



وصف المقرر الدراسي

قسم تقنيات الأشعة والسونار

المرحلة الثانية

التشريح الشعاعي 1

Radiologic Anatomy 1

الانكليزية

Theoretical syllabus

Theoretical syllabus	
	Details
	<u>Head and neck:</u> The skull and facial bones.
	The nasal cavity and paranasal sinuses.
	The mandible and teeth The oral cavity and salivary glands.
	The orbit and the orbital contents.
	The ear.
	The pharynx and related spaces The nasopharynx and related spaces.
	The larynx. The thyroid and parathyroid glands.
	The neck vessels
	<u>The central nervous system:</u> Cerebral hemispheres. Cerebral cortex.
	White matter of the hemispheres Thalamus, hypothalamus and pineal gland
	Pituitary gland. Limbic lobe.
	Brainstem. Cerebellum
	Ventricles, cisterns, CSF production and flow ventricles. Meninges.
	Arterial supply of the brain. Internal carotid artery.
	Venous drainage of the brain

	<u>The spinal column and its contents:</u> Vertebral column. Joints of the vertebral column.
	Ligaments of the vertebral column. Intervertebral discs
	Blood supply of the vertebral column. Spinal cord.
	Spinal meninges. Blood supply of the spinal cord
	Relevant MRI anatomy - cervical spine Relevant MRI anatomy - dorsolumbar spine
	<u>The thorax:</u> The thoracic cage.
	The diaphragm.
	The pleura
	The trachea and bronchi.
	The lungs. The mediastinal divisions
	The heart. The great vessels
	The oesophagus.
	The thoracic duct and mediastinal lymphatics. The thymus
	The azygos system Important nerves of the mediastinum
	The mediastinum on the chest radiograph Cross-sectional anatomy.

practical syllabus	
	Details
	<u>Head and neck:</u> The skull and facial bones.
	The nasal cavity and paranasal sinuses.
	The mandible and teeth The oral cavity and salivary glands.
	The orbit and the orbital contents.
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	The pharynx and related spaces The nasopharynx and related spaces.
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	The thoracic duct and mediastinal lymphatics. The thymus
	The azygos system Important nerves of the mediastinum
	The mediastinum on the chest radiograph Cross-sectional anatomy.

تقنيات التصوير الشعاعي 1

Radiographic Techniques 1

الانكليزية

practical syllabus

	Title
	Upper limb , hand, wrist, Scaphoid bone AP , lateral position, shown structure
	Forearm , radius and ulna, type of fracture ,
	Elbow joint , AP, Lateral, oblique , shown structure
	Humerus distal and proximal fracture
	Shoulder joint , AP, lateral , supero- inferior & oblique
	Foot , AP, lateral, oblique , shown structure,
	Ankle joint , AP, lateral, oblique ,oblique & AP with inversion
	Tibia & fibula ,AP, Lateral
	Knee joint AP, lateral,skyline for patella, erect AP
	Femur
	hip joint, AP, Lateral , frog-leg infro-superior view , shown structure
	Pelvic pathology,
	Examination
	Chest , AP ,lateral , apical view , lordotic position , shown structure, interpretation system
	Lung pathology ,
	Bone of the chest , ribs ,sternum , main fracture and pathology
	Heart and aorta , main branches
	Diaphragm , chest wall pathology
	Cases for lung pathology
	Examination
	Iatrogenic
	Tumors in the chest
	Normal variation and main Abnormality in the chest
	Cases of the chest pathology
	Review
	Final examination

Theoretical syllabus

	Title
	Terminology, body planes, section, lines , body position special projections,
	Image quality, exposure factor, brightness, contrast , resolution , distortion , noise
	Upper limb , hand, wrist, Scaphoid bone AP , lateral position, shown structure
	Forearm , radius and ulna, type of fracture ,
	Elbow joint , AP, Lateral, oblique , shown structure
	Humerus distal and proximal fracture
	Shoulder joint , AP, lateral , supero- inferior & oblique
	Foot , AP, lateral, oblique , shown structure,
	Ankle joint , AP, lateral, oblique ,oblique & AP with inversion
	Tibia & fibula ,AP, Lateral
	Knee joint AP, lateral,skyline for patella, erect AP
	Femur
	hip joint, AP, Lateral , frog-leg info-superior view , shown structure
	Pelvic pathology,
	Examination
	Chest , AP ,lateral , apical view , lordotic position , shown structure, interpretation system
	Lung pathology ,
	Bone of the chest , ribs ,sternum , main fracture and pathology
	Heart and aorta , main branches
	Diaphragm , chest wall pathology
	Cases for lung pathology
	Examination
	Iatrogenic
	Tumors in the chest
	Normal variation and main Abnormality in the chest
	Cases of the chest pathology
	Review
	Final examination

