



Iraqi Republic
Ministry of Higher Education and Scientific Research
Al-Ayen Iraqi University, Iraq
College of Health and Medical Technologies
Department of Radiology Technologies

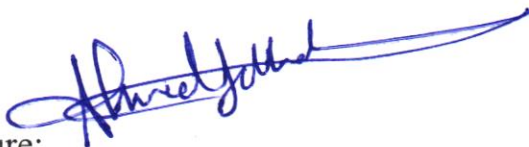


Ministry of Higher Education and Scientific Research
Scientific supervision and evaluation device
Department of Quality Assurance and Academic Accreditation

Description of the academic program
College of Health and Medical Technologies
Department of Radiology Technologies

University: Al-Ayen Iraqi
College/Institute: College of Health and Medical Technologies
Scientific Department: Radiology Technologies
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Assi.L. Jihan Hassoun Muhammad
Date of filling the file: 31 / 4 / 2024

Signature: 
Name of Department Head:
L. Dr. Abdullah Hassan Jabbar
Date: 31 / 3 / 2024

Signature: 
Assistant Scientific Dean:
Prof. Dr. Ahmed Salah El-Din
Date: / / 2024

The file was audited by the Quality Assurance and University Performance Division
Name of the Director of the Quality Assurance and University Performance
Division:
Date: 1 / 4 / 2024
Signature: 

Authentication of the Dean


Dr. Mohammed A. Al-Hakim
20.4.2024

Description of the academic program

summary of the most important characteristics of the program and the learning outcomes that the student is expected to achieve, demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course in the program.

1. Educational institution	Al-Ayen Iraqi University
2. Scientific department/center	Radiology Technologies
3. Name of the academic or professional program	Department of Health and Medical Technologies / Radiology Technologies
4. Name of the final certificate	Bachelor's degree in radiology technology
5. Academic system: Annual/ courses/other	Annual + courses
6. Accredited accreditation program	Practical + theoretical
7. Other external influences	Educational laboratory + library + the Internet
8. Date the description was prepared	2024
9. Objectives of the academic program	
Preparing and qualifying radiology and ultrasound technicians with scientific knowledge, abilities, and professional skills so that they are able to solve health problems at the national and international levels in the field of radiology and ultrasound techniques.	
Providing quality and distinguished health service to the community and keeping pace with developments in medical and health sciences	
Developing and encouraging the field of scientific research, and supporting links with national industrial and production institutions using research results and their applications	
Spreading health awareness through radiology and ultrasound techniques	
Graduating technical staff who work in radiation examination units and are able to complete all steps related to radiation and sonar techniques, such as examination and radiation treatment procedures and providing radiation protection for patients and	

workers in the radiation field.

10.Required program outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

A1- It teaches students to obtain knowledge and understanding of radiological examination procedures in all its forms.

A2- It helps students to obtain knowledge and understanding of the basic sciences in radiological devices

A3- It helps students to obtain knowledge and understanding of radiation protection

A4- It teaches students to obtain knowledge and understanding of physiological diseases and the method of examining them radiologically.

A5- It helps students to obtain knowledge and understanding of the principles of radiology and sonar.

B - The program's skill objectives

B1- Students complete all the steps related to radiological examination procedures in all their forms.

B2- Students solve problems related to the basic sciences of radiological devices

B3- Students complete all the steps related to radiation protection

B4- Students complete all the steps related to physiological diseases and the method of examining them radiologically

B5- Students will complete all the steps related to the principles of radiology and ultrasound

Teaching and learning methods

1. Giving scientific and theoretical lectures using information technology in the college (using computers and the Internet).

2. Providing students with the basics and additional topics related to the previous learning outcomes of skills, to solve practical problems.

3. Applying the topics studied theoretically at the practical level in the field of radiological examination techniques.

Evaluation methods

1. Conducting daily examinations.

2. Conducting monthly examinations

3. Conducting semester and final exams

C- Emotional and value-based opposition.

C1- That the student interacts during the lecture.

C2- The student should listen carefully to the professor's explanation.

C3- The student interactions and loves doing extracurricular activities

C4- The student should love doing homework

Teaching and learning methods	
1 . Conducting summer training workshops for the academic stages of training in radiological devices. 2. Use diverse teaching strategies and methods appropriate to the learning outcomes. 3. Developing learning methods and independent practical work.	
Evaluation methods	
1. Conducting daily examinations. 2. Conducting monthly examinations 3. Conducting semester and final exams	

Educational level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The first stage		Anatomy of the skeleton	2	3
		General physics	2	3
		General physiology	2	3
		Biology	2	3
		General chemistry	2	3
		Computer principles 1	1	2
		Human rights and democracy	1	-
		Anatomy of body systems	2	3
		Atom physics	2	3
		Functional physiology	2	3
		Radiobiology	2	4
		Fundamentals of nursing	2	4
		Computer principles 2	1	2
		Medical terms	2	-
		Arabic	2	-
		Ba'ath Party crimes	1	-
The second stage		Traditional radiological techniques	2	5
		Radiography techniques of the upper extremities	2	5
		Special radiological examinations of the digestive system and bones	2	5
		Radiographic anatomy of the head and upper extremities	2	4
		Fundamentals of radiation physics	2	3

		Basics of radiation protection	2	3
		Computed tomography techniques	2	5
		Radiographic techniques of the lower extremities	2	5
		Special radiological examinations of the biliary and reproductive system	2	5
		Radiographic anatomy of the lower extremities	2	4
		Physics of computed tomography	2	3
The third stage		Radiographic anatomy 2	2	2
		Radiography techniques 2	2	4
		Techniques of radiological medical imaging devices 2	2	4
		Special radiological examinations 2	2	4
		Pathology	2	2
		Radiological physics 2	2	2
		Radiation protection 2	1	2
		Computer applications2	1	2
The fourth stage		Principles of medicine and surgery	2	3
		CT scan	2	4
		Magnetic resonance imaging	2	4
		Ultrasound imaging	2	4
		Biostatistics and computer applications	2	2
		Research project	0	-
		Professional ethics	1	-

12. Planning for personal development
1 . Participation in courses and conferences. 2. Frequent visits to government and private laboratories to acquire skills. 3. Look at sources, books, and magazines as a source of information
13. Admission standard (setting regulations related to admission to the college or institute)
Central/according to the requirements of the Ministry of Higher Education and Scientific Research.
14. The most important sources of information about the program
1. Al-Ayen Iraqi University website

2. College of Health and Medical Technologies website

Curriculum skills chart																			
the boxes corresponding to the individual learning outcomes from the program subject to evaluation Please check																			
Learning outcomes required from the programme																			
General and qualifying transferable skills (other skills related to employability and personal development)				Emotional and evaluation objectives				Skills objectives of the programme				Cognitive objectives				General or specialist	Course Name	Course Code	Year/level
D4	D3	D2	D1	C4	C3	C2	C1	B4	B3	B2	B 1	A4	A3	A2	A1				
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Anatomy of the skeleton		The first stage
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	General physics		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	General physiology		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Biology		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	General chemistry		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Computer principles 1		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Human rights and democracy		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Anatomy of body systems		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Atom physics		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Functional physiology		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Radiobiology		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Fundamentals of nursing		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Computer principles 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Medical terms		

√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Arabic		The second stage
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Baath Party crimes		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Traditional radiological techniques		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiography techniques of the upper extremities		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Special radiological examinations of the digestive system and bones		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiographic anatomy of the head and upper extremities		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Fundamentals of radiation physics		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Basics of radiation protection		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Computed tomography techniques		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiographic techniques of the lower extremities		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Special radiological		

																	examinations of the biliary and reproductive system		The third stage
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiographic anatomy of the lower extremities		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Physics of computed tomography		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiographic anatomy 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Radiography techniques 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Techniques of radiological medical imaging devices 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	radiological Special examinations 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Pathology		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Radiological physics 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Radiation protection 2		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Computer applications2		The fourth stage
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Principles of medicine and		

																	surgery		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	CT scan		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Magnetic resonance imaging		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Ultrasound imaging		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Auxiliary	Biostatistics and computer applications		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Specialist	Research project		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	General	Professional ethics		

Department of Radiology Technologies (the first stage)



Skeletal anatomy course

This course provides a study of the anatomy of the skeleton and its levels, learning about its importance, and explaining the anatomical levels of the different parts of the body.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	Skeletal anatomy
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
8. Date this description was prepared	2024
9. Course objectives	
1. Introducing the student to discovering the human body	
2. Introducing the student to the main organs of the human body	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives
1. Introducing the student to all the body's organs and determining their locations
2. Linking the work of the members together
3. Understanding the academic material

B - The skills objectives of the course. 1. Definition of the basic concepts of anatomy 2. Introducing the student to the basic vocabulary of anatomy 3. Introducing the student to his full body and linking it to the job
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1. By linking changes at the cell level in the anatomical organ 2. The student is able to understand the importance of organs from an anatomical perspective and the relationship and importance of each organ 3. Practical skills that enable the student to identify the parts and anatomical structures of each organ in the body
D - General and qualifying transferable skills (other skills related to employability and personal development). • Teaching the student to deal with patients and various situations. • Teaching students psychological care skills for people with disabilities and oncology patients.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Introduction, definition	Understands material the	2 theoretical + 3 practical	1.
Apply and test	Interactive	Skeleton of the upper limb	Understands the material	2 theoretical + 3 practical	2.
Apply and test	Interactive	The humerus and radius ulna bones	Understands the material	2 theoretical + 3 practical	3.
Apply and test	Interactive	The hand	Understands the material	2 theoretical + 3 practical	4.
Apply and test	Interactive	The muscle of upper limbs	Understands the material	2 theoretical + 3 practical	5.
Apply and test	Interactive	Joints	Understands the material	2 theoretical + 3 practical	6.
Apply and test	Interactive	Skeleton of the chest	Understands the material	2 theoretical + 3 practical	7.
Apply and test	Interactive	Vertebrate	Understands the material	2 theoretical + 3 practical	8.
Apply and test	Interactive	Skeleton of the lower limb	Understands the material	2 theoretical + 3	9.

				practical	
Apply and test	Interactive	The femur, tibia and fibula bones	Understands the material	2 theoretical + 3 practical	10.
Apply and test	Interactive	The foot	Understands the material	2 theoretical + 3 practical	11.
Apply and test	Interactive	The muscles of lower limbs	Understands the material	2 theoretical + 3 practical	12.
Apply and test	Interactive	Skull	Understands the material	2 theoretical + 3 practical	13.
Apply and test	Interactive	Facial bones and TMJ	Understands the material	2 theoretical + 3 practical	14.
Apply and test	Interactive	Nasal cavity and paranasal sinus	Understands the material	2 theoretical + 3 practical	15.

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	Netter Atlas of human Anatomy Abrahams, Clinical Atlas of Anatomy
A-Recommended books and references (scientific journals, reports,...)	Pub med
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan

The curriculum development plan is based on the following:

- Giving the prescribed scientific material and observing and analyzing the students' results
- Study feedback from students' comments about vocabulary
- Study the practical laboratory notes for the course
- Comparing current vocabulary with the vocabulary of corresponding colleges in the field

General physics course

This course provides an introduction to the general rules and basic principles of physics, learning about units of measurement, electricity, magnetism, gravity, and kinetic energy, and determining the relationship between work and energy.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	General physics
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
8. Date this description was prepared	2024
9. Course objectives It is for the student to become acquainted with the scientific concepts, foundations, and facts in the general physics curriculum, and to consolidate some of the educational strategies and scientific concepts related to the physics curriculum at the university education stage, and through them to	

define for the student the educational and psychological methods and theories in studying physics.

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- That the student learns the basics of physics 2- The student should distinguish between what is theoretical and what is applied 3- The student should analyze physical theories practically 4- The student should evaluate the operation of the devices and their applications
B - The skills objectives of the course. 1- It involves encouraging students to be creative 2- Creating a spirit of perseverance through continuous encouragement of joint and effective cooperation among them to fulfill their academic requirements. 3- Enabling the student to participate and discuss in preparing research, reports, and group work. 4- Skills according to the student's mental and intellectual ability
Teaching and learning methods
3. Lectures 4. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1- Brainstorming 2- Logical analysis of a problem and its solution (critical analysis in learning) 3- High thinking to make good decisions
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Verbal communication 2- Teamwork 3- Analysis and application 4- Planning and organization 5- Time management

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Standard units of measurements	Understands the material	2 theoretical + 3 practical	1
Apply and test	Interactive	Electricity. Magnetism	Understands the material	2 theoretical + 3 practical	2
Apply and test	Interactive	Mechanics	Understands the material	2 theoretical + 3 practical	3
Apply and test	Interactive	Law of conservation of momentum	Understands the material	2 theoretical + 3 practical	4
Apply and test	Interactive	Conservation of Energy	Understands the material	2 theoretical + 3 practical	5
Apply and test	Interactive	Gravitational potential energy	Understands the material	2 theoretical + 3 practical	6
Apply and test	Interactive	Simple harmonic motion	Understands the material	2 theoretical + 3 practical	7
Apply and test	Interactive	Dynamics of Rotational Motion	Understands the material	2 theoretical + 3 practical	8
Apply and test	Interactive	Torque-angular acceleration relation	Understands the material	2 theoretical + 3	9

				practical	
Apply and test	Interactive	Static equilibrium experiments	Understands the material	2 theoretical + 3 practical	10
Apply and test	Interactive	Periodic Motion experiment	Understands the material	2 theoretical + 3 practical	11
Apply and test	Interactive	Gravitational potential energy	Understands the material	2 theoretical + 3 practical	12
Apply and test	Interactive	Heat and temperature	Understands the material	2 theoretical + 3 practical	13
Apply and test	Interactive	Methods of heat transferring	Understands the material	2 theoretical + 3 practical	14
Apply and test	Interactive	laws of pressure.	Understands the material	2 theoretical + 3 practical	15

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1.M. Radhi Al-Qurayshi and H. Qasim. AL-Mosawi " Radiation Physics and its applications in diagnostic radiological techniques", Middle Technical University (MTU), Iraq, (2015). 2. RF Farr and PJ Allisy-Roberts (Physics for Medical Imaging) Saunders, 4th edition (2001). 3. Stewart Carlyle Bushing, "Radiologic Science for Technologists Physics, Biology, and protection" Elsevier, Inc. , 7th edition, 2017.

A-Recommended books and references (scientific journals, reports,...)	Pub med
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

General Physiology course

This course provides an introduction to the main physiological concepts of cells and their components and the factors regulating homeostasis in the human body.
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1. Educational institution	Al-Ayen Iraqi University
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2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	General Physiology course
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
8. Date this description was prepared	2024
9. Course objectives It is for the student to become familiar with the concepts, foundations and scientific facts in the general physiology curriculum, and to consolidate some educational strategies and scientific concepts related to the physiology of the body at the university education stage.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Understand the main physiological concepts of cells and their components. 2. Identify the factors that regulate balance in the human body 3. Understand the physiological mechanisms of blood flow, gas exchange, and gastric secretions.
B - The skills objectives of the course. 1. It involves encouraging students to be creative 2. Creating a spirit of perseverance through continuous encouragement of joint and effective cooperation among them to fulfill their academic requirements. 3. Enabling the student to participate and discuss in preparing research, reports, and group work. 4. Skills according to the student's mental and intellectual ability
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods

1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1. Brainstorming 2. Enhancing students' confidence by preparing them for the next academic stages 3. Writing scientific reports and reading scientific research
D - General and qualifying transferable skills (other skills related to employability and personal development). • Teaching the student to deal with patients and various situations. • Teaching students psychological care skills for people with disabilities and oncology patients

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Introduction to Human Physiology -Cell components and organelles	Understands the material	2 theoretical + 3 practical	1
Apply and test	Interactive	:Blood Blood Functions- :blood components blood plasma, plasma proteins function	Understands the material	2 theoretical + 3 practical	2
Apply and test	Interactive	:Formed elements leukocytes (types and function), Platelets, and Erythrocytes, Erythropoietin Role in Erythrocytes Production.	Understands the material	2 theoretical + 3 practical	3
Apply and test	Interactive	:Blood Clotting clotting factors and Mechanism of Blood Clot Formation	Understands the material	2 theoretical + 3 practical	4
Apply and test	Interactive	:Fluid Compartments in the Body ICF,ECF, interstitial fluid and transcellular fluids, compositions of body fluids	Understands the material	2 theoretical + 3 practical	5
Apply and test	Interactive	:Fluid shift Diffusion, Osmosis, hydrostatic pressure, filtration & Active Transport Across Cell Membranes	Understands the material	2 theoretical + 3 practical	6
Apply and test	Interactive	:Homeostasis Blood glucose homeostasis, excretion homeostasis and Body Temperature Regulation	Understands the material	2 theoretical + 3 practical	7
Apply and test	Interactive	:Heart and blood vessels Heart function- Blood vessels function- cardiac valves and their functions- -Heart sounds.	Understands the material	2 theoretical + 3 practical	8
Apply and test	Interactive	:Circulations systemic circulation, pulmonary circulation, Cardiac cycle, cardiac	Understands the material	2 theoretical + 3	9

		output, and electrical properties		practical	
Apply and test	Interactive	:Blood Pressure Mean arterial blood pressure and its - regulation -Role of kidney in regulation blood pressure	Understands the material	2 theoretical + 3 practical	10
Apply and test	Interactive	:Measurement of lung function Lung volumes and capacities- -Exchange & transport of gases in the blood	Understands the material	2 theoretical + 3 practical	11
Apply and test	Interactive	:Gastrointestinal tract GI tract general functions- -Oral cavity function, Salivary glands function, stomach function, small intestine and large intestine function	Understands the material	2 theoretical + 3 practical	12
Apply and test	Interactive	:Gastrointestinal tract Secretions General characteristic of GI Secretions and their functions	Understands the material	2 theoretical + 3 practical	13
Apply and test	Interactive	:Physiology of Pregnancy Parturition, stages of labor hormonal stimulation of parturition and lactation	Understands the material	2 theoretical + 3 practical	14
Apply and test	Interactive	:Fetal development The newborn - First year after birth - -Aging and death	Understands the material	2 theoretical + 3 practical	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Seeleys <i>anatomy and physiology</i> (eleven edition) Cinnamon L. VanPutte , Jennifer L. Regan , and Andrew F. Russo (2017) 2. <i>Essentials of Human Anatomy & Physiology</i> , Global Edition Suzanne Keller Elaine Marieb (2017) 3. <i>Human Anatomy and Physiology</i> , Global Edition [Sep 14, 2015] Erin, C. Amerman 4. Study Guide to Human Anatomy and Physiology 1 (2012) Michael Harrell M.S.

