

وزارة التعليم العالي والبحث العلمي
جهاز الاشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الاكاديمي

استمارة وصف البرنامج الاكاديمي للكليات والمعاهد للعام الدراسي

الجامعة : شط العرب
الكلية / المعهد : التقنيات الصحية والطبية
القسم العلمي : تقنيات الاشعة
تاريخ ملء الملف : ٢٠٢٦ / ٩ / ١٥

التوقيع :
اسم المعاون العلمي : أ.د. ستار جبار قاسم
التاريخ : ٢٠٢٦ / ٩ / ١٥

التوقيع :
اسم رئيس القسم : أ.د. كريم هلال ثامر
التاريخ : ٢٠٢٦ / ٩ / ١٥



دقق الملف من قبل ٢٠٢٦
شعبة ضمان الجودة والأداء الجامعي
اسم مدير شعبة ضمان الجودة والأداء الجامعي :

التاريخ ٢٠٢٦ / ٩ / ١٥
التوقيع :

مصادقة السيد العميد
أ.د. كامل عبد الوهاب



1. Educational Institution

Academic Program Description for the Department of (Radiological Techniques):

This academic program description provides a concise summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve, demonstrating whether they have made the most of the available opportunities. It is accompanied by a description of each course within the program.

1. Educational Institution	Shatt Al-Arab University / College of Health and Medical Technologies
2. Scientific Department / Center	Radiological Techniques Department
3. Name of Academic or Professional Program	Applied Academic Program
4. Name of Final Certificate	Bachelor of Radiological Techniques
5. Study System: Annual / Courses / Other	Semester-based
6. Corresponding Department	Ministry of Higher Education and Scientific Research / Scientific Supervision and Evaluation Authority – Quality Assurance and Academic Accreditation Department – Accreditation Division
7. Other External Influences	15-9-2026
8. Date of Description Preparation	

Academic Program Objectives:

1. Preparing advanced health-medical technical staff capable of supporting health institutions and society according to their needs for specializations.
2. Graduating statisticians qualified with knowledge and skills that enable them to efficiently deal with radiology and medical imaging devices and perform various types of radiological

examinations, as well as being able to provide related medical services to all patients without prejudice to their dignity and respect.

3. Training students on how to deal with various pathological cases within the radiology department, methods of care, and justification for radiation exposure.
4. Preparing students with the foundations of professional ethics, administration, and imaging quality in the radiology department, while prioritizing patient safety and security.
5. Educating students and introducing them to the risks of radiation exposure and how to protect workers and patients from these risks, developing the student's educational and research skills, and spreading general knowledge and culture in the field of radiology and medical imaging in the local community through exhibitions, public seminars, and various media.
6. Providing the appropriate environment and necessary capabilities to enable faculty members to increase their capabilities and develop their academic skills to ensure the quality of educational outputs, as well as encouraging them to contribute effectively to the publication of scientific research and academic studies.

10. Required Program Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

1. Operating radiographic imaging devices, including computed tomography (CT), magnetic resonance imaging (MRI), and mammography devices.
2. Working in radiological imaging centers, organizing information, opening records, preserving radiographic films, and dealing with infectious and contagious patients and how to prevent them.
3. Preparing imaging devices by preparing special protocols according to the examination requested by the physician.
4. Conducting standard measurements for devices and measuring the radiation dose to which patients are exposed and the permissible limits for patients and workers in the field.
5. Preparing patients for various examination purposes using diagnostic devices.

Teaching and Learning Methods

1. Theoretical and practical tests.
2. Discussions.
3. Final examinations.
4. Conducting practical experiments.

5. Field visits to radiology and radiological examination centers.

Assessment Methods

Theoretical and practical tests, short quizzes, in addition to reports and seminars.

C. Affective and Value Objectives

1. Analyzing laboratory results.
2. Finding the relationship between laboratory results and the patient's condition.
3. Writing laboratory reports clearly and scientifically.
4. Continuously developing laboratory work.

