



Course Specifications

Course Title:	Digital Image Acquisition and Display
Course Code:	374217-2
Program:	Bachelor in Radiological Sciences
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours:	2
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	4th Level/ 2ndYear
4. Pre-requisites for this course (if any):	N/A
5. Co-requisites for this course (if any):	N/A

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description
The course is designed to enable the students to outline, describe and discuss digital radiography, imaging acquisition and to identify errors and soft image processing as well as different display modalities
2. Course Main Objective
Outline, describe and discuss digital radiography, imaging acquisition as well as digital display

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Define the digital image and the preprocessing as well as post processing methods.	K2
1.2	Explain errors during computer processing and their digital image appearances.	K1
2	Skills:	
2.1	Reconstruct computer parts and network used in radiology.	S4

CLOs		Aligned PLOs
2.2	Make use of picture archiving and communication system (PACS).	S5
3	Values:	
-	-	-

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Basic Principles of Digital Radiography Chapter III imaging science topic one page 11	3
2	Digital Radiography and limitation of conventional radiography P.p (12-14)	3
3	Characteristic of the digital imaging Chapter III imaging science topic two	3
4	Computed radiography overview Chapter III imaging science topic three	3
5	Details of Computed radiography (characteristics and comparison) chapter III	3
6	Common CR image Acquisition errors Chapter III imaging science chapter VI Pp 23	3
7	Flat Panel digital Radiography Chapter III imaging science Pp 15	3
8	Cassette less Equipment and image Acquisition Chapter III imaging science Pp 15-16	3
9	Picture Archiving and communication system PACs Chapter IV Pp 18	3
10	Image quality in DR, processing and manipulation Chapter IV Pp21 and 23	3
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Define the digital image and the preprocessing as well as post processing methods.	lecture	Direct method/ written exam (mid, final, and quiz).
1.2	Explain errors during computer processing and their digital image appearances.	lecture	Direct method/ written exam (mid, final, and quiz) Indirect method /survey
2.0	Skills:		
2.1	Reconstruct computer parts and network used in radiology.	Small group discussion	Direct method/ Discussion
2.2	Make use of picture archiving and communication system (PACS).	Lecture	Presentation
3.0	Values:		
-	-	-	-

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-term Examination	5 th – 6 th	30 %
2	Activity (Quiz, discussion, presentation and survey)	8 th – 9 th	20 %
3	Final Examination	11 th -12 th	50 %

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Faculty members are available for individual consultation. They usually dedicate 12 hours weekly for office hours and students are encouraged to visit them for help. Appointments can also be made in person with the faculty through email or phone. Faculty provide a range of academic and course management advice. Each student has an academic adviser who offers personal, academic, psychological, and professional counseling, as well as group counseling to support the academic, behavioral, emotional, psychological, and social growth of students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Radiologic Science for Technologists, Physics, Biology, and Protection Stewart Bushong 12 th Edition December 2020 ISBN: 9780323749558
Essential References Materials	Digital Imaging and Communications in Medicine (DICOM): A Practical Introduction and Survival Guide Oleg S. Pinykh 2 nd Edition 978364210849 2012
Electronic Materials	None.
Other Learning Materials	None.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with at least 30 seats.
Technology Resources (AV, data show, Smart Board, software, etc.)	- Data show. - Internet access.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Program Leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	11 TH
Date	24 TH MAY 2022





Course Specifications

Course Title:	Human Anatomy
Course Code:	374210-4
Program:	Bachelor in Radiological Sciences
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University

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1. Learning Resources	5
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H. Specification Approval Data	6

A. Course Identification

1. Credit hours:	4
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th level /2 nd year	
4. Pre-requisites for this course (if any): Medical Biology (2) 370211-4.	
5. Co-requisites for this course (if any): None.	

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	70	100 %
2	Blended	--	--
3	E-learning	--	--
4	Distance learning	--	--
5	Other	--	--

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	30
3	Tutorial	--
4	Others (specify)	--
	Total	70

B. Course Objectives and Learning Outcomes

1. Course Description

The course defines various terminology used in anatomy and its sub-division and explain the organization of bones in different parts of the body. The course enables the students to identify the features of each bone in the body and know the organization of human body and organs forming systems. In addition, the students will be able to identify the normal structure organs and systems and their relationship.

