

**HARMONIZED CURRICULUM FOR  
MEMBERSHIP AND FELLOWSHIP  
PROGRAMMES IN CLINICAL RADIOLOGY  
FOR ECOWAS REGION**

## 1. AIMS:

The aim of the membership and fellowship programmes in Clinical Radiology is to produce highly trained radiologists who can provide quality radiological service to the highest standards throughout the West African sub-region and Internationally.

## 2. LEARNING OBJECTIVES:

At the end of the programme, the trainee,

- Should have acquired adequate knowledge and skills in diagnostic and interventional radiology to provide optimum radiological services to the community.
- Should have developed professional ethics and communication skills necessary for radiology practice.
- For the fellowship training, the trainee should have successfully carried out research work in the field of radiology.

## 3. ADMISSION REQUIREMENTS:

The candidate must,

- Possess an acceptable basic medical degree.
- Have full registration with the Medical Council of the relevant country of training.
- Pass a primary examination in Radiology.
- An additional 24 months (2 years) training would be required for the award of Fellowship in a sub-specialty to a candidate with a membership degree.

## 4. COURSE DURATION:

### *Membership/Part 1 Program:*

- Minimum duration of *three* years (Modules 1 and 2)
- Modules 1 and 2 for Membership/Part 1 shall be for 18 months (1½ years) each

### *Part 2 Fellowship Program:*

- Minimum duration is *two* years
- The Part 2 Fellowships shall be for 24 months (2 years) .

### **General Considerations:**

- An exemption from parts of the training program may be granted subject to approval by the Council on the recommendation of the Faculty Board.
- Membership is an Exit Program that terminates at the end of 36 months (after full completion of Modules 1 & 2). Membership Candidates may re-enter into the Part 2 Fellowship program after Clinical work experience in an approved Primary or Secondary Health centre. (*The decision on duration and type of Clinical work experience should be left for each Faculty/College to approve if found appropriate*)

- Candidates who do not wish to exit at the end of the Membership Program may proceed directly with the Part 2 Fellowship program.

## 5. COURSE STRUCTURE:

### a. Primary

### b. Membership/Part 1 Fellowship program (36 months)

- Module 1 (18 months):
  - Radiological Physics
  - Radiological Anatomy and Technique
  - Clinical Radiology- Clinical skills, Communication, Interpretation and Report Writing Skills
- Module 2 (18 months)
  - Clinical Radiology- Clinical Skills, Communication, Interpretation and Report Writing Skills

### c. Part II Fellowship program (24 months)

- 6 months of Clinical Radiology in *General Radiology* Posting
- 18 Months of Clinical Radiology plus Dissertation in *Sub-Specialty* Posting

- Due to the complexities of rotations and the inherent differences between training schemes, the individual training schemes will determine the order of rotations and their duration.
- However, training schemes must ensure that their trainees are able to achieve all the core training objectives for each module and subspecialty as itemised below.
- Each trainee will participate in an appropriate on-call roster, or other scheme of exposure to acute and emergency radiology, in which he/she will be responsible to a named consultant(s).

## 6. COURSE CONTENT:

### A. PRIMARY EXAMINATION-

#### 1. GENERAL PHYSICS

A basic knowledge of physics up to Advance level is required.

The following items are intended to serve only as a guide to candidates.

- *Fundamental Ideas in physics*
  - Matter including metals and non-metals; properties of matter; density, inertia
  - Structure of matter, structure of atom, radioactivity, isotopes
  - Force, work, power and energy
  - Different forms of energy: internal potential, chemical, kinetic energies.
  - Other forms of energy: heat, electricity, magnetism, sound, light, x-rays, gamma-rays etc.
  - Relationship between matter and energy; the nature of energy as particles or packets, Planck's idea of energy.
  - Energy of waves; mechanical energy waves; waves caused by radiant energy; characteristics of waves.