Teaching and Learning Methods

Having students work in groups for experiments or seminars to encourage self-learning, in addition to assigning them projects through these groups and using the internet to complete the work.

Assessment Methods

Theoretical and practical tests and preparing practical laboratory reports.

D. General and Transferable Skills (Other skills related to employability and personal development)

Conducting standard measurements for devices, measuring the radiation dose to which patients are exposed and the permissible limits for patients and workers in the field, and preparing patients for various examination purposes using diagnostic devices.

Teaching and Learning Methods

1. Lecture using the whiteboard and dictation.
2. Demonstration (using instructional diagrams and images using a data show) - Interactive discussion.
3. Self-learning.

Assessment Methods

Theoretical and practical tests, short quizzes, and reports.

1. Program Structure

Study Stage	Course Code	Course Name	Credit Hours	
			Practical	Theoretical

Study Stage	Course Code	Course Name	Credit Hours	
First Year	First Semester			
		Anatomy of skeleton	3	2
		General physics	3	2
		General physiology	3	2
		Biology	3	2
		General chemistry	3	2
		Computer principles	2	1
		Human rights and democracy	-	1
		English language	3	2
		Anatomy of body systems	3	2
	Second Semester			
		Physics of atom	3	2
		Systemic physiology	3	2
		Radiobiology	4	2

Study Stage	Course Code	Course Name	Credit Hours	
Second Year		Principles of nursing	4	2
		Computer principles	2	1
		Medical terminology	-	2
		Arabic language	-	2
		First Semester		
		Radiological equipment techniques	5	2
		Radiographic techniques	5	2
		Radiological procedures	5	2
		Radiological anatomy	4	2
		Radio-Physics	3	2
		Radiation protection	3	2
		Second Semester		
		Computed tomography equipment	5	2
		Radiographic techniques for lower	5	2

Study Stage	Course Code	Course Name	Credit Hours	
Third Year		limbs		
		Special radiological	5	2
		Radiological anatomy	4	2
		Physics of computed	3	2
		First Semester		
		Equipment techniques	4	2
		Radiographic techniques	4	2
		Radiological procedures	4	2
		Radiological anatomy	2	2
		General pathology	2	2
		Physics of MRI	3	1
		Biological radiation hazards	3	2
		Computer applications 1	2	1
		Second Semester		

Study Stage	Course Code	Course Name	Credit Hours	
Fourth Year		Ultrasound equipment techniques	4	2
		Radiographic techniques	4	2
		Radiological procedures	4	2
		Radiological anatomy	2	2
		Systemic pathology	2	2
		Physics of ultrasound	3	1
		Computer applications	2	1
		First Semester		
		Computed tomography imaging	5	2
		MRI principles	5	2
		Abdominal ultrasound imaging	5	2
		Medicine of internal diseases	3	2
		Biostatistics and computer applications	4	2
		Second Semester		

Study Stage	Course Code	Course Name	Credit Hours	
		Computed tomography imaging	5	2
		MRI	5	2
		Obstetrics and gynecologic ultrasound imaging	5	2
		Medicine of surgical diseases	3	2
		Professional ethics	-	2
		Graduation project	6	-

2. Personal Development Planning

1. Vocational training in government or private laboratories recognized by health departments for a period of two months.
2. Periodic field visits to government laboratories.

3. Admission Criteria (Regulations related to joining the college or institute)

1. Central admission.
2. Scientific interview.
3. Exclusively accepts graduates of the preparatory stage, scientific branch (biological).
4. Medical examination.

4. Most Important Sources of Information about the Program

Course Description Form

Course Description:

This course description provides a concise summary of the most important characteristics of the course

and the learning outcomes expected of the student to achieve, demonstrating whether they have made the most of the available learning opportunities. It must be linked to the program description.