A-Recommended books and references (scientific journals, reports,...)	Pub med
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

General biology course

This course provides an introduction to biological systems within the human body and studies the main components of living cells.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	General biology course
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
8. Date this description was prepared	2024

9. Course objectives

Acquire basic knowledge and skills in general biology, especially microbiology.

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. Understanding the academic material
2. Introducing students to the basic and general concepts of biology in general
3. Know the main and important components of medical microbiology.

B - The skills objectives of the course.

1. It involves encouraging students to be creative
2. Creating a spirit of perseverance through continuous encouragement of joint and effective cooperation among them to fulfill their academic requirements.
3. Enabling the student to participate and discuss in preparing research, reports, and group work.

Teaching and learning methods

1. Lectures
2. Video clips

Evaluation methods

1. Written exams every week.
2. Daily oral evaluation.
3. Semester exams.

C. Emotional and evaluation objectives

1. By relating changes at the cell level
2. To brainstorm
3. Using modern teaching methods
4. Practical skills that enable the student to identify all the body's organs

D - General and qualifying transferable skills (other skills related to employability and personal development).

1. Introducing the student to the basic concepts in general and microbiology
2. Introducing the student to the basics of working in the laboratory and methods of working on it

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	The cell	Understands the material	2 theoretical + 3 practical	1
Apply and test	Interactive	PH, salts and ions	Understands material the	2 theoretical + 3 practical	2
Apply and test	Interactive	Lipids and carbohydrates	Understands the material	2 theoretical + 3 practical	3
Apply and test	Interactive	Proteins and nucleic acids	Understands the material	2 theoretical + 3 practical	4
Apply and test	Interactive	Plasma membrane	Understands the material	2 theoretical + 3 practical	5
Apply and test	Interactive	Cytoplasm	Understands the material	2 theoretical + 3 practical	6
Apply and test	Interactive	Mitochondria	Understands the material	2 theoretical + 3 practical	7
Apply and test	Interactive	Eukaryotic cell	Understands the material	2 theoretical + 3 practical	8
Apply and test	Interactive	DNA replication	Understands the material	2 theoretical + 3	9

				practical	
Apply and test	Interactive	DNA translation	Understands the material	2 theoretical + 3 practical	10
Apply and test	Interactive	DNA transcription	Understands the material	2 theoretical + 3 practical	11
Apply and test	Interactive	Meiosis THE	Understands the material	2 theoretical + 3 practical	12
Apply and test	Interactive	THE mitosis	Understands the material	2 theoretical + 3 practical	13
Apply and test	Interactive	Gematogenesis	Understands the material	2 theoretical + 3 practical	14
Apply and test	Interactive	Prokaryotic cell	Understands the material	2 theoretical + 3 practical	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1.Elizabeth o Grady, Jason Cashmore, Marsha, Carol Wismer(2018). Principles of Biology- An introduction to Biological Concepts . second Edition. 2 Peter Raven (2016) Biology. Elven Edition. 3. VJ. Bekish, Yu.T. Nikulin (2006) Practical Book on Medical Biology.
A-Recommended books and references (scientific journals, reports,...)	Pub med

B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University
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13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

General chemistry course

This course provides an introduction to the basic principles of chemistry, how to deal with chemicals, and methods of detecting and separating them.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	General chemistry course
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
8. Date this description was prepared	2024

9. Course objectives Acquiring basic knowledge and skills in chemistry.

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Understanding the academic material 2. Introducing the student to the basic concepts in chemistry
B - The skills objectives of the course. Introducing the student to the basics of working in the laboratory.
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1- The seriousness and continuous interest of the professor makes the student attracted to the scientific subject. 2- Continuous follow-up and use of modern means to deliver scientific material to the student. 3- Linking scientific material to life reality is important.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Introducing the student to the basic concepts in chemistry 2. Introducing the student to the basics of working in the laboratory

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	The atom	Understands the material	2 theoretical + 3 practical	1
Apply and test	Interactive	liquid mixture	Understands the material	2 theoretical + 3 practical	2
Apply and test	Interactive	quantitative and qualitative analysis	Understands the material	2 theoretical + 3 practical	3
Apply and test	Interactive	molar and normal concentrations	Understands the material	2 theoretical + 3 practical	4
Apply and test	Interactive	acid base	Understands the material	2 theoretical + 3 practical	5
Apply and test	Interactive	oxidation reduction	Understands the material	2 theoretical + 3 practical	6
Apply and test	Interactive	Hydrocarbons	Understands the material	2 theoretical + 3 practical	7
Apply and test	Interactive	alcohols, ketones, aldehydes, carboxylic acid	Understands the material	2 theoretical + 3 practical	8
Apply and test	Interactive	aromatic, carbohydrates	Understands the material	2 theoretical + 3 practical	9
Apply and test	Interactive	Amines	Understands the material	2 theoretical + 3 practical	10
Apply and test	Interactive	introduction to biochemistry	Understands the material	2 theoretical + 3 practical	11
Apply and test	Interactive	biochemistry and nutrition	Understands the material	2 theoretical + 3 practical	12
Apply and test	Interactive	sugars, starches and fibers	Understands the material	2 theoretical + 3 practical	13
Apply and test	Interactive	Isomers	Understands the material	2 theoretical + 3 practical	14
Apply and test	Interactive	electrolytes, electrochemistry	Understands the material	2 theoretical + 3 practical	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. <i>Solutions for General Chemistry: Principles and Modern Applications</i> 11th Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Madura, Carey Bissonnette 2. <i>Solutions for CHEMISTRY: The Molecular Nature of Matter and Change</i> 7th Martin S. Silberberg, Patricia G. Amateis

A-Recommended books and references (scientific journals, reports,...)	Pub med
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Human rights course

This course provides human rights topics in terms of the roots of their origin and the developments that these human rights have witnessed throughout the ages and human societies.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	Human rights course
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	1 theoretical hours x 15 weeks = 15 hours
8. Date this description was prepared	2024
9. Course objectives Teaching the student the topics of human rights in terms of the roots of their origin and the developments witnessed by these human rights throughout the ages and human societies and the contribution of divine laws, religions and civilizations in providing them with values and ideals, passing through the various medieval, modern and contemporary eras, dealing with schools, political and intellectual doctrines and revolutions, with a focus on the recognition of human rights in our contemporary history.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Understanding the academic material 2. Informing the student about the roots of human rights and the developments they have witnessed throughout different eras 3. Providing the student with the moral values that require adherence to and clarifying the most important rights entrusted to the individual
B - The skills objectives of the course. 1. The student acquires the knowledge and skills to defend his basic rights and freedoms guaranteed by constitutional and legal legislation and international conventions. 2. Spreading a culture of human rights within society and the place in which it works. 3. How to preserve society and the country by enhancing the country's love for

them. 4. Promoting citizenship among university students.
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1. Teaching students to search for realistic problems and link them to scientific material. 2. Urging students to be objective in discussions about the challenges facing the country. 3. Embodying the concept of freedom among students and clarifying wrong practices and how to avoid them.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Introducing the student to the basic concepts in human rights. 2. Adopting diplomacy and flexibility in dealing. 3. The ability to adapt and communicate with others.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	The roots of human rights and their development in human history	Understands the material	1	1
Apply and test	Interactive	Human rights in ancient civilizations and divine laws	Understands the material	1	2
Apply and test	Interactive	Human rights in religions and divine laws	Understands the material	1	3
Apply and test	Interactive	Human rights in the Middle and Modern Ages	Understands the material	1	4
Apply and test	Interactive	Contemporary recognition of human rights	Understands the material	1	5
Apply and test	Interactive	Contemporary regional recognition	Understands the material	1	6
Apply and test	Interactive	The emergence of non-governmental organizations and their role in the fields of human rights	Understands the material	1	7
Apply and test	Interactive	Contents of human rights and gender rights in international and regional conventions and national legislation	Understands the material	1	8
Apply and test	Interactive	Forms and generations of human rights	Understands the material	1	9
Apply and test	Interactive	Human rights guarantees and protection	Understands the material	1	10
Apply and test	Interactive	Human rights guarantees and protection at the national level	Understands the material	1	11
Apply and test	Interactive	Constitutional, judicial and political guarantees	Understands the material	1	12
Apply and test	Interactive	The role of national non-governmental organizations	Understands the material	1	13
Apply and test	Interactive	Human rights guarantees and protection at the regional and international levels	Understands the material	1	14
Apply and test	Interactive	The role of non-governmental organizations at the regional and international levels	Understands the material	1	15

12. Infrastructure	
1- Required prescribed books	Human rights and their development - their implications - their protection Professor Dr. Riad Aziz Hadi

2- Main references (sources)	1.The Constitution of the Republic of Iraq 2. The main regulations of the human rights organization
A-Recommended books and references (scientific journals, reports,...)	Human Rights Organization reports
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

English language course

This course provides the study of English grammar with the aim of developing students' linguistic skills.

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	English language
5. Available forms of attendance	%100
6. Annual/ courses	Courses

7. Number of study hours (total)	1 theoretical hours x 15 weeks = 15 hours
8. Date this description was prepared	2024
9. Course objectives This Course aims to study English grammar with the aim of developing students' linguistic skills, refining their skills, and increasing their linguistic communication skills.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives This course follows a clear grammatical and functional approach, and there is a coherent sequence of skills development. The course provides opportunities for students to expand their knowledge of the English language and become more fluent users of the language
B - The skills objectives of the course. The course aims to teach non-departmental university students how to communicate with English as a foreign language at the college level and focuses on reading and writing skills, in addition to training them on how to write correct sentences by teaching them English grammar.
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C. Emotional and evaluation objectives 1. Teaching students to break the psychological barrier and speak the English language. 2. Urging students to have conversations in English among themselves. 3. Urging students to write scientific reports in English using the correct grammar.

D - General and qualifying transferable skills (other skills related to employability and personal development).

1. Preparing radiology technicians who have sufficient information about the English language as a secondary language
2. Adopting the correct rules for pronouncing and writing sentences in English
3. The ability to adapt and communicate with others using the English language

11. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	How to introduce people	Understands the material	1	1
Apply and test	Interactive	Your World	Understands the material	1	2
Apply and test	Interactive	Exercises	Understands the material	1	3
Apply and test	Interactive	All about you	Understands the material	1	4
Apply and test	Interactive	Exercises	Understands the material	1	5
Apply and test	Interactive	Family and friends	Understands the material	1	6
Apply and test	Interactive	Exercises	Understands the material	1	7
Apply and test	Interactive	The Way I live	Understands the material	1	8
Apply and test	Interactive	Every day	Understands the material	1	9
Apply and test	Interactive	Exercises	Understands the material	1	10
Apply and test	Interactive	My favourites	Understands the material	1	11
Apply and test	Interactive	Exercises	Understands the material	1	12
Apply and test	Interactive	Exercises	Understands the material	1	13
Apply and test	Interactive	Exercises	Understands the material	1	14
Apply and test	Interactive	Exercises	Understands the material	1	15

12. Infrastructure

1- Required prescribed books	Human rights and their development - their implications - their protection
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	Professor Dr. Riad Aziz Hadi
2- Main references (sources)	New Headway Plus John and Liz Soars g
A-Recommended books and references (scientific journals, reports,...)	
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students' results • Study feedback from students' comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Fundamentals Computer1 course

This course provides a study of Fundamentals Computer, the concept of the computer, and the phases of the computer life cycle

1. Educational institution	Al-Ayen Iraqi University
2. College name	College of Health and Medical Technologies
3. Scientific department/center	Department of Radiology Technologies
4. Course name/code	Fundamentals Computer1
5. Available forms of attendance	%100
6. Annual/ courses	Courses
7. Number of study hours (total)	1 theoretical hours + 2 practical hours = 3 hours x 15 weeks = 45 hours
8. Date this description was prepared	2024
9. Course objectives Providing the student with the skills of dealing with basic office applications and creating office files and documents. The use of the operating system as well as the basics of working within the digital environment.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Introducing the student to basic office applications and creating files and documents 2. Teaching the student computer skills 3. Understanding the academic material
B - The skills objectives of the course. Providing the student with knowledge in managing and using various computer applications.

Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Defining the demand for the basic concepts of the computer concept 2-Introducing the student to the basic vocabulary of the computer 3- Introducing the student to the stages of the computer life cycle

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Computer Fundamentals Computer concept, cycle stages	Understands the material	1 theoretical + 2 practical	1
Apply and test	Interactive	Computer life, development of computer generations	Understands the material	1 theoretical + 2 practical	2
Apply and test	Interactive	Classification of computer advantages and areas of use	Understands the material	1 theoretical + 2 practical	3
Apply and test	Interactive	Computer in terms of purpose, size and type of data	Understands the material	1 theoretical + 2 practical	4
Apply and test	Interactive	Computer's components	Understands the material	1 theoretical + 2 practical	5
Apply and test	Interactive	Computer Components Components	Understands the material	1 theoretical + 2 practical	6
Apply and test	Interactive	Computer The physical parts of a computer are entities	Understands the material	1 theoretical + 2 practical	7
Apply and test	Interactive	Software	Understands the material	1 theoretical + 2 practical	8
Apply and test	Interactive	Your personal computer, computer security concept and licenses	Understands the material	1 theoretical + 2 practical	9
Apply and test	Interactive	Programs	Understands the material	1 theoretical + 2 practical	10
Apply and test	Interactive	Computer security and software licenses	Understands the material	1 theoretical + 2 practical	11
Apply and test	Interactive	Computer Safety & Software Licenses	Understands the material	1 theoretical + 2 practical	12
Apply and test	Interactive	Ethics of the electronic world, forms of abuse, security	Understands the material	1 theoretical + 2 practical	13
Apply and test	Interactive	Computer, computer privacy	Understands the material	1 theoretical + 2 practical	14
Apply and test	Interactive	Computer software licenses and their types, intellectual property,	Understands the material	1 theoretical + 2 practical	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	Computer basics and office applications (Part One)
A-Recommended books and references (scientific journals, reports,...)	
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan

The curriculum development plan is based on the following:

- Giving the prescribed scientific material and observing and analyzing the students' results
- Study feedback from students' comments about vocabulary
- Study the practical laboratory notes for the course
- Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Department of Radiology Technologies (the second stage)



Computed tomography techniques course

Teaching the student the principle of operation of the Computed tomography scanner and the main parts of this device

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Computed tomography techniques
4. Available forms of attendance	%100
5. Annual/ courses	courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives 1. Describe the different generations of CT systems. 2. Linking the components of the CT system to their functions. Discuss image reconstruction via interpolation, backprojection, and iteration. 3. Explain helical imaging and multi-detector computed tomography. 4. Describe the characteristics of the CT image of the image matrix. 5. Explain the factors that affect CT image quality, as they relate to spatial resolution and contrast. 6. Learn about other technical applications of CT imaging.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives The student must be familiar with and understand the basic principles of the CT scanner

B - The skills objectives of the course. The student has the ability to know the basic parts of the microscope and the impact of each part on the operation of the device
Teaching and learning methods
1. Lectures 2. Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • Teaching the student to deal with patients and various situations. • Teaching students psychological care skills for people with disabilities and oncology patients.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	History of Computed Tomography	Understands the material	7	1.
Apply and test	Interactive	Basic principles of CT Scanners	Understands the material	7	2.
Apply and test	Interactive	Helical/spiral CT Scanners:	Understands the material	7	3.
Apply and test	Interactive	Interpolation Algorithms	Understands the material	7	4.
Apply and test	Interactive	Multislice Computed Tomography (MSCT) (multidetector -row) CT	Understands the material	7	5.
Apply and test	Interactive	CT system design: (SSCT & MSCT)	Understands the material	7	6.
Apply and test	Interactive	Collimation,	Understands the material	7	7.
Apply and test	Interactive	Control Console	Understands the material	7	8.
Apply and test	Interactive	Reconstruction methods	Understands the material	7	9.
Apply and test	Interactive	Iterative reconstruction	Understands the material	7	10.
Apply and test	Interactive	CT image quality	Understands the material	7	11.
Apply and test	Interactive	Image noise	Understands the material	7	12.
Apply and test	Interactive	Image artifacts	Understands the material	7	13.
Apply and test	Interactive	Positron Emission Tomography/CT (PET/CT)	Understands the material	7	14.
Apply and test	Interactive	Advanced technical CT applications :	Understan	7	15.

			ds the material		
12. Infrastructure					
1- Required prescribed books			Training bag		
2- Main references (sources)			1. Stewart Carlyle Bushong, <i>“Radiologic Science for Technologists Physics, Biology, and Protection”</i> Elsevier, Inc. , 7 th edition, 2017. 2. Chris Guy & Dominic ffytche, <i>“An Introduction to The Principles of Medical Imaging”</i> , Imperial College Press, 2005. 3. Perry Sprawls, <i>“Physical principles of medical imaging”</i> , 2 nd Edition 1996. 4. J. Hsieh, <i>“Computed Tomography: Principles, Design, Artifacts, and Recent Advances”</i> , 2 nd ed. Wiley Inter-science, Bellingham, Washington, USA, (2009) 5. Euclid Seeram, <i>“ Computed tomography : physical principles, clinical applications, and quality control”</i> 4 th edition, Elsevier Inc. 2016.		
A-Recommended books and references (scientific journals, reports,...)			Computed Tomography for Technologists CT step by step		
B - Electronic references, Internet sites...			Radiopedia.org		