- Law of conservation of matter, energy and momentum. Capacity for holding or retaining energy.
- Mechanics: Statics, Motion, States of matter and their properties
- Machines, hydrostatics
- Speed, velocity, acceleration, momentum
- Newton's laws of motion; motion in a circle, rotator or spin motor
- Solids and properties of solids, liquids and surface tension; gases and gas laws
- Friction in solids and liquids, static, kinetic, viscosity
- Osmosis, diffusion, dynamics and laws of fluid flow
- ***Biological application of the laws of mechanics:***
  - Flow of air through the respiratory system
  - Diffusion of gases through tissues
  - Osmotic relationships between body compartments
  - Elastic resistance to ventilation
  - Surface tension of the alveolar liquid-air interface: The Law of Laplace
  - Airway resistance
  - Alimentary tract and the flow of food
  - Renal system and flow of urine in it
  - Haemodynamics of the cardiovascular system
  - Factors which influence viscosity of blood
  - Equilibrium of the blood vessel wall
  - Energetics of the circulation.
  - Heat energy and work
  - Sources of heat energy
  - Heat energy factors
  - Measurement of heat: calorimetry
  - Thermal effects
  - Coefficients of expansion
  - Latent heat
  - Laws of thermodynamics
  - Conversion of heat into work
  - Transfer of heat conduction, radiation, convection
- ***Sound Energy***
  - The speed of sound
  - Properties of sound: Intensity, loudness, frequency and pitch
  - Doppler effect, resonance, fundamental tones
- ***Light Energy***
  - Effects produced when light encounters an form of matter speed of light
  - Interference, reflection, refraction and transmission of light
  - Refractive index, formation of images by reflection
  - Images formed by plane and curved mirrors
  - Lens optics converging and diverging lenses

- Dispersion of light by a prism: the rainbow
- **Electrical Energy**
  - Static electricity
  - How electric charges are produced' induced charges
  - Conductors and insulators; capacitors
  - electric potential' power
  - Electricity in motion; electrical circuits; resistances
- **Magnetic energy**
  - The nature of magnetism
  - Mapping magnetic fields of force
  - Electromagnetism; electric generators

## 2. BASIC MEDICAL SCIENCES

An integrated content outline that organizes basic science materials of anatomy, physiology, biochemistry, pharmacology and principles of pathology is provided below :

- **Systems**
  - General principles e.g DNA replication, homeostasis
  - Individual organ systems.
  - Cardiovascular
  - Haematopoietic / Lymphoreticular
  - Gastrointestinal
  - Central and Peripheral Nervous Systems
  - Renal/Urinary
  - Skin/Connective Tissue
  - Reproductive
  - Musculoskeletal
  - Endocrine
  - Respiratory
- **Processes**
  - Normal development, structure and changes associated with aging
  - Normal processes e.g metabolism, system role in host defense, repair and regeneration, immunologic process.
  - Abnormal processes e.g infection, neoplasm, trauma
  - Principles of therapeutics, including adverse effects
  - Environmental influence and factors on diseases.

## 3. CLINICAL SCIENCES

- All candidates must possess the medical knowledge and understanding of the four core clinical subjects namely: Medicine, Paediatrics, Surgery and Obstetrics and Gynaecology , considered essential for provision of patient care under supervision.
- Potential trainees must understand the mechanisms of disease, be able to establish a diagnosis and apply principles of management in the four core clinical science subjects .

## **B. MODULE I OF MEMBERSHIP/PART 1 (18 MONTHS):**

### **1. RADIOLOGICAL PHYSICS**

An introductory course on basic radiation physics and radiation safety relevant to clinical radiology should be held during the 18 months of training.

It is recommended that approximately 60 hours of formal tuition in basic radiation physics and radiation safety, including the current ionizing radiation regulations and statutory obligations related to ionizing radiation, are delivered before attempting the Module 1 Membership Examination(s).

This course is taught primarily by medical physicists supplemented by clinical radiologists.

Candidates for the Module 1/Part I Examination(s) will be expected to supplement this tuition by a substantial amount of self-directed learning.

#### **Core knowledge**

The syllabus identified for the Module 1 Examination(s) includes the following:

- The fundamental physics of matter and radiation.
- Practical radiation protection.
- Statutory regulations and non-statutory recommendations.
- The physics of diagnostic radiology and radionuclide radiology techniques.

