College of Medicine

- **Graduate Diploma in Child Life**
- **Master of Science Child Life**
- **Master of Science in Medical Microbiology**
- **Doctor of Philosophy in Medical Microbiology**
- **Master of Science in Physiology**
- **Doctor of Philosophy in Physiology**
- **Master of Science in Medical Biochemistry**
- **Doctor of Philosophy in Medical Biochemistry**
- **Master of Science in Biomedical Sciences**
- **Master of Science in Pharmacology**
- **Doctor of Philosophy in Medical Sciences Pharmacology**
- **Master of Science in Clinical Nuclear Medicine**
- **Doctor of Philosophy in Clinical Nuclear Medicine**
- **Master of Science in Anatomy**
- **Master of Public Health in Epidemiology**
- **Master of Science in Pathology**
- **Doctor of Philosophy in Pathology**

MEDICINE (FACULTY BASED COURSES)

INTRODUCTION

All medicine graduate programs may require from their students to study the following Faculty Based Courses. These courses may be considered compulsory for some programs and electives for the others.

0500-503	Research Communication I	(1)
0500-504	Research Communication II	(1)
0520-538	Basic Immunology	(1)
0540-521	Basic Molecular Biology	(1)

COURSE DESCRIPTION

500-503: RESEARH COMMUNICATION I
CR: 1

The aim of this course is to improve the student's ability to locate and retrieve information in the library, take effective notes, recognize and manipulate biomedical word roots and affixes of classical origin, write scientific English and communicate effectively in seminars. The course has the following components, which are designated to achieve this aim: Library skills, biomedical terminology, basic information structure, processing and seminar skills.

0500-504: RESEARH COMMUNICATION II
CR: 1

This course has its emphasis on improving the student's ability to collect and organize relevant information, and then communicate that information effectively for research reporting purposes, whether as a written report or a seminar presentation. The timing of the course is contrived to oblique the student to present his thesis back ground and methods in a seminar.

0520-538: BASIC IMMUNOLOGY
CR: 1

Introduction to immunity, Innate and acquired immunity, Organs and cells of the immune system, the Major Histocompatibility Complex and its role in antigen presentation, Humoral immunity, antibodies and complement, Cell-mediated immune function T cells and macrophages, Cytokines and their roles in immune responses, Transplantation immunology, immunoprophylaxis and immunotherapy, Autoimmunity and autoimmune diseases, Hypersensitivity

0540-521: BASIC MOLECULAR BIOLOGY
CR: 1

Nucleic acid structure and functions; DNA analysis by agarose gel and DNA sequencing; DNA Replication: Mechanism, Regulation, Differences between prokaryotic and eukaryotic process; DNA damage, repair and mutagenesis, and diseases associated with defective repair; Transcription mechanisms and processing of primary RNA; The genetic code, protein synthesis and regulation; Restriction and modification enzymes and their importance in molecular biology.

MEDICINE (GENERAL COURSES)

INTRODUCTION

All Medical graduate programs require the study of one or more of the following courses offered by the **Department of Community Medicine and Behavioral Sciences**.

0510-501	Biostatistics and Computer in Medicine	(2)
0510-502	Advanced Biostatistics	(1)
0510-503	Epidemiology	(1)
0510-504	Radiotracer Methodology in Biological Research	(2)
0510-601	Biostatistical Method in Medical Research	(3)
0510-602	Epidemiology of Infectious Diseases	(3)

COURSE DESCRIPTION

0510-501: BIOSTATISTICS AND COMPUTER IN MEDICINE
CR: 2

This is a 2 credit hour faculty-required course intended for students joining the graduate M.Sc. program in the Faculty of Medicine, Kuwait University. The course takes into account the fact that enrolled students belong to various backgrounds and hence it includes a diversity of topics to meet their interest. The course is characterized by the inclusion of statistical methods in epidemiology (relative risk, odds ratio to measure the association between diseases and factors, evaluation of diagnostic tests), determination of size of investigations and power, analysis of variance, and design of controlled randomized clinical trials. It also includes multivariate statistical methods such as multiple linear regression and binary multivariable logistic regression. It focuses on concepts, limitations, validity and assumptions underlying these statistical methods.

The course also provides students with knowledge about hardware and software computer technology in addition to addition to the skills of applying the procedures of the SPSS statistical package, and information about computer uses in medicine (hospital information system, drug information system and computer-assisted diagnoses).

0510-502: ADVANCED BIOSTATISTICS
CR: 1

Planning of statistical investigation. Controlled comparative studies: Clinical and simple comparative trials, two period cross over design. Analysis of variance. Experimental design. The control of misclassification error. Survivorship tables and life tables. Biological assays: Parallel-line, slope ratio and quantal response. Non-parametric statistics: One-sample run test, Mann-whitney test, Kruskal-Wallis analysis of variance, and Kendall rank correlation.

0510-503: EPIDEMIOLOGY
CR: 1

Scope of epidemiology, basic measures of frequency, sources of morbidity data, direct and indirect standardization. Planning of an epidemiological investigation, survey planning, variability of measurements, validation and problems in validation, measurement of experimental error, population screening and disease control.

0510-504: RADIOTRACER METHODOLOGY IN BIOLOGICAL RESEARCH
CR: 2

This course provides an introduction to the principles and procedures underlying the use of radioactive isotopes in biological research. The material will be presented at a level requiring only elementary mathematics and the principles and procedures will be illustrated with practical examples drawn from actual laboratory work. The course begins with the materials, and detection and measurement of radiation, and progresses to discussions and illustrations of the applications and problems of radiation measurement and experimental design in biology and medicine and methods used for reduction of radiation exposure. Hazards associated with the use of radioactive material will be discussed. Topics which will be given special emphasis include Gamma and Beta counting of biological samples autoradiography, radiochromatography, use in life science and clinical research, and radiation safety measures.

0510-601: BIOSTATISTICAL METHODS IN MEDICAL RESEARCH
CR: 3 PR: 0510-501 or its equivalent.

The course primarily aims at equipping students with tools of research. This includes univariate statistical methods update, sampling methods and sample size, experimental design, multivariate analysis, logistic regression, survival analysis: clinical trials, statistical methods in epidemiology, analysis of matched data and nonparametric statistics. Mann-Whitney, Wilcoxon paired test, Kruskal-Wallis and Spearman rank correlation.

0510-602: EPIDEMIOLOGY OF INFECTIOUS DISEASES
CR: 3

Concepts and definitions, eipdemiological models, causality, epidemic process, indices of health and disease, natural history of infectious diseases, contact patterns, measuring infectivity, methods and techniques for studying an infection in the community, time and place clustering, use of routinely collected data, special surveys, surveillance of infectioue diseases, field investigation, analysis of an outbreak, seroepidemiology, the effect of bias, confounding and misclassification on the identification of source/reservoir of infection and mode of transmission, statistical techniques often used in infectious disease epidemiology, mathematical models for epidemics, primary and secondary prevention in the infectious disease epidemiology, epidemiology of vacation, control, elimination and eradication, epidemiology of emerging infections and epidemiology of specific infectious diseases.

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	(0)
0555-698	Dissertation	(0)
0555-699	Dissertation	(18)

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: 0

0555-698: DISSERTATION
CR: 0

0555-699: DISSERTATION
CR: 18