تقنيات اجهزة شعاعية 1

Radiological medical equipment technologies1

الانكليزية

Theoretical syllabus

	Details
	X-Ray machine : Shapes and sizes
	X-ray tube
	Operating console: line compensation, autotransformer
	KVp adjustment, mA control
	Exposure timer, checking a timer
	High voltage transformer , voltage rectification
	3-phase power, high frequency generators
	The grid: effect of scattered radiation on the contrast
	Characteristics of grid construction , grid ratio, grid frequency, interspaced material , grid material
	Grid types: linear, crossed , focused grid , moving grids
	Grid selection
	Processing the latent image: evolution of film processing
	Intensifying screens : screen construction , luminescence
	Screen characteristics, screen film combination, care of the screen
	history and physics of Ultrasound beam
	history and physics of Ultrasound beam
	Ultrasound machine
	Ultrasound transducer
	Ultrasound transducer
	Operational modes
	Operational modes
	Operational modes
	Mammography
	X-ray apparatus: target composition, filtration
	Heel effect
	Image receptors
	Fluoroscopy
	Image intensification of Fluoroscopy
	Television monitor and image

practical syllabus

	Details
	X-Ray machine : Shapes and sizes
	X-ray tube
	Operating console: line compensation, autotransformer
	KVp adjustment, mA control
	Exposure timer, checking a timer
	High voltage transformer , voltage rectification
	3-phase power, high frequency generators
	The grid: effect of scattered radiation on the contrast
	Characteristics of grid construction , grid ratio, grid frequency, interspaced material , grid material
	Grid types: linear, crossed , foc6used grid , moving grids
	Grid selection
	Processing the latent image: evolution of film processing
	Intensifying screens : screen construction , luminescence
	Screen characteristics, screen film combination, care of the screen
	Ultrasound machine
	Ultrasound transducer
	Ultrasound transducer
	Operational modes
	Operational modes
	Operational modes
	Mammography
	X-ray apparatus: target composition, filtration
	Heel effect
	Image receptors
	Fluoroscopy
	Image intensification of Fluoroscopy
	Television monitor and image

فحوصات شعاعية خاصة 1

Special radiological procedures 1

الانكليزية

Theoretical syllabus

	Details
	Historical development of radiographic agent.
	Adverse effect of I.V water soluble contrast media on specific organs
	Methods of imaging of GIT tract with barium water soluble contrast agents.
	Barium examination : swallow and meal.
	Barium examination: follow through, small bowel anema.
	Barium examination : barium enema, instant enema, air enema.
	Reduction of intussusception.
	Sonogram, retrograde ileogram, colostomy enema, loopogram, herniogram & Evacuating proctogram .
	Methods of imaging of hepatobiliary system .
	U/S of the liver ,gall bladder and biliary system
	C.T for the liver biliary tree.
	MRI of the liver
	Intraoperative & postoperative T- tube, cholangiography .
	Biliary drainage
	Methods of imaging of urinary tracts
	Excretion urography.
	C.T urinary tract.
	Magnetic MRI of the urinary tract.
	Micturating cystourethrography.
	Ascending urethrography in the male.
	Retrograde pyelourethrography.
	Percutaneous nephrostomy & nephrolithotomy.
	Methods of imaging of male & female reproductive system.

	Hystrosalpingography.
	C.T & MRI of the reproductive system.
	Methods n imaging of respiratory system.
	C.T of respiratory system .
	C.T scan Guided lung biopsy.
	Methods of imagings pulmonary embolism .
	Pulmonary arteriography and pet-C.T scan for respiratory system.

practical syllabus	
	Details
	Adverse effect of I.V water soluble contrase media on specifc organs
	Methods of imagings of GIT tract with barium water soluble contrase agents.
	Barium examination : swallow and meal.
	Barium examination: follow through,small bowel anema.
	Barium examin ation : barium enema,instant enema,air enema.
	Reduction of intussusception.
	Sonogram,retrograde ileogram,colostomy enema, lopogram, herniogram& Evacuating proctogram .
	Methods of imagings of hepatobiliary system .
	U/S of the liver ,gall bladder and biliary system
	C.T for the liver biliary tree.
	MRI of the liver
	Intraoperative & postoperative T- t ube,cholangeography .
	Biliary drai nge
	Methods of imagings of urinary tracts
	Excretion urography.
	C.T urinary tract.
	Magnatic MRI of the urinaryc tract.
	Micturating cystourethrography.
	Ascending urethrography in the male.
	Retrograde pylouretrography.
	Precutaneous nephrostomy & nephrolithotomy.
	Methods of imagings of male &femals reproductive system.
	Hystrosalpingography.
	C.T & MRI of the reproductive system.
	Methods n imaging of respiratory system.
	C.T of respiratory system .
	C.T scan Guided lung biopsy.