1. Educational Institution Shatt Al-Arab University

2. Scientific Department /
Center Radiological Techniques

3. Course Name / Code Radiobiology

4. Available Attendance
Forms Daily attendance

5. Semester / Year First Semester / 2026-2027

6. Total Study Hours

7. Date of Description
Preparation 15/9/2026

8. Course Objectives 1. Identify the level of organization between living organisms.
2. Be able to identify and describe the shape and components of the cell. Understand the structure of DNA and its role.

10. Course Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

1. Understand basic concepts in biology such as cellular organization, evolution, and heredity.
2. Develop scientific thinking and analytical skills in exploring biological phenomena.
3. Identify the vital structures and functions of various organs and their relationship to their environment.
4. Understand the interactions between living organisms and the environment and their effects on biological balance.

5. Develop the ability to handle scientific information and data in a systematic and accurate manner.
6. Use appropriate scientific methods and techniques to test and examine biological hypotheses.
7. Appreciate the importance of current research in various fields of biology and its practical applications in daily life, industrial, and medical fields.

B. Skill Objectives Specific to the Course

1. Understand basic concepts in biology.
2. Develop scientific thinking and analytical skills.
3. Identify methods and techniques used in studying biology.
4. Ability to apply concepts and knowledge in solving life problems.
5. Develop scientific communication skills, whether written or oral.
6. Identify relationships between biology and other sciences such as chemistry and physics.
7. Develop research and experimentation skills in various fields of biology.
8. Develop ethical understanding and responsibility in using scientific knowledge in society.

Teaching and Learning Methods

1. Lecture using the whiteboard and dictation.
2. Demonstration (using instructional diagrams and images using a data show) - Interactive discussion.
3. Self-learning.

Assessment Methods

1. Student participation during the lecture, presenting seminars, short quick quizzes.
2. Semester examinations for theoretical and practical material.

C. Affective and Value Objectives

1. Urging students to solve intellectual questions.
2. Holding intellectual competitions related to the scientific material.
3. Placing students in a scientific and practical environment related to biology to deduce diagnoses from data.

4. Urging students to compete among themselves to achieve advanced positions within the scientific material to obtain marks and moral prizes.

Teaching and Learning Methods

Books, lectures, and application. (Note: The original text is garbled here).

Assessment Methods

Practical and theoretical examinations.

D. General and Transferable Skills (Other skills related to employability and personal development)

1. Access to a greater extent to scientific sources.
2. Presenting recently raised global topics through a presentation and involving everyone in it.
3. Having students manage discussion circles and present presentations on scientific topics to develop and enhance their personalities.

1. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
1	2	Knowledge	Introduction to Biology - History and General concepts of Biology - Cell theory - Comparing Prokaryotic and Eukaryotic Cells	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
2	2	Knowledge	Introduction of the Chemistry of Life - Cell chemistry and Chemical bonds - Water, pH, Salts	Lecture, whiteboard, dictation, demonstration (using diagrams and	Theoretical and practical exams (daily, monthly, oral, written) and scientific

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
			and ions	instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	reports.
3	2	Knowledge	Biologically Important Molecules: - Carbohydrates - Lipids - Proteins - Nucleic Acids	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
4	2	Knowledge	Introduction to Cell Structure and Function - Plasma Membrane, Passive transport, active transport, factors affecting permeability - Cytoplasm	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
5	2	Knowledge	Introduction to Cell Structure and Function - Cytoskeleton: Microfilaments, Intermediate Filaments, Microtubules, Flagella and Cilia	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
6	2	Knowledge	Eukaryotic cell organelles: Mitochondria (morphology, structure), Lysosomes (types, function)	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
7	2	Knowledge	Eukaryotic cell organelles: Golgi complex (morphology, function)	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
				learning, open classes on Google Classroom.	
8	2	Knowledge	Eukaryotic cell organelles: Endoplasmic reticulum (smooth & rough) and their function. Vesicles and Vacuoles. Ribosome (protein synthesis)	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
9	2	Knowledge	Eukaryotic cell organelles: The nucleus, nuclear envelope	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
10	2	Knowledge	Eukaryotic cell organelles: Chromosome structure, changes	Lecture, whiteboard, dictation, demonstration	Theoretical and practical exams (daily, monthly, oral, written)

