اسم الكلية	التقنية الطبية
Faculty name	Medical Technology

	Name of Department	أسم البرنامج العلمي	Credit	
1	Medical Laboratory Department	**المختبرات الطبية**	**120**	4 year
2	Radiology Department	**الاشعة**	**120**	4 year
3	Physiotherapy Department	**العلاج الطبيعي**	**120**	4 year
4	Nutrition Department	**التغذية**	**120**	4 year
5	Anesthesia Department	**التخدير**	**120**	4 year
6	Biomedical Engineering	**الهندسة الطبية الحيوية**	**120**	4 year
7	Drug Technology	**تقنية الادوية**	**120**	4 year
8	Oral and Dental Health Technology	**تقنية وصحة الفم والاسنان**	**120**	4 year
9	Public Health Sciences	**علوم صحة المجتمع**	**120**	4 year
10	Health Management	**الإدارة المعلومات الصحية**	**120**	4 year
11	Technical analytical and forensic science	**تقنية العلوم التحليلية والجنائية**	**120**	4 year
12	Optics technology	**تقنية البصريات**	**120**	4 year

1) وصف البرامج التعليمية:

قسم المختبرات الطبية:

رؤية البرنامج

يطمح قسم المختبرات الطبية الي تحقيق التميز في هذا المجال وذلك من خلال التركيز على تأهيل طلابها و الحث على البحث العلمي و ذلك لرفد المجتمع بخريجين يتميزون بقدرات احترافية تمكنهم للتميز في مجالهم كذلك تزويدهم بلامكانيات البحثية التنافسية.

رسالة البرنامج

تقديم التعليم الأكاديمي والتدريب المخبري الطبي المتميز للطلبة في مجال المختبرات الطبية وغرس القيم المهنية والأخلاقية التي تصقل مهارات الخريجين والخريجات المؤهلين والمطابقة للمعايير العالمية. كذلك اتاحة الفرصة امام خريجي لكسب وضائف مميز في المستشفيات والعيادات العامة والخاصة، العمل في مختبرات ومصانع الأغذية، و مصانع الأدوية، و مراكز بحوث التقنيات الحيوية، ومراكز الأبحاث الطبية، وكذلك في مجال الأجهزة الطبية ذات العلاقة بالتحاليل. وغيرها، كما يتيح القسم للخريجين مواصلة دراستهم العليا ومواصلة البحث العلمي في هذا المجال.

أهداف البرنامج

1. العمل علي تدريب الطلبة في مجالات البحث العلمي والعمل علي حثهم للدراسات العليا.
2. السعي علي توحيد الخطط والمقررات الدراسية في الكليات مع الكيات المتناظرة مع الإبقاء على بعض المواد التي تعطي الكلية خصوصيتها.
3. تأهيل و تدريب الطلبة والطالبات علي كيفية التعامل مع مختلف التحاليل الطبية و الأجهزة الحديثة داخل قسم ، كذلك عن كيفية التدبير الوقائي عند التعامل مع العينات.
4. المساهمة المعرفية في تخصصات العلوم الطبية على المستويين المحلي والأقليمي.

5. تحقيق مستوي عال من التعليم الذي يؤهل خريجي المختبرات الطبية للمساهمه في خدمة مجتمعهم.
6. التجديد المستمر مع المتغيرات في مجال المتخصصات الطبية.
7. المشاركة مع المجتمع الطبي من خلال عرض ندوات و دورات ارشادية وتوعوية.
8. ترسيخ مبادئ الجودة الشاملة وتحقيق متطلبات الاعتماد الأكاديمي.
9. تحقيق السلامة المخبرية في تخصصات علوم المختبرات الطبية.
10. حصول الخريجين / الخريجات على أساسيات المعرفة العلمية والطبية والتفكير العلمي للعمل الطبي التطبيقي بعد الحصول على درجة البكالوريوس ليؤهلهم على مواكبة مستوى الخدمات الصحية المطورة في مجال تخصصهم.
11. الاستفادة من الخبرات الأكاديمية والمهنية لأعضاء هيئة التدريس في خدمة الجامعة والمساهمة في حل بعض المشكلات التي تواجه المجتمع في مجال تخصصهم.
12. الوفاء بحاجة المجتمع من الكوادر الصحية
13. المؤهلة في تخصص علوم المختبرات الطبية.

قسم الاشعة:

رؤية البرنامج

يطمح قسم الاشعة الي تحقيق التميز في هذا المجال وذلك من خلال التركيز على تأهيل طلابها والحث على البحث العلمي وذلك لرفد المجتمع بخريجين يتميزون بقدرات احترافية تمكنهم للتميز في مجالهم كذلك تزويدهم بالإمكانيات البحثية التنافسية.

رسالة البرنامج

تأهيل كفاءات محلية قادرة على تلبية احتياجات سوق العمل في مختلف مجالات الأشعة والتصوير الطبي مع التركيز على أخلاقيات المهنة وتحقيق شروط السلامة والجودة النوعية، وتقديم خدمات بحثية واستشارية للمجتمع المحلي.