Methods of imaging pulmonary embolism .

Pulmonary arteriography and pet-C.T scan for respiratory system.

RADIATION PHYSICS (1)

DETAILED CURRICULUM

Week	Theoretical	practical
1-4	<p>The Atom</p> <ul style="list-style-type: none">•Fundamental particles•Atomic structure•Binding energy <p>Sources of ionizing radiation</p> <ul style="list-style-type: none">•Alpha Particles•The Beta Particle•Gamma Radiation <p>Properties of Radiation</p> <p>Units of Radiation Measurement</p> <p>Electromagnetic radiation</p> <ul style="list-style-type: none">•Quantum aspects•Wave aspects•Wave and quantum theories combined•Intensity <p>Inverse square law</p>	<p>preface</p> <ol style="list-style-type: none">1. instructions to students2. graphs3. Errors and accuracy4. The SI system of units
5-10	<p>Basic Requirements for Production of X-Rays</p> <ul style="list-style-type: none">•Supply of Electrons•Movement of the Electrons <p>Components and Properties of an X-Ray Tube</p> <ul style="list-style-type: none">•Cathode•Anode•Processes Occurring in the Anode of an X-ray Tube <p>X-ray Generator Options</p> <ul style="list-style-type: none">•Kilovoltage•Focal Spot <p>Inherent Filtration</p> <p>Cooling Requirements</p>	<ol style="list-style-type: none">5. Characteristic X-rays of molybdenum6. Characteristic X-rays of tungsten

	<p>Production of X-rays The X-ray tube</p> <p>The Origin of Characteristic X-rays</p> <p>Continuous X-Ray Spectrum Characteristic X-Ray Spectrum Controlling the x-ray spectrum Effects of Voltage and Amperage on X-Ray Production</p> <ul style="list-style-type: none"> •Effect of Voltage & Effect of Amperage 	
<p>11-16</p>	<p>Introduction and Overview Compton Scattering (Modified Scatter)</p> <ul style="list-style-type: none"> •Direction of Scatter •Energy of Scattered Radiation <p>Photoelectric Effect Coherent Scatter Attenuation</p> <ul style="list-style-type: none"> •Linear Attenuation Coefficient <p>Factors Affecting the Attenuation</p> <ul style="list-style-type: none"> •Atomic number •Density •Thickness •X-Ray Energy <p>Photoelectric Rates</p> <ul style="list-style-type: none"> •Dependence on Photon Energy •Material Atomic Number <p>Effective atomic number Compton Rates Mass Attenuation Coefficient Use of Linear Attenuation Coefficients Half-Value Layer Competitive Interactions Secondary electrons Electron Interactions Electron Range Linear Energy Transfer Properties of x-and gamma rays Attenuation of x-rays by the patient Filtration Choice of filter material Effects of filtration</p>	<p>7. The intensity of characteristic X-rays as a function of anode current and anode voltage</p>
<p>17-21</p>	<p>Contrast Definition of Contrast and Physical Determinants of Contrast Radiographic Contrast of Biological Tissues</p> <ul style="list-style-type: none"> •Soft Tissue , Fat & Bone <p>Contrast Agents Effect of Scattered Radiation Scatter reduction and contrast improvement</p>	<p>8. Absorption of X-rays</p>