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
			(duplication, translocation, inversion)	(using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	and scientific reports.
11	2	Knowledge	DNA Replication and protein synthesis - The structure of the DNA	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
12	2	Knowledge	DNA Replication and protein synthesis - Transcription	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
13	2	Knowledge	DNA Replication and protein synthesis - Translation	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
14	2	Knowledge	Introduction to Reproduction at the Cellular Levels: The Cell Cycle - Mitosis	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-learning, open classes on Google Classroom.	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.
15	2	Knowledge	Introduction to Reproduction at the Cellular Levels: Meiosis - Prokaryotic Cell Division	Lecture, whiteboard, dictation, demonstration (using diagrams and instructional images via data show), interactive discussion, self-	Theoretical and practical exams (daily, monthly, oral, written) and scientific reports.

Week	Hours	Required Learning Outcomes	Unit or Topic Name	Teaching Method	Assessment Method
				learning, open classes on Google Classroom.	

2. Course Assessment

Distribution of marks out of 100 according to tasks assigned to the student such as daily preparation, daily, oral, monthly, and written exams, and reports.

40 marks for annual pursuit (10 First Monthly Exam + 10 Second Monthly Exam + 2.5 Daily Exams + 2.5 Attendance and daily/monthly assessments).

60 marks (20 marks final practical exam + 40 marks final theoretical exam).

3. Learning and Teaching Resources

Required textbooks (curricular if any): As mentioned above.

Main references (sources): As mentioned above.

Recommended books and references (scientific journals, reports...): As mentioned above.

Electronic references, internet sites: Websites available on Google Chrome.

11. Infrastructure

1. Required textbooks: Sources mentioned above.
2. Main references (sources): Sources mentioned above are sufficient.
 - A. Recommended books and references (scientific journals, reports...): All sites containing C++ programming language with YouTube and files downloaded to the electronic class, presentations downloaded to the electronic class, in addition to interactive electronic lessons, the electronic class, and files downloaded to the class and the subject's private YouTube.
 - B. Electronic references, internet sites:

12. Course Development Plan

We rely on the curriculum from the sectoral committee.

(Note: The document contains multiple similar course description forms for different subjects. Below is a translation of the key details from each remaining form found in the document. Due to the volume and OCR errors, some details are summarized or corrected for clarity.)

Course Description Form: Radiobiology (Continued from Page 14)

- **Course Objectives:** 1. Identify the biological radiation effects of radiation on cells and tissues. 2. Understand the different responses of normal and tumor cells to radiation. 3. Study the effect of ionizing radiation and radiation therapy.
- **Cognitive Objectives:** 1. Understand the concept of radiation and its types (ionizing and non-ionizing). 2. Study the effect of radiation on living tissues and human health. 3. Analyze and evaluate radiation risks and how to protect individuals. 4. Use radiobiology techniques in diagnosis and treatment (X-rays, radiotherapy). 5. Understand laws and legislation related to radiation safety. 6. Apply scientific principles and techniques in radiobiology to ensure work and environmental safety.
- **Skill Objectives:** 1. Understand nuclear and radiation physics. 2. Conduct radiological examinations. 3. Assess radiation damage. 4. Monitor radiation safety. 5. Use modern technologies. 6. Communicate and cooperate effectively with medical teams and patients.
- **Course Structure (Topics):** Introduction to Radiobiology, Radiation chemistry, Oxygen Effect (OER), Radiosensitizers, Radioprotectors, DNA damage response, Cell death after irradiation (Apoptosis, Autophagy, Necrosis, Senescence, Mitotic catastrophe), Molecular Repair of DNA Damage, Target theory, Cell survival curves, Types of Cellular Damage, Radiobiology of Tissue and Organs Response, Severity of radiation effects (Subacute, Acute, Chronic), Tumor Response to Radiation, Biosafety and Security, Biosafety barriers in laboratories.
- **References:** 1. Beyzaoglu, M.; Ozyigit, G. and Ebruli, C. (2010). Basic Radiation Oncology. Springer. 2. Elizabeth O Grady, et al. (2018) Principles of Biology. 3. IAEA. Radiation Biology: A Handbook for Teachers and Students (2010).