أهداف البرنامج

1. يسعي قسم الاشعة الي تخريج أخصائيين مؤهلين بالمعرفة والمهارات التي تمكّنهم من التعامل مع أجهزة الأشعة والتصوير الطبي وعمل الفحوصات الإشعاعية بمختلف أنواعها.
2. التجديد المستمر مع المتغيرات في مجال المتخصصات الطبية
3. تأهيل وتدريب الطلاب على كيفية التعامل مع مختلف الحالات الفئات العمرية و المرضية داخل قسم الأشعة، كذلك عن كيفية التدبير الوقائي عند التعرض للأشعة.
4. العمل على تدريب الطلبة في مجالات البحث العلمي والعمل علي حثهم للدراسات العليا.
5. توعية الطلبة والطالبات وتعريفهم على الاشعة ومخاطر الناتجة عن الاشعة وكيفية الحماية ضد مخاطرها.
6. إعداد الطلاب بالأسس الأخلاقية المهنية والإدارية والجودة التصويرية بقسم الأشعة.
7. إعداد الطلاب بالأسس الأخلاقية المهنية والإدارية والجودة التصويرية بقسم الأشعة
8. السعي على توحيد الخطط والمقررات الدراسية في الكليات مع الكليات المتناظرة مع الإبقاء على بعض المواد التي تعطي الكلية خصوصيتها.
9. ترسيخ مبادئ الجودة الشاملة وتحقيق متطلبات الاعتماد الأكاديمي

قسم العلاج الطبيعي:

رؤية البرنامج

يطمح قسم العلاج الطبيعي الي تحقيق التميز في هذا المجال وذلك من خلال التركيز على تأهيل طلابها و الحث على البحث العلمي و ذلك لرفد المجتمع بخريجين يتميزون بقدرات احترافية تمكنهم للتميز في مجالهم كذلك تزويدهم بلامكانيات البحثية التنافسية.

رسالة البرنامج

تأهيل كفاءات محلية قادرة على تلبية احتياجات سوق العمل في مختلف مجالات العلاج الطبيعي مع التركيز على أخلاقيات المهنة وتحقيق شروط السلامة والجودة النوعية، وتقديم خدمات بحثية واستشارية للمجتمع المحلى.

أهداف البرنامج

1. التجديد المستمر مع المتغيرات في مجال المتخصصات الطبية.
2. تأهيل و تدريب الطلبة والطالبات علي كيفية التعامل مع مختلف الحالات الفئات العمرية و المرضية داخل قسم العلاج الطبيعي.
3. العمل علي تدريب الطلبة في مجالات البحث العلمي والعمل علي حثهم للدراسات العليا.
4. يسعي قسم علاج الطبيعي الي تخريج أخصائيين مؤهلين بالمعرفة والمهارات التي تمكّنهم من عمل الفحوصات العلاجية بمختلف أنواعها.
5. السعي علي توحيد الخطط والمقررات الدراسية في الكليات مع الكيات المتناظرة مع الإبقاء على بعض المواد التي تعطي الكلية خصوصيتها.
6. ترسيخ مبادئ الجودة الشاملة وتحقيق متطلبات الاعتماد الأكاديمي.

قسم التغذية:

رؤية البرنامج

يطمح قسم التغذية الي تحقيق التميز في هذا المجال وذلك من خلال التركيز على تأهيل طلابها و الحث على البحث العلمي و ذلك لرفد المجتمع بخريجين يتميزون بقدرات احترافية تمكنهم للتميز في مجالهم كذلك تزويدهم بلامكانيات البحثية التنافسية.

رسالة البرنامج

تأهيل كفاءات محلية قادرة على تلبية احتياجات سوق العمل في مختلف مجالات التغذية مع التركيز على أخلاقيات المهنة وتحقيق شروط السلامة والجودة النوعية، وتقديم خدمات بحثية واستشارية للمجتمع المحلي.

أهداف البرنامج

1. نشر الثقافة الصحية في مجال الغذاء والتغذية العلاجية مع جميع الأطراف المحلية والإقليمية والدولية.
2. العمل علي تدريب الطلبة في مجالات البحث العلمي والعمل علي حثهم للدراسات العليا.
3. السعي علي توحيد الخطط والمقررات الدراسية في الكليات مع الكيات المتناظرة مع الإبقاء على بعض المواد التي تعطي الكلية خصوصيتها.
4. ترسيخ مبادئ الجودة الشاملة وتحقيق متطلبات الاعتماد الأكاديمي.
5. المساهمة بتقديم أبحاث لتحسين العادات الصحية السليمة للتغذية على صعيد الإقليمي والدولي
6. تحقيق مستوي عال من التعليم الذي يؤهل خريجي التغذية للمساهمه في خدمة مجتمعهم.
7. الاستفادة من الخبرات الأكاديمية والمهنية لأعضاء هيئة التدريس في خدمة الجامعة والمساهمة في حل بعض المشكلات التي تواجه المجتمع في مجال تخصصهم.
8. الوفاء بحاجة المجتمع من الكوادر الصحية المؤهلة في تخصص علوم التغذية والغذاء .

