**Description of the Courses Offered by the Department of Radiography for plane (2015) and (2016);**

**0903102 Fundamentals of Radiologic Technology. Credit hours: 2 (2+0)**

**Prerequisite: --**

This course describes the basic concepts of X-ray machine, X-ray film, formation of latent image, intensifying screen imaging including the construction of intensifying screen. In addition, it describes the radiographic exposure technique factors, radiographic technique charts, geometry of the radiographic image, X-ray tube restrictors, and radiation protection includes the protective barriers.

**0903111 First Aids. Credit hours: 3 (3 + 0)**

**Prerequisite: --**

This course provides the students the knowledge to be able and execute a simple first aid procedure in; bleeding in different organs, fractures in different limps, stings, bites, and burns in many positions of human body. Also, it covers the concepts of radiation, radioisotopes, biological effects, and how to deal with medical radioisotopes safely either in labs or in hospitals.

 **0903160 Radiological Medical Physics. Credit hours: 3 (3+0)**

**Prerequisite: -**

This course is designed to acquaint the students with knowledge about forces ad units of forces, energy changes in the body, heat loss from the body, and breathing mechanism. It helps the students acquire knowledge about electric signals of the body, general properties of sound in the body as a drum (percussion in medicine) and vision defects and corrections. Moreover, it makes the students recognize sources of radioactivity, nuclear medicine imaging devices, and the dose in nuclear medicine and therapy with radioactivity***.***

**0903161 Physics of Diagnostic Radiology. Credit hours: 3 (3+0)**

**Prerequisite: 0303164**

This course discusses the production of X-rays, X-ray tube components, types of generators, emission of X-rays, X-ray tube output, quality of X-rays, factors affecting quality and intensity of X-rays. Furthermore, the course covers the basic interaction of X and gamma rays with matter, attenuation of radiation, introduction to imaging modalities including Computed Tomography (CT), and fluoroscopy Imaging.

**0903164 Radiation Physics/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0303160**

This course discusses the basic radiation physics, classification of radiation, natural radioactivity, types of radioactive equilibrium, and types of radioactive decay. Furthermore, the course covers the basic principles of electromagnetic radiation, interaction of charged particles with matter, interaction of neutrons with matter, and discusses the radiation monitoring instruments includes the principle of operation of different types of radiation detectors.

**0903165 Radiation Physics/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0303164**

This course provides the students with skills of the basic radiation physics, natural radioactivity, and types of radioactive decay. Also, it gives the students the efficient practice of the radiation monitoring instruments of different types of radiation detectors.

**0903210 Imaging and Radiographic Processing/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0303161**

This course introduces the student to different types of radiographic films and radiographic intensifying screens, the radiologic technology science and explains the process of image formation including radiographic film structure, latent image formation, and processing of the X-ray film. In addition, it describes the exposure technique factors which used to produce good image quality, and describes the image artifacts.

**0903212 Imaging and Radiographic Processing/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0303210**

This course provides the students with skills needed to deal with different types of radiographic films and radiographic intensifying screens, the process of image formation and processing of the X-ray film. Furthermore, it supplies them the essential capabilities to produce good image quality, with low image artifacts.

**0903213 Radiation Protection. Credit hours: 2 (2+0)**

**Prerequisite: 0903161**

This course covers different topics: the sources of ionizing radiation and radioactivity, properties of ionizing radiation, principles of radiation safety, the dose concept and dose parameters, dose limitation and dose reduction measures, methods of reduction exposure to patients and staff from radiation in radiographic centers, special dose reduction in fluoroscopy according to QA. Furthermore, this course discusses the licensing system and requirements, risk assessments, general procedures used for prevention and protection from radiation, general recommendations for design and layout of diagnostic radiology rooms, and the types of radiation survey monitors used for monitoring occupational exposures.

**0903214 Radiobiology. Credit hours: 3 (3+0)**

**Prerequisite: 0903161**

This course discusses the energy transfer processes, energy absorption, radiation dosimetry, radiation chemistry, interaction of free radicals with the organic molecules in tissue, radiation effects at the: molecular and sub-cellular levels, cellular, tissue, organs levels, and total body, and radiation effects on DNA. In addition, the course covers the theories and models for cell survival, human cell radiosensitivity and survival curves, and modification of the biological effect of radiation.