2. Course Main Objective

The students will be able define various terminology used in anatomy and its sub-division, to correlate anatomical structures of the human body with medical images and correctly locate human body parts, structures by surface marking to enable him to carry out correctly positioning for radiographic procedures.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Recall the anatomical structures of the human body systems.	K1
1.2	Define the anatomy of human skeleton.	K1
1.3	Outline the surface anatomical landmarks to facilitate accurate positioning for radiographic procedures.	K1
2	Skills:	
2.1	Relate the anatomy of the human body to X-ray images.	S1
2.2	Interpret the clinical importance of the anatomy of the body systems.	S1
3	Values:	
-	-	-

C. Course Content

No	List of Topic	Contact Hours
1	Bones and joints of the upper limb with practical demonstration. (Chapter, 2 PP.101-112, 45-46, 49-52, 64-66, 75-76, 95)	7
2	Bones and joints of the lower limb with practical demonstration. (Chapter, 3 PP.169-183, 132-134, 139-144, 148, 160-165)	7
3	Skull and mandible with practical demonstration. (Chapter, 8 PP.525-533)	7
4	Vertebra and vertebral column, Bony Pelvis and Thoracic cage with practical demonstration. (Chapter, 6 PP.438-444, 449-454) (Chapter, 4 PP.225-228) (Chapter, 5 PP.298-299)	7
5	Respiratory system with practical demonstration. (Chapter, 6 PP.384-391, 397-402, 406-409), (Chapter, 4 PP.200-202, 219-224)	7
6	Cardio-vascular system with practical demonstration. (Chapter, 4 PP.203-212)	7
7	Digestive system with practical demonstration. (Chapter, 6 PP.370-372, 392-402), (Chapter, 5 PP.256-278)	7
8	Nervous system with practical demonstration. (Chapter, 7 PP.473-511)	7
9	Urinary system with practical demonstration. (Chapter, 5 PP.293-297, 306-309, 331,333)	7
Total		70

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Recall the anatomical structures of the human body systems.	Lecturing	Written exams
1.2	Define the anatomy of human skeleton.	Lecturing	Written exams
1.3	Outline the surface anatomical landmarks to facilitate accurate positioning for radiographic procedures.	Lecturing	Written exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills:		
2.1	Relate the anatomy of the human body to X-ray images.	Discussion Lecturing Problem-solving	Written exam Practical exams
2.2	Interpret the clinical importance of the anatomy of the body systems.	Discussion Lecturing Problem-solving	Written exam Practical exams
3.0	Values:		
-	-	-	-

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-term written exam.	5 th	20 %
2	Mid-term practical exam (case study).	6 th	10 %
3	Assignment.	8 th	10 %
4	Final practical exam.	10 th	20 %
5	Final written exam.	11 th - 12 th	40 %

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Faculty members are available for individual consultation. They usually dedicate 12 hours weekly for office hours and students are encouraged to visit them for help. Appointments can also be made in person with the faculty through email or phone. Faculty provide a range of academic and course management advice. Each student has an academic adviser who offers personal, academic, psychological, and professional counseling, as well as group counseling to support the academic, behavioral, emotional, psychological, and social growth of students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Last's Anatomy Regional and Applied. Chummy Sinnatamby, 11 th Edition. Imprint: Churchill Livingstone. 2009 ISBN: 9780443100321.
Essential References Materials	Gray`s anatomy for students. Richard L., Drake Wayne. Vogl , Adam W. M.Mitchell ,Henry Gray . Imprint: Churchill Livingstone/Elsevier (2 nd Edition, 2010). ISBN: 9780443069529
Electronic Materials	- Link for the course at Blackboard Learn Portal on Taif university webpage (https://lms.tu.edu.sa/webapps/login/) - Saudi Digital Library (SDL) on Taif University website (through the Electronic Services portal - academic systems services).

Other Learning Materials	None
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2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom - Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	- Data show - Internet access
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	- Anatomy lab

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Program Leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	11 TH
Date	24 TH MAY 2022





Course Specifications

Course Title:	Patient Care and Ethics in Radiology
Course Code:	374216-2
Program:	Bachelor in Radiological Sciences
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University

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1. Learning Resources	5
2. Facilities Required.....	6
G. Course Quality Evaluation	6
H. Specification Approval Data	6

A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Level / 2 nd Year
4. Pre-requisites for this course (if any): None.
5. Co-requisites for this course (if any): None.