### **2. RADIOLOGICAL ANATOMY AND TECHNIQUES**

In the eighteen months of training, the trainee must have acquired adequate knowledge of radiological anatomy and begin to acquire some of the practical skills that will eventually be required of a clinical radiologist.

In the case of plain film radiography, trainees should become familiar with the radiographic techniques even if they do not take the radiographs themselves.

### **3. CLINICAL RADIOLOGY- Communication, Interpretation And Report Writing**

The trainee must begin to acquire some of the interpretation, reporting and communication skills that will eventually be required of a clinical radiologist.

It is recommended that a minimum requirement of two sessions per week be devoted to image reporting sessions.

#### **Core**

- All core knowledge and skills are as listed under systems below.

#### **Optional**

- All optional knowledge and skills are as listed under systems below.

## **C. MODULE 2 OF MEMBERSHIP/PART 1 (18 MONTHS):**

### **1. CLINICAL RADIOLOGY- Communication, Interpretation and Report Writing**

In the eighteen months of training the trainee must continue to acquire a sound understanding of, and acquisition of the practical skills , as well as ,more interpretative, reporting and communication skills that will eventually be required of a clinical radiologist. The trainee during this period is exposed to intensive general clinical radiology work to be able to function with minimal supervision. It is recommended that a minimum requirement of three sessions per week be devoted to image reporting.

#### **Core**

- All core knowledge and skills are as listed under systems below.

#### **Optional**

- All optional knowledge and skills are as listed under systems below.

## **D. PART II FELLOWSHIP (24 MONTHS)**

In the first 6 months of training, the trainee must continue to acquire a sound understanding of, and acquisition of the practical skills that will eventually be required of a clinical radiologist. The trainee during this period is exposed to intensive general clinical radiology work to be able to function with minimal supervision.

In the last 18 months, the individual trainee would identify a subspecialty for the Part 2 Fellowship training. Trainees will submit a dissertation proposal for approval to the College in the proposed subspecialty.

The framework for Part 2 Fellowship core training will consist of rotations which should give appropriate experience in the subspecialties identified below:

### **1. System-based subspecialties:**

Breast imaging.  
Cardiac imaging.  
Gastrointestinal (GI) imaging.  
Head and neck imaging including ear, nose and throat, and dental.  
Musculoskeletal and trauma imaging.  
Neuroradiology.  
Obstetric imaging and gynecological imaging  
Thoracic imaging  
Uroradiology  
Vascular imaging  
Interventional Radiology

### **2. Imaging Modality - based subspecialties:**

Ultrasonography.  
Computed Tomography.  
Magnetic Resonance Imaging.

Nuclear Imaging

**3. Disease- based subspecialty:**

Oncological imaging.

**4. Age-based subspecialties:**

Paediatric imaging.

Geriatric imaging.

**Competencies:**

**Core** - knowledge and skills that will be acquired during the rotations of assigned years.

**Optional** - practical skill is not essential but a theoretical knowledge is still required. These are optional only for membership and Part 1 trainees but are regarded as ‘Core’ for Part 2 fellowship trainees.

**1. General Core competencies-**

*Core knowledge*

- Acquire knowledge of the current legislation regarding radiation protection.
- Ability to offer advice as to the appropriate imaging procedure to perform in different clinical situations.

*Core skills*

- Reporting plain radiographs
- Perform routine general radiological procedures
- Case presentation at Clinico -radiological seminars
- Competence at reviewing studies on a workstation and familiarity with digital image manipulation and post-processing.

**2. System Competencies:**

**a) Breast Imaging**

*Core knowledge*

- Knowledge of breast anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiographic techniques employed in diagnostic mammography
- Understand the principles of current practice in breast imaging and breast cancer screening
- Knowledge of the proper application of other imaging techniques to breast imaging (e.g. US, MRI and radionuclide studies)

*Core skills*

- Identification and Reporting of common breast diseases using the relevant imaging modalities.

*Optional experience*

- Perform breast biopsy and localization.