	<ul style="list-style-type: none"> •Field size •Kilovoltage •Grid •Air Gap •A flat metal filter <p>Effect on scattered rays Contrast improvement factor Effect on direct rays</p> <ul style="list-style-type: none"> •Focused and unfocused grids •Grid cut-off •Stationary and moving grids •Moving slot <p>Magnification and distortion Unsharpness and blurring</p> <ul style="list-style-type: none"> •Geometrical unsharpness •Movement unsharpness •Absorption unsharpness <p>Choice of Exposure Factors</p> <ul style="list-style-type: none"> •Kilovoltage •Milliamperes-seconds •Exposure time <p>Macroradiography Mammography</p>	<p>9. Compton scattering of X-rays</p> <p>10. K- and L- absorption edges of X-rays / Moseley's Law and the Rydberg constant</p>	
<p>22-24</p>	<p>Overview of Fluoroscopy Description Fluoroscopy Works Benefits/Risks Components of Fluoroscope</p> <ul style="list-style-type: none"> • X-ray generator • X-ray tube • Collimator • Patient table and pad • Image Intensifier <p>Image Intensifier Fluoroscopy Systems</p>	<p>11. Contrast medium experiment with a blood vessel model</p>	
<p>25-30</p>	<p>Introduction History of Computed Tomography Operating Steps Different Generations of CT Scanners</p> <ul style="list-style-type: none"> • First-generation CT • Second-generation • Third-generation CT • Fourth-generation CT • Fifth-generation CT <p>Basic principles of CT</p> <p>CT Image Principles of Helical CT Scanning Operation Factors Affecting Spatial Resolution</p>	<p>12. Absorption of x- and gamma ray</p>	

- Matrix and Pixel Size
 - Field Of View (FOV) in CT
 - Voxel Size
 - Focal Spot Size
 - Blur
- Nyquist Sampling Theorem
 Low-Contrast Resolution
 Factors Relating to Low-Contrast Resolution
 Basic CT scanner components
- Scanning unit (gantry)
 - X-Ray Tube
 - Detector array
 - Data-Acquisition System (DAS)
 - CT Patient Table or Couch
- Fan beam
 Focused septa:
 Image Reconstruction
 The Filtered Backprojection Algorithm
 Image Generation
- Acquisition:
 - Display
 - Windowing
 - Volume Visualization
- Image Quality Characteristics

" RADIATION PROTECTION (1) "

DETAILED CURRICULUM

Week	Theoretical	practical
1,2,3	Structure of the Atom Composition <ol style="list-style-type: none"> 1. Electrons 2. Nucleus Electronic Structure <ol style="list-style-type: none"> 1. Electron Orbits 2. Orbital Nomenclature 3. Binding Energy 4. Electron Transitions 5. Characteristic Radiation 6. Auger Electrons Nuclear Structure <ol style="list-style-type: none"> 1. Composition 2. Nuclear Force 3. Mass Defect 	<p style="text-align: center;">preface</p> <ol style="list-style-type: none"> 1. instructions to students 2. graphs 3. Errors and accuracy 4. The SI system of units

	<p>4. Binding Energy 5. Nuclear Instability—Overview</p>	
4	<p>Electromagnetic (EM) Radiation Wave-Particle Duality 1. Wave Characteristics 2. Particle Characteristics Electromagnetic Spectrum 1. Ionizing 2. Non-Ionizing</p>	5. Characteristics of a Geiger-Muller (G-M) tube
5	<p>Particulate Radiation Light Particles Heavy Charged Particles Uncharged Particles 1. Neutrons 2. Neutrinos</p>	
6,7	<p>Radiation Units System of Units 1. SI 2. Classical Exposure 1. Coulomb/kilogram 2. roentgen (R) 3. KERMA gray (Gy) rad</p>	
8,9	<p>Absorbed Dose 1. gray (Gy) 2. rad Equivalent Dose 1. Radiation Weighting Factors 2. sievert (Sv) 3. rem Effective Dose 1. Tissue Weighting Factors 2. sievert (Sv) 3. rem 4. Reference Levels 5. Importance in Radiation Protection Peak Skin Dose</p>	6-Use a G-M tube : (a) To detect background radiations (b) To detect and identify the principal nuclear radiations
10	<p>Background Radiation 1. Cosmic 2. Terrestrial 3. Internal 4. Radon Non-Medical Sources 1. Nuclear Power Emissions 2. Tobacco 3. Technologically-Enhanced Naturally-Occurring</p>	7. Dead time of a G-M tube

	Radioactive Material (TENORM) 4. Fallout	
11,12	Medical Sources: Occupational and Patient Doses Projection Radiography Mammography Fluoroscopy	8. Efficiency of a G-M tube for β counting
13,14	Interventional Radiology and Diagnostic Angiography CT Sealed Source Radioactive Material Unsealed Radioactive Material Non-Ionizing	
15,16	Factors Affecting Patient Dose Radiography Fluoroscopy and Interventional Radiology Computed Tomography (CT) Mammography Nuclear Medicine	9. Relative Efficiency of a G-M tube for β/γ counting
17	Regulatory Dose Limits and “Trigger” Levels 1. Institutional 2. Local 3. State 4. Federal	10. Absorption of γ -rays 11. Absorption of β -rays
18,19	Persons at Risk Occupational Non-Occupational Staff Members of the Public Fetus Patient 1. Adult 2. Child 3. Pregnancy Identified 4. Pregnancy Status Unknown	
20	Dose limits Occupational Dose Limits 1. Effective Dose 2. Specific Organ 3. Pregnant Workers	
21	Members of the Public 1. General 2. Caregivers 3. Limit to Minors	
22,23	Radiation Detectors Personnel Dosimeters 1. Film 2. Thermoluminescent Dosimeters (TLDs) 3. Optically-Stimulated Luminescent (OSL)	12. Attenuation of γ -rays by matter