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	30
3	Tutorial	-
4	Others (specify)	-
	Total	50

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>This course is designed to provide the students with the knowledge and skills needed to assess the physical and mental health status of different types of patients with different age groups and basic concept of routine and emergency patient care procedures. Skills lab (practical sessions) allows the student to practice and refine basic nursing skills.</p>
<p>2. Course Main Objective</p> <ul style="list-style-type: none"> Define the role and responsibilities of health care members at the medical imaging department and practice effective communication skills between the technologist and different types of patients. Demonstrate accepted infection control and general safety practices and how to respond appropriately to emergency situations.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and understanding	

CLOs		Aligned PLOs
1.1	Describe principles of patient's care, ethical and legal health care issues.	K3
1.2	Describe how to communicate with different types of patients and suitable transferring methods for each patient.	K3
2	Skills:	
2.1	Analyze different vital signs, emergency situations and how to deal with all types of patients during and after the procedures.	S1
2.2	Develop effective verbal/nonverbal communication skills with patients and healthcare staff	S1
3	Values:	
3.1	Evaluate the different aspects of profession's code of ethics and comply with the profession's scope of practice.	V1
3.2	Distinguish an accepted infection control principles and general safety practices and how to respond appropriately to emergency situations.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to patient care and medical ethics.	5
2	Communication skills.	5
3	interactions inside radiology department.	5
4	Patient Safety.	5
5	Patient transfer.	5
6	Evaluation of patient physical needs.	5
7	Infection control.	5
8	Emergency procedures.	5
9	Patient interventions.	5
10	Ethics and ethical behavior.	5
Total		50

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Describe principles of patient's care, ethical and legal health care issues.	Lectures	Quizzes, Mid-term exam and Final exam.
1.2	Describe how to communicate with different types of patients and suitable transferring methods for each patient.	Lectures	Quizzes, Mid-term exam and Final exam.
2.0	Skills:		
2.1	Analyze different vital signs, emergency situations and how to deal with all types of patients during and after the procedures.	Lectures and Problem solving	Assignments and practical exams.
2.2	Develop effective verbal/nonverbal communication skills with patients and healthcare staff	Lectures and Problem solving	Assignments and practical exams.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	Values:		
3.1	Evaluate the different aspects of profession's code of ethics and comply with the profession's scope of practice.	Self-learning	Presentations.
3.2	Distinguish an accepted infection control principles and general safety practices and how to respond appropriately to emergency situations.	Self-learning	Presentations.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-term Examination	6 th	30
2	Activity	7 th	10
3	Final Practical Examination	10 th	10
4	Final Examination	11 th -12 th	50

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Faculty members are available for individual consultation. They usually dedicate 12 hours weekly for office hours and students are encouraged to visit them for help. Appointments can also be made in person with the faculty through email or phone. Faculty provide a range of academic and course management advice. Each student has an academic adviser who offers personal, academic, psychological, and professional counseling, as well as group counseling to support the academic, behavioral, emotional, psychological, and social growth of students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Introduction to Radiologic Sciences and Patient Care Arlene A., Richard R. Carlton Fourth edition, 2007 ISBN 13: 9780323566711
Essential References Materials	Introduction to Radiography and Patient Care Adler A, Carlton R 2nd edition, 1999 WB Saunders ISBN-13: 978-0721676623
Electronic Materials	shorturl.at/hpDR0 https://journalofethics.ama-assn.org/article/radiologists-ethical-and-professional-obligations/2007-11

Other Learning Materials	Blackboard E-learning and patient care websites.
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2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> Classrooms. Lab for patient care equipment with nursing simulators (catheters, nasal tubes and vital signs check accessories)
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Videos.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Program Leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	11TH
Date	24TH MAY 2022





Course Specifications

Course Title:	Radiation Physics
Course Code:	374211-2
Program:	Bachelor in Radiological Sciences
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University

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H. Specification Approval Data	8

A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Level/ 2 nd Year
4. Pre-requisites for this course (if any): Medical physics (370213-3).
5. Co-requisites for this course (if any): None.

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	100 %
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	20
2	Laboratory/Studio	30
3	Tutorial	-
4	Others (specify)	-
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

This course integrates with basic understanding of physics in connection with different radio phenomenal applications, which helps improve radiological fundamental concept. Emphasizing on different interaction processes of diagnostic radiation.