Course Description Form: Physiology (First Semester)

- **Course Objectives:** 1. Study the functions of the body's organs in detail. 2. Know the internal and external structure and shape of the body's members. 3. Distinguish between the functions of the body's organs.
- **Cognitive Objectives:** 1. Conducting necessary medical analyzes and knowing the structure and function of body parts. 2. Understanding and studying the basic body organs.
- **Skill Objectives:** 1. Clarify the mechanism of action of the body's systems. 2. Explain and work the practical side of member functions, purpose, and use.
- **Course Structure (Topics):** Introduction to the respiratory system (alveoli, lungs), Introduction to the renal system (kidneys, body fluids), Oral structure, Study of the structure and functions of the gastrointestinal tract.

- **Assessment:** 40 marks annual pursuit (10 First Month + 10 Second Month + 2.5 Daily + 2.5 Attendance) + 60 marks final (20 practical + 40 theoretical).
- **References:** 1. Elaine N. Marieb, R.N. (2006). Essentials of Human Anatomy and Physiology (8th ed.). 2. Memmler, Ruth Lundeen. (1990). Structure and function of the human body (4th ed.). 3. Gerard J. Tortora, Nicholas P. Anagnostakos. (1987). Principles of anatomy and physiology (5th ed.). 4. Essentials of Medical Pharmacology (7th ed.) KD Tripathi. 5. Medical Pharmacology & Therapeutics (5th ed.) Derek G. Waller.

Course Description Form: Physiology (Second Semester)

- **Course Objectives:** Same as above.
- **Course Structure (Topics):** Cell physiology, Nerve and muscle Microanatomy, Nerves (types), Nerve (Types of muscles), Nervous System, Red blood cells, White blood cells, Blood groups, Blood coagulation, Cardiovascular system, Study of blood vessels, Study of veins and arteries.
- **References:** Same as above. Includes: Learning package in medical physiology - Designed by Dr. Rawaa Adnan 2009-2010.

Course Description Form: General Physics

- **Course Objectives:** 1. Learn standard units of measurement. 2. Define electricity and magnetism. 3. Identify gravity and kinetic energy. 4. Determine the relationship between work and energy. 5. Identify conservative and non-conservative forces. 6. Define momentum, impulse, and collisions. 7. Define periodic motion. 8. Explain the dynamics of rotational motion. 9. Define heat and pressure.
- **Course Structure (Topics):** Standard units of measurements, Electricity, Magnetism, Mechanics, Newton's Laws of Motion, Weight, Friction force and acceleration, Momentum, Impulse, Collisions, Work, Energy, Types of energy, Conservation, Rotational motion, Damped and Driven oscillation, Gravitational potential energy, Escape velocity, Heat, temperature, Latent heat, Specific Heat, Methods of heat transferring, Gases Pressure & volume, laws of pressure.
- **References:** 1. M. Radhi Al-Qurayshi and H. Qasim. AL-Mosawi "Radiation Physics and its applications in diagnostic radiological techniques", MTU, Iraq (2015). 2. RF Farr and PJ Allisy-Roberts "Physics for Medical Imaging", Saunders, 4th ed. (2001). 3. Stewart Carlyle Bushong, "Radiologic Science for Technologists Physics, Biology, and Protection" Elsevier, 7th ed., 2017.