13. Course development plan
The curriculum development plan is based on the following: • Giving the prescribed scientific material and observing and analyzing the students’ results • Study feedback from students’ comments about vocabulary • Study the practical laboratory notes for the course • Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Computerized tomography physics course

It specializes in the study of radiation in terms of its origin, methods, generation, interaction of radiation with matter, the human body, its dangers, and how to deal with it. It specializes in a theoretical study of the basics of CT generation.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Computerized tomography physics course
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
7. Date this description was prepared	2024
8. Course objectives 1. Explaining the methods of producing rays and the interaction processes between CT and determine the factors affecting the electron beam. 2. Determine the factors affecting the outputs of X-rays and CT scans	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- A deep understanding of CT diagnosis and treatment 2-Understanding the science of growth and development in CT. 3- The ability to deal with modern devices and technologies 4-Responding to recent developments in the field of CT
B - The skills objectives of the course. 1 - Identify habits and skills using X-Ray technology 2- Know the factors and problems surrounding X-Ray technology

methods Teaching and learning
1- leactures 2- video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C- Emotional and evaluation objectives c1 - the student should be convinced of the importance of the specialty he is studying C 2 - The effort of teaching staff and technicians in providing scientific material is appreciated. C3 - Groups of students participate in group work. C 4- the student should be respects sincerity in work and hates cheating
D - General and qualifying transferable skills (other skills related to employability and personal development). D1- Using the electronic sense in the field of specialization D2- The ability to collect information and analyze its main ideas D3 - Writing technical reports about devices in the field of specialization

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Test and apply	Interactive	Introduction and overview	Understands the material	5	.1
Test and apply	Interactive	Basic Physics : Projected ray radiation attenuation Energy Dependence	Understands the material	5	.2
Test and apply	Interactive	CT numbers: Accuracy & uniformity -Hounsfield unit, scale	Understands the material	5	.3
Test and apply	Interactive	CT image: Window window width and level	Understands the material	5	.4
Test and apply	Interactive	Data Acquisition + basic concepts for data acquisition sampling	Understands the material	5	5
Test and apply	Interactive	Data Acquisition Geometries: Data acquisition in : -first generation Scanners -second generation Scanners -third generation Scanners -Fourth generation Scanners	Understands the material	5	6
Test and apply	Interactive	fifth generation Scanners -Spiral-Helical Geometry -Dual source CT Scanner .	Understands the material	5	7
Test and apply	Interactive	Multislice Computed Tomography (MSCT).	Understands the material	5	8
Test and apply	Interactive	Data Processing mage reconstruction Views	Understands the material	5	9
Test and apply	Interactive	Data Flow in a CT Scanner - Sequence of Events	Understands the material	5	10
Test and apply	Interactive	Image Display, Storage, and Communication	Understands the material	5	11
Test and apply	Interactive	Format the CT image + Image matrix Pixel Voxel	Understands material the	5	12
Test and apply	Interactive	Field Of View (FOV) in CT : Display field of view (DFOV (Scan field of view (SFOV (	Understands the material	5	13
Test and apply	Interactive	Basic CT Physics	Understands the material	5	14
Test and apply	Interactive	Image Axes	Understands the material	5	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1-M. Radhi Al-Qurayshi and H. Qasim. AL-Mosawi "Radiation Physics and its applications in diagnostic radiological techniques", Middle Technical University (MTU), Iraq, (2015). 2- W. R. Hendee and E. R. Ritenour "Medical Imaging Physics", 4th Edition, Wiley-Liss, Inc., (2002). 3- Stewart Carlyle Bushong, "Radiologic Science for Technologists Physics, Biology, and Protection" Elsevier, Inc., 7th edition, 2017.
A-Recommended books and references (scientific journals, reports,...)	An Introduction to The Principles of Medical Imaging Physical principles of medical imaging book
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan focuses on the following: 1 - Giving the prescribed scientific material and observing and analyzing the students' results. 2 - Studying feedback from students' comments about vocabulary. 3 - Study the practical laboratory notes for the course. 4 - Comparing the current vocabulary with the vocabulary of corresponding colleges in the field

Traditional radiation equipment techniques Course

This course deals with the study of traditional radiological devices used in the field of radiography and medical examination and learning how these devices work.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Traditional radiation equipment techniques
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives 1. Identify the components of the X-ray system operating unit 2. Explain the operation of a high voltage generator 3. Identify the basic components of an X-ray tube 4. Explain the types of important technologies in X-ray imaging systems 5. Learn about other technical applications of CT imaging.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives The student must be familiar with all traditional radiological devices and how they work

B - The skills objectives of the course. The student has the ability to know modern techniques in developing traditional devices
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • Teaching the student how to deal with all radiological devices. • Teaching students the skills of using x-ray machines

11. Course structure					
Evaluation method	Teaching method	of the unit/topic Name	Required learning outcomes	hours	the week
Apply and test	Interactive	x-ray machine system	Understands the material	7	.1
Apply and test	Interactive	High voltage generators	Understands the material	7	.2
Apply and test	Interactive	x-ray tube	Understands the material	7	.3
Apply and test	Interactive	x-ray tube failure	Understands the material	7	.4
Apply and test	Interactive	Construction of film	Understands the material	7	5
Apply and test	Interactive	Filter	Understands the material	7	6
Apply and test	Interactive	Grid types	Understands the material	7	7
Apply and test	Interactive	Digital radiography	Understands the material	7	8
Apply and test	Interactive	Direct to digital radiography	Understands the material	7	9
Apply and test	Interactive	Imagequality	Understands material the	7	10
Apply and test	Interactive	Mammography	Understands the material	7	11
Apply and test	Interactive	Digital Mammography	Understands the material	7	12
Apply and test	Interactive	Fluoroscopy	Understands the material	7	13
Apply and test	Interactive	Bone density scan	Understands the material	7	14
Apply and test	Interactive	Orthopantogram	Understands the material	7	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Stewart Carlyle Bushong, <i>“Radiologic Science for Technologists Physics, Biology, and Protection”</i> Elsevier, Inc. , 7th edition, 2017. 2. Chris Guy & Dominic ffytche, <i>“An Introduction to The Principles of Medical Imaging”</i> , Imperial College Press, 2005. 3. Perry Sprawls, <i>“Physical principles of medical imaging”</i>, 2nd Edition 1996.
A-Recommended books and references (scientific journals, reports,...)	Chris Guy & Dominic ffytche, <i>“An Introduction to The Principles of Medical Imaging”</i> , Imperial College Press, 2005.
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the prescribed scientific material and observing and analyzing the students’ results 2-Study feedback from students’ comments about vocabulary 3-Study the practical laboratory notes for the course 4-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiographic anatomy of the head and upper extremities course

The student should be able to identify the parts of the body that appear in the x-ray

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiographic anatomy of the head and upper extremities
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 15 weeks = 90 hours
7. Date this description was prepared	2024
8. Course objectives 1. Preparing and qualifying radiology technicians with scientific knowledge and professional skills so that they are able to solve health problems in the field of radiology techniques. 2. Developing and encouraging the field of scientific research using research results and applications	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- It teaches students to obtain knowledge and correct understanding of the anatomical parts of the human body. 2- It teaches students how to read a radiograph and know its anatomical parts. 3- It teaches students to obtain knowledge and understanding of the dangers of radiation and its long-term impact.

B - The skills objectives of the course. 1- Teaching students the anatomical parts of the human body, especially the skull area, upper limbs, and lower limbs. 2- Teaching students how the anatomical parts of the human body appear on an x-ray.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • The graduate will be able to correctly examine the anatomical part required of him • The graduate will be able to keep pace with developments in diagnostic radiology devices

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Normal anatomy of skull	Understand s the material	6	.1
Apply and test	Interactive	Radiological features of the skull	Understand s the material	6	.2
Apply and test	Interactive	Normal anatomy of facial bone	Understand s the material	6	.3
Apply and test	Interactive	Radiological features of facial bone	Understand s the material	6	.4
Apply and test	Interactive	Normal anatomy of nasal cavity & paranasal sinuses	Understand s the material	6	5
Apply and test	Interactive	Scapuller radiological features & Ossification centers. The humerus : radiological features & ossification centers	Understand s the material	6	6
Apply and test	Interactive	The clavicle: radiological features & Ossification centers. The humerus : radiological features & Ossification centers	Understand s the material	6	7
Apply and test	Interactive	The radius & ulna: radiological features & ossification centers	Understand s the material	6	8
Apply and test	Interactive	The hand: radiological features & ossification centers of carpal, metacarpal & phalanges	Understand s the material	6	9
Apply and test	Interactive	The shoulder joint: components, radiological features of the shoulder joint	Understand s the material	6	10
Apply and test	Interactive	The elbow joint: components, articulating surface radiological features	Understand s the material	6	11
Apply and test	Interactive	The wrist joint: components, articulating surface, radiological features	Understand s the material	6	12
Apply and test	Interactive	blood supply of upper limbs Arteries of the upper limb	Understand s the material	6	13
Apply and test	Interactive	Radiological features of the upper limb arteries	Understand s the material	6	14
Apply and test	Interactive	Veins of the upper limb, radiological features of the upper limb veins	Understand s the material	6	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Kelley, L. L., & Petersen, C. (2018). <i>Sectional Anatomy for Imaging Professionals</i>. Third & fourth edition. 2. Ryan, S., McNicholas, M., & Eustace, S. (2011). <i>Anatomy for diagnostic imaging</i>. 3. Lazo, D. L. (2015). <i>Fundamentals of sectional anatomy: an imaging approach</i>
A-Recommended books and references (scientific journals, reports,...)	Studies published on pubmed and scopus
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the assigned scientific material and observing the students' results. 2-Study the practical laboratory notes for the course 3-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiographic techniques of the lower extremities Course

This course is concerned with studying imaging of all examinations of the lower extremities and studying interpretations of radiographs to arrive at imaging methods and correct diagnosis.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiographic techniques of the lower extremities
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives Teach students how to direct the patient in a specific imaging way to best view pathology of the lower extremities.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- Knowing and understanding radiography/examinations of the lower extremities, knowing the diseases related to them, and understanding the results of radiography in order to reach the most accurate methods of special radiography in them. 2- Knowing and understanding the imaging of joint examinations in the lower extremity areas, knowing the diseases related to them, and understanding the results of radiographic imaging in order to reach the most accurate methods of special radiographic imaging therein. 3- Knowledge and understanding of bones, fractures and their types 4- Knowledge of the operation of the X-ray machine

B - The skills objectives of the course. 1 - Imaging all examinations of the lower extremities 2- Imaging all examinations of the joints and pelvic area 3 - Studying interpretations of radiographs to arrive at imaging methods and correct diagnosis
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • 1- Methods of guidance and how to deal with the patient • 2- Computer Encyclopedia of Applications • 3- Adding modern equipment such as CR – DR at work

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Method image of Foot with anatomy	Understands the material	7	.1
Apply and test	Interactive	Toe radiography	Understands the material	7	.2
Apply and test	Interactive	Foot, AP, lateral, oblique, shown structure	Understands the material	7	.3
Apply and test	Interactive	Ankle joint, AP, lateral, oblique, oblique & AP with inversion	Understands the material	7	.4
Apply and test	Interactive	Ankle joint pathology	Understands the material	7	5
Apply and test	Interactive	Leg radiography Tibia & fibula, AP, Lateral	Understands the material	7	6
Apply and test	Interactive	Mid exam	Understands the material	7	7
Apply and test	Interactive	Knee joint AP, lateral, skyline for, erect AP	Understands the material	7	8
Apply and test	Interactive	Patella radiography	Understands the material	7	9
Apply and test	Interactive	Intercondylar fossa radiography	Understands the material	7	10
Apply and test	Interactive	Femoral radiography	Understands the material	7	11
Apply and test	Interactive	hip joint, AP, lateral	Understands the material	7	12
Apply and test	Interactive	frog-leg infro -superior view shown structure	Understands the material	7	13
Apply and test	Interactive	pelvic pathology,	Understands material the	7	14
Apply and test	Interactive	Final exam	Understands the material	7	15

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1. Whitley, A. S., Jefferson, G., Holmes, K., Sloane, C., Anderson, C., & Hoadley, G. (2015). Clark's Positioning in Radiography 13E. crc Press. 2. Bontrager, K. L., & Lampignano, J. (2013). Bontrager's handbook of radiographic positioning and techniques. Elsevier Health Sciences.
A-Recommended books and references (scientific journals, reports,...)	chapman & nakielny's guide to radiological procedures (eight edition)
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the prescribed scientific material and observing and analyzing the students' results 2-Study feedback from students' comments about vocabulary 3-Study the practical laboratory notes for the course 4-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiographic techniques of the upper extremities Course

This course is concerned with studying imaging of all examinations of the upper extremities and studying interpretations of radiographs to arrive at imaging methods and correct diagnosis.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiographic techniques of the upper extremities
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives Teach students how to direct the patient in a specific imaging way to best view pathology of the upper extremities.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- Knowing and understanding radiography/examinations of the upper extremities, knowing the diseases related to them, and understanding the results of radiography to reach the most accurate radiography methods for them. 2- Knowing and understanding the imaging of joint examinations in the upper extremities, knowing the diseases related to them, and understanding the results of radiographic imaging in order to reach the most accurate methods of special radiographic imaging in them. 3- Knowing and understanding the imaging of bones and fractures and their types

4- Knowing and understanding lung diseases, methods of diagnosing them, and reading their diagnostic images 5- Knowledge of the operation of the X-ray machine
B - The skills objectives of the course. 1 - Photographing all examinations of the upper extremities 2- Imaging all general lupus examinations 3 - Study radiological interpretations to arrive at correct imaging and diagnosis methods
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • The seriousness and continuous interest of the professor makes the student attracted to the academic subject • Continuous follow-up and use of modern means to deliver scientific material to the student • Enabling students to understand the suffering and pain of patients and how to provide assistance to them

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Terminology, body planes, section, lines, body position special projections,	Understands the material	7	.1
Apply and test	Interactive	Image quality, exposure factor, brightness, contrast, resolution, distortion, noise	Understands the material	7	.2
Apply and test	Interactive	Upper limb, hand, wrist, Scaphoid bone AP, lateral position, shown structure	Understands material the	7	.3
Apply and test	Interactive	Hand radiography	Understands the material	7	.4
Apply and test	Interactive	wrist radiography	Understands the material	7	5
Apply and test	Interactive	Humerus distal and fracture	Understands the material	7	6
Apply and test	Interactive	Forearm, radius and ulna, type of fracture	Understands the material	7	7
Apply and test	Interactive	Humerus proximal fracture	Understands the material	7	8
Apply and test	Interactive	Scapula distal and proximal fracture	Understands the material	7	9
Apply and test	Interactive	Scapula radiography	Understands the material	7	10
Apply and test	Interactive	Elbow joint, AP, Lateral, oblique, shown structure	Understands the material	7	11
Apply and test	Interactive	Shoulder joint, AP, lateral, supero - inferior & oblique	Understands the material	7	12
Apply and test	Interactive	Shoulder joint, pathology	Understands the material	7	13
Apply and test	Interactive	Mid exam	Understands the material	7	14
Apply and test	Interactive	Final exam	Understands the material	7	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Whitley, A. S., Jefferson, G., Holmes, K., Sloane, C., Anderson, C., & Hoadley, G. (2015). Clark's Positioning in Radiography 13E. crc Press. 2. Bontrager, K. L., & Lampignano, J. (2013).

	<i>Bontrager's handbook of radiographic positioning and techniques.</i> Elsevier Health Sciences.
A-Recommended books and references (scientific journals, reports,...)	chapman & nakielny's guide to radiological procedures (eight edition)
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the prescribed scientific material and observing and analyzing the students' results 2-Study feedback from students' comments about vocabulary 3-Study the practical laboratory notes for the course 4-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

special radiological examinations of the biliary and reproductive system course

Teaching students how to perform a radiological examination of the biliary and reproductive system using a conventional radiograph, ultrasound, helical scanner, and magnetic resonance imaging (and using contrast material designated for each examination).

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	special radiological examinations of the biliary and reproductive system
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives Teach students how to use contrast media and perform radiological examination of the biliary and reproductive systems	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Use appropriate materials for X-ray coloring and in appropriate amounts. 2. Knowledge and understanding of the human anatomy and its functions. 3. Learn methods of medical imaging of the biliary and reproductive systems. 4. Reasons, contraindications, complications, and method of examining the liver, gallbladder, and bile ducts using ultrasound. 5. Indications, contraindications, complications, and method of examining the liver, gallbladder, and bile ducts using a helical microscope. 6. Reasons, contraindications, complications, and method of

examining the liver, gallbladder, and bile ducts using magnetic resonance imaging. 7. Examination of the gallbladder and bile ducts during and after the operation. 8. Learn methods of medical imaging of the urinary system. 9. Examination of the urinary system using conventional x-rays and a special colored substance. 10. Examination of the sewage and urinary system with a spiral microscope. 11. MRI examination of the urinary system. 12. Coloring the uterus and fallopian tubes using x-rays and dye. 13. Methods of examining the male and female reproductive system. 14. Examination of the reproductive system using a helical microscope. 15. Examination of the reproductive system using MRI.	
B - The skills objectives of the course. 1. Teaching the student how to use coloring matter and conduct radiological examination of various body systems. 2. Preparing efficient cadres to meet the needs of educational institutions in general and the health sector in general private. 3. Availability of qualified personnel to work in the field of teaching and imaging examinations in hospitals Governmental and private centres. 4. Exchanging scientific expertise and competencies with similar laboratories in other universities and colleges.	
Teaching and learning methods	
• Lectures • Video clips	
Evaluation methods	
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.	
D - General and qualifying transferable skills (other skills related to employability and personal development). • Learn how to protect against radiation and its harms. • Learn how to deal with the patient during radiological examinations. • Learn about the use of medical imaging techniques (sonography, helical scanner, and magnetic resonance imaging). • Directing and advising patients to prepare them before undergoing medical	

imaging (preparing and introducing the patient to the examination)

- Learn about using modern devices and updating student information as these devices develop.
- Preparing the student to be a faculty member in the future.

11. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	• Methods of imagines of hepatobiliary system .	Understands the material	7	.1
Apply and test	Interactive	• U/S of the liver, gallbladder and biliary system .	Understands the material	7	.2
Apply and test	Interactive	• CT for the liver biliary tree.	Understands the material	7	.3
Apply and test	Interactive	• MRI of the liver .	Understands the material	7	.4
Apply and test	Interactive	• Intraoperative & postoperative T-tube, cholangiography.	Understands the material	7	5
Apply and test	Interactive	• Biliary drainage .	Understands the material	7	6
Apply and test	Interactive	• Methods of imagines of urinary tracts . • Excretion urography.	Understands the material	7	7
Apply and test	Interactive	• CT urinary tract.	Understands the material	7	8
Apply and test	Interactive	• Magnetic MRI of the urinary tract.	Understands the material	7	9
Apply and test	Interactive	• Micturition cystourethrography . • Ascending Urethrography in the male.	Understands the material	7	10
Apply and test	Interactive	• Methods of imagines of male & female reproductive system.	Understands the material	7	11
Apply and test	Interactive	• Hysterosalpingography .	Understands the material	7	12
Apply and test	Interactive	• CT of the reproductive system.	Understands the material	7	13
Apply and test	Interactive	• MRI of the reproductive system.	Understands the material	7	14
Apply and test	Interactive	• Magnetic MRI of the urinary tract.	Understands material the	7	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Watson, N. & Jones, H. chapman& Nakielnys <i>“Guide to Radiological procedures”</i> , 7 th edition, Elsevier Health Sciences, 2017.
A-Recommended books and references (scientific journals, reports,...)	chapman & nakielny’s guide to radiological procedures (eight edition)
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the prescribed scientific material and observing and analyzing the students’ results 2-Study feedback from students’ comments about vocabulary 3-Study the practical laboratory notes for the course 4-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Special radiological examinations of the digestive system and bones course

Teaching students how to use contrast media and conduct a radiological examination of the digestive system and bones using a conventional radiograph, ultrasound, helical scanner, and magnetic resonance imaging (and using the contrast material designated for each examination).

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	special radiological examinations of the digestive system and bones
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 5 practical hours = 7 hours x 15 weeks = 105 hours
7. Date this description was prepared	2024
8. Course objectives Teach students how to use contrast media and perform radiological examination of the digestive system and bones	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives 1. Use appropriate materials for X-ray coloring and in appropriate amounts. 2. Learn medical imaging of the digestive system and the appropriate color material. 3. Knowing and understanding the human anatomy and its functions. 4. Reasons, contraindications, and complications of examining the esophagus using x-rays and the appropriate contrast material. 5. Reasons, contraindications, and complications of examining the stomach using x-rays and the appropriate contrast material. 6. Reasons, contraindications, and complications of examining the small intestine using x-rays and the appropriate contrast material. 7. Reasons, contraindications, and complications of examining the large intestine using x-rays and the appropriate contrast material. 8. Examination and treatment of intestinal obstruction 9. Examination of the digestive system using ultrasound and MRI techniques. 10. Examination of bones and joints using magnetic resonance imaging. 11. Bone examination using radioactive isotopes.
B - The skills objectives of the course. 1. Teaching the student how to use coloring matter and conduct radiological examination of various body systems. 2. Preparing efficient cadres to meet the needs of educational institutions in general and the health sector in general private. 3. Availability of qualified personnel to work in the field of teaching and imaging examinations in hospitals Governmental and private centres. 4. Exchanging scientific expertise and competencies with similar laboratories in other universities and colleges.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.

D - General and qualifying transferable skills (other skills related to employability and personal development).

- Learn how to protect against radiation and its harms.
- Learn how to deal with the patient during radiological examinations.
- Learn about the use of medical imaging techniques (sonography, helical scanner, and magnetic resonance imaging).
- Directing and advising patients to prepare them before undergoing medical imaging (preparing and introducing the patient to the examination)
- Learn about using modern devices and updating student information as these devices develop.
- Preparing the student to be a faculty member in the future.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	- Intravascular contrast media - Adverse effect of Intravenous (IV) water soluble contrast media	Understands the material	7	.1
Apply and test	Interactive	Contrast Agents in Magnetic Resonance Imaging	Understands the material	7	.2
Apply and test	Interactive	Methods of imaging of Gastrointestinal tract (GIT) with barium water soluble contrast agents	Understands the material	7	.3
Apply and test	Interactive	- Barium examination: swallow and meal - Barium examination: follow through, small bowel anema .	Understands the material	7	.4
Apply and test	Interactive	Barium examination: barium enema instant enema air enema.	Understands the material	7	5
Apply and test	Interactive	Reduction of intussusception	Understands the material	7	6
Apply and test	Interactive	Computed Tomography of the Gastrointestinal Tract	Understands the material	7	7
Apply and test	Interactive	Magnetic Resonance Imaging of the Gastrointestinal Tract	Understands the material	7	8
Apply and test	Interactive	Imaging modalities of bones & joints.	Understands the material	7	9
Apply and test	Interactive	Musculoskeletal MRI	Understands the material	7	10
Apply and test	Interactive	Arthrography — general points	Understands material the	7	11
Apply and test	Interactive	Arthrography of the knee & hip	Understands the material	7	12
Apply and test	Interactive	Arthrography of the shoulder & bow	Understands the material	7	13
Apply and test	Interactive	Arthrography of the wrist & ankle	Understands the material	7	14
Apply and test	Interactive	Radionuclide bone scan	Understands the material	7	15

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1. Watson, N. & Jones, H. chapman& Nakielnys “ <i>Guide to Radiological procedures</i> ”, 7 th edition, Elsevier Health Sciences, 2017.
A-Recommended books and references (scientific journals, reports,...)	chapman & nakielny’s guide to radiological procedures (eight edition)
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Increase scientific courses and workshops 2- Application within health institutions 3- Sending top performers to courses outside the country 4- Participate in post-graduation training courses in an advanced training center and keep pace with development in the specialty. 5- Opening postgraduate studies in specific specializations. 6- Participation in international and local conferences.

Basics of radiation protection1 course

Radiation protection is the science of protecting humans from the effects of ionizing radiation, whether they are elementary particles such as protons and neutrons or high-energy electromagnetic radiation such as X-rays and gamma rays.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Basics of radiation protection1
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
7. Date this description was prepared	2024
8. Course objectives 1. The student obtains valuable information in the subject of theoretical radiation protection and applies it in the laboratory in preparation for benefiting from it in the specialty. 2. Use the information that the student was trained on in the laboratory and link it to his specialty, especially in places that contain sources of radiation, such as hospitals, the nuclear medicine unit, and other centers. 3. This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description. 4. Achieving the best level of safety and security for individuals and the environment and ensuring that peaceful applications of radioactive sources are a source of modern technology for the sake of human well-being without exposing them to any risks that may result from these applications. This is done by providing sufficient information and guidance to officials and workers in various fields of ionizing radiation about the principles and preventive methods that must be followed when dealing with ionizing radiation.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives First, gain knowledge about an important scientific topic 1. Applying it in his field of work 2. He obtains new ideas that can be combined with his specialty
B - The skills objectives of the course. B1. Developing the student from the practical aspect in the laboratory and the theoretical aspect in understanding the basics of radiation protection B2. Solve the problems facing the student in the field of work by developing his mind in thinking to solve the problem B3. The student learns how to write scientific reports
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • The seriousness and continuous interest of the professor makes the student attracted to the academic subject • Continuous follow-up and use of modern means to deliver scientific material to the student • Enabling students to understand the suffering and pain of patients and how to provide assistance to them future.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	• Classification of ionizing radiation • Sources of ionization Radiation (background radiation) – Natural sources – Human-made (artificial) sources • Comparison of Radiation Doses	Understand s Subject Scholarship	theoretical + 3 2 practical	.1
Apply and test	Interactive	• Radiation Measurement Units & International SI Units – Activity – Exposure – Absorbed dose – Kerma – Equivlant dose – Effective dose – Committed Equivlant & effective dose	Understand s Subject Scholarship	theoretical + 3 2 practical	.2
Apply and test	Interactive	• The Principles of Radiological Protection – Justification of a practice – Optimisation of Protection (ALARA principles) ❖ Time ❖ Distance ❖ Shielding	Understand s Subject Scholarship	theoretical + 3 2 practical	.3
Apply and test	Interactive	– Dose limits – Maximum Permissible Occupational Doses – Maximum Permissible public Doses – Maximum Permissible patient Doses – Whole-Body Dose Limits	Understand s Subject Scholarship	theoretical + 3 2 practical	.4
Apply and test	Interactive	• Radiation protection for classification of exposure: – Occupational – Medical – Public • Whole body non-occupational exposure • Partial-body occupational exposure	Understand s Subject Scholarship	theoretical + 3 2 practical	5
Apply and test	Interactive	• Occupational Radiation Exposure in: – Fluoroscopy – Mammography – Computed Tomography – Surgery	Understand s Subject Scholarship	theoretical + 3 2 practical	6
Apply and test	Interactive	• Patient Radiation Dose Descriptions – Entrance Skin Exposure (ESE) – Mean Marrow Dose (MMD)	Understand s Subject Scholarship	theoretical + 3 2 practical	7
Apply and test	Interactive	• Dose and management principles in Special cases: – X-ray and pregnancy ❖ Pregnancy patient ❖ Pregnancy technologist – X-ray and obesity ❖ Obese patient ❖ Obese technologist	Understand s Subject Scholarship	theoretical + 3 2 practical	8
Apply and test	Interactive	• Design of Protective Barriers in X-Ray Installations – Design of Primary Protective Barrier – Design of Secondary Protective Barrier ❖ Leakage Radiation ❖ Scattered Radiation	Understand s Subject Scholarship	theoretical + 3 2 practical	9
Apply and test	Interactive	• Factors That Affect Barrier Thickness	Understand s Subject	theoretical + 3 2 practical	10

			Scholarship		
Apply and test	Interactive	• Radiation Detection and Measurement – Ionization gases detectors (Gas-Filled Detectors) ❖ Geiger Counters ❖ Proportional counting ❖ Ion Chambers	Understand s Subject Scholarship	theoretical + 3 2 practical	11
Apply and test	Interactive	– Scintillation detectors ❖ Organic Scintillators ❖ Inorganic Scintillators – Semiconductor Detectors • Instrument Calibration	Understand s Subject Scholarship	theoretical + 3 2 practical	12
Apply and test	Interactive	• Personnel Dosimeters – Film Badges – Thermoluminescence Dosimeters (TLDs) – Optically stimulated luminescence (OSL) – Pocket Dosimeters – Direct Ion Storage (DIS) – Radiophotoluminescence – Electronic personal dosimeter (MOSFET dosimeters)	Understand s Subject Scholarship	theoretical + 3 2 practical	13
Apply and test	Interactive	• CT Dose Metrics and Calculation – CT dose index (CTDI) – dose-length product(DLP)	Understand s Subject Scholarship	theoretical + 3 2 practical	14
Apply and test	Interactive	• Fluoroscopy dose: – To patient – To staff • methods of minimizing fluoroscopy dose	Understand s Subject Scholarship	theoretical + 3 2 practical	15

12. Infrastructure	
1- Required prescribed books	Stewart C. Bushong , Sc.D., FACR,FACMP Houston, Texas "Radiologic Science for Technologists" , Fifth edition, 1993. P.A. Robert, J. Williamas, Europe “Farr’s Physics for medical imaging” second edition.
2- Main references (sources)	Factors affecting patient dose in diagnostic radiology , J L Poletti / NRL Report. RADIATION HEALTH SERIES GUIDANCE NOTES ON RADIATION PROTECTION FOR DIAGNOSTIC RADIOLOGY Radiation Health Unit / Department of Health. Radiation Protection 136 European guidelines on radiation protection in dental radiology The safe use of radiographs in dental practice.

	Directorate-General for Energy and Transport Directorate H — Nuclear Safety and Safeguards Unit H.4 — Radiation Protection 2004
A-Recommended books and references (scientific journals, reports,...)	Physics of diagnostic imaging for medical students. James E. Martin Physics for Radiation Protection. A Handbook. James E. Martin Copyright _ 2006 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim ISBN: 3-527-40611-5 Nuclear Science—A Guide to the Nuclear Science, Wall Chart ©2003 Contemporary Physics Education Project (CPEP)
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1- Giving the prescribed scientific material and observing and analyzing the students' results 2-Study feedback from students' comments about vocabulary 3-Study the practical laboratory notes for the course 4- Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiographic anatomy of the lower extremities course

The student should be able to identify the body parts of the lower extremities that appear in the x-ray.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiographic anatomy of the lower extremities
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 15 weeks = 90 hours
7. Date this description was prepared	2024
8. Course objectives 1. Preparing and qualifying radiology technicians with scientific knowledge and professional skills so that they are able to solve health problems in the field of radiology techniques. 2. Developing and encouraging the field of scientific research using research results and applications	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- It teaches students to obtain knowledge and correct understanding of the anatomical parts of the human body. 2- It teaches students how to read a radiograph and know its anatomical parts. 3- It teaches students to obtain knowledge and understanding of the dangers of radiation and its long-term impact.

B - The skills objectives of the course. 1. Teaching students the anatomical parts of the human body, especially the skull area, upper limbs, and lower limbs. 2. Teaching students how the anatomical parts of the human body appear on a radiograph.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • The graduate will be able to correctly examine the anatomical part required of him • The graduate will be able to keep pace with developments in diagnostic radiology devices

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Bony pelvis	Understand s the material	6	.1
Apply and test	Interactive	pelvis male &female iffrencesd	Understand s the material	6	.2
Apply and test	Interactive	femure of ranatomy	Understand s the material	6	.3
Apply and test	Interactive	bone tibia anatomy	Understand s the material	6	.4
Apply and test	Interactive	bone fibula anatomy	Understand s the material	6	5
Apply and test	Interactive	bone foot anatomy	Understand s the material	6	6
Apply and test	Interactive	features radiological bone foot of	Understand s the material	6	7
Apply and test	Interactive	of capsule &ligaments joint hip	Understand s the material	6	8
Apply and test	Interactive	of features radiological joint hip	Understand s the material	6	9
Apply and test	Interactive	knee of anatomy	Understand s the material	6	10
Apply and test	Interactive	features radiological knee of	Understand s the material	6	11
Apply and test	Interactive	ankle of anatomy	Understand s the material	6	12
Apply and test	Interactive	lower of supply blood limbs	Understand s the material	6	13
Apply and test	Interactive	features radiological arteries of	Understand s the material	6	14
Apply and test	Interactive	features radiological veins of	Understand s the material	6	15

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. Kelley, L. L., & Petersen, C. (2018). <i>Sectional Anatomy for Imaging Professionals</i>. Third & fourth edition. 2. Ryan, S., McNicholas, M., & Eustace, S. (2011). <i>Anatomy for diagnostic imaging</i>. 3. Lazo, D. L. (2015). <i>Fundamentals of sectional anatomy: an imaging approach</i>
A-Recommended books and references (scientific journals, reports,...)	Studies published on pubmed and scopus
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1-Giving the assigned scientific material and observing the students' results. 2-Study the practical laboratory notes for the course 3-Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Fundamentals of radiation physics course

It specializes in the study of dental rays in terms of their origin, methods, generation, interaction of rays with matter, the human body, their dangers, and how

to deal with them. It specializes in a theoretical study of the basics of X-ray generation.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Fundamentals of radiation physics
4. Available forms of attendance	%100
5. Annual/ courses	Courses
6. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 15 weeks = 75 hours
7. Date this description was prepared	2024
8. Course objectives 1. Explaining the methods of producing X-rays, the interaction processes between X-rays, and identifying the factors affecting the electron beam. 2. Determine the factors affecting the output of x-rays and x-ray images.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- A deep understanding of X-Ray diagnosis and treatment 2-Understanding the science of growth and development in X-Ray. 3- The ability to deal with modern devices and technologies 4- Responding to recent developments in the field of X-Ray
B - The skills objectives of the course. 1 - Identify habits and skills using X-Ray technology 2- Know the factors and problems surrounding X-Ray technology
Teaching and learning methods

1- leactures
2- video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C- Emotional and evaluation objectives c1 - the student should be convinced of the importance of the specialty he is studying C 2 - The effort of teaching staff and technicians in providing scientific material is appreciated. C3 - Groups of students participate in group work. C 4- the student should be respects sincerity in work and hates cheating
D - General and qualifying transferable skills (other skills related to employability and personal development). D1- Using the electronic sense in the field of specialization D2- The ability to collect information and analyze its main ideas D3 - Writing technical reports about devices in the field of specialization

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Test and apply	Interactive	Generating the tube voltage , Exposure timing , Falling load , Filament voltage	Understands the material	5	.1
Test and apply	Interactive	Limitation of the x-ray tube , Line focus Rotation anode tube , Heat rating	Understands the material	5	.2
Test and apply	Interactive	X-Ray Tube Heating and Cooling Heat Factors •production Heat capacity affecting the heat capacity Focal spot area Focal spot size Rotating anode speed Anode body	Understands the material	5	.3
Test and apply	Interactive	X-Ray Production Characteristic radiation Emission •Bremsstrahlung radiation Bremsstrahlung •spectrum Importance in Imaging and Dose Influence of Electron Energy	Understands the material	5	.4
Test and apply	Interactive	Influence of Filtration Characteristic Radiation Importance in Imaging and Dose Influence of Electron Energy Influence of Target Material Influence of Filtration	Understands the material	5	5
Test and apply	Interactive	Luminescence phenomenon X-ray fluorescence -X-ray phosphorescence	Understands the material	5	6
Test and apply	Interactive	Electron tube energy Added Filtration Factors affecting electron emission spectrum mA and MAS KVp Voltage Waveform Target Material	Understands the material	5	7
Test and apply	Interactive	X-ray Emission: Factors Influencing x-ray spectra and output X-ray quantity X-ray intensity Factors affecting x-ray quantity	Understands the material	5	8
apply Test and	Interactive	X-ray quality Penetrability Photon range filtration	Understands the material	5	9
Test and apply	Interactive	The Linear X-ray Attenuation Coefficient Interaction X-ray with matter processes • Photoelectric Absorption Unmodified scatter	Understands the material	5	10
Test and apply	Interactive	actors affecting image contrast Linear attenuation coefficient of subject Soft Tissue -Photon energy (KVp Calcium Radiography Iodine and Barium Contrast Media Scatter Radiation and Contrast-	Understands the material	5	11
Test and apply	Interactive	Attenuation of X-ray by The patient Contrast media	Understands the material	5	12
Test and apply	Interactive	Differential absorption Dependence on Atomic Number Dependence on Mass density	Understands the material	5	13