2. Course Main Objective

The course is designed to enable the student to describe the components of the x-ray tube and their functions, the characteristics of the x-ray beam, the attenuation of x-rays and how it affects the radiographic image; in addition to focusing on understanding the basic concepts of radiation physics and the difference between particulate and electromagnetic radiation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Describe the nature of radiation, atomic structure and theory.	K1
1.2	List the X-ray tube contents and their types.	K2
1.3	Summarize radioactivity and radionuclides used for medical application.	K3
2	Skills:	
2.1	Analyses the nature of electromagnetic radiations	S2
2.2	Utilize different experiments in lab.	S2
3	Values:	
3.1	-	-

C. Course Content

No	List of Topics	Contact Hours
1	Introduction 1. Matter <ol style="list-style-type: none"> Nature of Matter Physical States of Matter Forms of Matter 2. Composition of Nucleus <ol style="list-style-type: none"> Proton and electron balance. Electron shells. Binding energy. Valence shell. Ionization. Excitation. Atomic Number Z. Mass number A. 3. Practical demonstration (Lab). Chapter 1, p.1-19	5
2	1. Nature of Radiation: <ol style="list-style-type: none"> Electromagnetic. Spectrum. Wave-particle duality and Properties. 2. Particulate Types and Characteristics. 3. Non-ionizing (excitation) vs. Ionization Energy Probability. 4. Radioactivity. 5. Radioactive Decay: <ol style="list-style-type: none"> Alpha. Beta. Gamma emission. Half-life ($T_{1/2}$). 6. Radionuclide used within medical applications: <ol style="list-style-type: none"> Diagnostic. Therapy. 7. Practical demonstration (Lab). Chapter 6, p. 101- 123	5

3	<ol style="list-style-type: none"> 1. X-Ray Production. 2. The interaction processes in the X-ray tube. 3. Types of Bremsstrahlung and Characteristic 4. Practical demonstration (Lab). Chapter 9, p.203-230 	5
4	<ol style="list-style-type: none"> 1. Percentage relationship with energy. 2. Common terms related to X-ray beam. 3. Primary beam. 4. Exit/remnant beam 5. Leakage radiation. 6. Off-focus radiation. 7. X-ray tube Conditions necessary for production: <ol style="list-style-type: none"> a. Source of electrons. b. Acceleration of electrons. c. Focusing the electron stream. d. Deceleration of electrons. 8. Practical demonstration (Lab). Chapter 10, p.231-263 	5
5	<ol style="list-style-type: none"> 1. Conditions necessary for production: <ol style="list-style-type: none"> a. Source of electrons. b. Acceleration of electrons. c. Focusing the electron stream. d. Deceleration of electrons. 2. X-ray emission spectra <ol style="list-style-type: none"> a. Continuous spectrum b. Discrete spectrum c. Minimum wavelength 3. Practical demonstration (Lab). Chapter 10, p. 231-263 	5
6	<ol style="list-style-type: none"> 1. Factors that affect emission spectra and effect of each factor in details kVp mA: <ol style="list-style-type: none"> a. Time Atomic number of targets. b. Distance Filtration. c. Voltage. d. Waveform. e. Efficiency in production. f. Description. g. Frequency and wavelength. h. Interaction of Photons with Matter. i. Transmission of photons. j. Attenuated radiation. k. Exit/remnant radiation. 2. Practical demonstration (Lab). Chapter 2, p.20-37 	5
7	<ol style="list-style-type: none"> 1. Interaction of X-ray and gamma ray with matter: <ol style="list-style-type: none"> a. Unmodified scattering (coherent). 	5

	<ul style="list-style-type: none"> b. Description of interaction. c. Relation to atomic number. d. Energy of incident photon and resulting product. e. Probability of occurrence. f. Application. <p>2. Practical demonstration (Lab). Chapter 7, p.124-159</p>	
8	<p>1. Interaction of Photons with Matter:</p> <ul style="list-style-type: none"> a. Photoelectric effect. b. Description of interaction. c. Relation to atomic number. d. Energy of incident photon and resulting product. e. Probability of occurrence atomic number. f. Photon energy. g. Part density. h. Application. <p>2. Practical demonstration (Lab). Chapter 8, p.160-202</p>	5
9	<p>1. Modified scattering (Compton):</p> <ul style="list-style-type: none"> a. Description of interaction. b. Relation to electron density. c. Energy. d. Probability of occurrence. e. Importance of each interaction. f. Relation to imaging. <p>2. Practical demonstration (Lab). Chapter 12, p.292-345</p>	5
10	<p>1. Less important interaction process in diagnostic and image formation:</p> <ul style="list-style-type: none"> a. Pair production. b. Photodisintegration. <p>2. Link of radiation physics to radiation protection and imaging.</p> <p>3. Practical demonstration (Lab). Chapter 13, p.246-394</p>	5
Total		50

