Doctor of Philosophy in Clinical Nuclear Medicine
Program code: 055571

INTRODUCTION

The Department of Nuclear Medicine (Faculty of Medicine) offers a Ph.D. program in **Nuclear Medicine**. English is the Language of instruction and research. The aim of this program is to offer an academic program leading to PhD degree in Clinical Nuclear Medicine for physicians interested in pursuit of an academic career and practice of academic nuclear medicine at the highest level.

PROGRAM REQUIREMENTS

33 TOTAL COURSE CREDITS

10 COMPULSORY COURSES (credits in parenthesis)

0555-601	Advanced Physics and Instrumentation	(2)
0555-602	Advanced Radiopharmaceuticals	(2)
0555-603	Advanced Clinical Nuclear Medicine 1	(2)
0555-604	Advanced Clinical Nuclear Medicine 2	(2)
0555-605	Pathophysiologic Basis of Nuclear Medicine	(1)
0555-606	Multiplanar Anatomy in Imaging	(1)

5 ELECTIVES COURSES

0510-501	Biostatistics and Computer in Medicine	(2)
0520-538	Basic Immunology	(1)
0555-607	Therapeutic Nuclear Medicine	(1)
0555-608	Nuclear Medicine Imaging of Bone Diseases	(1)
0555-609	Nuclear Cardiology	(1)
0555-610	Pediatric Applications of Nuclear Medicine	(1)
0555-611	Neurologic Applications of Nuclear Medicine	(1)
0555-612	Seminar	(1)
0555-613	Molecular Imaging of Tumors	(1)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)

18 COMPULSORY COURSES

0555-697	Dissertation	(9)
0555-698	Dissertation	(9)

COURSE DESCRIPTION

0555-601: ADVANCED PHYSICS AND INSTRUMENTATION
CR: 2

The course will cover in details the physics and instrumentation of single-photon emission computed tomography (SPECT) and positron emission tomography (PET) and the new techniques of hybrid imaging including PET/CT, SPECT/CT, PET/MRI and optical imaging. Image reconstruction and analysis will also be covered.

0555-602: ADVANCED RADIOPHARMACEUTICALS
CR: 2

This course will cover the radiopharmacokinetics and radiopharmacodynamics of molecular imaging tracers that will include the metabolic pathways of the tracers. The radiotracers include: F-18 imaging agents and other PET radiopharmaceuticals including: Ga-68, C-11, O2-15, N-13, Rb-82 and receptor radiopharmaceuticals. The course will also cover methodology of research using radiotracers including experimental methods in vitro and in vivo using radiotracers.

0555-603: ADVANCED CLINICAL NUCLEAR MEDICINE (I)
CR: 2

This course deals with in depth aspects of clinical nuclear medicine. It includes both theory through didactic lectures and practice in clinical service and laboratory. In the practical portion, the candidate will participate in obtaining patient's information, examine patients, check studies before the patient leaves the department, check the quality control tests, write preliminary reports and attend reading sessions. Candidates will be assigned to prepare and deliver presentations on various clinical subjects. It also emphasizes interpretation of studies using correlative imaging approach.

0555-604: ADVANCED CLINICAL NUCLEAR MEDICINE (II)
CR: 2

This course will continue to cover the in depth aspects of clinical nuclear medicine with focusing on specific organ systems including endocrine, gastroenterology, hematology, and urogenital systems.

0555-605: PATHOPHYSIOLOGIC BASIS OF NUCLEAR MEDICINE
CR: 1

This course will deal with the pathophysiologic changes in the relevant diseases. It will help the student to understand the basis of scintigraphic changes seen during the course of a disease. The course will cover the pathophysiogy of diseases of inflammation, cardiology, tumors, gastrointestinal tract, skeletal endocrine, genitourinary and pulmonary systems.

0555-606: MULTIPLANAR ANATOMY IN IMAGING
CR: 1

The purpose of this course will be to provide an understanding of the sectional anatomy in computed tomography and nuclear medicine. The course will provide a comprehensive study of the cross sectional anatomy The core content of the course will cover the brain; skull base; head and neck (lymph nodes; pharynx and larynx), chest, abdomen and pelvis. In addition musculoskeletal (MSK) anatomy will be covered. The student will become competent in identifying normal anatomy on cross-sectional imaging.

0555-607: THERAPEUTIC NUCLEAR MEDICINE
CR: 1

This course will start by covering pathophysiologic basis of the conditions which are treated using radiopharmaceuticals. The course will then proceed to cover the therapeutic applications of nuclear medicine both theoretically and practically in the hospital as well as basis of therapy and principles of therapy planning. The course will provide the students with knowledge and experience to be able to treat thyroid hyperactivity, thyroid cancer, certain joint diseases, lymphoma, neuroendocrine tumors, hepatic tumors and intractable bone pain due to bony metastases. Relevant radiopharmaceuticals, radiobiologic aspects and specific radiation protection precautions during and after therapy will be covered.

0555-608: NUCLEAR MEDICINE IMAGING OF BONE DISEASES
CR: 1

This course will deal with in-depth understanding of nuclear medicine role in benign and malignant diseases of bone thereby helping the students

understand the expanding diagnostic capabilities of nuclear medicine in identifying the imaging patterns of various bone diseases particularly the benign conditions in which nuclear medicine has an expanding role. The course will cover the relevant inflammatory, neoplastic and metabolic conditions of bone.

0555-609: NUCLEAR CARDIOLOGY
CR: 1

This course will deal with the methods for the diagnosis and follow up of coronary artery disease including viability using multiple imaging methods in a correlative approach. It will include risk stratification, viability, calcium score and CT angiography.

0555-610: PEDIATRIC APPLICATIONS OF NUCLEAR MEDICINE
CR: 1

This course will address all standard pediatric nuclear medicine studies as well as the less-common but important assessment of mandibular growth and symmetry and dacryoscintigraphy. The course will also contain radiation absorbed doses; radiation risk; sedation and magnification. SPECT studies will be emphasized in brain, heart, lung, bone, kidney, and oncological scintigraphy. PET applications will be also covered.

0555-611: NEUROLOGIC APPLICATIONS OF NUCLEAR MEDICINE
CR: 1

The course will star with review of the anatomic and physiologic aspects of the central nervous system. Pathophysiology of relevant diseases will then be covered. Detailed studies for the diagnosis and follow up of such diseases will be studied including hybrid imaging investigations. Special emphasis on PET applications will be included.

0555-612: SEMINAR
CR: 1

This course will emphasize on improving the student's ability to understand research methods, collect and organize information and data, and then communicate that information effectively for research reporting purposes, whether as a written report or a seminar presentation. The course will be tailored to student’s needs based on individual circumstances. Examples include coverage of animal handling in case of planning for experimental work for dissertation.

0555-613: MOLECULAR IMAGING OF TUMORS
CR: 1

The course will start with molecular basis of cancer. It will also cover the most important relevant tumors: breast, lung, lymphoma, myeloma and other bone, gastrointestine, thyroid and neuro-endocrine to include pathology, staging and management Imaging tumors with various radiotracers including receptor imaging will be covered. Correlative imaging in the diagnosis and follow up of such tumors will also be covered from theoretical and practical aspects.

0555-697: DISSERTATION
CR: 9

0555-698: DISSERTATION
CR: 9