**b) Cardiac Imaging**

*Core knowledge*

- Knowledge of cardiac anatomy, pathology and diseases relevant to clinical radiology



- Understand the radiologic techniques used in cardiac imaging
- knowledge of the proper application of the following techniques in cardiac imaging:
  - plain radiography
  - echocardiography (including transoesophageal).
  - radionuclide investigations.
  - CT.
  - MRI.
  - Angiography, including coronary angiography.

*Core skills*

- Identification and Reporting of common cardiac diseases using the relevant imaging modalities.

*Optional experience*

- Observe relevant angiographic, echocardiographic and radionuclide studies.
- Report radionuclide CT and MRI images of cardiac disease.
- Perform echocardiography (including transoesophageal)
- Perform coronary angiography and other cardiac angiographic and interventional procedures.

**c) Gastrointestinal Radiology (including liver, pancreas and spleen)**

*Core knowledge*

- Knowledge of GIT and biliary anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in GIT and hepato-biliary imaging
- knowledge of the proper application of the following techniques in GIT and biliary imaging:
  - plain radiography
  - contrast studies (including ERCP),
  - US, CT, MRI, radionuclide studies and angiography.
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

*Core skills*

- Identification and Reporting of common GIT and biliary diseases using the relevant imaging modalities
- perform interventional procedures in GIT and biliary diseases
  - US-guided biopsy and drainage
  - CT-guided biopsy and drainage
  - Abscess localization

*Optional experience*

- perform interventional procedures in GIT and biliary diseases:
  - Biliary stenting
  - percutaneous gastrotomy
  - balloon dilatation of the oesophagus/stent insertion
  - porto-systemic decompression procedures
- perform ERCP and other diagnostic and therapeutic endoscopic techniques
- endoluminal US
- perform T-tube cholangiography and percutaneous cholangiography

#### **d) Head and neck Radiology including ORL/Dental**

##### *Core knowledge*

- Knowledge of of head and neck anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in of head and neck imaging
- knowledge of the proper application of the following techniques in of head and neck imaging:
  - plain radiography
  - Relevant contrast studies
  - US, CT, MRI, radionuclide studies
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

##### *Core skills*

- Identification and Reporting of common head and neck diseases using the relevant imaging modalities

##### *Optional experience*

- Perform biopsies of neck masses (thyroid, lymph nodes etc.)
- Perform US of the eye
- Reporting CT and MRI of congenital anomalies of the ear
- Report radionuclide parathyroid investigations
- Perform and report of sialography and dacrocystography

#### **e) Musculoskeletal Radiology including trauma**

##### *Core knowledge*

- Knowledge of musculoskeletal anatomy, pathology and diseases relevant to clinical radiology
- knowledge of normal variants of normal anatomy, which may mimic trauma
- Understand the radiologic techniques used in musculoskeletal imaging
- knowledge of the proper application of the following techniques in musculoskeletal imaging:
  - plain radiography
  - Relevant contrast studies
  - US, CT, MRI, radionuclide studies
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

##### *Core skills*

- Identification and Reporting of common musculoskeletal diseases. including trauma, using the relevant imaging modalities

##### *Optional experience*

- Perform and report relevant contrast examinations (e.g. arthrography, angiography)
- Perform discography and facet injections
- Perform image-guided bone biopsy

## **f) Neuroradiology**

### *Core knowledge*

- Knowledge of neuroanatomy, neuropathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in neuroradiology
- knowledge of the proper application of the following techniques in neuroradiology:
  - plain radiography
  - CT, MRI, conventional angiography, CTA and MRA
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

### *Core skills*

- Identification and Reporting of common cranial and spinal diseases. including trauma, using the relevant imaging modalities

### *Optional experience*

- perform and report cerebral angiograms
- perform and report carotid US including Doppler
- perform and report Cranial US
- perform and report interventional neuroradiological procedures
- perform and report functional brain imaging techniques (radionuclide and MRI)