2) بداية الدارسة : 2024/09/29
3) نهاية الدراسة: 2025/07/31

4) المقررات الدراسية

Foundation year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	MT101	General Chemistry	كيمياء عامة	4	3	2	

Course aims:

1. Introduce the basic principles of general chemistry, chemistry calculations, atomic structure and electronic configuration.
2. Introduce the basic principles of atomic spectra, geometric. Shape of molecule, bonding, ionic equilibria and their application.

Intended learning outcomes:

a. Knowledge and understanding:

a.1: Understand the type of a compound and its structure.
a.2: Recognize the atomic structure and type of bonding.
a.3: Know the shape of the molecule, chemical equilibria and conductance
a.4: Recognize potential laboratory safety concerns and address them using appropriate techniques.

b. Intellectual skills:

b.1: Elucidate the bonding types, atomic structure, geometrical shape of the molecules.
b.2: Predict the polarity of the molecule and the conductance of different electrolytes.
b.3: Apply ionic equilibria and its application

c. Professional and practical skills:

c.1: Be able to apply safety concerns and address them using appropriate techniques.
c.2: Be able to present result and conclusion of scientific experiment
c.3: Be able to determine 3D shapes of molecules.
c.4: Be able to problem solving and learning to interpret the data, to employ valid and effective methods of analysis.

d. General and transferable skills:

d.1: Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2: Practice independent learning needed for continuous professional development.
d.3: Interact effectively in team working.

Topics:

1. Introduction ; Matter and Measurement
2. The Atomic Nature of Matter
3. The composition of Molecules
4. Chemical Reaction and Stoichiometry

5. The behavior of Gases
6. Energy and its Conservation
7. Atoms and Lights
8. Atomic Energies and Electronic structures of Atoms
9. Electronic structures of Atoms and Periodic Trends
10. Fundamentals of Chemical Bonding
11. Molecular Structures and Chemical Bonding
12. Theories of Chemical Bonding
13. Effects of Intermolecular Forces
14. Properties of Solution
15. Representative Carbon Compounds:
Functional Groups, Intermolecular Forces. Hydrocarbons: Representative Alkanes, Alkenes, Alkynes, and Aromatic,
Compounds Functional Groups: Alkyl Halides, Alcohols, Ethers, Amines, Aldehydes, Ketones, Carboxylic Acids, Esters, Amides, and Nitriles. Physical Properties and Molecular Structure
16. Alkanes:
Nomenclature, Conformational Analysis, Introduction to Alkanes and cycloalkanes, Shapes of Alkanes, IUPAC Nomenclature of Alkanes, Alkyl Halides and Alcohols, Nomenclature of Cycloalkanes, Alkenes, Cycloalkenes and Alkynes, Physical Properties of Alkanes and Cycloalkanes, Chemical Reactions of Alkanes
17. Alkenes and Alkynes I:
Properties and Synthesis. Elimination Reactions of Alkyl Halides, The (E)—(Z) System for Designating Alkene ,Diastereomers, Relative Stabilities of Alkenes ,Cycloalkenes,
Synthesis of Alkenes via Elimination Reactions, Synthesis of Alkynes by Elimination Reactions, The Acidity of Terminal Alkynes
18. Alkenes and Alkynes II: Addition Reactions
Introduction: Additions to Alkenes, Addition of Hydrogen Halides to Alkenes: Markovnikov's Rule, Stereochemistry of the Ionic Addition to an Alkene, Addition of Sulfuric Acid to Alkenes, Addition of Water to Alkenes: Acid-Catalyzed Hydration Alcohols from Alkenes Through Oxymercuration-Demercuration:
Markovnikov Addition, Alcohols from Alkenes through Hydroboration-Oxidation: ,Anti- Markovnikov Syn Hydration, Addition of Bromine and Chlorine to Alkenes, Halohydrin Formation, Addition of Bromine and Chlorine to Alkynes, Addition of Hydrogen Halides t Alkynes, Oxidative Cleavage of Alkynes
19.Aromatic Hydrocarbon
20. Benzene & Phenol

2.	**MT102**	**Physiology**	**علم وظائف الأعضاء**	**4**	**3**	**2**	

Course aims:

1. The overall aim of the course is to provide the students with basic knowledge of physiology and develop several practical skills related to experimental work through training on several basic medical skills.
2. Study structures and functions of the various systems of the human body.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Learn basic concepts in a dynamic equilibrium within the human body, which include maintaining the stability of the internal environment (temperature, osmotic pressure, glucose concentration, oxygen pressure, carbon dioxide, pH, ... etc.
a.2 Identify the different components of CNS, Urinary system, respiratory system, cardiovascular system and reproduction system.
a.3 Definition the various body functions, such as gastrointestinal, vascular, respiratory, urinary, nervous, endocrine system, the musculoskeletal system and reproductive systems.
a.4 Definition to control some important functions such as blood flow and mechanical control to adjust the volume and blood pressure.
a.5 Identify blood as a tissue and classify it and knowing the clotting process. The gas exchange and regulate the acidity of the blood.
a.6 Knowing of functional overlap of the pancreas and liver
a.7 Identify ways to configure the eggs and sperm and ovarian hormones cycle the organization and its relationship to the menstrual cycle.