Test and apply	Interactive	X-ray tube output factors X-ray tube kilovoltage -output milliamperere-seconds automatic exposure control Filtration Focal spot measurement	Understands the material	5	14
Test and apply	Interactive	Equipment tests Speed of film processor	Understands the material	5	15

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1-M. Radhi Al-Qurayshi and H. Qasim. AL-Mosawi "Radiation Physics and its applications in diagnostic radiological techniques", Middle Technical University (MTU), Iraq, (2015). 2- W. R. Hendee and E. R. Ritenour "Medical Imaging Physics", 4th Edition, Wiley-Liss, Inc., (2002). 3- Stewart Carlyle Bushong, "Radiologic Science for Technologists Physics, Biology, and Protection" Elsevier, Inc., 7th edition, 2017.
A-Recommended books and references (scientific journals, reports,...)	An Introduction to The Principles of Medical Imaging Physical principles of medical imaging book
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan

The curriculum development plan focuses on the following:

- 1 - Giving the prescribed scientific material and observing and analyzing the students' results.
- 2 - Studying feedback from students' comments about vocabulary.
- 3 - Study the practical laboratory notes for the course.
- 4 - Comparing the current vocabulary with the vocabulary of corresponding colleges in the field

Department of Radiology

Technologies

(third level)



Radiographic anatomy 2 course

This course studies how to teach the student the structures that appear in radiographs of various body organs.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiographic anatomy 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 2 practical hours = 4 hours x 30 weeks = 120 hours
7. Date this description was prepared	2024
8. Course objectives Preparing radiography technologist has knowledge potential in learning about the anatomy of the human body through the x-ray image.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Preparation of a radiology technician who has sufficient knowledge of general medical anatomy. 2- Prepare a radiology technician who has full knowledge of radiographic anatomy. 3- Teaching the student medical terminology related to radiographic anatomy. 4- Teaching the student the relationship between the picture and detailing the organ to be photographed.
B - The skills objectives of the course. 1- Teaching the student to control image quality and build details of the anatomical area. 2- Building a protocol for building dimensions and planning angles to plan the x-ray process.

3- Study all concepts related to anatomical conditions that require in-depth understanding and related to blood vessels. 4. Know all the differences between radiological devices, which vary according to the field of interest in anatomical vision.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Teaching the student to participate with the rest of the radiology units in the relationship of image quality to anatomy. 2- Teaching the student how to decide which device is appropriate based on the anatomy of the affected organ or the type of disease. 3- Preparing trainers with advanced skills in radiographic anatomy.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	outcomes Education	hours	the week
Apply and test	Intreactive	Anatomy Cranial parts	Understands the material	4	.1
Apply and test	Intreactive	Anatomy Temporal bone	Understands the material	4	.2
Apply and test	Intreactive	Main parts of the brain	Understands the material	4	.3
Apply and test	Intreactive	Anatomy of the orbit	Understands the material	4	.4
Apply and test	Intreactive	Anatomy of nasal cavity	Understands the material	4	.5
Apply and test	Intreactive	Anatomy of cervical spine	Understands the material	4	.6
Apply and test	Intreactive	Thoracic spine	Understands the material	4	.7
Apply and test	Intreactive	Lumbar spine	Understands the material	4	.8
Apply and test	Intreactive	Mediustinal structures	Understands the material	4	.9
Apply and test	Intreactive	Heart	Understands the material	4	.10
Apply and test	Intreactive	Blood supply for chest	Understands the material	4	.11
Apply and test	Intreactive	Abdominal anatomy i	Understands the material	4	.12
Apply and test	Intreactive	Abdominal anatomy	Understands the material	4	.13
Apply and test	Intreactive	Urinary system i	Understands the material	4	.14
Apply and test	Intreactive	Urinary system ii	Understands the material	4	.15
Apply and test	Intreactive	Pancreas and spleen	Understands the material	4	.16
Apply and test	Intreactive	Large and small bowels i	Understands the material	4	.17
Apply and test	Intreactive	Large and small bowels ii	Understands the material	4	.18
Apply and test	Intreactive	Blood supply for abdomen	Understands the material	4	.19
Apply and test	Intreactive	Pelvic anatomy, bone	Understands the material	4	.20
Apply and test	Intreactive	Pelvic anatomy, tests	Understands the material	4	.21
Apply and test	Intreactive	Prostate	Understands the material	4	.22

Apply and test	Intreactive	Anatomy for female i	Understands the material	4	.23
Apply and test	Intreactive	Anatomy for female ii	Understands the material	4	.24
Apply and test	Intreactive	Blood supply for pelvic	Understands the material	4	.25
Apply and test	Intreactive	i Anatomy of breast	Understands the material	4	.26
Apply and test	Intreactive	Anatomy of breast ii	Understands the material	4	.27
Apply and test	Intreactive	biliary system	the Understands material	4	.28
Apply and test	Intreactive	Review	Understands the material	4	.29
Apply and test	Intreactive	Review	Understands the material	4	.30

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	Fundamentals of Sectional Anatomy
A-Recommended books and references (scientific journals, reports,...)	Studies published on the PUBmed website
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1. Giving the prescribed scientific material and observing and analyzing the students' results 2. Study feedback from students' comments about vocabulary 3. Study the practical laboratory notes for the course 4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiography techniques 2 course

This course studies how to teach the student about radiography of the skull and spine for normal and abnormal (pathological) cases.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiography techniques 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives	Teach the student x-ray imaging of the skull and spine for normal and abnormal (pathological) cases.

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Know and understand the principles of radiography. 2. Use special imaging positions to obtain clear radiographs. 3. Know and understand how x-ray machines work. 4. Know and understand the anatomy of the parts being photographed. 5. Examination of the skull and spine using X-ray techniques.
B - The skills objectives of the course. 1- Teaching the student how to use and perform radiological examination of various body systems. 2- Preparing efficient cadres to meet the needs of educational institutions in general and the health sector in general private. 3- Availability of qualified personnel to work in the field of teaching and

imaging examinations in hospitals Governmental and private centres. 4- Exchanging scientific expertise and competencies with similar laboratories in other universities and colleges.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Identify how to protect against radiation and its harms 2- Learn how to deal with the patient during radiography 3- Directing and advising patients to prepare them before performing the radiography 4- Identify the use of modern devices and update student information as these devices develop

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Lines & planes of projection of the skull 1	Understands the material	6	.1
Apply and test	Interactive	Lines & planes of projection of the skull 2	Understands the material	6	.2
Apply and test	Interactive	Skull AP, Lateral, Towns	Understands the material	6	.3
Apply and test	Interactive	Skull, towns and basal view	Understands the material	6	.4
Apply and test	Interactive	Sinuses, face, and nose PA and lateral	Understands the material	6	.5
Apply and test	Interactive	Sinuses, shown structure	Understands the material	6	.6
Apply and test	Interactive	Paranasal sinuses, waters view & lateral view	Understands the material	6	.7
Apply and test	Interactive	Paranasal sinuses, shown structure main finding	Understands the material	6	.8
Apply and test	Interactive	Mandible PA and oblique	Understands	6	.9

		projection, shown structure, main finding	the material		
Apply and test	Intreactive	Chin ventro - dorsal, TMJ view, maxillary bone	Understands material the	6	.10
Apply and test	Intreactive	Main skull pathology, image interpretation of special cases	Understands the material	6	.11
Apply and test	Intreactive	Cases for skull and facial bones	Understands the material	6	.12
Apply and test	Intreactive	Cervical spine, AP, lateral	Understands the material	6	.13
Apply and test	Intreactive	Cervical spine, AP for C1-C3, AP view for C3-C7, shown structure	Understands the material	6	.14
Apply and test	Intreactive	Cervico-thoracic region lateral waterskiing position, oblique view	Understands the material	6	.15
Apply and test	Intreactive	Main cervical spine finding, image interpretation of cervical fractures	Understands the material	6	.16
Apply and test	Intreactive	Cases review for cervical spine	Understands material the	6	.17
Apply and test	Intreactive	Thoracic spine, AP, lateral	Understands the material	6	.18
Apply and test	Intreactive	Thoracic spine, lateral decubitus, shown structure	Understands the material	6	.19
Apply and test	Intreactive	Image interpretation and main pathology of the thoracic spine	Understands the material	6	.20
Apply and test	Intreactive	Lumber spine, AP, lateral	Understands the material	6	.21
Apply and test	Intreactive	Lumber spine, oblique projection, shown structure	Understands the material	6	.22
Apply and test	Intreactive	Main finding, fractures, pathology, image interpretation of the lumber spine	Understands the material	6	.23
Apply and test	Intreactive	Sacrum and coccyx, AP, lateral, shown structure, main finding	Understands the material	6	.24
Apply and test	Intreactive	Cases review for the spinal column	Understands the material	6	.25
Apply and test	Intreactive	Abdomen, AP, PA erect, lateral view, Urinary tract KUB, shown structure	Understands the material	6	.26
Apply and test	Intreactive	Urinary tract KUB, shown structure	Understands the material	6	.27
Apply and test	Intreactive	pediatric imaging,	Understands the material	6	.28
Apply and test	Intreactive	Mammography, main position, finding, image interpretation	Understands the material	6	.29
Apply and test	Intreactive	Cases review,	Understands the material	6	.30

12. Infrastructure	
1- Required prescribed books	Bontrager's Handbook of Radiographic Positioning and Techniques: 10e, South Asia Edition-E-Book. Elsevier Health Sciences. Merrill's Atlas of Radiographic Positioning and Procedures-3-Volume Set-E-Book. Elsevier Health Sciences
2- Main references (sources)	Clark's Positioning In Radiography. A. S. Whitley
A-Recommended books and references (scientific journals, reports,...)	Textbook of Radiographic Positioning and Related Anatomy, 11th Edition Image Interpretation: Bones, Joints, and Fractures, 1st Edition
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan
The curriculum development plan is based on the following: 1. Giving the prescribed scientific material and observing and analyzing the students' results 2. Study feedback from students' comments about vocabulary 3. Study the practical laboratory notes for the course 4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Pathology course

This course aims to know and understand pathology and its relationship to other organ functions.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Pathology
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 2 practical hours = 4 hours x 30 weeks = 120 hours
7. Date this description was prepared	2024
8. Course objectives 1. Knowledge and understanding of pathology and its relationship to other organ functions. 2. Scientific skills that enable the student to study the pathological lesions of each organ in the human body and the importance of knowing the clinical signs. 3. Thinking and analysis skills that enable the student to know the interconnection of organs according to their anatomical locations and the type of infections that occur due to microbes. 4. Students achieved knowledge of histological events and clinical signs and linked them to the general changes of the disease state	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Enabling students to obtain knowledge and understanding of the intellectual and skills framework of pathology 2. Enabling the student to obtain knowledge and understanding of diseases, their causes, and methods of diagnosing the disease 3. Developing students' ability to distinguish between diseases and their clinical signs through differential diagnosis
B - The skills objectives of the course. 1. Enabling the student to know how to diagnose the disease and the pathology of the disease 2. Enabling the student to recognize the differential diagnosis of the disease and

compare it with other diseases 3. Enabling students to know about diseases and their impact on public health
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1 - Developing the student's ability to learn the most important racial and pathological differences that arise from the disease. 2- It helps the student to know the importance of pathology and its relationship to other sciences

11.Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Intreactive	Necrosis - cell death	Understands Subject	theoretical 2 practical 2 +	1.
Apply and test	Intreactive	Inflammation	Understands Subject	theoretical 2 practical 2 +	2.
Apply and test	Intreactive	Repair process	Understands Subject	theoretical 2 practical 2 +	3.
Apply and test	Intreactive	Infection	Understands Subject	theoretical 2 practical 2 +	4.
Apply and test	Intreactive	Body response to infection	Understands Subject	theoretical 2 practical 2 +	5.
Apply and test	Intreactive	Carcinogenesis	Understands Subject	theoretical 2 practical 2 +	6.
Apply and test	Intreactive	Radiation effect - early	Understands Subject	theoretical 2 practical 2 +	7.
Apply and test	Intreactive	Radiation effect - late	Understands Subject	theoretical 2 practical 2 +	8.
Apply and test	Intreactive	Homodynamic disorders	Understands Subject	theoretical 2 practical 2 +	9.
Apply and test	Intreactive	Blood disorders- WBC, RBC	Understands Subject	theoretical 2 practical 2 +	10.
Apply and test	Intreactive	Blood disorders - coagulation	Understands Subject	theoretical 2 practical 2 +	11.
Apply and test	Intreactive	Diseases of bones & joints	Understands Subject	theoretical 2 practical 2 +	12.
Apply and test	Intreactive	Bone fracture	Understands Subject	theoretical 2 practical 2 +	13.
Apply and test	Intreactive	Pathological diseases of the kidneys	Understands Subject	theoretical 2 practical 2 +	14.
Apply and test	Intreactive	Pathological diseases of the ureters & Urinary bladder	Understands Subject	theoretical 2 practical 2 +	15.
Apply and test	Intreactive	Pathological diseases of the esophagus & stomach	Understands Subject	theoretical 2 practical 2 +	16.
Apply and test	Intreactive	Pathological diseases of small & large bowels	Understands Subject	theoretical 2 practical 2 +	17.
Apply and test	Intreactive	Pathological diseases of the liver	Understands Subject	theoretical 2 practical 2 +	18.
Apply and test	Intreactive	Pathological diseases of the lung & pleura	Understands Subject	theoretical 2 practical 2 +	19.
Apply and test	Intreactive	Pathological diseases of the upper respiratory tract	Understands Subject	theoretical 2 practical 2 +	20.
Apply and test	Intreactive	Pathological diseases of the upper respiratory tract	Understands Subject	theoretical 2 practical 2 +	21.

Apply and test	Intreactive	Pathological diseases of the brain	Understands Subject	theoretical 2 practical 2 +	22.
Apply and test	Intreactive	Pathological diseases of the spinal cord	Understands Subject	theoretical 2 practical 2 +	23.
Apply and test	Intreactive	Pathological diseases of the gall bladder & biliary tract	Understands Subject	theoretical 2 practical 2 +	24.
Apply and test	Intreactive	Pathological diseases of the cardiovascular system	Understands Subject	theoretical 2 practical 2 +	25.
Apply and test	Intreactive	Pathological diseases of the endocrine system	Understands Subject	theoretical 2 practical 2 +	26.
Apply and test	Intreactive	Pathological diseases of the pituitary gland & adrenals	Understands Subject	theoretical 2 practical 2 +	27.
Apply and test	Intreactive	Pathological diseases of the lymphatic system	Understands Subject	theoretical 2 practical 2 +	28.
Apply and test	Intreactive	Pathological diseases of the female reproductive system	Understands Subject	theoretical 2 practical 2 +	29.
Apply and test	Intreactive	Pathological diseases of the breast	Understands Subject	theoretical 2 practical 2 +	30.

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	Robbins Abbas Kumar Pathology Basic Edition 9 th
A-Recommended books and references (scientific journals, reports,...)	Textbook of Pathology Basic
B - Electronic references, Internet sites...	The website of Al-Ayen Iraqi University

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Special radiological procedures 2 course

This course teaches how to use contrast media and conduct X-ray examination of various body systems

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	special radiological procedures 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives 1- University students are prepared to fully understand (Special Radiological procedures 2), which qualifies them to understand how to use contrast media and conduct X-ray examinations of various body systems. And improving the capabilities and skills of radiology technicians to work in the field of interventional radiology 2- Preparing students who are able to perform radiological and non-radiological examinations at the practical and applied level through the use of available means such as animated films and projection films to explain the most important examinations for catheter interventions of the heart and arteries and MRI and ultrasound examination of the remaining parts of the body.	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives 1. Teach the student how to use contrast media 2. Identify the anatomy after using contrast material 3. Knowing the appearance of the disease after using contrast material 4. Ability to define and use abbreviations for common special radiological procedures. 5. Learn about reading radioactive chips after contrast.
B - The skills objectives of the course. 1- Teaching how to deal with the dye and the relationship between the timing of administration and the presentation of anatomical parts 2- Comparison between the anatomical parts of the body in different radiology devices before and after the use of contrast media (conventional X-rays / CT scanners / resonance imaging) 3- Maintaining the quality of the radiological examination
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. - Graduate as a radiology technician familiar with common special radiological procedures 2 to enable him to perform radiographic calculations 2- Enabling the student to develop himself continuously after graduation to keep pace with developments in the field of specialization. Teaching and learning methods. Continuous guidance on (special radiological examinations 2) during lectures.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Intreactive	Methods of imaging of the heart and .angiocardigraphy	Understands the material	6	1.
Apply and test	Intreactive	Coronary arteriography & cardiac CT .including coronary angiography	Understands the material	6	2.
Apply and test	Intreactive	Methods of imaging the arterial system & introduction to catheter .techniques	Understands the material	6	3.
Apply and test	Intreactive	Femoral, brachial & axillary punctures .for catheterization	Understands the material	6	4.
Apply and test	Intreactive	General complications of catheter .techniques	Understands the material	6	5.
Apply and test	Intreactive	Ascending aortoraphy and lower limb .arteriography	Understands the material	6	6.
Apply and test	Intreactive	.Balloon angiography	Understands the material	6	7.
Apply and test	Intreactive	.Vascular embolization	Understands the material	6	8.
Apply and test	Intreactive	.CT & MRI angiography	Understands the material	6	9.
Apply and test	Intreactive	Methods of imaging the venous .system & peripheral venography	Understands the material	6	10.
Apply and test	Intreactive	.Central venography	Understands the material	6	11.
Apply and test	Intreactive	.Portal venography	Understands the material	6	12.
Apply and test	Intreactive	Position emission tomography .imaging	Understands the material	6	13.
Apply and test	Intreactive	.f-FDG PET scanning 18	Understands the material	6	14.
Apply and test	Intreactive	Lymph node imaging.	Understands the material	6	15.
Apply and test	Intreactive	Imaging modalities of bones & joints.	Understands material the	6	16.
Apply and test	Intreactive	.Muscloskeletal MRI – general points	Understands the material	6	17.
Apply and test	Intreactive	.Arthrography-general points	Understands the material	6	18.
Apply and test	Intreactive	.Arthrography of the knee & hip	Understands the material	6	19.
Apply and test	Intreactive	Arthrography of the shoulder & Am .bow	Understands the material	6	20.
Apply and test	Intreactive	.Radionuclide bone scan	Understands the material	6	21.

