



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

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

<b>Course Description</b>
<p>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 <b>functions of human organs</b>. This matter is not available, or is not easily available by other medical imaging modalities such as CT and MRI.</p> <p>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.</p>

<b>Course Objectives</b>
By the end of this course, student is expected to:
<p>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.</p> <p>Shortly, the course will give comprehensive introductory to the Nuclear Medicine different Imaging Scanners in addition to their associated common clinical applications.</p>

<b>Recommended Textbook</b>
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.

<b>Other References</b>
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.

<b>Course Contents</b>
<p><b>Introduction to NUCLEAR MEDICINE IMAGING</b></p> <ul style="list-style-type: none"> <li>• How does NM Imaging Procedure Work?</li> <li>• Radiopharmaceuticals: Function-Characteristics-Localization- Production</li> </ul>

## **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

<b>Assessment</b>	
<b>First Exam</b>	20
<b>Second Exam</b>	20
<b>Final Exam</b>	40
<b>Lab + In course assessment</b>	20