b. Intellectual skills:

b.1 Integrate facts about function of different organs sub serving the homeostasis as CNS, kidney, digestive system and endocrine gland.
b.2 Solve medical problems on pathophysiological bases related to diagnosis and treatment of physiological problem as : PH disturbance, fluid and electrolytes disturbances, fever, hypothermia and sensory disturbances.

c. Professional and practical skills:

c.1 The student should be able to: determine visual acuity
c.2 Measure blood pressure
c.3 Determination of the bleeding time, coagulation time, packed cell volume (PCV), hemoglobin content, blood groups and blood indices
c.4 Calculation of the pulse pressure and mean arterial, blood pressure, heart rate and ECG

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:
Introduction:
• Function, morphology of cell membrane and transport of substances across the cellmembrane.
Body fluid:
Its composition and compartments Forces responsible for movement of substances between compartments.
• Homeostasis and internal environment Control mechanism - PH and buffers Osmolality and osmotic pressure of body fluid - Units of measurement of solute concentration.
Regulation of ECF volume
Nervous system and sense organs
• Neuron (Function unit of the nervous system)
• Components of the reflex arc
Structure of the vertebrate central and peripheral nervous system
• Types of sensory receptors chemoreceptor , Mechanoreceptor, Hearing ,Vision
Circulation (open and closed circulatory systems)
• Heart, blood vessels (tubular systems), structures.
• path of blood
• Composition of blood
• Function of blood
Blood groups , blood coagulation
• lymphatic System
defense mechanism
Gastro-intestinal physiology
• Digestive system (structure)
• Digestion in mouth (constituents of saliva, function of saliva, tooth)
• Swallowing
• Digestion in the stomach
• Digestion in duodenum (liver and Pancreas
Digestion in the small intestine.
• Liver and biliary system
• Functions of liver
• Composition of bile salts and their functions
• Enterohepatic circulation of bile salts and bile acids
• bile pigments and their metabolism
• Gall bladder
• Hepatico out bile and gall bladder bile
Jaudice Cholecystography.
Absorption in various parts of GIT

• Factors affecting absorption site and mechanism of absorption of various food stuffs – Routes of absorption –Malabsorption syndromes.
Large intestine – Absorption of water and salts – Gastrocolic and duodenocolic reflexes – Mucous secretion – Defecation.
• Gastrointestinal hormones and their functions.
Vitamins and Minerals
Respiration:
• Structure of respiratory system
• Mechanism of respiratory system,
• Mechanism of breathing
control of breathing (inspired, expired and alveolar air)
Gas exchange, gaseous exchange in lunge, transport of gases in blood.
Excretion:
• Excretory substances
• Organs of excretion
Urinary system (kidneys , ureters, urinary bladder, urethra)
• Structure of kidney
• Nephrons
Urine formation
Chemical CO- ordination (ENDOCRINE SYSTEM)
• Endocrine and Exocrine glands
Hormones (secretion rate, control of action)
Hormones of Pituitary gland, Hypothalamus, Thyroid gland, Adrenal cortex, Medulla, Ovary, Testis.

3.	**MT103**	**Medical Physic**	**الفيزياء الطبية**	**4**	**3**	**2**	

Course aims:
1. Introduce the principles of physical science
2. Introduce the students the basics and fundamentals of heat and thermodynamics.
3. Introduce the student the particle dynamic: work, energy and power.
4. Introduce the student the properties of matter, heat, waves and light ,sound …etc

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify and define physical quantities.
a.2 Define the principles of units and dimensional analysis.
a.3 Know more information about thermal physics and its applications
a.4 Define the quantity of heat, mechanism of heat transfer, and 1st & 2nd of thermodynamics.
a.5 Explain the major law of physics

b. Intellectual skills:

b.1 Apply critical analytical skills to evaluate physical phenomena.
b.2 Demonstrate clear understand of scientific method and its application to the fundamental principle of physics.
b.3 Analyze the experimental results.
b.4 Connect and explain contributions of scientists to development of physical law and concepts and theories, which integrate them.

c. Professional and practical skills:

c.1 Use measuring instruments, and laboratory equipment to obtain data.
c.2 Be able to do the experimental and get the suitable results.
c.3 Able laws of mechanics to explain physical phenomena and solve problem.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:

General Introduction.
Units and Dimensions and conversions (measurement estimating)
Describing of motion : in one dimensions
Properties of matter
density , pressure , specific gravity ,viscosity , bernoullis equation , principle of fluids
Static Equilibrium:
Applications of muscles and joints stability. Conditions of equilibriums
Heat and Temperature :
heat as energy specific heat ,heat transfer
Temperature and kinetic theory:
temperature and measurements ,thermal expansion
Laws of thermodynamics :
thermodynamics process first law, second law
Electric charge and Electric field:
coulombs law, electric force between charges
The Waves and light :
laws of light ,speed of light and frequency
The sound :
characteristic of sound speed of sound ,sound waves
Work and energy : work done and energy
Laws of energy ,kinetic and potential energy

