

Course Syllabus

Faculty: Faculty of Medicine and Health Sciences
Department: Health Sciences
Program: Radiologic Technology & Medical Imaging

إدارة ضمان الجودة والاعتماد
جامعة العلوم والتكنولوجيا
مستحسن
APPROVED

I. General information about the course instructor :							
Name	Dr. Abdullah Taher	Office Hours(3 Hours Weekly)					
Location & phone number	UST- 715989708	Sat	Sun	Mon	Tue	Wed	Thu
Email	Ataher8383@yahoo.com						

II. General information about the course:					
1. Course Title :	Radiation Physics (II)				
2. Course Code and Number :	BMI213				
3. Credit Hours :	Credit Hours				Total
	Theoretical	Seminar/Tutorial	Practical	Training	
	2		1		3
4. Study Level and Semester:	2 nd level, 1 st semester				
5. Pre-requisites (if any):	Radiation Physics (I)				
6. Co-requisites (if any):	-				
7. Program in which the course is offered:	Radiologic Technology & Medical Imaging				
8. Teaching Language:	English				
9. Instruction location:	UST- Sana'a				

I. Course Description

This course provides student with the principles of Medical imaging physics using nonionizing radiation sources such as ultrasound and magnetic resonance, and that using ionizing sources such as gamma sources in nuclear medicine imaging, as well as their applications.

The course topics will cover and focus on: Magnetic resonance imaging (MRI), Ultrasound imaging (US), and Nuclear medicine (NM) imaging principles, in addition concern the medical

عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبدالجبيب ردمان

المراجع:
د. إسماعيل الشرعي

الموصف:
د. عبدالله طاهر

imaging equipment which using physical principles to produce diagnostic imaging.

The course carried out using: lectures, self-learning, seminar, applied research, discussion, Brainstorming session, Miniature education, Solve problems, and other activities to teach this course. Evaluation via periodic oral, written presentations, practical reports, and final written exam.

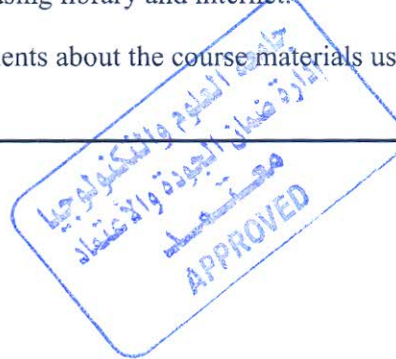
The prerequisite of this course are General Physics, Radiation Physics (I), and Introduction to Radiologic Technology courses.

II. Course Aims:

1. Develop basic understanding of medical imaging physics concepts.
2. Learn to integrate various physical concepts related to medical imaging problems.
3. Investigate the effect of physical parameters on the quality of medical image.
4. Extend students' knowledge with Medical imaging applications (Magnetic resonance imaging scanners, ultrasound imaging, and Nuclear medicine imaging applications such as Gamma camera, Single-Photon Emission Computed Tomography, and Positron Emission Tomography).

III. Course Intended Learning Outcomes (CILOs) :

1. Describe the medical imaging procedures to produce medical images using non ionizing and ionizing radiation sources
2. Describe the basic physical principles of medical image production using medical imaging instrumentations (Magnetic resonance imaging scanners, ultrasound imaging, and Nuclear medicine imaging applications such as Gamma camera, Single-Photon Emission Computed Tomography, and Positron Emission Tomography).
3. Analyze the relevant data used during imaging procedures to produce good quality image.
4. Interpret the relations between the factors which affect on the work of medical systems operation and control its behaviour by using physical laws.
5. Gain experience from applying physical theories solutions during medical imaging procedures to enhance image quality.
6. Prepare the literature review for reports using library and internet.
7. Manage of tasks regarding doing assignments about the course materials using different sources.



عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبدالحبيب ردمان

المراجع:
د. اسماعيل الشرعي

الموصف:
د. عبدالله طاهر

IV. Course Contents				
Theoretical Aspect:				
No.	Course Units	Sub-topics	No. of Weeks	Contact Hours
1	Ch. 1 Magnetic resonance Imaging (MRI):	<ul style="list-style-type: none"> ▪ Magnetic resonance Imaging (MRI) Physics: <ul style="list-style-type: none"> - Magnetization - Magnetic moment - Radiofrequency - Larmor equation - MR Signal ▪ Principle of Magnetic resonance Imaging <ul style="list-style-type: none"> - Pulse sequences - Relaxations - MRI Contrast factors. - T 1, T 2 Weighting - Image Artefacts in MRI. - Functional MRI - Safety in magnetic resonance imaging. 	4	8
2	Ch. 2 Ultrasound	<ul style="list-style-type: none"> • Ultrasound physics: <ul style="list-style-type: none"> - Waves - Reflection - Transmission - attenuation • Ultrasound Principles: <ul style="list-style-type: none"> - Transducer - Echoes - Pulse Echo Techniques - Ultrasound modes imaging - Doppler Physics 	3	6
3	Ch. 3 Radioactivity	<ul style="list-style-type: none"> - Radionuclides - Radionuclide production - Radiopharmaceuticals and Tracers. - Half life time 	2	4
4	Ch. 4 Nuclear Imaging	<ul style="list-style-type: none"> Basis for Nuclear medicine physics <ul style="list-style-type: none"> - Principles of nuclear imaging. - Attenuation of Gamma-Rays - Scintillation Detectors - Concepts of nuclear 	2	4

جامعة الطبرق والتكنولوجيا
الإدارة ضمان الجودة والاعتماد
مختصة
APPROVED

عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبد الحبيب ردمان

المراجع:
د. إسماعيل الشرعي

الموصف:
د. عبدالله طاهر

		Image Quality		
5	Ch. 5 Nuclear Medicine Systems	Gamma Camera <ul style="list-style-type: none"> - Gamma camera head - Emission Tomography - Performance Parameters of Gamma Cameras Single Photon Emission Computed Tomography (SPECT) <ul style="list-style-type: none"> - Data Acquisition - Image Reconstruction - Factors Affecting SPECT - Quality Control Tests for SPECT Cameras Positron Emission Tomography (PET) <ul style="list-style-type: none"> - Positron-Emitting Radionuclides. - Detector for PET - Data Acquisition. - Factors Affecting PET - Quality Control Tests for PET Scanners. 	3	6
Total number of weeks and hours			14	28

جامعة العلوم والتكنولوجيا
إدارة ضمان الجودة والاعتماد
مفتحة
APPROVED

Second: Practical/Tutorial/Clinical Aspects :			
Write up practical/tutorial/clinical topics			
No.	Practical/Tutorial/Clinical topics	Week due	Contact Hours
1	Oral Presentation about MRI.	2	2
2	Report about magnetic resonance experiment.	4	2
3	Factors affecting on US image quality	6	2
4	Report about Doppler imaging	7	2
5	Report about the Production of the radionuclides.	9	2
6	Gamma camera image quality factors (report)	10	2
7	Radionuclide production methods (oral presentation)	12	2
8	Nuclear image production (report)	14	2
Total number of weeks and hours		8	16

عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبدالحبيب ردمان

المراجع:
إ.د. إسماعيل الشرعبي

الموصف:
د. عبدالله طاهر