Apply and test	Intreactive	.Method of imaging the brain	Understands the material	6	22.
Apply and test	Intreactive	.CT & MRI of the brain	Understands the material	6	23.
Apply and test	Intreactive	.Cerebral & lumber myelography	Understands the material	6	24.
Apply and test	Intreactive	Methods of imaging the spine.	Understands the material	6	25.
Apply and test	Intreactive	.Cervical & lumber myelography	Understands the material	6	26.
Apply and test	Intreactive	Methods of imaging of the salivary glands	Understands the material	6	27.
Apply and test	Intreactive	Methods of imaging the thyroid & parathyroid glands with CT & MRI of the thyroid and parathyroid glands	Understands the material	6	28.
Apply and test	Intreactive	Methods of imaging of the breast & mammary glands	Understands the material	6	29.
Apply and test	Intreactive	Final exam	Understands the material	6	30.

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	CHAPMAN & NAKIELNY'S GUIDE TO RADIOLOGICAL PROCEDURES
A-Recommended books and references (scientific journals, reports,...)	CHAPMAN & NAKIELNY'S GUIDE TO RADIOLOGICAL PROCEDURES (eight edition)
B - Electronic references, Internet sites...	PubMed, ISI, master mri, question & answer mri, Google schooler.... etc.

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiation physics 2 course

Get an overview of MRI and ultrasound systems and the basic physics of both systems. Gain a basic understanding of how MRI and ultrasound images are created

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiation physics 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 2 practical hours = 4 hours x 30 weeks = 120 hours
7. Date this description was prepared	2024
8. Course objectives	
1. Develop knowledge of MRI, ultrasound, and image formation conditions 2. Obtain a detailed background in MRI and ultrasound physics and see available designs	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- The student should know the physical and medical definition of ultrasound 2- The student should know the cases of ultrasound 3- To know the principles of magnetic resonance imaging 4- To know the role of MRI in detecting and characterizing diseases and to recognize the advantages of MRI
B - The skills objectives of the course. 1. The student will learn how to operate the Piezoelectric operator 2. That the student understands and explains how the Piezoelectric Effect and reverse Piezoelectric Effect 3. The student will gain an understanding of how different soft tissues have T1 relaxation times and how this affects the overall images created in the MRI

machine. 4. That the student understands and defines the meaning of TR (repetition time) and TE (echo delay time).
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Describe the general relationship between image quality and wavelength for an ultrasound device 2. Explain the advantages and disadvantages of CW Doppler 3. Discuss the differences between T1-weighted images, proton density-weighted images, and T2-weighted images.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Intreactive	Magnetic Resonance Imaging	Understands the material	6	1.
Apply and test	Intreactive	Historical introduction, The Hardware Magnet Types	Understands the material	6	2.
Apply and test	Intreactive	RF Coils	Understands the material	6	3.
Apply and test	Intreactive	Other Hardware	Understands the material	6	4.
Apply and test	Intreactive	Excitation Relaxation	Understands the material	6	5.
Apply and test	Intreactive	Phase and Phase Coherence	Understands the material	6	6.
Apply and test	Intreactive	Acquisition Computing and Display	Understands the material	6	7.
Apply and test	Intreactive	Signal Coding	Understands the material	6	8.
Apply and test	Intreactive	Gradient Specifications	Understands the material	6	9.
Apply and test	Intreactive	MRI Image Quality, Artifacts, and Imaging Parameters	Understands the material	6	10.
Apply and test	Intreactive	Signal to Noise and Contrast Resolution	Understands the material	6	11.
Apply and test	Intreactive	Scan parameters (TR, TE, flip angle)	Understands the material	6	12.
Apply and test	Intreactive	Selection of the transmit and receive coil (RF coil) Field of View	Understands the material	6	13.
Apply and test	Intreactive	Number of Excitations, MRI Contrast Agents	Understands the material	6	14.
Apply and test	Intreactive	K-Space, Filling k-Space, K-Space Symmetry	Understands the material	6	15.
Apply and test	Intreactive	Physics of Ultrasound_Definition	Understands	6	16.

			the material		
Apply and test	Intreactive	Properties of Ultrasound	Understands the material	6	17.
Apply and test	Intreactive	Diagnostic Ultrasound, Piezoelectric Materials	Understands the material	6	18.
Apply and test	Intreactive	Ultrasound Transducers	Understands the material	6	19.
Apply and test	Intreactive	<u>Amplification</u>	Understands the material	6	20.
Apply and test	Intreactive	, DisplayImage Processor	Understands the material	6	21.
Apply and test	Intreactive	Things to consider	Understands the material	6	22.
Apply and test	Intreactive	Ultrasound Modalities	Understands the material	6	23.
Apply and test	Intreactive	Ultrasound Characteristics	Understands the material	6	24.
Apply and test	Intreactive	<u>Intensity and Power</u>	Understands the material	6	25.
Apply and test	Intreactive	Interactions of Ultrasound with Tissue	Understands the material	6	26.
Apply and test	Intreactive	ModesUltrasound	Understands the material	6	27.
Apply and test	Intreactive	Doppler Effect Basic principles The Doppler Equation	Understands the material	6	28.
Apply and test	Intreactive	Pulsed and Continuous Wave Doppler	Understands the material	6	29.
Apply and test	Intreactive	High PRF Color Flow Mapping Pulsed Wave Doppler	Understands the material	6	30.

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1-Radiation Physics and its applications in diagnostic radiological techniques 2-Medical Imaging Physics Fourth Edition 3-Basic Physics of Ultrasonographic Imaging
A-Recommended books and references (scientific journals, reports,...)	Textbook of Radition physics

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiation protection 2 Course

Radiation protection is the science of protecting humans from the effects of ionizing radiation, whether they are elementary particles such as protons and neutrons or high-energy electromagnetic radiation such as X-rays and gamma rays.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiography techniques 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	1 theoretical hours + 2 practical hours = 3 hours x 30 weeks = 90 hours
7. Date this description was prepared	2024
8. Course objectives 1. Providing sufficient information to students regarding radon. 2. Provide clinical examples that illustrate the principles of ALARA. 3. Distinguish between workers in the area who are occupationally at risk and those who are treated as members of the general public. 4. Discuss the factors that determine the dose to a pregnant person sitting next to a patient being injected with a radionuclide for a diagnostic or therapeutic procedure. 5. Describe the steps used in applying suitability criteria.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Gaining knowledge of an important scientific topic and applying it in his field of work. 2. Obtaining new ideas that can be combined with his specialty 3. In response to recent developments in the field of radiation protection
B - The skills objectives of the course. 1. Developing the student from the practical aspect in the laboratory and the theoretical aspect in understanding the basics of radiation protection 2. Solve the problems facing the student in the field of work by developing his mind in thinking for a solution the problem 3. The student learns how to write scientific reports
Teaching and learning methods

• Lectures • Video clips
methods Evaluation
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Using a computer in the field of specialization. 2. The ability to search for information, analyze it statistically, and extract it through the use of the studied programs. 3. The ability to collect information, analyze it, and summarize the main ideas. 4. Writing technical reports on experiments used in the field of specialization.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Review Structure of the Atom – Radiation Units – ALARA principles –	Understands the material	3	1
Apply and test	Interactive	Diagnostic X-Ray Room Measurement of Area Radiation Levels Leakage Radiation In-room Scattered Radiation Measurement Protective Barrier/Shielding Assessment Area Radiation Level Checklist	Understands the material	3	2,3
Apply and test	Interactive	Medical Sources: Occupational and Patient Doses Ionizing radiation interactions with tissue Radiobiological effects at the cellular and whole body level Genetic and somatic effects of ionizing radiation deterministic effects • stochastic effects • probability coefficients for tissues at risk • effective dose • Threshold and non-threshold effects.	Understands the material	3	4,5,6
Apply and test	Interactive	Radiation protection principles Justification • Optimization • Limitation •	Understands the material	3	7
Apply and test	Interactive	Radiation protection principles applied to medical diagnostic procedures Radiation protection of patients who are or might be pregnant Practical measures for the reduction of patient dose	Understands the material	3	8,9,10

		Some dose-saving equipment Some dose-saving techniques High-risk examinations			
Apply and test	Interactive	Risks from radiological examinations Explaining radiation risks to patients Personal protection and personal monitoring - how, why, when, where dose limits typical doses to staff and associated risks Protection of employees and members of the public protection of patients	Understands the material	3	11,12,13
Apply and test	Interactive	Physical factors affecting radio-sensitivity 1. Linear energy transfer 2. Relative biological effectiveness 3. Fractionation and protraction	Understands the material	3	14
Apply and test	Interactive	Biologic factors affecting Radio sensitivity 1. Oxygen effect 2. Age effect 3. Sex effect 4.Recovery 5.Chemical agents	Understands the material	3	15,16
Apply and test	Interactive	Early effects of radiation Acute radiation syndrome Hematologic syndrome • Gastrointestinal syndrome • Central nervous system • syndrome Local tissue damage Skin • Gonads • Extremities • Hematologic depression Cytogenetic damage	Understands the material	3	17,18
Apply and test	Interactive	Late effects of radiation	Understands the material	3	19,20

		- Leukemia • - Other malignant disease • - Effect of fetal irradiation - Prenatal death • - Neonatal death • - Congenital malformation • - Childhood malignancy • - Fetuses irradiated in utero			
Apply and test	Interactive	- Radiation dose-response relationships - Linear dose-response relationships - Non-Linear dose-response relationships - Constructing a dose-response relationships - Linear, quadratic dose-response relationships - Radiolysis of water - Direct and indirect	Understands the material	3	21,22,23
Apply and test	Interactive	- Maximum permissible dose - Whole body non-occupational exposure - Partial-body occupational exposure - X-ray and pregnancy 1. The pregnant technologist 2. Management principles 3. The pregnant patient	Understands the material	3	24,25
Apply and test	Interactive	- Designing for radiation protection - Design of X-ray apparatus - Design of protective barrier thickness	Understands the material	3	26
Apply and test	Interactive	- Factors affecting barrier thickness - Occupational Exposure	Understands the material	3	27
Apply and test	Interactive	- Patient dose - Patient dose in special examinations - Reduction of occupational exposure - Reduction of unnecessary patient dose - Unnecessary examinations	Understands the material	3	28,29,30

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1. RF Farr and PJ Allisy-Roberts “Physics for Medical Imaging”, Saunders, 4 th edition (2001). 2. S.C. Bushong “Radiologic Science For Technologists”, Mosby, Fifth edition (1988). H. Cember “Introduction to Health Physics”, Pergamon Press, Third edition (1987).
A-Recommended books and references (scientific journals, reports,...)	S.C. Bushong “Radiologic Science For Technologists”, Mosby, Fifth edition (1988).
B - Electronic references, Internet sites...	Website of the International Agency for Radiation Protection The website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: 1. Giving the prescribed scientific material and observing and analyzing the students’ results 2. Study feedback from students’ comments about vocabulary 3. Study the practical laboratory notes for the course 4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Computer applications 2 course

This course aims to provide the student with the skills of dealing with basic office applications and creating office files and documents. The use of the operating system as well as the basics of working within the digital environment.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Computer applications 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	1 theoretical hours + 2 practical hours = 3 hours x 30 weeks = 90 hours
7. Date this description was prepared	2024
8. Course objectives 1- Identify the applications and basics of three programs: Excel, PowerPoint, and the statistical program SPSS. 2- Providing students with abundant information on how to apply computer concepts in the health and medical system 3- Urging students to actively participate in attending advanced scientific courses and conferences to practice their specialty 4- Introducing the student to: calculator software, Excel, the SPSS statistical program, and the PowerPoint program in practicing the profession, and learning about its concept, benefits, specifications, features, and methods of operation.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1- Understands the principles and basics of computer programs. 2- Identify the types and stages of development of computer programs. 3- Get acquainted with statistical calculator programs, especially the statistical program SPSS. 4- Learn a set of program instructions related to computer programs targeted at health and medical teaching.

5- He can deal with Office programs, Excel and PowerPoint
B - The skills objectives of the course. 1 - Be able to deal with a computer. 2 - He can write and execute programs on the computer 3 - He carries out some procedures related to some electronic instructions
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Using the electronic calculator in the field of specialization. 2- The ability to search for information, analyze it statistically, and extract it through the use of the studied programs. 3- The ability to collect information, analyze it, and summarize the main ideas. 4- Writing technical reports on the devices used in the field of specialization.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	Excel program	Understands the material	3	1.
Test and apply	Interactive	Cell handling	Understands the material	3	2.
and apply Test	Interactive	File handling	Understands the material	3	3.
and apply Test	Interactive	Using functions	Understands the material	3	4.
and apply Test	Interactive	Format cells	Understands the material	3	5.
and apply Test	Interactive	Formatting tables	Understands the material	3	6.
and apply Test	Interactive	Formatting tables	Understands the material	3	7.
and apply Test	Interactive	handling Cell	Understands the material	3	8.
and apply Test	Interactive	Statistical programme	Understands the material	3	9.
and apply Test	Interactive	Statistician the program	Understands the material	3	10.
and apply Test	Interactive	And Files dealing with data	Understands the material	3	11.
and apply Test	Interactive	Analysis application	Understands the material	3	12.

		Descriptive			
and apply Test	Interactive	Apply averages and comparisons	Understands the material	3	13.
and apply Test	Interactive	Application of statistical packages	Understands the material	3	14.
and apply Test	Interactive	Dealing with charts	Understands the material	3	15.
and apply Test	Interactive	Application of statistical packages	Understands the material	3	16.
and apply Test	Interactive	Application of statistical packages	Understands the material	3	17.
and apply Test	Interactive	program Power Point	Understands the material	3	18.
and apply Test	Interactive	Get to know the program	Understands the material	3	19.
and apply Test	Interactive	program the dealing with	Understands the material	3	20.
and apply Test	Interactive	Apply effects	Understands the material	3	21.
and apply Test	Interactive	Apply effects	Understands the material	3	22.
and apply Test	Interactive	Apply effects	Understands the material	3	23.
and apply Test	Interactive	program the dealing with	Understands the material	3	24.
and apply Test	Interactive	program the dealing with	Understands the material	3	25.
and apply Test	Interactive	And Files dealing with data	Understands the material	3	26.

and apply Test	Interactive	And Files dealing with data	Understands the material	3	27.
and apply Test	Interactive	Page formatting	Understands the material	3	28.
and apply Test	Interactive	Formatting tables	Understands the material	3	29.
apply and Test	Interactive	File format	Understands the material	3	30.

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1-Computer and Internet basics. Mother. Dr.. Ziad Muhammad Abboud 2013 2-Discovering Statistics Using SPSS, 3rd Edition (Introducing Statistical Methods) Computer and Internet basics. Mother. Dr. Ziad Muhammad Abboud 2013 3-Discovering Statistics Using SPSS, 3rd Edition Introducing Statistical Methods
A-Recommended books and references (scientific journals, reports,...)	IC3 book for computers and spss program
B - Electronic references, Internet sites...	The official website of the spss program Office official website

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Radiological medical device techniques2 course

This course teaches how to use contrast media and conduct X-ray examination of various body systems.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Radiological medical device techniques 2
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives	
1. Introducing the student to the components of radiological medical devices and how they work.	
2. Providing knowledge about the historical background of radiological medical devices.	
3. Explore the components of basic devices used in radiography, such as magnets, RF coils, and gradient coils.	
4. Understand the acquisition, computing, and display processes in radiography.	
5. Introduce the student to the different types of files used in radiography devices, including volumetric RF files, surface files, and sequential array files.	
6. Explore the concepts of pixel, voxel, matrix, and slice thickness in radiography.	
7. Providing theoretical and practical knowledge about radiography techniques	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives 1. Understanding the principles and techniques of operating radiological medical devices. 2. Identify the components of radiological medical devices and the role of each component in the radiography process. 3. Acquire the necessary knowledge about the history and development of radiological medical device technologies. 4. Developing skills in dealing with various types of files and magnets used in radiography. 5. The ability to analyze and understand radiographs and the data extracted from them. 6. Applying theoretical concepts in practical work on radiography devices. 7. Develop teamwork and communication skills in a multi-disciplinary work environment
B - The skills objectives of the course. 1. Developing skills in identifying and distinguishing between the components of radiological medical devices. 2. Acquiring analytical and critical thinking skills in evaluating the performance of radiological medical devices. 3. Develop effective interaction and communication skills with the work team in a medical environment. 4. Develop research and exploration skills to learn about the latest technologies and innovations in the field of radiological medical devices. 5. Improving the skills of practical application of theoretical concepts related to radiological medical device techniques. 6. Developing the skills of analyzing and interpreting radiographs and the data extracted from them. 7. Enhancing innovation and development skills in the field of radiological medical device technologies
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Communication skills: Enhancing the student's ability to communicate effectively with patients and colleagues in the health work environment. 2. Technical skills: Developing practical work skills on radiological medical

devices and using modern technologies in this field.

3. Research skills: Enhancing the student's ability to research and collect the necessary information to analyze cases and make sound decisions.