## **g) Obstetrics and gynaecology Imaging**

### *Core knowledge*

- Knowledge of obstetrics and gynecological anatomy, pathology and diseases relevant to clinical radiology
- knowledge of the physiological changes affecting imaging of the female reproductive organs
- knowledge of the changes in maternal and foetal anatomy during gestation
- Understand the radiologic techniques used in obstetrics and gynaecological imaging
- knowledge of the proper application of the following techniques in obstetrics and gynaecological imaging- Plain radiography, USS, Contrast studies, MRI
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

### *Core skills*

- Identification and Reporting of common gynaecological diseases using the relevant imaging modalities
- perform and report transabdominal and endovaginal US in gynecological disorders, including early complications of early pregnancy(e.g, ectopic)
- perform and report hysterosalpingography
- Perform and report CT studies of gynecological disorders
- Perform and report MRI studies of gynecological disorders perform and report transabdominal US in obstetrics- normal and abnormal pregnancies

### *Optional experience*

- perform and report endovaginal US in obstetrics

- perform and report fetal anomaly US
- perform and report MRI in obstetric applications (e.g. assessing pelvic dimensions)
- perform and report foetal MRI
- perform and report angiography and vascular interventional techniques in gynecological disease

## **h) Chest Radiology**

### *Core knowledge*

- Knowledge of chest anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in chest imaging
- knowledge of the proper application of the following techniques in chest imaging:
  - Plain radiography, USS, Contrast studies, CT, MRI, Radionuclide studies
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

### *Core skills*

- Identification and Reporting of common chest diseases using the relevant imaging modalities
- perform interventional procedures like drainage of pleural space collection under image guidance

### *Optional experience*

- perform image guided biopsies of lesions within the thorax
- Perform and report thoracic MRI and angiography:
- Perform bronchial stenting

## **i) Uroradiology**

### *Core knowledge*

- Knowledge of urinary tract anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in urinary tract imaging
- knowledge of the proper application of the following techniques in urinary tract imaging:
  - Plain radiography, USS, Contrast studies, CT, MRI, Radionuclide studies
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.
- knowledge of the application of angiography and vascular interventional techniques

### *Core skills*

- Identification and Reporting of common urinary tract diseases using the relevant imaging modalities
- Perform interventional procedures relevant to management of urinary tract diseases.

### *Optional experience*

- perform and report urinary tract interventional techniques :
  - percutaneous ureteric stent placement
  - endorectal US
  - image-guided renal biopsy under US and CT guidance
  - perform and report MRI of the urinary tract
  - angiography and vascular interventional techniques

- antegrade and retrograde pyelo-ureterography
- Urodynamic studies
- Percutaneous nephrolithotomy
- Lithotripsy

## **j) Vascular Radiology**

### *Core knowledge*

- Knowledge of vascular anatomy, pathology and diseases relevant to clinical radiology
- Understand the radiologic techniques used in vascular imaging
- knowledge of the proper application of the following techniques in vascular imaging:
  - US (including Doppler)
  - Digital subtraction techniques
  - Intra-arterial angiography
  - CT and CT angiography
  - MRI and MRI angiography
- Knowledge of the applications, indications, contraindications and complications of relevant interventional procedures.
- pre-procedure preparation (including informed consent), sedation and anaesthetic regimens, patient monitoring during vascular imaging procedures, procedural techniques and post procedure patient care

### *Core skills-*

- Identification and Reporting of vascular diseases using the relevant imaging modalities
- perform and report the following techniques:
  - US (including Doppler), venous and arterial
  - Digital subtraction angiography
- CT examinations of the vascular system including post-processing
- MRI examinations of the vascular system including
- post-processing

### *Optional experience-*

- Perform and Report diagnostic and therapeutic vascular interventional procedures::
  - selective angiography (e.g., hepatic, renal, visceral)
  - pulmonary angiography
  - alternative arterial access (e.g., brachial, axillary puncture)
  - upper limb venography
  - portal venography
  - pelvic venography via femoral approach
  - superior vena cavography
  - inferior vena cavography
  - angioplasty and stenting techniques
  - embolisation
  - thrombolysis
  - caval filter insertion

