



Syllabus

Quality Control of Radiological Images (140508315)

First Semester 2022 /2023

COURSE INFORMATION	
Course Name: Quality Control of Radiological Images Semester: First Department: Department of Medical Imaging Faculty: Applied Medical Sciences	Course Code: 140508315 Section: 1 Core Curriculum:
Day(s) and Time(s): Sunday: 01:00-02:00 Thursday: 01:00-02:00 Labs : Sunday 08-11, 02-05 Tuesday 08-11, 02-05 Classroom: Nursing 203	Credit Hours: 3 Prerequisites: 140508212
COURSE DESCRIPTION	
<p>This course introduces the student to the principles of radiographic techniques which producing the best diagnostic image quality. Therefore, Quality control is the use of diagnostic tools to detect trends that will eventually cause repeated exposures to the patient and correct them before such unnecessary exposures come about. By definition, then, QC plays a vital role in minimizing patient exposure.</p>	
DELIVERY METHODS	
<p>The course will be delivered through:</p> <ul style="list-style-type: none"> • PowerPoint lectures and active classroom based discussion. • Collaborative learning through small groups acting in an interdisciplinary context. • Labs. 	
FACULTY INFORMATION	
Name	<i>Khaled rababeh</i>
Academic Title:	<i>Professor</i>
Office Location:	<i>Applied Medical Sciences /3158</i>
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Office Hours:

Sunday: 11:00-01:00

Tuesday: 11:00-01:00

Monday: 10:00-11:00, 12:00-01:00

Please send an e-mail (khalidr (@hu.edu.jo) to meet at any other time.

REFERENCES AND LEARNING RESOURCES

Required Textbook:

Title: Fuchs's Radiographic Exposure and Quality Control

Author: Quinn Carroll

Publisher: Charles Thomas publisher, Ltd

Year: 2003

Edition 7th, Ed

Suggested textbook for reading:

Title: An Analysis of Radiographic Quality

Author: Daniel Donohue

Publisher: Lippincott Williams and Wilkins

Year: 1995

Edition: 3rd Ed

Title: Essential of Diagnostic Imaging

Author: Guebert,

Publisher Mosby, Inc

Year 1995,

STUDENT LEARNING OUTCOMES MATRIX*

Core Curriculum Learning Outcomes	Program Learning Outcomes	Course Objectives	Course Student Learning Outcomes	Assessment Method
<p>Think critically and creatively in a variety of methods in order to make decisions and solve problems</p> <p>Communicate competently with others using oral and written English skills</p>	<p>KP1: Develop an understanding of human anatomy and physiology as it relates to health and disease and acquire competency in medical terminology, documentation</p> <p>KP2: Understand the principles and physics of medical imaging technologies such as general X-ray, CT, MRI, ultrasound, fluoroscopy, nuclear medicine, dental radiography, and mammography and relate medical research</p> <p>KP3: Develop and implement protocols for medical imaging procedures, including patient positioning, patient care, proper exposure factor selection, appropriate radiation protection measures, demonstrating technical competence, and the use of contrast agents</p> <p>SP1: Demonstrate depth of knowledge and</p>	<p>Describe the visibility and recognizability of radiographic quality</p> <p>Identify contrast, gray scale and resolution</p>	<p>Know the basic principles of quality image</p> <p>Know the main components and factors of of the quality image</p> <p>Know the definition of contrast, resolution and gray scale.</p>	<ul style="list-style-type: none"> • Exams • Quizzes with no marks just to give chance to the students to revise the course. • Labs Reports
		<p>Give two reasons why mAs should be considered as the primary control for image density.</p> <p>Define optimum kVp</p>	<p>Explain the optimum kVp and mAs.</p> <p>Explain the compromise between kVp, mAs, and exposure time.</p>	<p>Exams</p> <p>Quizzes with no marks just to give chance to the students to revise the course.</p> <p>Labs Reports</p>
		<p>Explain the difference between grid ratio and grid radius</p> <p>List the methods by which scatter radiation can be reduced or eliminated after it has been produced</p>	<p>know the difference between grid ratio and grid radius</p> <p>know the methods by which scatter radiation can be reduced or eliminated after it has been produced</p>	<p>Exams</p> <p>Quizzes with no marks just to give chance to the students to revise the course.</p> <p>Labs Reports</p>
		<p>Explain the most effective way for individual radiographer to minimize patient exposure</p> <p>Describe the effect of off- centering and beam divergence on radiographic quality.</p>	<p>know how to minimize the patient exposure.</p> <p>know the effect of off-centering and beam divergence on radiographic quality.</p>	<p>Exams</p> <p>Quizzes with no marks just to give chance to the students to revise the course.</p> <p>Labs Reports</p>