4. Analytical skills: Develop the ability to accurately analyze data and medical images and understand the results correctly.

5. Technical skills: Learn to use modern devices and techniques in the field of medical imaging and radiology diagnosis.

6. Administrative skills: Developing time management, organization, and leadership skills to achieve efficiency in a healthy work environment.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Apply and test	Interactive	History of Hardware	Understands the material	3	1.
Test and apply	Interactive	Permanent magnets	Understands the material	3	2.
and apply Test	Interactive	Superconducting magnets	Understands the material	3	3.
and apply Test	Interactive	Volume RF Coils	Understands the material	3	4.
and apply Test	Interactive	Surface coils	Understands the material	3	5.
and apply Test	Interactive	Phased Array Coils	Understands the material	3	6.
and apply Test	Interactive	Acquisition	Understands the material	3	7.
and apply Test	Interactive	Gradient Coils	Understands the material	3	8.
and apply Test	Interactive	Slice / phase Encoding	Understands the material	3	9.
and apply Test	Interactive	Frequency Encoding	Understands the material	3	10.
and apply Test	Interactive	Pixel, Voxel, Matrix	Understands the material	3	11.
and apply Test	Interactive	Receiver bandwidth	Understands the material	3	12.

and apply Test	Interactive	Size of the (image) matrix	Understands the material	3	13.
and apply Test	Interactive	Matrices types	Understands the material	3	14.
and apply Test	Interactive	Number of acquisitions	Understands the material	3	15.
and apply Test	Interactive	Field of View	Understands the material	3	16.
and apply Test	Interactive	History of CT scan	Understands the material	3	17.
and apply Test	Interactive	Generations of CT Scanner i	Understands the material	3	18.
and apply Test	Interactive	Generations of CT Scanner ii	Understands the material	3	19.
and apply Test	Interactive	Principles of helical CT	Understands the material	3	20.
and apply Test	Interactive	Data acquisition	Understands the material	3	21.
and apply Test	Interactive	Basic CT components i	Understands the material	3	22.
and apply Test	Interactive	Basic CT components ii	Understands the material	3	23.
and apply Test	Interactive	Data Acquisition System	Understands the material	3	24.
and apply Test	Interactive	X-ray tubes and collimators	Understands the material	3	25.
and apply Test	Interactive	Radiation detectors	Understands the material	3	26.
		Axial computed tomography	Understands the		27.

and apply Test	Interactive		material	3	
and apply Test	Interactive	Multislice CT i	Understands the material	3	28.
and apply Test	Interactive	Multislice CT ii	Understands the material	3	29.
and apply Test	Interactive	CT fluoroscopy	Understands the material	3	30.

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	1- MRI- Essentials for Innovative Technologies 2- CT scan Hardware, overview
A-Recommended books and references (scientific journals, reports,...)	1- Radiopaedia. Org. 2- Radioinfo. 3-Rad. Assistant
B - Electronic references, Internet sites...	The official website of the spss program Office official website

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Department of Radiology Technologies

(The fourth stage)



Computed Tomography scan course

This course studies how to teach students about computed tomography examinations of all body organs, the appropriate organs for each examination, the cases that require staining, and how to use it.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Computed Tomography scan
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives Preparation of a radiology technician who works in the CT scanner unit, and has all the knowledge and skills necessary to perform all examinations on the CT scanner.	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. Building anatomical and pathological knowledge as an essential part of dealing with the case report sheet. 2. Participate with the radiologist in conducting advanced examinations such as angiography, cardiac, and entrography examinations. 3. Teaching the student how to deal with the device in terms of sustainability and reducing examination errors in cooperation with the Medical Engineering Division in the institution in which he works. 4. Teach the student the concept of (image quality) and distinguishing it from those that give diagnostic errors.

5. Teaching the student the basics of radiation risks and measuring the effective dose before the examination, in cooperation with medical physicists.
B - The skills objectives of the course. 1- Teaching the student how to prepare an appropriate protocol according to the type of examination. 2- Teaching the student post processing techniques to print the final image for examination. 3- Dealing with patients coming from the emergency department in terms of speed and quality. 4- Participate with the rest of the radiology units in evaluating examinations that require more than one examination. 5- Reaching the level of training and education in the institution in which he works for new graduates and graduates of radiography institutes. 6- Dealing with critical cases by performing staining tests, basics of pulmonary and cardiac resuscitation, and reducing the risk of allergic reactions.
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- Teaching the student how to deal with patients and their different personality types. 2- Teaching students psychological care skills for people with disabilities and oncology patients. 3- Teaching the student the foundations of health management in the CT-scan unit in terms of archiving and making statistics. 4- Teaching the student the basics of teaching methods

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Education outcomes	hours	the week
Applied and test	Interactive	<i>Basic of CT i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.1
Applied and test	Interactive	<i>Basic of CT ii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.2
Applied and test	Interactive	<i>Types of CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.3
Applied and test	Interactive	<i>Basic terms</i>	Understand s the material	hours theoretical + 2 hours practical 4	.4
Applied and test	Interactive	<i>CT artifacts</i>	Understand s the material	hours theoretical + 2 hours practical 4	.5
Applied and test	Interactive	<i>Contrast media i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.6
Applied and test	Interactive	<i>Contrast media ii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.7
Applied and test	Interactive	<i>Contrast media iii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.8
Applied and test	Interactive	<i>Brain CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.9
Applied and test	Interactive	<i>Stroke CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.10
Applied and test	Interactive	<i>Paranasal CT i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.11
Applied and test	Interactive	<i>Paranasal CT ii</i>	Understand s the material	theoretical + hours 2 hours practical 4	.12
Applied and test	Interactive	<i>Thorasic CT i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.13
Applied and test	Interactive	<i>Thoracic CT ii</i>	Understand s the	hours theoretical + 2 hours practical 4	.14

			material		
Applied and test	Interactive	<i>HR Lung CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.15
Applied and test	Interactive	<i>Cardiac CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.16
Applied and test	Interactive	<i>Neck CT i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.17
Applied and test	Interactive	<i>Neck CT ii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.18
Applied and test	Interactive	<i>Pulmonary Art. CT</i>	Understand s the material	theoretical + hours 2 hours practical 4	.19
Applied and test	Interactive	<i>CT GIT i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.20
Applied and test	Interactive	<i>CT GIT ii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.21
Applied and test	Interactive	<i>CT colonography</i>	Understand s the material	hours theoretical + 2 hours practical 4	.22
Applied and test	Interactive	<i>Virtual CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.23
Applied and test	Interactive	<i>CT liver (phasing CM) i</i>	Understand s the material	hours theoretical + 2 hours practical 4	.24
Applied and test	Interactive	<i>CT liver (phasing CM) ii</i>	Understand s the material	hours theoretical + 2 hours practical 4	.25
Applied and test	Interactive	<i>Pancreas CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.26
Applied and test	Interactive	<i>Urinary CT</i>	Understand s the material	hours theoretical + 2 hours practical 4	.27
Applied and test	Interactive	<i>MSK CT i</i>	Understand s the material	+ hours theoretical 2 hours practical 4	.28
Applied and test	Interactive	<i>MSK CT ii</i>	Understand	hours theoretical + 2 hours practical 4	.29

			s the material		
Applied and test	Interactive	<i>CT trauma</i>	Understand s the material	hours theoretical + 2 hours practical 4	.30

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	Computed Tomography for Technologists: A Comprehensive Text
A-Recommended books and references (scientific journals, reports,...)	Studies published on the PUBmed website
B - Electronic references, Internet sites...	Radiopedia.org

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Principles of medicine and surgery course

This course studies all the important information in evaluating pathological conditions and following modern methods of diagnosing diseases

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Principles of medicine and surgery
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 3 practical hours = 5 hours x 30 weeks = 150 hours
7. Date this description was prepared	2024
8. Course objectives 1. Providing students with practical and theoretical information on how to care for patients and collecting all important information in evaluating pathological cases and following modern methods in diagnosing diseases. 2. Teaching students everything related to diseases and their symptoms 3. Introducing students to various pathogens, their transmission methods, and their epidemiology 4. Teaching and training students on methods of diagnosing diseases	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. Enabling students to know the most important internal diseases in humans, their methods of transmission, symptoms, and causes, and to differentiate between them.
2. Enabling students to know the most important methods of diagnosing diseases, especially those that rely on radiographs, ultrasound, MRI, etc.
3. Enabling students to know the most important surgical interventions that help diagnose some disease

B - The skills objectives of the course. 1. Training students on how to collect information about the history of medical cases 2. Training students on how to care for patients and consider them physically and psychologically, especially those who need surgical intervention. 3. Training students to be able to read and take radiographs and operate various sonar and resonance devices
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
C- Emotional and evaluation objectives 1. Enabling students to adapt the hospital environment and medical conditions 2. Enabling students to understand the suffering and pain of patients and how to provide assistance to them 3. Developing students' ability to tolerate and deal with various medical conditions
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Enabling students to continue self-development after graduation through training courses 2. Enabling students to pass job interviews

11.Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Applied and test	Interactive	Headache: types & imaging of headache	Understands the material	2 theoretical + 3 practical	1,2
Applied and test	Interactive	Head injury: the role of imaging in head injury	Understands the material	2 theoretical + 3 practical	3
Applied and test	Interactive	Cerebrovascular accident (CVA):imaging in CVA	Understands the material	2 theoretical + 3 practical	4,5
Applied and test	Interactive	Paranasal sinuses: imaging in paranasal sinuses diseases	Understands the material	2 theoretical + 3 practical	6
Applied and test	Interactive	The orbit: imaging in orbital diseases	Understands the material	2 theoretical + 3 practical	7
Applied and test	Interactive	The spine: imaging of spinal lesions	Understands the material	2 theoretical + 3 practical	8
Applied and test	Interactive	The neck: role of imaging in neck masses	Understands the material	2 theoretical + 3 practical	9
Applied and test	Interactive	Bone disease: infection, tumor	Understands the material	2 theoretical + 3 practical	10,11
Applied and test	Interactive	Bone fracture: types & imaging	Understands the material	2 theoretical + 3 practical	12
Applied and test	Interactive	Respiratory tract diseases: infections, chest trauma, lung masses	Understands the material	2 theoretical + 3 practical	13
Applied and test	Interactive	Pulmonary embolism, pneumothorax, pleural effusion.	Understands the material	2 theoretical + 3 practical	14
Applied and test	Interactive	Urinary tract obstruction: causes, clinical features & imaging.	Understands the material	2 theoretical + 3 practical	15
Applied and test	Interactive	Urinary tract infection: imaging in UTI	Understands the material	2 theoretical + 3 practical	16
Applied and test	Interactive	Renal & physical tumors: types, features, imaging.	Understands the material	2 theoretical + 3 practical	17
Applied and test	Interactive	Cystic diseases of kidney, congenital.	Understands the material	2 theoretical + 3 practical	18
Applied and test	Interactive	GIT: diseases of esophagus.	Understands the material	2 theoretical + 3 practical	19
Applied and test	Interactive	Diseases of the stomach: gastric mass, ulcer	Understands the material	2 theoretical + 3 practical	20
Applied and test	Interactive	Diseases of duodenum: Duodenal ulcer (DU).	Understands the material	2 theoretical + 3 practical	21
Applied and test	Interactive	Diseases of jejunum & ileum.	Understands the material	2 theoretical + 3 practical	22
Applied and test	Interactive	Diseases of colon	Understands the material	2 theoretical + 3 practical	23
Applied and test	Interactive	Liver: hepatitis, jaundice, cholecystitis , portal hypertension.	Understands the material	2 theoretical + 3 practical	24
Applied and test	Interactive	Hepatic masses: role of imaging	Understands the material	2 theoretical + 3 practical	25
Applied and test	Interactive	Female reproductive system: infertility, causes & role of imaging.	Understands the material	2 theoretical + 3 practical	26

Applied and test	Interactive	Tumors of uterus&ovaries	Understands the material	2 theoretical + 3 practical	27
Applied and test	Interactive	Breast masses: benign & malignant	Understands the material	2 theoretical + 3 practical	28
Applied and test	Interactive	Diseases of vascular system	Understands the material	2 theoretical + 3 practical	29
Applied and test	Interactive	Final examination	Understands the material	2 theoretical + 3 practical	30

12. Infrastructure	
1- Required prescribed books	1-Textbook of medical –surgical nursing , ed. 1996 by ths . 8'Brunner and SuddarthSuzanne C. Smeltzer : Brenda G. Bane . Lippincott-raven publishers
2- Main references (sources)	1-Medical –surgical nursing, critical thinking for collaborate care. Donna D. Ignatavicius; . Ed. 2006 Elsevier thM.Linda Workman. 5Saunders Inc. 2-Assesment and management of clinical .ed. thproblems , Lewis, Heitkeper, Dirksen. 62004 Mosby, Inc.
A-Recommended books and references (scientific journals, reports,...)	Anatomy for diagnostic imaging , second edition , Stephanie ryan
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: 1. Giving the prescribed scientific material and observing and analyzing the students' results 2. Study feedback from students' comments about vocabulary 3. Study the practical laboratory notes for the course 4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Magnetic resonance imaging course

The student teaches how to conduct MRI examinations for all body procedures, the appropriate clips and protocols for each examination, the cases that require the use of staining material, and how to use it.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Magnetic resonance imaging
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives This course aims to prepare university students to fully understand the radiological procedures for MRI examinations, making them able to teach the student how to use contrast media in MRI and conduct examinations of various body systems. And refining the capabilities and skills of radiology technicians to work in the field of arterial and venous examinations, cardiac imaging examinations, and functional resonance imaging examinations to differentiate between benign and malignant tumors, as well as examinations to measure brain activities to identify some diseases caused by increased or decreased brain activity.	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives 1. Teach the student how to use contrast media with MRI examinations 2. Identifying the anatomy after using contrast material in MRI images 3-Knowing the time to give contrast material based on the MRI images 4. The ability to define and use abbreviations for radiological procedures related to MRI. 5. Getting to know the reading of radioactive chips after the contrast procedure. 6- Identify the principle of MRI and its relationship to the nature of the disease and the form of the examination image
B - The skills objectives of the course. 1- Teaching how to deal with the dye and the relationship between the timing of administration and showing the anatomical parts 2- Comparison between the anatomical parts of the body in different radiology devices before and after contrast (resonance imaging) 3- Maintaining the quality of the radiological examination 4- Skills in choosing the protocol according to the type of disease and not choosing the protocol according to the part of the body examined
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). 1- The ability to search for information, analyze it statistically, and extract it through the use of the studied programs. 2- The ability to collect information, analyze it, and summarize the main ideas. 3- Writing technical reports about the devices used in the field of specialization.

11. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
and apply Test	Interactive	MRI terms1	Understand s the material	2 theoretical + 4 practical	1.
Test and apply	Interactive	MRI terms1	Understand s the material	2 theoretical + 4 practical	2.
Test and apply	Interactive	Concepts of MRI	Understand s the material	2 theoretical + 4 practical	3.
Test and apply	Interactive	Concepts of MRI	Understand s the material	2 theoretical + 4 practical	4.
Test and apply	Interactive	Principle of mri	Understand s the material	2 theoretical + 4 practical	5.
Test and apply	Interactive	Principle of mri	Understand s the material	2 theoretical + 4 practical	6.
Test and apply	Interactive	Pulse sequences and Image Contrast 1	Understand s the material	2 theoretical + 4 practical	7.
Test and apply	Interactive	Pulse sequences and Image Contrast 2	Understand s the material	2 theoretical + 4 practical	8.
Test and apply	Interactive	Artifacts and their compensation	Understand s the material	2 theoretical + 4 practical	9.
Test and apply	Interactive	Mri Safety prepration and contrast agent	Understand s the material	2 theoretical + 4 practical	10.
Test and apply	Interactive	Mri Safety prepration and contrast agent	Understand s the material	2 theoretical + 4 practical	11.
Test and apply	Interactive	MRI of the brain	Understand s the material	2 theoretical + 4 practical	12.
Test and apply	Interactive	MRI of the brain 2	Understand	2 theoretical	13.

			s the material	+ 4 practical	
Test and apply	Interactive	Mri orbital	Understand s the material	2 theoretical + 4 practical	14.
apply Test and	Interactive	Mri cs	Understand s the material	2 theoretical + 4 practical	15.
Test and apply	Interactive	Mri thoracic	Understand s the material	2 theoretical + 4 practical	16.
Test and apply	Interactive	Mri of neck	Understand s the material	2 theoretical + 4 practical	17.
Test and apply	Interactive	Mri chest	Understand s the material	2 theoretical + 4 practical	18.
Test and apply	Interactive	MRI of the abdomen	Understand s the material	2 theoretical + 4 practical	19.
Test and apply	Interactive	MRI of the slave 2	Understand s the material	2 theoretical + 4 practical	20.
Test and apply	Interactive	Mri of biliary tree and pancreas	Understand s the material	2 theoretical + 4 practical	21.
Test and apply	Interactive	MRI of the mal pelvis	Understand s the material	2 theoretical + 4 practical	22.
Test and apply	Interactive	MRI of the femal pelvis	Understand s the material	2 theoretical + 4 practical	23.
Test and apply	Interactive	Mri of shoulder j.	Understand s the material	2 theoretical + 4 practical	24.
Test and apply	Interactive	Mri of hip joint	Understand s the material	2 theoretical + 4 practical	25.
Test and apply	Interactive	Mr of knee j.	Understand s the material	2 theoretical + 4 practical	26.

Test and apply	Interactive	MRI in obstetrics	Understand s the material	2 theoretical + 4 practical	27.
Test and apply	Interactive	MRA &MRV	Understand s the material	2 theoretical + 4 practical	28.
Test and apply	Interactive	MRI of suspected fracture	Understand s the material	2 theoretical + 4 practical	29.
Test and apply	Interactive	Mri of soft tissue	Understand s the material	2 theoretical + 4 practical	30.