- central venous access

### **k) Interventional radiology**

*Optional knowledge and skills:*

- knowledge of the equipment and techniques used in interventional techniques
- knowledge of the indications, contraindications, pre-procedure preparation (including informed consent), patient monitoring during the procedure, and post procedure patient care
- knowledge of procedure and post procedure complications and their management
- perform US-guided interventional procedures (e.g., biopsy and drainage)
- perform CT-guided interventional procedures (e.g., biopsy and drainage)
- Perform interventional procedures currently performed in the following systems:
  - vascular system (including neurovascular)
    - urinary system
    - biliary system
    - GI system
    - Musculoskeletal system
- Perform MRI-guided interventional procedures

## **3. Competencies for Imaging Modality -based subspecialties:**

The core training objectives are listed below for reference, although they have also been incorporated into the system based modules.

### **a) Ultrasound**

*Core knowledge and skills:*

- knowledge of the technical aspects of USS relevant to optimizing image quality
- knowledge of the cross-sectional anatomy as visualized on USS
- perform and report transabdominal US examination of structures in the following anatomical areas:
  - general abdomen (including vessels)
  - pelvis (obstetrics and gynaecological)
  - small parts (scrotum, thyroid, neck structures)
  - upper abdomen (including lower chest)
- perform and report Doppler USS images of leg veins

*Optional experience-*

- perform and report Doppler USS images of other arteries.
- perform and report USS of the breast
- perform and report USS of the musculoskeletal system
- perform USS-guided interventional procedures (e.g., biopsy and drainage)
- perform and report transcranial paediatric USS

### **b) Computed Tomography**

*Core knowledge and skills:*

- knowledge of the technical aspects of performing CT, including the use of contrast media
- knowledge of cross-sectional anatomy as demonstrated by CT
- Vetting of study requests, determining protocols, supervise the CT examination, and perform post-processing and report the examination in the following anatomical sites:
  - brain
  - head and neck
  - chest
  - abdomen and pelvis
  - musculoskeletal
  - vascular

*Optional experience-*

- Perform CT-guided procedures, e.g., biopsy and drainage
- Perform CT venography and angiography

**c) Magnetic Resonance Imaging**

*Core knowledge and skills:*

- knowledge of current practice regarding the safety aspects of MRI
- knowledge of the basic physical principles of MRI, including the use of contrast media
- knowledge of the cross-sectional anatomy on orthogonal planes, and the appearance of normal structures on different MRI sequences
- Vetting of study requests, determining protocols, supervise the MRI examination, and perform post-processing and report the examination in the following anatomical sites:
  - brain
  - head and neck
  - chest
  - abdomen and pelvis
  - musculoskeletal (e.g., hips, knees, shoulders and extremities)

*Optional experience-*

- Perform, Supervise and Report magnetic resonance angiography and venography

**d) Nuclear Imaging**

*Core knowledge and skills:*

- knowledge of the relevant aspects of current legislation regarding the administration of radiopharmaceuticals
- knowledge of the technical aspects of radionuclide radiology relevant to optimizing image quality
- knowledge of the radiopharmaceuticals currently available for the purposes of imaging organs and locating inflammatory collections, tumours and sites of haemorrhage
- knowledge of the relevant patient preparation, precautions (including drug effects), and complications of the more commonly performed radionuclide investigations

- knowledge of the principles and indications of commonly performed radionuclide investigations and how these relate to other imaging techniques, in particular knowledge of the radionuclide investigations in the following areas:
  - cardiology
  - endocrinology
  - gastroenterology and hepato-biliary disease
  - haematology
  - infection
  - lung disease
  - nephro-urology
  - nervous system
  - oncology
  - paediatrics
  - skeletal disorders
  - knowledge of the strengths and weaknesses of radionuclide investigations compared to other imaging modalities
- Interpretation of normal and abnormal results
- Perform, supervise and report radionuclide investigations in systems listed above

*Optional experience-*

- knowledge of the practical application of SPECT and PET

NB: Ideally the training in radionuclide radiology should take place during a radionuclide imaging attachment, but it may occur in part or wholly during one or more system-based attachments.