Course Description Form: Atomic Physics

- **Course Objectives:** 1. Define atomic and nuclear structure. 2. Identify types of ionizing radiation. 3. Know the mechanism of interaction of radiation with matter. 4. Define the interaction of scattered radiation with matter. 5. Discuss types of attenuation coefficients. 6. Introduce nanotechnology, types of nanomaterial manufacturing, and their applications.

- **Course Structure (Topics):** Incoherent scattering, Pair and triplet production, Compton scattering by free electrons, Scattering and energy transfer coefficients, stopping power, Photon Attenuation Coefficients, Interactions of electrons with matter, Introduction of Nanomaterials, Synthesis Routes (Bottom-Up, Top-Down), Applications of nanomaterials in medicine & biology, Nanotechnology in renewable energy systems.
- **References:** 1. Perry Sprawls, "Physical principles of medical imaging", 2nd Ed. 1996. 2. Allisy-Roberts PJ, Williams J. Farr's "physics for medical imaging". Elsevier, 2007. 3. Chris Guy & Dominic ffytche "An Introduction to The Principles of Medical Imaging" Revised Ed., Imperial College Press, 2005. 4. Sang Hyun Cho, Sunil Krishnan, MD, "Cancer Nanotechnology Principles and Applications in Radiation Oncology". Taylor & Francis, 2013.

Course Description Form: Skeletal Anatomy

- **Course Objectives:** 1. Identify the structure and function of the skeletal system. 2. Explain its role in the body. 3. Differentiate between types of bones. 4. Study muscles, their types and functions. 5. Identify the upper and lower skeletal system and the rib cage.
- **Course Structure (Topics):** Surface anatomy and anatomical position, Skeletal of upper limbs (Humerus, Radius and ulna, The hands), Joints types and mechanics of movement, Skeleton of chest, Vertebrae (Cervical, thoracic, lumbar, sacrum and coccyx), Skeleton of lower limbs (pelvic girdle, Femur, Tibia and fibula, The foot), Muscles of lower limbs, Bones of skull.
- **References:** 1. Human anatomy (p. 904). San Francisco, CA: Pearson/Benjamin Cummings. 2. Clarke, B. (2008). Normal bone anatomy and physiology. Clinical journal of the American Society of Nephrology.

Course Description Form: Anatomy of Body Systems

- **Course Objectives:** 1. Identify the anatomy of each system in the body, how it works, and describe its connection to other body parts, nerves, and blood supply, and how to distinguish between them.
- **Course Structure (Topics):** The mid brain hemisphere and ventricles, The hind brain (cerebrum, pons, Medulla oblongata), Meninges and spinal meninges, Cranial nerves, Lumbar and sacral plexuses, Respiratory system, Cardiovascular system, Digestive system, Small and large intestine, Liver, pancreas and spleen, Urinary system, The breast.
- **References:** As mentioned in other forms.

Course Description Form: General Chemistry

- **Course Objectives:** 1. Introduce the student to chemistry. 2. How to handle chemicals. 3. Detection and separation of substances and preparation of standard solutions. 4. Skills for

developing mathematical problem-solving. 5. Writing reports and data. 6. Use of laboratory tools and equipment.

- **Course Structure (Topics):** Atom, molecular structure, chemical bonding, Liquid mixture, buffer solution, Quantitative, qualitative analysis, Molar, normal analysis, Acids, base, Oxidation, reduction, Hydrocarbon, alkene, Alcohol, ketone, aldehyde, carboxylic acids, Aromatic hydrocarbon, Amine aryl amine, biochemistry, Protein, Sugar, starches, fibers, isomers, electrolyte.
- **References:** 1. Solutions for General Chemistry: Principles and Modern Applications 11th Ralph H. Petrucci, et al. 2. Solutions for CHEMISTRY: The Molecular Nature of Matter and Change 7th Martin S. Silberberg, Patricia G. Amateis.