	<p>Dosimeters</p> <ol style="list-style-type: none"> 4. Electronic Personnel Dosimeters 5. Applications: Appropriate Use and Wearing 6. Limitations and Challenges in Use 	
24,25	<p>Principles of Radiation Protection</p> <p>Time</p> <p>Distance</p> <p>Shielding</p> <ol style="list-style-type: none"> 1. Facility 2. Workers 3. Patients 4. Members of the Public 5. Appropriate Materials <p>Justification, Optimization, Limitation</p>	13. Determination of the range of α -particle in air.
26	<p>Contamination Control</p> <p>As Low As Reasonably Achievable (ALARA)</p> <ol style="list-style-type: none"> 1. Culture of Safety 2. "Open Door" Policy <p>Procedure Appropriateness</p>	
27,28	<p>Estimating Effective Fetal Dose (Procedure-Specific Doses)</p> <p>Radiography</p> <p>Mammography</p> <p>Fluoroscopy</p> <p>Computed Tomography (CT)</p>	
29,30	<p>Shielding</p> <p>Design Philosophy</p> <ol style="list-style-type: none"> 1. Occupancy 2. Workload <p>Controlled vs. Uncontrolled Areas</p> <p>Examples of Shielding Design</p>	

السلوك المهني

Medical ethics

العربية

Theoretical syllabus

التفاصيل	
مبادئ اداب المهنة في مراحل التطورات الحضارية مبادئ اداب المهنة في الحضارة العربية والاسلامية اداب التعامل مع الطبيب ،المزملاء، المرضى	
السلوك المهني – تعريفه ،مفهومه ، تطبيقاته ، العلاقة بين العاملين و رؤسائهم .	
الاداب الاساسية للمهنة ، خصائص اداب المهنة كموجه ومرشد، كيفية توظيف اداب المهنة من موقع الموجه لسلوك الفرد وانفعالاته وقدرته على اتخاذ القرار المناسب. خصائص وصفات العاملين في الحقل الصحي – المظهر ، السلوك، الالتزام. الحقوق الادبية و القانونية للمريض والتعامل وفق سلوكية المريض ومرافقيه .	
الانماط السلوكية – (الانسانية ، التفاعلية ، الجمعية) – تعريفها ، طبيعتها، دوافعها، تفسيراتها	
اساليب الاتصال (اللغوية وغير اللغوية) – تعريفها، انواعها ،تأثيراتها ، تصميم اساليب اتصال ناجحة . كيف تؤثر اساليب الاتصال على السلوك (فن الاصغاء والاستماع).	
الاتجاهات والميول السلوكية – تعريفها ، تصنيفها ، العوامل المؤثرة ، طرق قيامها .	
القيم ،العادات و التقاليد – تعريفها ، تصنيفها ، العوامل المؤثرة ، طرق قيامها.	
انماط الشخصية ، كيفية التعامل معها ،تعريف الشخصية –انواعها وعلاقتها	
امتحان	
شروط تجسيد الصحة النفسية- تعريفها ،العوامل المؤثرة ،الوقاية ،دور الصحة النفسية في الامراض.	
شروط التوافق المهني وعلاقته بالعمل المرتبط به ، مفهومه و شروطه	
سلوكية التعامل مع المريض : استقبال المريض والتعامل معه والحفاظ على اسرار المهنة	
تحديد المواعيد والحفاظ على حاجات المريض	
امتحان	
سلوكية التعامل مع الاجهزة و المعدات الطبية .الاطلاع اليومي على الاجهزة والادوات والمحاليل وتهينتها للعمل اليومي وادامتها وصيانتها والحفاظ عليها .تهيئة الادوية اللازمة للعمل وحسن التصرف بها .	
السلامة المهنية : الوقاية من مخاطر العمل والحوادث ، الوقاية من مخاطر التلوث الجرثومي والاشعاعي ، الوقاية من مخاطر العدوى للامراض المعدية والسارية . تجنب الممارسات الخاطئة في حقل العمل .	
تطبيقات في السلوك المهني	