#### **4. Competencies for disease -based subspecialties**

##### **a) Oncology Imaging**

*Core knowledge*

- Knowledge of tumour pathology and diseases relevant to clinical radiology
- knowledge of tumour staging nomenclature
- knowledge of the proper application of the following techniques in tumour staging, and monitoring the response of tumours to therapy- Plain radiography, USS, radionuclide , Contrast studies, MRI, angiography
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

*Core skills*

- Identification and Reporting of oncological images using the relevant imaging modalities in tumour staging and monitoring the response of tumours to therapy

*Optional experience-*

- perform interventional procedures for oncological management
- Knowledge of molecular imaging

#### **5. Competencies for Age -based subspecialties:**

##### **a) Paediatric Radiology**



### *Core knowledge*

- Knowledge of anatomy, pathology and diseases specific to paediatric age group, including non-accidental injury
- knowledge of the proper application of the following techniques in paediatric imaging
  - Plain radiography, USS, Contrast studies, CT, MRI and radionuclide investigations
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

### *Core skills*

- Identification and Reporting of common paediatric diseases using the relevant imaging modalities

### *Optional experience*

- Perform US- guided reduction of intussusception in the paediatric age group

## **b) Geriatric Radiology**

### *Core knowledge*

- Knowledge of anatomy, pathology and diseases specific to geriatric age group
- Knowledge of the proper application of the following techniques in geriatric imaging
  - Plain radiography, USS, Contrast studies, CT, MRI and radionuclide investigations
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.

### *Core skills*

- Identification and Reporting of common geriatric diseases using the relevant imaging modalities

## **6. Other Core Competencies:**

The trainee will also attain an appropriate level of knowledge in:

- a) Current trends and recent advances in clinical radiology
- b) medical ethics
- c) statistics and research methods
- d) Communication skills (breaking bad news, consent, communication with colleagues etc.)
- e) legal and ethical framework within which radiology and general healthcare provision operates
- f) Teaching skills
- g) Clinical audit
- h) clinical effectiveness
- i) clinical risk management including discrepancy review
- j) quality standards
- k) Research
- l) Management - The following management skills should be acquired:

Contextual awareness, understanding the bigger picture and developing an ability to operate effectively at all appropriate levels of health care, strategic thinking, functional and operational skills, and knowledge of the day-to-day operation of radiology departments and other healthcare units, clinical governance including clinical effectiveness, quality assurance and clinical risk management,

human resources/people management, team building, complaints procedures, professional development

m) Health Informatics - The trainee should:

develop core skills in information technology, especially the ability to perform basic word processing, and to access computerized medical databases, electronic mail systems and the internet, keep abreast of developments in information management relevant to radiology departments strive for best practice in patient record keeping and the transfer of clinical data and images, comply with the Acts and Directives concerning data protection in clinical practice, and when using patient data for research, audit or teaching

n) understand the principles and practice of evidence based medicine

o) understand how clinical information is used in clinical governance

Some of these aspects of training will require attendance at in-house and/or external meetings and courses at appropriate periods during the training.

p) Personal attributes as part of his/her general professional development- self-awareness, time management, team work, handling uncertainty

## 7. COURSE ASSESSMENT

### A. Primary

#### SUMMATIVE

- Multiple Choice questions in General Physics and Basic Medical Sciences
- Multiple Choice questions in Clinical Medical Sciences in the core areas of internal medicine, surgery, paediatrics, obstetrics and gynaecology
- Each question will consist of 5-stem True or False or Best of five options.

#### *Pass Criteria*

The candidate must score at least 50% on the average

### B. Module 1 of Membership/Part 1 :

#### SUMMATIVE

- Written papers in the following shall consist of either MCQ or essay type questions:
- Radiological Anatomy and Techniques of Radiological Procedures
- Radiological Physics
- Clinical radiology
- Slide viewing- anatomy and techniques and clinical radiology
- Viva Voce- for all aspects of the assessment

#### *Pass Criteria*

The candidate must:

- Score a minimum of 50% in at least two of the 3 radiology theory written papers
- Score not less than 45% in the third written paper
- Score at least 50% in the overall theory papers
- Score at least 50% in clinical examination (slide viewing and viva voce)

- Score at least 50% in the overall examination

**FORMATIVE**

- Assessment of log-book
- Progressive annual assessment by training department in conjunction with the institution and the appropriate College.