4.	**MT104**	**General Biology**	**علم الاحياء العام**	**4**	**3**	**2**	

Course aims:

1. Distinguish the differences between prokaryotes and eukaryotes
2. Describe the structure and function of the cell organelles.
3. Identify and distinguish the major criteria and function of plant and animal tissues
4. Recognize different processes of nutrition, metabolism and bioenergy production.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a1 Summarize the characterize of living things
a.2 Describe the general structure of the animal cell and its organelles
a.3. Identify the differences types of tissues in the body
a.4. Understand the basics of DNA , RNA and protein interactions

b. Intellectual skills:

b.1 Differentiate between mitosis and meiosis division
b.2 Discuss the steps of protein synthesis
b.3 Comment on DNA replication
b.4 Identify the differences between each step of each

c. Professional and practical skills:

c.1 Drew a labeled and show the differences between plant and animal cells
c.2 Show the specific structure of different types of human tissues
c.3 Write an assay about the animals and their environment
c.4 Identify each phases of meiosis and mitosis

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process
d.2 Practice independent learning needed for continuous professional development
d.3 Interact effectively in team work

Topics:

Introduction to biological sciences (manifestation of life)
1.Cell structure and function Ultrastructure of cell
2.Cell organelles (ultrastructure and function
3. Prokaryotes and eukaryotes
Cell movement, cilia, centrioles, microtubules and microfilament
Tissues and organs
a. plant tissues
1. meristematic tissue
2. surface tissues
3.Fundamental tissue
Vascular tissue

b. animal tissues
*Epithelial tissue
*connective tissue
*Muscle tissue
*Nerve tissue
Membrane transport
*membrane permeability
*facilitated diffusion
*Active transport
Exchange of large particles across plasma
Membrane, osmosis
Energy and living cells
(Energy transformation)
(Photosynthesis and respiration)
Chemical reaction and energy
Making ATP
Food as fuel (coenzymes)
*Breakdown of glucose
*Anaerobic fermentation
Information coding and transfer
*DNA structure
*DNA replication
*structure of Euc. chromosomes
*protein synthesis (RNA, Genetic code, transcription of DNA to RNA
Cell Reproduction (chromosomes, cell cycle, cell division Mitosis and Meiosis), bryophyte and alternation of generation
MENDELAIN GENETICS (Mendelain methods, Gene pairs, Mendelain law (1&2)
Test cross
Mutation and variation
Sex-linkage

5.	**MT105**	**Anatomy**	**علم التشريح**	**4**	**3**	**2**	

Course aims:

1. Identify the basic knowledge of anatomy, including the osteology, musculature, circulatory system, viscera, and the human nervous system, including the cortex, brainstem, cerebellum, deep brain structures, spinal cord, peripheral nerves, sensory systems, motor systems, and the autonomic nervous system.
2. Study the anatomical structure of the various systems of the human body.
3. The ability to distinguish different tissue types during the slide show process.
4. The ability to describe the anatomical structure of different organs of the body

Intended learning outcomes:

a. Knowledge and understanding:

a.1: Integrate the anatomical facts while examining the living subject in order to reach a proper diagnosis

a.2: The ability to distinguish different tissue types during the slide show process.

a.3: The ability to describe the anatomical structure of different organs of the body

a.4: Identify the basic knowledge of anatomy, including the osteology, musculature, circulatory system, viscera, and the human nervous system, including the cortex, brainstem, cerebellum, deep brain structures, spinal cord, peripheral nerves, sensory systems, motor systems, and the autonomic nervous system.

b. Intellectual skills:

b.1: Be able to draw diagrams for each organ in the human body

b.2: The student able to prepare an anatomical model for the location of each system.

b.3: Ask critical questions about the course

b.4: The ability to distinguish the distinctive compositions of each organs.

c. Professional and practical skills:

c.1: Communicate clearly by verbal and written means with teaching staff during the learning process.

c.2: Practice independent learning needed for continuous professional development

c.3: Interact effectively in team working.

c.4: Understand the function of every organ of the human body.

c.5: Distinguish between the various components of the cardiovascular system, including the heart, major arteries and veins, and the lymphatic system.

d. General and transferable skills

d.1: Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2: Practice independent learning needed for continuous professional development.

d.3: Interact effectively in team working.

Topics:

1. Introduction to General anatomy

anatomical position, Anatomical.

Terminology, Planes.

Terms of movements

Terms of Directions.

2. Skin (Epidermis, Dermis)

Function of skin.

3. Fascia

- superficial fascia
- Deep fascia.

