



Course Syllabus of Radiographic Equipment

Faculty: Medicine and Health Sciences

Department: Health Sciences

Program: Bachelor in Radiologic Technology & Medical Imaging

I. General information about the course instructor :

Name	Dr. Awadh Ali Alqubati	Office Hours(3 Hours Weekly)					
Location & phone number	Al-Asbahi -770807295	Sat	Sun	Mon	Tue	Wed	Thu
Email	dawadh@gmail.com					3	

II. General information about the course:

1.	Course Title :	Radiographic Equipment				
2.	Course Code and Number :	BMI227				
3.	Credit Hours :	Credit Hours				Total
		Theoretical	Seminar/Tutorial	Practical	Training	
		3	-	1	-	4
4.	Study Level and Semester:	2 nd Level / 2 nd Semester				
5.	Pre-requisites :	None				
6.	Co-requisites:	None				
7.	Program in which the course is offered:	Bachelor in Radiologic Technology & Medical Imaging				
8.	Teaching Language:	English				
9.	Instruction location:	University of Science and Technology, Sana'a, Yemen				

III. Course Description

This course is designed for students with little background in electronics and medical devices techniques. The course provides a solid presentation of radiographic equipment's, it will introduce the fundamentals concepts of radiographic equipment, and their applications, including the fundamentals of radiologic imaging, diagnostic imaging. Special topics include conventional and mobile x-ray, dental radiography, fluoroscopy, interventional radiology ,CT, MRI, and the various modes of digital imaging. The teaching will include lecture, Clinical practice ,self-learning discussion and assignment. The students will be evaluated through report, written exam and practical exam.

عميد الكلية:
د. عبدالله المخلافي

رئيس القسم:
د. عبد الحبيب القباطي

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المراجع:
د. عبدالله طاهر

الموافق:
د. عوض علي القباطي

IV. Course Aims: This course aims to:-

1. Enable the students to convey a working knowledge of radiologic physics and radiographic equipment.
2. Provide the students the knowledge about the routine and advance techniques and procedures of radiography and advanced imaging modalities.
3. Learn the students to make informed decisions about technical factors, diagnostic image quality, and radiation management for both patients and personnel.
4. Provide the students the skills to manipulate the different medical imaging modalities professionally.

V. Course Intended Learning Outcomes (CILOs) : At the end of this course study the students will able to:-

1. Describe the radiologic emission spectrum and the factors that contribute to scatter radiation.
2. Delineate physical aspects in medical radiation production.
3. Differentiate between various types and techniques of radiographic equipment's.
4. Interpret the rating charts of diagnostic radiation equipment and the causes of failure.
5. Examine the radiographic equipment and techniques to create high-quality images.
6. Implement the technical principle to improve the understanding of radiographic equipment work.
7. Perform the quality control tests for radiographic equipment and devices.
8. Operate the radiographic equipment to meet individual needs.
9. Manage effectively with technician to repair the radiologic devices and prepare relevant reports.
10. Formulate practical reports in precise details.

VI. Course Content

Topics/Units of Course Contents

First: Theoretical Aspects

No.	Course Topics/Units	Sub-topics	Weeks.due	Contact Hours
1	Introduction to the radiographic equipment's	<ul style="list-style-type: none">• Medical instrument and equipment's.• Medical instruments classes	1 st	3
2	X-ray tube	<ul style="list-style-type: none">• X-Ray tube major components• X-Ray tube components Construction and details• Tungsten material benefits• The problem of Heat• Focal Spot	2 nd	3
3	X-Ray generator	<ul style="list-style-type: none">• High tension circuit• X-Ray generators• Basic X-Ray circuits	3 rd	3

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المراجع :
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الموصف :
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		<ul style="list-style-type: none"> • Rectification • High tension cables 		
4	X-Ray production	<ul style="list-style-type: none"> • Production of X-Rays • Conditions for X-Ray production • Properties of X-Rays • Units of X-Radiation 	4 th	3
5	Exposure factors effects and control	<ul style="list-style-type: none"> • X-Ray tube Kilovoltage effect and control • Primary Exposure factors • Control of Tube Current • Tube current measurement • Falling-Load generator 	5 th	3
6	Scattered x-ray	<ul style="list-style-type: none"> • Scattered radiation specifications • Primary factors contribute to an increase in scatter • Effects of scatter radiation • Control of scattered radiation • X-ray system couch and buckys 	6 th	3
7	Mobile x-ray equipment's	<ul style="list-style-type: none"> • Mobile X-Ray machines • Types of mobile X-Ray machines • Electrical energy source • Accident and emergency x-ray equipment • Orthopantomography 	7 th	3
8	Midterm exam	Midterm exam	8 th	3
9	Fluoroscopy and the system	<ul style="list-style-type: none"> • Components of fluoroscope • Image-Intensifier Tube • Fluoroscopy television camera • The TV system 	9 th	3
10	Principles of ultrasound	<ul style="list-style-type: none"> • What is a ultrasound • When and why is it used • Advantages and Disadvantages of Ultrasounds • Physical Principles • Ultrasound Production • Types of Ultrasound 	10 th	3
11	Doppler and Lithotripsy	<ul style="list-style-type: none"> • Doppler Ultrasound • Ultrasound Safety and Risks • Ultrasound Transducers • What is Lithotripsy • Lithotripsy – Advantages • Purpose of Lithotripsy and techniques • ESWL Procedure and Disadvantages • Troubleshooting of ultrasound Machines 	11 th	3
12	Computed radiography	<ul style="list-style-type: none"> • Basic theory of CT ○ What's inside the gantry? ○ Data acquisition ○ Image reconstruction • Variations in scanner design ○ Generation ○ Detector type ○ Number of projections and detectors ○ Slip-ring scanning 	12 th	3
13	Radiation equipment's safety and maintenance	<ul style="list-style-type: none"> • Sources of Radiation in Hospital • Biological Effects of Ionizing Radiation 	13 th	3

		<ul style="list-style-type: none"> • Dose Limits • Radiation Protection Program • Troubleshooting X-Ray Machines 		
14	Magnetic Resonance Imaging	<ul style="list-style-type: none"> • Basic theory of MRI • MRI system components • Image acquisition 	14 th	3
	Presentations and reports discussion	Assignments presentations and discussion.	15 th	3
	Final theoretical exam	Final exam	16 th	3
Total number of weeks and hours			16	48

Second: Practical/Tutorial/Clinical Aspects

No.	Practical/Tutorial/Clinical topics	Week due	Contact Hours
1	Introduction and lab safety	2 nd	2
2	Rating charts and cooling curves of x-ray tube	3 rd , 4 th	4
3	X-ray tube lab demonstration	5 th , 6 th	4
4	X-ray system couch and bucky lab demonstration	7 th	2
5	X-ray mobile equipment's lab demonstration	8 th , 9 th	4
6	Dental radiography lab demonstration	10 th	2
7	Fluoroscopy lab demonstration	11 th	2
8	Ultrasound imaging lab demonstration	12 th	2
9	CT& MRI scan imaging lab demonstration	13 th	2
10	Biomedical devices used for Bio-signal acquisition and observation lab demonstration	14 th	2
11	Final practical exam	15 th	2
Total number of weeks and hours		14	28