Course Description Form: Computer Applications

- **Course Objectives:** Give the student theoretical and practical information on hardware and software components of the computer. Give knowledge of basic computer components. Ability to increase student knowledge using computer fundamentals and applications. Achieve deep understanding of information security and protecting sensitive data from electronic threats like hacking and viruses. Improve communication and collaboration at work through file and data sharing and working on joint projects via internet technologies.
- **Course Structure (Topics):** Introduction to computer, Computer generations, Computer Hardware, Input and output devices, Computer Software, Computer security, Types of programs, Operating Systems (OS), Windows environment, Windows settings, Icons, Files and Folders, Firewall and antivirus, Control Panel.
- **References:** 1. Book: Fundamentals of Computers and Office Applications, Part 1, by Dr. Ziad Muhammad Abboud et al., 2014. 2. Book: Computer and Ready-made Software, Basic Skills, by Dr. Muhammad Bilal Al-Zoghbi et al., 2013. 3. Microsoft Official Website: www.microsoft.com.

Course Description Form: English Language

- **Course Objectives:** 1. Analyzing the basics of English language and parts of speech. 2. Understanding the best way in translating. 3. Reconstructed medical terms in easier way to translate it perfectly. 4. Study of how can the reader understand Medical terms.
- **Course Structure (Topics):** Grammar (Cardinal numbers, years, prices), Phonetic of Alphabet letters and punctuation, Parts of speech, Question Words, Abbreviation, Simple present tense, Simple past tense, Present Continues, Possession, Conjunction words, Pronounces, Medical Terminology, Language of medicine, Spelling of Medical Terms, Pronunciation of medical terms, Suffixes and prefixes and root, Body Structure, Planes of the body, Orientation and directional terms, Body positions, Body Cavities.

- **References:** As mentioned below. Some scientific Websites. Some Academic websites like Academia and Research gate.

Course Description Form: Radiological Physics

- **Course Objectives:** 1. Identify radiological examinations and how to use them for imaging for diagnosis and treatment of diseases. 2. Identify types of radiological imaging parts and how to use them during medical examinations.
- **Course Structure (Topics):** Introduction and overview, Basic Physics, CT numbers (Hounsfield unit, scale), CT image (Windowing, Window width and level), Data Acquisition, Data Acquisition Geometries, fifth generation Scanners, Multislice Computed Tomography (MSCT), Data Processing, Data Flow in a CT Scanner, Image Display, Storage, and Communication, Format the CT image, Basic CT Physics, Image Axes.
- **References:** 1. M. Radhi Al-Qurayshi and H. Qasim. AL-Mosawi "Radiation Physics and its applications in diagnostic radiological techniques", MTU, Iraq, (2015). 2. W. R. Hendee and E. R. Ritenour "Medical Imaging Physics", 4th Ed., Wiley-Liss, Inc., (2002). 3. Stewart Carlyle Bushong, "Radiologic Science for Technologists Physics, Biology, and Protection" Elsevier, Inc., 7th ed., 2017. 4. Chris Guy & Dominic ffytche, "An Introduction to The Principles of Medical Imaging", Imperial College Press, 2005. 5. Perry Sprawls, "Physical principles of medical imaging", 2nd Ed. 1996. 6. Euclid Seeram, "Computed tomography: physical principles, clinical applications, and quality control" 4th ed., Elsevier Inc. 2016.

Course Description Form: Radiological Procedures

- **Course Objectives:** 1. Identify radiological examinations and how to use them for imaging for diagnosis and treatment of diseases. 2. Identify types of radiological imaging devices and how to use them during medical examinations.
- **Course Structure (Topics):** METHODS OF IMAGING THE HEPATOBILIARY SYSTEM, ULTRASOUND OF THE LIVER, COMPUTED TOMOGRAPHY OF THE LIVER AND BILIARY TREE, MAGNETIC RESONANCE IMAGING OF THE LIVER, INTRAOPERATIVE CHOLANGIOGRAPHY, BILIARY DRAINAGE, Methods of Imaging the Urinary Tract, COMPUTED TOMOGRAPHY URINARY TRACT, MAGNETIC RESONANCE URINARY TRACT, MICTURATING CYSTOURETHROGRAPHY, ASCENDING URETHROGRAPHY IN THE MALE, RETROGRADE PYELOURETERGRAPHY & PERCUTANEOUS RENAL CYST PUNCTURE AND BIOPSY.
- **References:** As mentioned in other forms.