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Describe the nature of radiation, atomic structure, and theory.	Lectures	Quizzes Midterm exam Final exam
1.2	List the X-ray tube contents and their types.	Lectures	Quizzes Midterm exam Final exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Summarize radioactivity and radionuclides used for medical application.	Lectures	Assignments
2.0	Skills:		
2.1	Analyses the nature of electromagnetic radiations	Lectures	Assignments
2.2	Utilize different experiments in lab.	Small group discussion	Practical exam
3.0	Values:		
-	-	-	-

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam (written test).	6 th	30%
2	Assignments.	8 th	30%
3	Practical Exam (experiments).	10 th	20%
4	Final Exam (written exam).	11 th -12 th	20%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Faculty members are available for individual consultation. They usually dedicate 12 hours weekly for office hours and students are encouraged to visit them for help. Appointments can also be made in person with the faculty through email or phone. Faculty provide a range of academic and course management advice. Each student has an academic adviser who offers personal, academic, psychological, and professional counseling, as well as group counseling to support the academic, behavioral, emotional, psychological, and social growth of students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Frank Herbert Attix. Introduction to Radiological Physics and Radiation Dosimetry. published:19 November 1986 ISBN:9783527617135 DOI:10.1002/9783527617135
Essential References Materials	Fundamentals of Diagnostic Radiology Daniels C, Cupido 1999 Halifax, Nova Scotia: Dalhousie University.
Electronic Materials	1. http://www.arrt.org 2. https://www.asrt.org/asrt.htm 3. http://www.auntminnie.com 4. http://www.air.asn.au
Other Learning Materials	None.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with multimedia projector. Lab for radiation physics with X-ray simulator. Lab with X-ray machine.
Technology Resources (AV, data show, Smart Board, software, etc.)	Multimedia projector (data show) Software installed in the X-ray simulator.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	X-ray simulator.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Program Leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	11 TH
Date	24 TH MAY 2022





Course Specifications

Course Title:	Radiation Protection and Dosimetry
Course Code:	374212-2
Program:	Bachelor in Radiological Sciences
Department:	Department of Radiological Sciences
College:	College of Applied Medical Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Level/ 2 nd Year
4. Pre-requisites for this course (if any): Medical Physics (370213-3).
5. Co-requisites for this course (if any): None.

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	30

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>This course is designed to enable students to work on radiation environment area by knowing the benefits and the risk of ionizing radiation to both patients and staff, also enable them to achieve the basic knowledge of radiation protection to allow them to take position in research center that deal with radiation protection and dosimeters concepts.</p>
<p>2. Course Main Objective</p> <ol style="list-style-type: none"> 1. Define the importance of radiation protection and its related topics 2. Memorize the safe usage of ionizing radiation during diagnostic procedures and radiation protection tools and devices within the diagnostic department 3. Summarize the principles of pregnant staff and patients.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Outline radiation protection principles.	K1

CLOs		Aligned PLOs
1.2	Define the importance of radiation protection and the safe usage of ionizing radiation tools during diagnostic procedure for patients, staff and public.	K3
2	Skills:	
2.1	Apply the protection measures in diagnostic procedures for pregnant patient and staff.	S2
2.2	Utilize the protection rules in diagnostic imaging for the children.	S4
3	Values:	
-	-	-

