTITUTION FOR TRAINING OF MEDICAL PHYSICISTS

The following requirements must be complied with to be accredited as a training institution for experiential training of Medical Physicists.

1. GENERAL REQUIREMENTS

- 1.1 The guidelines for minimum staffing of Medical Physicists must be considered.
- 1.2 The Professional Board may inspect an institution to determine the suitability of an institution for experiential training purposes.
- 1.3 If an institution cannot provide training in all categories, the institution may apply for limited recognition, satellite arrangements may be approved by the Professional Board.
 - 1.3.1 Any institution applying for registration for limited training should comply with the minimum training facilities required for the specific category.
 - 1.3.2 Persons undergoing/completing experiential training in institutions with limited training facilities, will be required to undergo further training at other recognised institutions to complete their training.
 - 1.3.3 The selection of the supplementary institution, the duration of experiential training and the part of the syllabus to be covered, should in accordance with paragraphs 2 1(2) and 2 2(2) of the **RULES FOR THE REGISTRATION OF MEDICAL PHYSICISTS**
 - 1.3.4 The institution providing the satellite training must be approved by the Professional Board for that purpose.
 - 1.3.5 A medical physicist-in-training who is registered for experiential training at an institution with limited training facilities, will be notified of these limitations and be informed at which institution the supplementary training can be done.
 - 1.3.6 It will be the responsibility of the medical physicist-in-training to arrange that the prescribed certificate of completion of experiential training is completed. The completed forms must be sent to the Registrar of the Professional Board together with an application form for registration as well as the prescribed fee.

2. FACILITIES

For the category **Medical Physics (Ionising Radiation)** the following minimum facilities must be available and be applied according to the guidelines set by the Professional Board.

- 2.1 Physics for Diagnostic Radiology:
 - 2.1.1 X-ray equipment such as conventional X-ray units (including mammography), screening units, mobile units, CT scanner.
 - 2.1.2 Non-ionising radiation equipment such as ultrasonic imaging equipment and Doppler facilities.
 - 2.1.3 Measuring devices for X-ray exposure and quality assurance.
- 2.2 Physics for Radiation Oncology
 - 2.2.1 Teletherapy units: linear accelerator (photon and electron beams), cobalt unit, X-ray unit (< 300kV).
 - 2.2.2 Brachytherapy: sealed sources, remotely controlled after loading system, unsealed radionuclides.
 - 2.2.3 Dosimetry: calibrated measuring devices for external beam and Brachytherapy, thermoluminescent dosimetry system, radiation survey meter.
 - 2.2.4 Treatment planning: computerised planning system.
- 2.3 Physics for Nuclear Medicine
 - 2.3.1 Licensed laboratory.
 - 2.3.2 Scintillation camera with digital imaging and processing.
 - 2.3.3 Scintillation counter system with multi channel analyser for the determination of *in vivo* and *in vitro* radioactivity.
 - 2.3.4 Calibrated measuring devices for the determination of radioactivity administered to patients for diagnostic and therapeutic purposes.
 - 2.3.5 Geiger-Muller type contamination monitor and calibrated ionisation chamber survey meter.
- 2.4 Appropriate computer facilities.