

Specialization	Radiologic Technology
Course Number	020810281
Course Title	Nuclear Medicine And Radiotherapy
Credit Hours	(3)
Theoretical Hours	(1)
Practical Hours	(6)

Brief Course Description:

- This course provides the students with the knowledge about the basic physical Principles of nuclear medicine and radiotherapy enabling them to know how to obtain images and dealing with the types of radioactivity media used in radiology department, with special preparation for each radiographic procedure, indication and contraindications of each procedure and taking care of the patient after the end of the procedure.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Know the basic physical principles of these procedures.
2. Know hazards and safety measures of these procedures.
3. Know how to obtain images by these types of procedures.
1. Apply practical skills related to theoretical material.

Unit number	Unit name	Unit content	Time needed
1	Introduction	<ul style="list-style-type: none"> • Definition. • Radioactivity and inter action in biological material. • Physics of radionuclides. 	
2	Nuclear Medicine	<ul style="list-style-type: none"> • Gamma cameras, for planar and single photon emission computedtomography (SPECT and SPECT/CT). • Principles and practical aspects of nuclear medicine equipment qualitycontrol and testing. • Chemistry, radio pharmacy, quality control and regulation of single photon, positron-emitting and particle-emitting agents used for imaging and no imaging Studies and therapy. • Radiation biology pertinent to diagnostic and therapeutic uses ofradionuclides. • Radionuclide imaging procedures: <ul style="list-style-type: none"> ○ Bone or Joint Scan ○ Gallium Scan ○ Gastric Emptying ○ Gastroesophageal Reflux Study ○ Hepatobiliary Scan ○ Liver or Spleen Scan ○ Meckel's Scan ○ Renal Scan ○ SPECT Brain Scan ○ SPECT Liver Scan (Red Blood Cell Scan of Liver) ○ Thyroid Scan and Uptake (Radionuclide Iodine Uptake). 	
3	Bone mineral densitometry equipment (DEXA scan)	<ul style="list-style-type: none"> • Principles and practice of bone mineral densitometry (BMD). • Bone physiology. • Pathophysiology related to bone mineral loss. • Principles of fracture risk. • Interpretation of BMD and impact on fracture risk and management. • Interpretation of bone mineral densitometry in a pediatric context. 	
4	Radiotherapy	<ul style="list-style-type: none"> • Equipment and methods used in radiotherapy, treatment indications, and 	

		<p>alternative treatment methods.</p> <ul style="list-style-type: none"> • General principles of radiation protection (justification, optimization) in radiotherapy. • Biological principles of radiotherapy, phenomena at the cellular and molecular level in tumors and normal tissue. • Factors modifying the effects of radiation (fractionation, time, dose rate, oxygen concentration, etc.). • Direct effects of radiation, late reactions in normal tissue, risks involved in radiotherapy. • Assessing radiation risk and explaining it understandably to the patient. • Radiotherapy dosimetry. • Dose planning and confirming of treatment. • Symptoms and treatment of acute radiation syndrome. • Quality assurance, self-assessment and clinical audits. • Radiation protection of the patient and staff. 	
	<p>Clinical Part</p>	<p>The competencies are divided in to the following:</p> <ul style="list-style-type: none"> • Patient care and welfare. • Departmental Organization. • Instrumentation with quality control. • Performance of imaging. • Radio therapeutic procedures. • Radiopharmacy. • Radiation protection. • Occupational health and safety. 	

Teaching Methodology:

1. Lectures.
2. Discussion and quizzes.
3. Home works
4. Demonstration and practical training.
5. Training field competencies assessment.

Text Books & References:

1. Merrill's Atlas of Radiographic Positioning and Procedures 13th Edition, Volume, Feb. 2015.
2. Medical Imaging and Radiotherapy Research E-Book -Skills and Strategies by Aarthi Ramlal, MA, B.Tech. Rad., N.Dip.Rad, 2010.
3. Walter and Miller's Textbook of Radiotherapy E-book, 7th Edition -Radiation Physics, Therapy and Oncology, Edited by R Paul Symonds and John A Mills, 2012.
4. Radiation Protection in Medical Radiography, 8th Edition- By Mary Alice Statkiewicz Sherer, AS, RT(R), Paula J. Visconti, , E. Russell Ritenour, and Kelli Haynes, MSRS, RT(R) 2018.
5. Nuclear Medicine and PET/CT, 8th Edition- Technology and Techniques by Kristen M. Waterstram-Rich, MS, CNMT, NCT, FSNMTS and David Gilmore 2017.
6. Principles and Practice of Radiation Therapy, 4th Edition By Charles M. Washington, MBA, RT(T), FASRT and Dennis T. Leaver, MS, RT(R)(T), FASR 2016.