Course Description Form: Radiological Anatomy

- **Course Objectives:** The student will be able to know: Knowledge and understanding of radiological anatomy. Add scientific skills enabling the student to study the radiological anatomical structures of each organ in the human body and its importance. Develop thinking

and analysis skills enabling the student to know the radiological interconnection of organs. General anatomy and radiological characteristics of the skull bones. General anatomy and radiological features of facial bones. General anatomy and radiological characteristics of the maxillary sinus. General anatomy and radiological features of upper and lower limbs. General anatomy and radiological characteristics of the joints of upper and lower limbs.

- **Course Structure (Topics):** Normal anatomy of the skull (cranial) bones, Radiological features of the skull bones, Normal anatomy of the facial bones, Radiological features of the facial bones, Normal anatomy of nasal cavity & paranasal sinuses, Radiological features of the nasal cavity & paranasal sinuses, shoulder girdle (scapula and clavicle bones), Radiological features of the scapula and clavicle bones, Ossification centers, Normal anatomy of the humerus, radiological features of the humerus, Ossification center, Normal anatomy of the radius and ulna bones, radiological features of the radius and ulna bone, Ossification centers, Normal anatomy of the hand, radiological features of the hand, Ossification centers, Shoulder joint, Elbow joint, Wrist joint, Blood supply of upper limbs, Radiological features of the upper limb arteries, Veins of the upper limb, Radiological features of the upper limb veins, Bony pelvis (pelvic girdle), Differences between male & female pelvis, Normal anatomy of the femur, Normal anatomy of the tibia bone, Normal anatomy of the fibula bone, Normal anatomy of patella, Normal anatomy of the foot, Hip joint, Knee joint, Ankle joint, Blood supply of lower limbs.
- **References:** 1. Whitley, A. S., et al. (2015). Clark's Positioning in Radiography 13E. 2. Bontrager, K. L., & Lampignano, J. (2013). Bontrager's handbook of radiographic positioning and techniques. Elsevier. 3. Gray's Anatomy for Students. 4. Diagnostic Radiology Physics. 5. <https://radiopaedia.org/articles?lang=us>. 6. <https://www.radiologymasterclass.co.uk/>. 7. Skeleton | 3D Anatomy/ app. 8. Kelley, L. L., & Petersen, C. (2018). Sectional Anatomy for Imaging Professionals. 9. Ryan, S., McNicholas, M., & Eustace, S. (2011). Anatomy for diagnostic imaging. 10. Lazo, D. L. (2015). Fundamentals of sectional anatomy: an imaging approach.

Course Description Form: Radiography

- **Course Objectives:** 1. Preparing scientific cadres working in advanced radiology devices. 2. Technical training for workers on radiology devices in specialized hospitals. 3. Using high-level curricula to obtain the required results.
- **Course Structure (Topics):** Normal anatomy of the skull bones, Radiological features of the skull bones, Normal anatomy of facial bones, Radiological features of the facial bones, Normal anatomy of the hand, radiological features of the hand, Ossification Centers, Shoulder joint, Elbow joint, Wrist joint, Blood supply of the upper Limbs, Radiological features of the upper limb arteries, Veins of the upper limb, Pelvis, Ilium, Symphysis pubis, Sacro-iliac joints, Acetabulum, Femur, Hip joint (AP, Lateral frog, Leg info-superior View), Tibia & fibula (AP, lateral), Knee joint (AP, lateral, skyline for patella, erect AP), Patella positions, Foo