4. Skeletal System

- Cartilage
- Bone

Function of bones.
Blood supply of bones
Parts of bones
Types of bones.
5. The sekeleton :
Axial skeleton
Appendicular skeleton.
6.Joints: Types of joints, types of synovial joints.
7. Muscles: Definition, Types.
8. Skeleton Muscles
Types of muscles fibers inside the skeletal Muscle
Parts of skeletal muscles.
9. Blood vessels: Arteries, Veins, Capillaries.
10. Respiratory system: Nasa passage, Pharynx, Larynx, Trachea, bronchi, Lungs and pleura
11. Cardiovascular System: The right atrium, The right ventricle, The left atrium, The left ventricle
12. Heart: Definition and parts
Blood supply of the heart: Definition and part
Main Arteries of the Body: Definition and parts
Main Vein of the body: Definition and parts
13. Digestive System: The organs of the digestive system, Alimentary canal, Pyloric opening, Digestive glands.
14. The Urinary system: The kidney, Ureter, Urinary bladder, Urethra.
15. Male Gentile system: Testis, Prostate, Epidermis, Vas deferens, Seminal vesicles, The external genitalia.
16. Female Gentile system: Ovary, Uterine, Uterus, The External genital of male: Definition and parts
17. Endocrine System: Definition and parts.
18. Nervous System-CNS: Definition and parts

6.	**MT106**	**Biostatistics**	**الإحصاء الحيوي**	**2**	**2**	**0**	

Course aims:
1. Recognize and give examples of different types of data arising in public health and clinical studies
2. Describe basic principles and the practical importance of key concepts from probability and inference, inductive versus deductive reasoning, including random

variation, systematic error, sampling error, measurement error, hypothesis testing, type I and type II errors, and confidence bound
3. Interpret differences in data distributions via visual displays
4. Calculate standard normal scores and resulting probabilities
5. Calculate and interpret confidence intervals for population means and proportions
6. Interpret and explain a p-value
7. Calculate and interpret of the central tendency
8. Apply numerical, tabular, and graphical descriptive techniques commonly used to characterize and summarize public health data

Intended learning outcomes:

a. **Knowledge and understanding:**

a.1 Define the principal concepts about biostatistics
a.2 Recognize the definition of statistics
a.3 Identify distribution form relating to the variable/variables
a.4 Identify and understand hypothesis testing via some of the statistical distributions
a.5 Understand and use the terminology of probability
a.6 Explain the methods of estimation of the population parameters.
a.7 Organize and display the data as a simple/grouped frequency table according to its type.

b. Intellectual skills:

b.1 Distinguish between the different types of data.
b.2 Differentiate between quantitative problems that can be addressed with standard, commonly used statistical methods and those requiring input from a professional biostatistician.
b.3 Demonstrate statistical reasoning skills correctly and contextually

c. Professional and practical skills:

c.1 Be able to identify appropriate statistical methods to be applied in a given research setting, apply these methods, and acknowledge the limitations of those method
c.2 Critically apply hypothesis testing via some of the statistical distributions

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:

1. Statistics terms and motivation
2. Displaying statistical data
3. Measures of central tendency
4. Selecting an appropriate measure of central tendency
5. Measures of dispersion

6. Measures of asymmetry
7. Other statistical measures
8. Probability I
9. Probability II
10. Statistical distribution
11. The normal distribution
12. Regression
13. Hypothesis I
14. Hypothesis II

7.	**MT107**	**English Language**	**اللغة الإنجليزية**	**2**	**2**	**0**	

Course aims:

1. Achieve an effective balance of linguistic skills (listening, reading, speaking and writing) with the emphasis on clear, accurate oral communication in different department of faculty of medical technology.
2. Using academic and technical terms and expressions in writing.
3. To enhance Students ability to incorporate rules of grammar in their writing.
4. To help Students practice and apply rules of contemporary grammar in their speech.

Intended learning outcomes:

a. Knowledge and understanding:

a.1 Recognize the use of some words in different contexts
a.2 Identify some scientific terms and expressions
a.3 Acquire academic topics to answer comprehension questions and to write academically
a.4 Understand the difference between the different types of the English sentences.

b. Intellectual skills:

b.1 Combine, exchange, and assess different ideas, views, and knowledge from a range of sources
b.2 Assess different ideas, views, and knowledge from a range of source.
b.3 Analyze different view points
b.4 Synthesize information from different sources
b.5 Draw conclusions about academic topics.

c. Professional and practical skills:

c.1 Exchange knowledge and skills with community using English language.
c.2 Acquire the skills of writing, reading and speaking English.
c.3 display their understanding of the grammatical rules of English in their writing
c.4 Make a discussion and communication with others.
c.5 Apply rules of English grammar in their speech

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the

learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:

A. Introduction: Medical Terms
B. Basic Part Of Speech Grammar : Nouns
C. Countable and Uncountable nouns
D. Nouns:
1.Common and proper nouns
2. Singular and plural forms of nouns
3. Gender of Nouns
E. Pronouns
1. Subject and object pronouns
2. Types of pronouns
F. Verb
1. Action/non action verb
2. Linking verb
3. Helping verb
4. Tenses of verb
G. Adjectives, Adverb, Prepositions, Conjunctions
H. Capitalization and punctuations
I. Words: Sentence Pattern
J. Development of Paragraph
Essay Writing
K. Paragraph and essay writing
L. Object and model presentation: Oral
M. Continuation :Object and models presentation
N. Letter Writing and documentation
O. Medical Terms
P. Communication
Nature and oral communication
Q. Elements of communication
R. Important of communication
S. Oral communication practical evaluation
T. Model of communication
U. Visual Aids used in Speech
V. Speaking: Why we study public speaking as Medical Technologist Functions affecting public Speaking
W. Poise, diction and proper pronunciation
X. Things to consider in organizing a speech