**C. Module 2 of Membership/Part 1 :**

**SUMMATIVE**

- Clinical Radiology - MCQ or essay type questions
- Clinical examination- clinical radiology Slide viewing and viva voce

***Pass Criteria***

The candidate must:

- Score at least 50% in the clinical radiology theory paper
- Score at least 50% in the combined clinical (slide viewing and Orals)
- Score at least 50% in the overall examination

**FORMATIVE**

- Assessment of log-book
- Progressive annual assessment by training department in conjunction with the institution and the appropriate College.

**D. Part II Fellowship**

**SUMMATIVE**

- Clinical Radiology in Sub-specialties - MCQ
- Clinical examination- Slide viewing in clinical radiology and viva voce and/or reporting sessions
- Defence of Dissertation

***Pass Criteria***

The candidate must:

- Pass the defence of the Dissertation
- Score at least 50% in the clinical radiology theory paper
- Score at least 50% in the clinical examination
- Score at least 50% in the overall examination

**FORMATIVE**

- Assessment of log-book
- Progressive annual assessment by training department in conjunction with the institution and the appropriate College.
  
- Any candidate who has passed the written and the clinical aspects of the examination but fails the dissertation shall have this component of the examination banked and be examined only on the dissertation in subsequent examinations.

- On the other hand any candidate who has passed the dissertation aspect of the examination but fails the written shall also have this component of the examination banked and be examined only on the written and clinical in subsequent examinations

### **GENERAL CONSIDERATIONS:**

- The trainer will also be responsible for undertaking appraisal of the trainee at the beginning, during and at the end of the rotation and may be involved in the end of rotation assessment.
- There will be annual reviews of all trainees to:
  - verify experience and competence gained during the preceding year by reviewing the in-training assessments
  - ensure that set targets have been met
  - review clinical, technical and general professional development

## **8. LEARNING METHODS**

- Clinical apprenticeship
- Didactic lectures
- Group discussion and tutorials/seminars
- Update and revision courses
- Clinico-radiological/Clinico-pathological meetings
- Self Study

## **9. CERTIFICATION**

### **- Award of Membership in General Radiology**

Candidates that are successful at Module 2 examination shall be awarded provisional certification, to practice in Government secondary health care institutions (General hospitals, etc) in lieu of rural posting for 3 months after which he/she becomes fully certified.

### **- Award of Fellowship in Radiology**

Candidates that are successful at the Part 2 fellowship examination shall be awarded the Fellowship qualification.

## **10. ACCREDITATION CRITERIA**

The accredited department in the Teaching Hospital or Medical centers should have:

- **Personnel**
  - Two consultants, at least one with 5-years post Fellowship experience
  - At least a Medical Physicist
  - Resident Doctors (at a ratio of 3 Residents to 1 Consultant)
  - Radiographers
  - Nursing Staff.
  - Darkroom Staff
- **Equipments**
  - Basic**

- At least 2 Static radiographic machines
- At least 1 mobile radiographic machines
- At least 1 fluoroscopy machine
- At least 2 ultrasound machines , and at least one with colour Doppler facilities
- 1 Computed Tomography Machine
- Mammography unit
- Automatic X-Ray Film Processor / Manual Film Processor
- Optional**
- 1 C-Arm fluoroscopy machine
- 1 Magnetic Resonance Imaging Machine
- 1 Radionuclear Scanning Machine
- PACS system
- ***Radiation Protection***
  - Personnel Monitoring
  - Radiation Warning Lights and Signs
  - Survey Meter
  - Radiation Safety Officer/Radiation Safety Committee
- ***Infrastructure***
  - Reporting Room
  - Seminar Room
  - Departmental Library
  - Internet Services
  - Audio-visual equipment
  - Staff Offices
  - Call Room
- ***Structured Teaching***  
 ///End.