**0903230 Cross Sectional Anatomy/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0901102**

This course enables the students to identify the different body systems, structures, tissues, and organs which are useful for cross sectional images of MRI and CT scans.

**0903232 Cross Sectional Anatomy/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903230**

This course enables the students to identify cross sectional images which describe the different body systems, structures, tissues, and organs which are useful for cross sectional images of MRI and CT scans.

**0903310 Image Quality Control/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0903210**

This course describes the basic concepts of image quality assurance (IQA), principles of quality control (QC) and QC exposure technique factors in radiography. Furthermore, this course is designed to cover all the technical and administrative processes to ensure that the radiographic equipment performed according to manufacture standards.

**0903314 Image Quality Control/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903310**

This course covers the experimental tests for radiographic equipment which includes conventional X-ray unit, X-ray films, screen-film combinations, and film processing to maintain a high image quality. In addition, it gives the students the ability to practice quality control in: fluoroscopy, mammography, computed tomography and to deal and modify factors affecting dose reduction in all types of imaging modalities, beam restricting devices, includes the grid, air gap technique, and control of scatter radiation.

**0903320 Radiographic Methods (1)/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0901102**

This course describes the radiographic procedures of the chest, abdomen, pelvis, and upper and lower limbs. This includes patient preparation for Imaging and the use of contrast media.

**0903323 Radiographic Methods (1)/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903320**

This course provides the students the practice of all radiographic procedures of the chest, abdomen, pelvis, and upper and lower limbs x-ray examinations. This includes patient preparation for Imaging and the use of contrast media.

**0903325 Fundamentals of Nuclear Medicine. Credit hours: 2 (2 + 0)**

**Prerequisite: 0903161**

This course focuses on the radiopharmaceuticals used in nuclear medicine imaging (NMI), mechanisms of radiophamaceutical localization, NM instrumentations, basic principles of gamma camera (GC), imaging quality in the NM, imaging artifacts, types of QC testing of GC, internal radiation dosimetry, radiation protection in NM and disposal of radioactive waste. This course covers signal photon emission computed tomography (SPECT), positron emission tomography (PET), and study the analysis and interpretation of each scan, and describes the different methods used to diagnose many diseases, especially cancer, and study the gastro esophageal functions.

**0903328 Fundamentals of Nuclear Medicine/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903325**

This course provides the students the practice of all radiographic procedures used in nuclear medicine imaging (NMI), NM instrumentations, basic principles of gamma camera (GC), imaging quality in the NM, imaging artifacts, types of QC testing of GC, signal photon emission computed tomography (SPECT), positron emission tomography (PET), the gastro esophageal functions.

**0903326 Pediatric and Adult Imaging/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0901102**

This course discusses the use of imaging devices for children and the adult and how to deal with children and the elderly in addition to the interest in the welfare of children and the elderly during the imaging.

**0903327 Pediatric and Adult Imaging/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903326**

This course provides the students the practice of using imaging devices for children and the adult, and to deal with children and the elderly in addition to the interest in the welfare of children and the elderly during the imaging.

**0903329 Radiographic Methods (2)/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0903320**

This course describes the radiographic procedures of the head and neck, dental, and vertebral column. This includes patient preparation for Imaging and the use of contrast media.

**0903330 Radiographic Methods (2)/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903329**

This course provides the students the practice of all radiographic procedures of the head and neck, dental, and vertebral column. This includes patient preparation for Imaging and the use of contrast media.

**0903332 Computed Tomography (1). Credit hours: 3 (3 + 0)**

**Prerequisite: 0903230**

This course provides the students with an overview of basic principles of computed tomography (CT) system components and functions, including an introduction to the physics and instrumentations related to obtaining CT images , data acquisition system , and image reconstruction, image processing. In addition, this course discusses the hardware, software and technical parameters, analysis the signal from detector, and imaging displays, radiation dose in CT. The course includes CT operational modes, quality control in CT, and image artifacts.