Y. Eye contact facial expression and body language
Z. Individual Speeches: As Medical Technologist

Medical laboratory department:

Second year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	ML201	General Biochemistry	الكيمياء الحيوية العامة	3	2	2	

Course aims:

1. Understand the chemical structure of different classes of biochemical compounds including; Carbohydrates, proteins lipids, enzymes and Hormones.
2. Learn the function of essential micro- and macromolecules; such as enzymes and co-enzymes in human body.
3. Utilize the provided knowledge in biochemical field and apply it in advanced courses of biochemistry.
4. Learn and know the main differences between quantitative and qualitative tests for detecting Carbohydrates, Lipids.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the chemical processes, which transform diet into compounds that are characteristics of the cells of a particular species. The catalytic functions of enzymes
a.2 Identify the principles and chemical behavior of oxidative phosphorylation and energy production
a.3 Know the potential energy obtained from the oxidation of foodstuff consumed for the various energy-requiring processes of the living cell.
a.4 Know Cell Biology deals with the structure and functions of cells in living organisms.

b. Intellectual skills:

b.1 Able to design experiments and understand the limitations of the experimental approach
b.2 Able to interpret experimental data and identify consistent and inconsistent components.
b.3 Recommend good safety practice (GSP) guidelines in biochemical research.
b.4 Determine suitable methods of identifying macronutrient in biological fluids.

c. Professional and practical skills:

c.1 Utilize the proper biochemical terminology to communicate with the staff members and other health care professionals
c.2 Handle and dispose hazardous chemicals and biological reagents and compounds safely
c.3 Carry out laboratory tests for identification skillfully with understanding of the

mechanism of reaction
c.4 Apply appropriate methods for identification of biochemical compounds of different classes including; lipids, carbohydrates, proteins and other non-protein nitrogenous compounds.
c.5 Be able to express a good "quantitative" skills such as the ability to accurately and reproducibly prepare reagents for experiments

d. General and transferable skills:

d.1 Ability to dissect a problem into its key features.
d.2 Awareness of the major issues at the forefront of the discipline.
d.3 Interact effectively in team working.
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Carbohydrate of Physiologic Importance.
Monosaccharides
• Cyclic structure of sugars
• Asymmetric carbon atom and isomeris
• Disaccharides
• Polysaccharides
• Proteoglycans and glycoproteins
Digestion and absorption of carbohydrates, Glycolysis
Hexoses monophosphate cycle (HMP cycle), Metabolism of Fructose,
Gluconeogenesis, Disorder of carbohydrate metabolism with special reference to diabetic mellitus
Lipids of physiologic Importance
•Classification of lipids
• Fatty acid
• Simple lipids and triacylglycerol's
• Complex lipids
Derived lipids (sterols and steroids)
Digestion and absorption of lipids, Metabolism of fatty acids, β-oxidation, Synthesis of fatty acids
Phospholipids biosynthesis, Sphingomyelin biosynthesis, Triacylglycerol synthesis, Lipolysis,
Cholesterol synthesis and metabolism, Transportation of lipids in humen body by lipoproteins, Atherosclerosis
Ketone bodies formation and their metabolism , Citric acid Cycle
Amino acids
• Peptides
• Protein structure

• Simple proteins
• Conjugated proteins
• Derived proteins
• Techniques for separation of amino acids and proteins
• Hemoproteins
Overview, Protein digestion and absorption, Transamination, Deamination, Urea formation, Phenylketonuria, Alkaptonuria, Albinism, Kwashikor marasmus
Porphyrin & Haem biosynthesis, Bilirubin formation & jaundice, Creatinine , Histamine, Serotonine
Enzymes
Classification,Nomenclature,Coenzymes, Intracellular enzymes, Enzyme Kinetics,Michaelis menten equation, Enzyme Inhibition,
Regulation of enzymes. Enzyme catalysis, Isoenzymes and use of enzymes in clinical diagnosis
Respiratory Chain andOxidative phosphorylation
Nucleic acids (structure and functions)
• DNA synthesis (replication) and DNA repair
• RNA synthesis (transcription)
• Protein synthesis (translation)
Hormones

2.	**ML202**	**General Microbiology**	**علم الاحياء الدقيقة العام**	**3**	**2**	**2**	

Course aims:
To provide students with the basis to face the study of the major fundamentals of microbiology including bacteriology, virology and immunology.
Intended learning outcomes (ILOS):
a. Knowledge and understanding:
a.1 knowledge on the understanding of the concepts and fundamental principles of microbiology
a.2 key features of the structure, growth, physiology and behavior of bacteria, viruses, fungi and protozoa.
a.3 Basic knowledge to deal with the study of genetic, metabolic strategies and ecology of microorganisms.
a.4 Basic knowledge of the main microbiological techniques to be applied in the laboratory
b. Intellectual skills:
b.1 Identify and evaluate critically the principles and the mechanisms underlying the different fields of microbiology.
b.2 Analyze the different applications of microbiology in biotechnology, industry and medicine.
b.3 Use the acquired knowledge to the use of bacteria in the lab and the main sterilization

techniques.

c. Professional and practical skills:

c.1 Use aseptic technique in handling microorganisms.

c.2 Demonstrate the proper use of PPE and code of conduct for Biosafety

c.3 Proficiently prepare and view specimens for examination using appropriate staining techniques and microscopy (bright field)

c.4 Use pure culture and selective techniques to enrich for and isolate microorganisms.

d. General and transferable skills:

d.1 Use appropriate microbiological lab equipment and methods.

d.2 Document and report on experimental protocols, results and conclusions.

d.3 Interact effectively in team working

d.4 Present information clearly in written, electronic and oral forms.