C. Course Content

No	List of Topics	Contact Hours
1	1.1 Overview of the curriculum. 1.2 Introduction to radiation protection. (Textbook1- Ch1-Pages:1-6) 1.3 Regulatory/Advisory, Agencies and Regulations. (Textbook2-Ch7-Pages:110-116)	3
2	2.1 Dose concepts - Quantities and units. (Textbook1- Ch3-Pages:43-51) 2.2 Radiation: Types, sources, and doses received. (Textbook2- Ch9-Pages:143-157)	3
3	3.1 Principles and methods of radiation protection in diagnostic departments. (Textbook2- Ch8-Pages:119-120) 3.2 Materials used for primary barrier and secondary barrier. (Textbook2- Ch8-Pages:120-122) 3.3 Barrier Half Value Layer and tenth-value layer -Anti -scatter grid. (Textbook2- Ch8-Pages:123-126)	3
4	Application for protection from scatter, leakage radiation and Secondary radiation. (Textbook1- Ch7-Pages:161-171)	3
5	5.1 Radiation protection in practice X-ray and ancillary equipment. (Textbook1- Ch7-Pages:153-160) 5.2 Beam limiting devices- Exposure control devices. 5.3 Patient protection and image quality.	3
6	6.1 Optimization of image quality and patient dose. (Textbook1- Ch7-Pages:161-171) 6.2 Relation between radiation dose and image quality. 6.3 Exposure rate constant- gamma constant.	3
7	7. Special issues in radiation protection: (Textbook1- Ch8-Pages:201-210) 7.1 Pregnant patient and staff – Pediatric safety. 7.2 Radiation safety during fluoroscopy and interventional radiology. (Textbook1- Ch8-Pages:211-215)	3
8	8.1 Molecular and cellular radiation biology. (Textbook1- Ch6-Pages: 105-127) 8.2 Early tissue reactions and their effects on organ systems. 8.3 Stochastic effects and late tissue reactions of radiation in organ systems. 8.4 Dose limits for exposure to ionizing radiation.	3
9	9. Radiation Dosimetry: (Textbook2- Ch5-Pages:57-71) 9.1 Equipment design for Radiation Protection 9.2 Characteristic- advantages and disadvantages of each measurement instrument	3
10	10 Radiation Dosimetry-Cont. (Textbook1- Ch9-Pages:225-237) 10.1 Personnel Monitoring.	3

10.2 Management of imaging personnel radiation dose during diagnostic X-ray procedures for staff.	
10.3 Radioisotopes and radiation protection	
Total	30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding		
1.1	Outline radiation protection principles.	Lectures	Direct method Examinations (Quizzes, Midterm exam and Final exam) Indirect method (survey)
1.2	Define the importance of radiation protection and the safe usage of ionizing radiation tools during diagnostic procedure for patients, staff and public.	Lectures	Direct method Examinations (Quizzes, Midterm exam and Final exam) Indirect method (survey)
2.0	Skills:		
2.1	Apply the protection measures in diagnostic procedures for pregnant patient and staff.	Problem-solving Small group discussion	Direct method Assignments Case study
2.2	Utilize the protection rules in diagnostic imaging for the children.		
3.0	Values:		
-	-	-	-

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-term Examination	4 th – 5 th	30
2	Activity (Quiz assignment + case study)	8 th	20
3	Final Examination	11 th -12 th	50

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Faculty members are available for individual consultation. They usually dedicate 12 hours weekly for office hours and students are encouraged to visit them for help. Appointments can also be made in person with the faculty through email or phone. Faculty provide a range of academic and course management advice. Each student has an academic adviser who offers personal, academic, psychological, and professional counseling, as well as group counseling to support the academic, behavioral, emotional, psychological, and social growth of students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<p>Radiation Protection in Medical Radiography Authors: Mary Alice Statkiewicz Sherer, Paula Visconti, E. Russell Ritenour, Kelli Welch Haynes 8th Edition March 28, 2017 ISBN: 9780323566780</p> <p>Introduction to Radiation Protection Claus Grupen. 2nd Edition 2015 Springer ISBN: 978-3-642-02585-3</p>
Essential References Materials	<p>Sherer, M.S. Visconti, P.J., et al. "Radiation Protection in Medical radiography", 8th edition. Mosby, 2018 ISBN:978-0-323-44666-2 - ICRP 2017 Radiation protection and dosimetry Journal RPD Report of IAEA for patient protection each year</p>
Electronic Materials	<p>Link for the course at Blackboard Learn Portal on Taif university webpage (https://lms.tu.edu.sa/webapps/login/)</p>
Other Learning Materials	<p>None</p>

2. Facilities Required

Item	Resources
<p>Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	Classrooms
<p>Technology Resources (AV, data show, Smart Board, software, etc.)</p>	Data show- Smart Board
<p>Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Program Leaders	Direct
Extent of achievement of course learning outcomes	Faculty	Direct
Quality of learning resources	Student, Faculty	Indirect
Course management and planning	Students	Indirect
Teaching and interaction with students	Students	Indirect

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Evaluation and exams	Students, peer review	Direct, Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
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