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	MRI A to Z : Gary Liney - MRI at a Glance: Catherine Westbrook Principles of Magnetic Resonance Imaging: Physics Concepts, Pulse Sequences, & Biomedical Applications [Wang PhD, Yi]
A-Recommended books and references (scientific journals, reports,...)	Radiopedia
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan
The curriculum development plan is based on the following: 1. Giving the prescribed scientific material and observing and analyzing the students' results 2. Study feedback from students' comments about vocabulary 3. Study the practical laboratory notes for the course 4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Ultrasound imaging course

This course studies the working principle of the ultrasound device, its terminology, types of ultrasound sensors, and its uses

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Ultrasound imaging
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 4 practical hours = 6 hours x 30 weeks = 180 hours
7. Date this description was prepared	2024
8. Course objectives The student will be able to know: • The working principle of the ultrasound device, its terminology, types of ultrasound sensors, and its uses • Preparing patients for examination • Ultrasound indications for each examination • Voice manifestations of normal and abnormal organs • Differential diagnosis of diseases and lesions of the abdominal organs	

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

- Knowledge and understanding
- Building radiology technicians with scientific efficiency
- Good understanding of scientific materials
- Gaining knowledge in ultrasound examinations
- Using the application in the field of work can combine obtaining new ideas efficiently
- Teaching the student how to handle the ultrasound device and the examination method

B - The skills objectives of the course. • The student practices his specialty • Develop their English and medical terminology related to their field • Solve problems facing students in their jobs and know how to deal with them in specific and emergency situations
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). • Gaining practical experience enables the acquisition of skills • Gaining scientific experience enables the acquisition of skills • The graduate has the ability to acquire development skills • The graduate will have the ability to complete his studies in his field of specialization in general and in the field of ultrasound imaging in particular.

11. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Test and apply	Interactive	Principle of ultrasound and its terms	Understands the material	2 theoretical + 4 practical	1.
Test and apply	Interactive	Normal appearance of the liver	Understands the material	2 theoretical + 4 practical	2.
Test and apply	Interactive	:Abnormal liver :Enlarged liver/hepatomegaly :homogeneous pattern :Enlarged liver :non-homogeneous pattern Small liver/shrunken liver	Understands the material	2 theoretical + 4 practical	3.
Test and apply	Interactive	Cystic lesions in normal or larger liver	Understands material the	2 theoretical + 4 practical	4.
Test and apply	Interactive	Differential diagnosis of liver masses Trauma of the liver	Understands the material	2 theoretical + 4 practical	5.
Test and apply	Interactive	Normal appearance gallbladder and biliary tract	Understands the material	2 theoretical + 4 practical	6.
Test and apply	Interactive	abnormal gallbladder and biliary tract:	Understands the material	2 theoretical + 4 practical	7.

		†extended gallbladder †Acute cholecystitis Echoes within the gallbladder			
Test and apply	Interactive	thick gallbladder walls, small gallbladder, Gallbladder in Jaundice	Understands the material	2 theoretical + 4 practical	8.
Test and apply	Interactive	Normal and abnormal appearance of pancreas	Understands the material	2 theoretical + 4 practical	9.
Test and apply	Interactive	Normal and abnormal appearance of spleen	Understands the material	2 theoretical + 4 practical	10.
Test and apply	Interactive	Normal appearance of the kidney †and ureters Considerations of the absent †kidney abnormal kidney: large kidney	Understands the material	2 theoretical + 4 practical	11.
Test and apply	Interactive	Renal cysts, Renal masses	Understands the material	2 theoretical + 4 practical	12.
Test and apply	Interactive	Small kidney. †Renal calculi †Trauma Peripheral fluid	Understands the material	2 theoretical + 4 practical	13.
Test and apply	Interactive	Normal and abnormal appearance of the urinary bladder	Understands the material	2 theoretical + 4 practical	14.
Test and apply	Interactive	Normal and abnormal appearance of the thyroid gland	Understands the material	2 theoretical + 4 practical	15.
Test and apply	Interactive	Gynecology (non-pregnant female pelvis): normal appearance of the uterus	Understands the material	2 theoretical + 4 practical	16.
Test and apply	Interactive	Intrauterine contraceptive device, fluid in the posterior cul-de-sac	Understands the material	2 theoretical + 4 practical	17.
Test and apply	Interactive	†The endometrium position of the uterus ovaries	Understands the material	2 theoretical + 4 practical	18.
Test and apply	Interactive	:Ovaries normal appearance of the ovary ovarian follicles	Understands the material	2 theoretical + 4 practical	19.
Test and apply	Interactive	Abnormal uterus: †myomas malignant disease	Understands the material	2 theoretical + 4 practical	20.
Test and apply	Interactive	Appearance of the uterine endometriosis	Understands the material	2 theoretical + 4 practical	21.
Test and apply	Interactive	:Abnormal variation	Understands	2 theoretical	22.

		• Ovarian cysts Pelvic hydatid cyst solid ovarian masses	the material	+ 4 practical	
Test and apply	Interactive	• Pelvic inflammatory disease • pelvic abscess, pelvic varices fallopian tubes	Understands the material	2 theoretical + 4 practical	23.
Test and apply	Interactive	Obstetrics: Introduction to obstetrics	Understands the material	2 theoretical + 4 practical	24.
Test and apply	Interactive	Early pregnancy ectopic pregnancy	Understands material the	2 theoretical + 4 practical	25.
Test and apply	Interactive	The appearance of the embryo yolk bag multiple pregnancy	Understands the material	2 theoretical + 4 practical	26.
Test and apply	Interactive	Abnormalities in the first trimester of pregnancy	Understands the material	2 theoretical + 4 practical	27.
Test and apply	Interactive	Estimation of fetal size and age (fetal biometry)	Understands the material	2 theoretical + 4 practical	28.
Test and apply	Interactive	Normal and abnormal :appearance of the testis • Unilateral swelling Small or absent testis	Understands the material	2 theoretical + 4 practical	29.
Test and apply	Interactive	Normal and abnormal •appearance of epididymis • trauma • Torsion of the testis hernia and varicocele	Understands the material	2 theoretical + 4 practical	30.

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	• Manual of diagnostic ultrasound Edited by P.E.S Palmer • Paul L. Allan, Grant M. Baxter, Michael J.Weston. Clinical Ultrasound. Volume one, 3 rd Edition, 2011. • Gibbs JF, Litwin AM, Kahlenberg MS (2004) Contemporary
A-Recommended books and references (scientific journals, reports,...)	1. Examination Review for Ultrasound: Abdomen and Obstetrics & Gynecology by Steven M. 2. Introduction to Sonography and Patient Care by Steven M. Penny M.A 3. Ultrasound Secrets by Vikram S 4. Basics of Musculoskeletal Ultrasound by

	James M. Diagnostic Ultrasound: Musculoskeletal by James F.
B - Electronic references, Internet sites...	• Ultrasoundpaedia

13. Course development plan
• Introducing modern technology and interactive technology into the educational process • Introducing modern technology and interactive technology with the educational and illustrative means used for the student • Trying to twin with international universities that have the same branches as our department, and learning about their experiences and the curricula used for students. • Continue to hold local or international workshops for faculty members to develop their capabilities. • The topic of special or advanced procedures, where the student will learn the anatomical part, the method of examining it, the radiological anatomy that will appear in it, and the diseases that will accompany it. Therefore, we will focus more on A single study platform based on what the student is studying by unifying the curriculum titles and curricula for various subjects. • The interconnection of the study materials for one stage with the rest of the stages, as the student can, for example, when studying anatomy in radiological anatomy, study at the same time the method of ultrasound imaging of this area and the diseases that pertain to this anatomical part.

Biostatistics and computer applications course

This course aims for the student to learn the correct methods for conducting scientific research and the statistical tools used in scientific research
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1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies

3. Course name/code	Biostatistics and computer applications
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	2 theoretical hours + 2 practical hours = 4 hours x 30 weeks = 120 hours
7. Date this description was prepared	2024
8. Course objectives 1. That the student learns the correct methods for conducting scientific research 2. Using correct statistical tools in scientific research	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1. To know scientific research. 2. To know the medical and health survey 3. To choose the topic of scientific research
B - The skills objectives of the course. 1. To learn to write a scientific research plan, its stages and parts 2. To learn to collect, present and represent data
Teaching and learning methods
• Lectures • clips Video
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation. 3. Semester exams.
D - General and qualifying transferable skills (other skills related to employability and personal development). The student learns the methods of collecting statistical data and what are the best of these methods, and then how to analyze, display and represent this data, how to apply it in reality, and what is the benefit of it.

11. Course structure					
Evaluation method	Teaching method	of the unit/topic Name	Required learning outcomes	hours	the week
Test and apply	Interactive	General introduction, definition of scientific research, definition of survey, selection of research topics, scientific research methods	Understands the material	2 theoretical + 2 practical	1.
Test and apply	Interactive	Scientific research plan, its preparation, elements, and parts of the research when writing	Understands the material	2 theoretical practical2+	2.
Test and apply	Interactive	Stages of the statistical method and their importance	Understands material the	2 theoretical practical2+	3.
Test and apply	Interactive	Methods of collecting, classifying and tabulating information and data	Understands the material	2 theoretical practical2+	4.
Test and apply	Interactive	Methods of displaying data, frequency tables	Understands the material	2 theoretical practical2+	5.
Test and apply	Interactive	Graphs, measures of central tendency	Understands the material	2 theoretical practical2+	6.
Test and apply	Interactive	Relative and absolute stabilization .measures. With applied examples	Understands the material	2 theoretical practical2+	7.
Test and apply	Interactive	Introduction to probability	Understands the material	2 theoretical practical2+	8.
Test and apply	Interactive	Formulation of probability, types of probability	Understands the material	2 theoretical practical2+	9.
Test and apply	Interactive	Its application in the medical and applied health field. With examples	Understands the material	2 theoretical practical2+	10.
Test and apply	Interactive	Measures of torsion and effacement: definition of measures of torsion, definition of . measures of effacement	Understands the material	2 theoretical practical2+	11.
Test and apply	Interactive	Calculation methods. With .applied examples	Understands the material	2 theoretical practical2+	12.
Test and apply	Interactive	Time series: its components, methods for calculating the general trend	Understands the material	2 theoretical practical2+	13.
Test and apply	Interactive	Its application in the field of medical and health research. With .applied examples	Understands the material	2 theoretical practical2+	14.
Test and apply	Interactive	Estimation: Point estimate, .Confidence interval estimate	Understands the material	2 theoretical practical2+	15.
Test and apply	Interactive	.Practical examples	Understands the material	2 theoretical practical2+	16.
Test and apply	Interactive	the concept of tests, errors : tests of the first and second types	Understands the material	2 theoretical practical2+	17.

Test and apply	Interactive	Significance level, degrees of freedom	Understands the material	2 theoretical practical2+	18.
Test and apply	Interactive	Tests based on the normal distribution, tests based on the Student's distribution	Understands the material	2 theoretical practical2+	19.
Test and apply	Interactive	(F) Tests based on the distribution, tests based on the distribution square -Chi	Understands the material	2 theoretical practical2+	20.
Test and apply	Interactive	.Practical examples	Understands the material	2 theoretical practical2+	21.
Test and apply	Interactive	Analysis of variance: one .(Anova) criterion, two criteria .With applied examples	Understands the material	2 theoretical practical2+	22.
Test and apply	Interactive	Analysis of variance: one .(Anova) criterion, two criteria .With applied examples	Understands the material	2 theoretical practical2+	23.
Test and apply	Interactive	Analysis of variance: one .(Anova) criterion, two criteria .With applied examples	Understands the material	2 theoretical practical2+	24.
Test and apply	Interactive	Simple correlation coefficient, coefficient. simple regression .With applied examples	Understands the material	2 theoretical practical2+	25.
Test and apply	Interactive	Simple correlation coefficient, simple regression coefficient. .With applied examples	Understands the material	2 theoretical practical2+	26.
Test and apply	Interactive	Vital statistics: rates and ratios of life phenomena (birth rates, death (rates, fertility rates	Understands the material	2 theoretical practical2+	27.
Test and apply	Interactive	Vital statistics: rates and ratios of life phenomena (birth rates, death (rates, fertility rates	Understands the material	2 theoretical practical2+	28.
Test and apply	Interactive	Vital statistics: rates and ratios of life phenomena (birth rates, death (rates, fertility rates	Understands the material	2 theoretical practical2+	29.
Test and apply	Interactive	Vital statistics: rates and ratios of life phenomena (birth rates, death (rates, fertility rates	Understands the material	2 theoretical practical2+	30.

12. Infrastructure	
1- Required prescribed books	Training bag
2- Main references (sources)	1. DANIEL, W. W. "Biostatistics: a foundation for analysis in the health sciences", Eleven Edition, 2018. 2. David M Levine and David F. Stephan, Even you can learn statistics : a guide for

	everyone who has ever been afraid of statistics, Eleven Edition, 2011. James T McClave and Terry Sincich. Statistics, Tenth Edition, 2005.
A-Recommended books and references (scientific journals, reports,...)	Book of Life Statistics, author Abdul Khaleq Abdul Jabbar Al Naqeeb. 1993 AD
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Study the practical laboratory notes for the course
4. Comparing current vocabulary with the vocabulary of corresponding colleges in the field

Professional ethics course

This course aims to familiarize the student with professional ethics and provide him with professional ethical rules that enhance his commitment to them in his field of work, as well as studying moral values and the importance of ethics for the individual, society, and work.

1. Educational institution	Al-Ayen Iraqi University, College of Health and Medical Technologies
2. Scientific department/center	Department of Radiology Technologies
3. Course name/code	Professional ethics
4. Available forms of attendance	%100
5. Annual/ courses	Annual
6. Number of study hours (total)	1 theoretical hours x 30 weeks = 30 hours
7. Date this description was prepared	2024
8. Course objectives This course aims to determine the behavioral objectives within the framework of the lesson plan at the single lecture level and identify the factors affecting the job outcomes	

10. Course outcomes and teaching, learning and evaluation methods
A- Cognitive objectives 1-Method of establishing professional ethics. 2-Levels of building and consolidating professional ethics. 3-Means and methods of consolidating professional ethics.
B - The skills objectives of the course. 1- Identify habits and skills 2- Knowing the factors and problems
Teaching and learning methods
• Lectures • Video clips
Evaluation methods
1. Written exams every week. 2. Daily oral evaluation.

3. Semester exams.
C- Emotional and evaluation objectives 1. Enabling students to adapt the hospital environment and medical conditions 2. Enabling students to understand the suffering and pain of patients and how to provide assistance to them 3. Developing students' ability to tolerate and deal with various medical conditions
D - General and qualifying transferable skills (other skills related to employability and personal development). 1. Enabling students to continue self-development after graduation through training courses 2. Enabling students to pass job interviews

11. Course structure					
Evaluation method	Teaching method	unit/topic Name of the	Required learning outcomes	hours	the week
Test and apply	Interactive	.The concept of morality and its origin .General rules of ethics.	Understands the material	1	2-1
Test and apply	Interactive	Ethics sources Moral values	Understands the material	1	4-3
Test and apply	Interactive	.To do and its importance .Work behaviors .Concept of profession .Definition of profession The difference between the concept of work, profession and craft. Standards upon which the profession must be based	Understands the material	1	6-5
Test and apply	Interactive	What are professional ethics Positive outcomes of commitment to professional ethics Characteristics of work ethics Characteristics of work ethics Steps for the acceptable level of Values -Four professional ethics. Unit and professional ethics	Understands the material	1	8-7
Test and apply	Interactive	.To be honest .Honesty .Advice	Understands the material	1	10-9
Test and apply	Interactive	.Justice Good dealing and mastery of work	Understands the material	1	-11 12
Test and apply	Interactive	Unethical administrative behavior Definition of administrative corruption - .Types of administrative corruption Bribery The concept of bribery .Types of bribery	Understands the material	1	-13 14
Test and apply	Interactive	The difference between a gift and a bribe The reasons and motives behind bribery Cheating .The concept of cheating .The nature of fraud at work- Manifestations of fraud in job	Understands the material	1	16-15

		.performance			
Test and apply	Interactive	Method of establishing professional .ethics Levels of building and consolidating .professional ethics Means and methods of consolidating .professional ethics	Understand the material	1	-17 18
Test and apply	Interactive	into Things that must be taken . consideration in formulating the ethical . .code of the profession How to promote ethical behavior at work according to (Kreitner) . And (Kenicki	Understand the material	1	-19 20
Test and apply	Interactive	Characteristics and prescriptions of the .medical technician Duties of a medical technician towards .his profession, patient, society	Understand the material	1	22-21
Test and apply	Interactive	:Patient rights Justice and equality confidentiality of Maintaining the patient information patient privacy Maintain consent Informed Comprehensive care Putting the patient's interests first. . Effective 28-Communicating with 27 have the right communication Patients Rights to to access medical records health records	Understand the material	1	-23 24
Test and apply	Interactive	It is related to the basic rules of the profession to prevent the spread of epidemics and diseases, as well as the importance of its role in spreading the .disease The medical technician with society and the his responsibility towards environment and public safety through technology Health and ways to prevent .the spread of diseases	Understand the material	1	-25 26
Test and apply	Interactive	Professional relationship: The relationship of the medical technician in the health with his colleagues .institution Respect, cooperation, avoiding criticism in front of patients, accuracy and honesty in evaluating performance, :ethics and medical research Ethics of conducting medical	Understand the material	1	-27 28

		experiments in Iraqi health institutions			
Test and apply	Interactive	Convention on the Ethics of Medical Experiments. Ethics of writing medical .research Ethics of teaching and learning for .patients	Understands the material	1	-29 30

12. Infrastructure

1- Required prescribed books	Training bag
2- Main references (sources)	
A-Recommended books and references (scientific journals, reports,...)	The official website of the Human Rights Organization
B - Electronic references, Internet sites...	The official website of Al-Ayen Iraqi University

13. Course development plan

The curriculum development plan is based on the following:

1. Giving the prescribed scientific material and observing and analyzing the students' results
2. Study feedback from students' comments about vocabulary
3. Comparing current vocabulary with the vocabulary of corresponding colleges in the field