The Hashemite University
Faculty of Allied Health Sciences
Department of Medical Imaging
Course Syllabus

Course information	
Course Title	Nuclear Medicine
Course Code	110508325
Prerequisites	110102161
Credit Hours	3 (2 Theory + 3 Lab hours)

Course Description

Nuclear Medicine Imaging (NMI or NM) is a major branch of medical imaging Systems. There are three main NMI devices. These are the Gamma Camera (Planner NM Imaging), the Single Photon Emission Computerized Tomography SPECT, and the Positron Emission Tomography PET. These systems observe the distribution of a radiopharmaceutical within human. The resulting NM images give clinical information about certain **functions of human organs**. This matter is not available, or is not easily available by other medical imaging modalities such as CT and MRI.

The course describes basic concepts of NM imaging instrumentation (Gamma Camera, SPECT, PET). Also, it provides explanation of aspects related to radiopharmaceuticals including the processes of production, localization, uptake, and clearance. Then the course moves to explain the common clinical applications. The valuable diagnostic information of these applications is emphasised. This include the clinical significance of heart, kidney, thyroid, brain, bone examinations. Finally, the course gives details about the major advances in both the radiopharmaceuticals and instrumentation as in PET/CT and SPECT/CT. The significance of these hybrid imaging systems is illustrated.

Course Objectives

By the end of this course, student is expected to:

The course is divided into 12 chapters. Chapters 1 to 6 cover the basic of nuclear medicine, instrumentation, image quality, internal radiation dosimeter and radiation protection. Whilst, Chapters 7 through 12 discuss topics in radio nuclide imaging begins with gastro-oesophageal function studies, gastro-intestinal transit and GI bleeding scan, hepatic, spleen, hepatobiliary system, urinary tract and bone.
Shortly, the course will give comprehensive introductory to the Nuclear Medicine different Imaging Scanners in addition to their associated common clinical applications.

Recommended Textbook

Nuclear Medicine and PET/CT: Technology and Techniques, Paul E. Christian, Kristen M. Waterstram-Rich. 7th Ed., 2011. Published By: Elsevier Science.

Practical Nuclear Medicine, By P.F. Sharp, H.G. Gemmell and F. W.Smith, 3rd Ed., 2005. Published By: Oxford Medical Public.

Other References

The essential physics of Medical Imaging. By: Bushong J., Seibert J., Leidholdt E., and Boone J. 3rd Ed., 2012. Published By LWW

Physics and Radiobiology of Nuclear Medicine, By: B.Saha, 3rd Ed., 2010. Published By: Springer.

Course Contents

Introduction to NUCLEAR MEDICINE IMAGING

- How does NM Imaging Procedure Work?
- Radiopharmaceuticals: Function-Characteristics-Localization- Production

Nuclear Medicine Imaging Systems

- **Gamma Camera**
  - Gamma Camera Concepts and Instrumentation
  - Data Acquisition in NM Imaging, Image Filtering.
- **SPECT**
  - Principle and Basic Instrumentation in SPECT
- **PET**
  - Principle & Basic Instrumentation in PET
- **The PET/CT and SPECT/CT Imager**
  - Principle & Basic Instrumentation

Radiopharmacy

- Radiopharmacy Design
- Production of Radiopharmaceuticals

Central Nervous System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Endocrine System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Respiratory System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Cardiovascular System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Gastrointestinal System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Genitourinary System

- Radiopharmaceuticals
- Nuclear Medicine protocols

Clinical PET/CT in Oncology

- Intracellular 18F-FDG Metabolism
- Patient Preparation and Injection
- PET Oncology Main Applications

Assessment	
First Exam	20
Second Exam	20
Final Exam	40
Lab + In course assessment	20