<p>integrate it of the basic scientific principles of all medical imaging technologies for the implementation of various protocols and techniques and to conduct scientific research in this field</p> <p>SP2: Use creativity, critical thinking, analysis, and research skills to modify standard procedures to adapt to new circumstances, difficult cases, or unusual situations while maintaining appropriate medical imaging quality.</p> <p>SP3: Evaluate and criticize all types of medical images</p> <p>CP1: Access, evaluate, and provide medical imaging requirements</p> <p>CP2: Recognizing the need to learn from professional learning, managing learning in the field of medical imaging in an integrated manner, and acquiring continuous learning skills</p> <p>CP3: Demonstrate professional identity and responsibility</p>			
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	<p>with patients, colleagues, employers, and society, with ethical and professional behaviors and attitudes in the practice of health care.</p> <p>CP4: Produces high quality, diagnosable medical images by applying positioning skills, selecting technical parameters, and using radiation protection.</p>			
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ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.

COURSE REGULATIONS

Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student should not miss more than 15% of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance.* It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviors that compromise his/her own integrity as well as that of the Hashemite University.

Plagiarism includes the following examples and it applies to all student assignments or submitted work:

- **Use of the work, ideas, images or words of someone else without his/her permission or reference to them.**
- **Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.**
- **Misrepresentation of the sources that were used.**

The instructor has the right to fail the coursework or deduct marks where plagiarism is detected

Late or Missed Assignments

In all cases of assessment, students who fails to attend an exam, class project or deliver a presentation on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a fail grade for this part of the assessment.

- Submitting a term paper on time is a key part of the assessment process. Students who fail to submit their work by the deadline specified will automatically receive a 10% penalty. Assignments handed in more than 24 hours late will receive a further 10% penalty. Each subsequent 24 hours will result in a further 10% penalty.

- In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with University regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

COURSE ASSESSMENT

Course Calendar and Assessment

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Assessment	Grade Weighting	Deadline Assessment
Exam 1	20%	
Exam 2	20%	
Final Exam	40%	To be arranged by the registration office
Lab and In course assessment	20%	

Description of Exams

Test questions will predominately come from material presented in the lectures. Semester exams will be conducted during the regularly scheduled lecture period. Exam will consist of a combination of multiple choice, short answer, match, true and false and/or descriptive questions.

Homework:

Will be given for each chapter, while the chapter in progress you are supposed to work on them continuously and submit in next lecture when I finish the chapter.

You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

Quizzes:

Unannounced quizzes will be given during or/and at the end of each chapter based upon the previous lectures. It will enforce that you come prepared to the class.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines.

Grades are not negotiable and are awarded according to the following criteria*:

Letter Grade	Description	Grade Points
A+	Excellent	4.00
A		3.75
A-		3.50
B+	Very Good	3.25
B		3.00
B-		2.75
C+	Good	2.50
C		2.25
C-		2.00

D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I	Incomplete	-

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

“Lecture hours and weeks are approximate and may change as needed” Note: Every

week there is 3 hours lab for every student

Part One 1	QUALITY OF RADIOGRAPHIC IMAGE	Week 1- 3	9 lecture hours
1.1	Quality Assurance QA and Quality Control QC		
1.2	Objectives of QA Program		
1.3	Visibility		
1.4	Recognizability		
1.5	Qualities of the radiographic		
Part Two:	X-RAY TUBE/VISIBILITY FACTORS	Week 4-9	10 lecture hours
2.1	Milliambere-second (mAs) <ul style="list-style-type: none"> • Control of Density • Effect on Contrast • Exposure Time and Motion 		
2.2	Kilo-voltage-Peak kVp <ul style="list-style-type: none"> • Control of contrast • Control of Density • Exposure latitude 		
2.3.	Machine Phase and Rectification <ul style="list-style-type: none"> • X-ray quality and quantity • Effect on Density • Effect on Contrast 		
2.4	Beam Filtration <ul style="list-style-type: none"> • X-ray quality and quantity • Compensating Filtration 		
2.5	Filed Size Limitation <ul style="list-style-type: none"> • Effect on Density • Effect on Contrast 		
Part Three	X-RAY INTERACTION/ VISIBILITY FACTORS	Week 10-12	4 lecture hours
	<ul style="list-style-type: none"> • Effect of Scatter radiation on Density and Contrast • Fog versus Blur • Scatter and Radiation Exposure • Effect of Grid on Contrast • Grid Efficiency • Grid Cut-off • Intensifying Screen 		

Part Four:	GEOMETRICAL FACTORS	Week 13-15	6 lecture hours
Focal spot size The anode bevel Source image receptor distance Object-image receptor distance Distance ratio Geometric function of positioning			
Review and University Exams		<i>Week 16</i>	