**0903334 Magnetic Resonance Imaging (1). Credit hours: 3 (3 + 0)**

**Prerequisite: 0903161**

This course discusses the history of MRI, main components of the MR imager concepts of magnetic resonance spectroscopy including resonance absorption, relaxation time measurement, different techniques for localized spectroscopy, processing of the MRI signal, image display, image contrast, image artifacts, and contrast agents in MRI. The course describes biologic effects of MRI, safety and precaution, and factors affecting image quality in MRI.

**0903341 Quantitative Analysis of Medical Images. Credit hours: 3 (2 + 3)**

**Prerequisite: 90 Credit hours.**

This course covers the modern medical imaging includes image processing, computer-aided diagnosis (CAD), image recording and storage, and image transmission, most of which are included in a picture archiving and communication system (PACS). This course includes a short review of the development in medical imaging science and technology, which covers: diagnostic imaging, the importance of image quality and diagnostic performance, analogue imaging systems, digital imaging system, image processing, computer-aided diagnosis, PACS, 3-D imaging and future directions.

**0903342 Digital Imaging. Credit hours: 3 (3+0)**

**Prerequisite: 0903210**

This course discusses the use of different digital modalities in radiography, the components and mechanisms of computed radiography (CR) system, development of digital imaging, and image characteristics. Furthermore, the course covers the digital radiography (DR), DR detectors and detector techniques, image processing, image archiving, digital display, storage system, image artifacts, digital mammography, digital fluoroscopy, digital subtraction angiography equipment, and quality assurance of computed radiography and digital radiography systems.

**0903351 Mammography/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0903161**

This course covers the history and development of mammography, problems with mammography, breast anatomy, mammography in young women, types of breast cancer, breast cancer treatment, side effects of radiotherapy, modern mammographic imaging systems, demonstrate use of computer aided diagnosis (CAD), mammographic positioning technique, quality control and dose in mammography and dosimetry, mean glandular dose, radiation risks associated with mammography and alternative breast imaging modalities.

**0903353 Mammography/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903351**

This course provides the students the practice of all radiographic procedures of mammography, positioning and modern modalities of mammography.

**0903356 Ultrasound Imaging/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0903161**

This course discusses the basic principles of the nature of diagnostic ultrasound (US), US interaction with tissue, US intensity and beam shape, basic US instrumentation; static and dynamic imaging principles, image processing and display, and US contrast agents. Also, the course covers Doppler US, types of Doppler, Doppler applications, US image artifacts, US quality control and acceptance testing, biological effects of US, studying pictures of human organs, includes the abdomen, and pelvis, and the side effects of US in fetus.

**0903357 Ultrasound Imaging/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903356**

This course provides the students the practice of all radiographic procedures of diagnostic ultrasound (US), US intensity and beam shape, basic US instrumentation, image processing and display, and US contrast agents. Also, the course interacts with Doppler US, types of Doppler, Doppler applications, US image artifacts, US quality control and acceptance testing, studying pictures of human organs, include the abdomen, and pelvis.

**0903358 Radiotherapy/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0903161**

This course covers the principles of production of high energy X- ray, and charged particles, quality of X- ray beam, different radiation therapy treatment machines for malignant tumor treatments, the physical aspects and clinical applications, measurement of absorbed dose in radiotherapy, radiation dosimetry, dose calculation models, treatment planning, dose distribution and scatter analysis. This course discusses the isodose distributions and combination of radiation fields for tumor treatments, quality control and radiation protection in radiotherapy.

**0903359 Radiotherapy/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903358**

This course provides the students the practice of all radiographic procedures of using high energy X- ray, and charged particles, different radiation therapy treatment machines for malignant tumor treatments, measurement of absorbed dose in radiotherapy, radiation dosimetry, dose calculation models, treatment planning. Also to apply quality control and radiation protection in radiotherapy.

**0903414 Computer in Radiography. Credit hours: 2 (2 + 0)**

**Prerequisite: 0612114**

This course provides the students the use of ready software in various areas of specialization as MRI, CT, NM, Fluoroscopy, Digital Imaging, with special emphasis on its practical applications.

**0903422 Radiographic Methods (3)/ Theoretical. Credit hours: 2 (2+0)**

**Prerequisite: 0903329**

This course describes the use of the conventional and digital fluoroscopic techniques to image upper and lower gastrointestinal tract (GIT) system, urinary system, biliary tract system, circulatory and lymphatic systems, reproductive system, sialography, myelography, and arthrography. Also, this course includes patient preparation for imaging and the use of contrast media.