Classroom Participation: Assessment Criteria					
Criteria	Quality				Score
	Excellent (5 points)	Good (4 points)	Satisfactory (3 points)	Needs Improvement (2 points)	
Degree to which student integrates course readings into classroom participation	often cites from readings; uses readings to support points; - often articulates "fit" of readings with topic at hand.	-occasionally cites from readings; - sometimes uses readings to support points; -occasionally articulates "fit" of readings with topic at hand .	-rarely able to cite from readings; -rarely uses readings to support points; - rarely articulates "fit" of readings with topic at hand	-unable to cite from readings; -cannot use readings to support points; cannot articulates "fit" of readings with topic at hand .	
Interaction/ participation in classroom discussions	-always a willing participant, responds frequently to questions; - routinely volunteers point of view .	-often a willing participant, - responds occasionally to questions; -occasionally volunteers point of view .	-rarely a willing participant, -rarely able to respond to questions; - rarely volunteers point of view .	-never a willing participant., -never able to respond to questions; - never volunteers point of view .	
Interaction/participation in classroom learning activities	-always a willing participant; -acts appropriately during all role plays; -responds frequently to questions; -routinely volunteers point of view.	-often a willing participant; -acts appropriately during role plays; - responds occasionally to questions; -occasionally volunteers point of view.	-rarely a willing participant. -occasionally acts inappropriately during role plays; - rarely able to respond to direct questions; -rarely volunteers point of view .	-never a willing participant -often acts inappropriately during role plays;; - never able to respond to direct questions; - never volunteers point of view.	
Demonstration of professional attitude and demeanor	-always demonstrates commitment through thorough preparation; -always arrives on time; - often solicits instructors' perspective outside class.	rarely unprepared; rarely arrives late; - occasionally solicits instructors' perspective outside class .	-often unprepared; occasionally arrives late; - rarely solicits instructors' perspective outside class .	-rarely prepared; - often arrives late; -never solicits instructors' perspective outside class	

ASSESSMENT RUBRICS

Classroom Participation: Oral Presentation

Element	Excellent			Satisfactory			Needs Improvement			Points
	8	7	6	5	4	3	2	1	0	
Organization	<ul style="list-style-type: none"> There is a logical sequence of information. Title slide and closing slide are included appropriately. 			<ul style="list-style-type: none"> There is some logical sequence of information. Title slide and closing slides are included. 			<ul style="list-style-type: none"> There is little or no logical sequence of information. Title slide and/or closing slides are not included. 			
Slide Design (text, colors, background, illustrations, size, titles, subtitles)	<ul style="list-style-type: none"> Presentation is attractive and appealing to viewers. 			<ul style="list-style-type: none"> Presentation is somewhat appealing to viewers. 			<ul style="list-style-type: none"> Little to no attempt has been made to make presentation appealing to viewers. 			
Content	<ul style="list-style-type: none"> Presentation covers topic completely and in depth. Information is clear, appropriate, and accurate. 			<ul style="list-style-type: none"> Presentation includes some essential information. Some information is somewhat confusing, incorrect, or flawed. 			<ul style="list-style-type: none"> Presentation includes little essential information. Information is confusing, inaccurate, or flawed. 			
Language	<ul style="list-style-type: none"> Spelling, grammar, usage, and punctuation are accurate Fluent and effective 			<ul style="list-style-type: none"> There are minor problems in spelling, grammar, usage, and/or punctuation. 			<ul style="list-style-type: none"> There are persistent errors in spelling, grammar, usage, and/or punctuation. Less or not fluent and effective. 			
Delivery	<ul style="list-style-type: none"> Ideas were communicated with enthusiasm, proper voice projection and clear delivery. There was sufficient eye contact with audience. There were sufficient use of other non-verbal communication skills. Appropriate delivery pace was used. 			<ul style="list-style-type: none"> There was some difficulty communicating ideas due to voice projection, lack of preparation, incomplete work, and/or insufficient eye contact. Insufficient use of non-verbal communication skills. Delivery pace is somewhat appropriate. 			<ul style="list-style-type: none"> There was great difficulty communicating ideas due to poor voice projection, lack of preparation, incomplete work, and/or little or no eye contact. No use of non verbal communication skills. Inappropriate delivery pace was used. 			
Interaction with Audience	<ul style="list-style-type: none"> Answers to questions are coherent and complete. 			<ul style="list-style-type: none"> Most answers to questions are coherent and complete. 			<ul style="list-style-type: none"> Answers to questions are neither coherent nor complete. 			

	<ul style="list-style-type: none">▪ Answers demonstrate confidence and extensive knowledge.	<ul style="list-style-type: none">▪ Answers somehow demonstrate confidence and extensive knowledge.	<ul style="list-style-type: none">▪ Is tentative or unclear in responses.	
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