**0903425 Radiographic Methods (3)/ Practical. Credit hours: 1 (0+3)**

**Prerequisite: 0903422**

This course provides the students the practice of all radiographic procedures of the conventional and digital fluoroscopic techniques to image upper and lower gastrointestinal tract (GIT) system, urinary system, biliary tract system, circulatory and lymphatic systems, reproductive system, sialography, myelography, and arthrography. Also, this course includes patient preparation for imaging and the use of contrast media.

**0903432 Computed Tomography (2)/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0903332**

This course describes the multi-slice technique in CT, advanced clinical applications in CT, CT contrast media, dynamic scanning and positron emission tomography (PET). Furthermore this course discusses typical CT of the head, cerebral vessels, spine, neck, chest, abdominal, pelvis, CT angiography, imaging protocols, and essentials of advanced multi-slice CT clinical applications.

**0903434 Computed Tomography (2)/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903332**

This course provides the students the practice of all radiographic procedures of multi-slice technique in CT, advanced clinical applications in CT, CT contrast media, dynamic scanning and positron emission tomography (PET). Furthermore, typical CT of the head, cerebral vessels, spine, neck, chest, abdominal, pelvis, CT angiography, imaging protocols, and essentials of advanced multi-slice CT clinical applications.

**0903436 Magnetic Resonance Imaging (2)/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0903334**

This course covers the necessity of digital imaging and the characteristics of the digital computer, MRI clinical applications including: brain scan, angiography, cardiac gated imaging, and other organs, imaging protocols.

**0903437 Magnetic Resonance Imaging (2)/ Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903436**

This course provides the students the practice of all radiographic procedures of MRI clinical applications including: brain scan, angiography, cardiac gated imaging, and other organs, imaging protocols.

 **0903443 Principles of Diagnostic Radiology. Credit hours: 3 (3 + 0)**

**Prerequisite: 0901102**

This course describes the basic principles of diagnostic imaging. Creating the student to learn the medical semesterionology that used for diseases to be imaged by suitable different imaging modalities, and aid the student in understanding the strengths and limitations of the tools in his/ her practice.

**0903444 Angiogram Imaging/ Theoretical. Credit hours: 2 (2 + 0)**

**Prerequisite: 0903422**

This course is an introduction to angiographic examinations and procedures that include diagnostic and interventional procedures involving the cardiovascular system, vascular interventional radiology, preparation of the patients for angiography and post angiographic measures. Furthermore this covers information about the needles, guide wire, catheters and there use in angiography, cardiac catheterization, head and neck angiography, renal and spinal angiography.

**0903445 Angiogram Imaging / Practical. Credit hours: 1 (0 + 3)**

**Prerequisite: 0903444**

This course provides the students the practice of all radiographic procedures of angiographic examinations that include diagnostic and interventional procedures involving the cardiovascular system, vascular interventional radiology, preparation of the patients for angiography and post angiographic measures.

**0903456 Special Topics. Credit hours: 3 (3 + 0)**

**Prerequisite: 70 Credit hours.**

This course describes the advanced study for one of the topics in the field of radiography and medical imaging chosen at the beginning of the semester, and trains the students to use the library and internet, as well as electronic resources and scientific references.

**0903470 Internship in Radiography. Credit hours: 3 (0 + 9)**

**Prerequisite: 90 Credit hours.**

Application of radiographic techniques, student must spend 9 hours per week in hospital, or medical centers to learn radiography techniques on patients in these hospitals and medical centers with these topics:

* + - * **Conventional and Digital X-rays, Digital fluoroscopic Imaging. 6 (0+18)**
			* **Computed Tomography, Mammogram. 3 (0+9)**
			* **Magnetic Resonance Imaging, Angiogram. 3 (0+9)**

**0903550 Seminar. Credit hours: 1 (1 + 0)**

**Prerequisite: 70 Credit hours.**

The students choose a current topic in one of the areas of digital radiography field using recent references, library and internet. Also, they will be introduced to processes of work writing up and presents the seminar using proper audiovisual aids.