Topics:

1. Scope and History of Microbiology
2. Microscopy and Staining
3. Characteristics of Prokaryotic And Eukaryotic Cells
4. Growth and Culturing of Bacteria
5. Microbial Genetics
6. Gene Transfer and Genetic Engineering
7. Viruses
8. Sterilization and Disinfection
9. Host-Microbe Interaction and Disease Process
10. Epidemiology and Nosocomial Infections
11. Applied Microbiology
12. Laboratory Health and Safety
13. Safety Quiz
14. Microscopy (Compound Light Microscope)
15. Instruments used in Microbiology Laboratory
16. Preparation of bacterial smear for microscopy examination
17. Simple Stains
18. Differential Stains (Gram stain)
19. The Ziehl-Neelsen Acid-Fast stain
20. Preparation of Media
21. Culturing Bacteria
22. The Streak-Plate Technique
23. Performing an Antibiotic Sensitivity Test
24. Anaerobic Culturing
25. Sterilization and Disinfection
26. Microscopic Examination of a range of ready-made slides

3.	**ML203**	**Basic Pathology**	**اساسيات علم الامراض**	**3**	**2**	**2**	

Course aims:

1. Definition of pathology and diseases, aetiology
2. Explain the basic nature of disease processes from standpoint of causation,
3. Definition of pathology specimens and methods of pathological studies and their relation to clinical aspects
4. Discuss tissue injury and diseases processes, using appropriate vocabulary.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Provide the knowledge, technical skills to medical students to understand human disease.

a.2 Illustrate the molecular and cellular response of the living body when exposed to injurious agent

a.3 Recognizing key of congenital, haemodynamic, inflammatory, infectious. Moreover, developing knowledge needed to interpret laboratory data

a.4 Describe the mechanisms of pathological alterations

b. Intellectual skills:

b.1 By the end of studying this course, the graduate should be able to;
Differentiate between tissue/organ appearance in health and diseased specimens

b.2 Score good selection of tissue specimens for pathological diagnosis on print finger bases

b.3 Integrating and predicting the prognosis and sequllae of diseases

b.4 Analyse various gross and microscopic pathologic data resulting from the general pathological process.

c. Professional and practical skills:

c.1 Collect the experience in gross examination, sampling and reporting

c.2 Perform good management in microscopy and description of different changes in different tissues

c.3 Use the light microscope to examine and identify microscopic findings of some selected examples of studied diseases

c.4 Prepare the graduate to get the ability of decision making

d. General and transferable skills:

d.1 Demonstrate the ability of problem definition

d.2 Utilize the computer, microscope and internet. Therefore, will Increase the ability of problem solving

d.3 Utilize the pathology as a diagnostic tool

d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Introduction to pathology
Practical: 1. Machines and reagents used.
2. Types of stains
Cell injury and adaption
(Causes& mechanisms)
Morphology of cell injury)
Practical: Demonstration on slides
• Morphology of cell injury
• Necrosis
•Lysosomes: hetrophagy and autophagy, Causes and mechanisms
•Intracellular accumulations
•Lipids and other intracellular accumulations.
Practical: demonstration on slides
• Intracellular accumulations
• Fatty change
• Intracellular accumulations
• Lipids and other intracellular accumulations
Practical: demonstration of slides
• Cellular adaptation
• Hypertrophic tissue
• Cellular adaptation of growth and differentiation
• Pathologic calcification
Practical: demonstration of slides
• Hyperplastic tissue
Inflammation :
• Acute inflammation
• Vascular change and cellular events
• Chemical mediators of inflammation
Practical: acute inflammation
• Margi nation of leucocytes
• Cellular elements of exudates neutrophils, eosinophil
• Chronic inflammation
• Definition and causses
Practical: chronic inflammation
• Monocytes
• Macrophages
• Lymphocytes
• Chronic inflammation cells
• Granulomatous inflammation
Practical: chronic inflammation

• Plasma cells
• Giant cells
• Granuloma
• Tuberculosis granuloma
Role of lymphatic and lymphoid tissue
• Systemic manifestations of inflammation
Tissue renewal &fibrosis
• Cell growth.
• Regeneration.
• Cutaneous wound healing.
Practical: Repair in wound healing
• Granulation tissue
• Hymodynamic Disorders
• Oedema
• Hyperemia or congestion.
Practical: Oedema/ Congestion tissue
Disorders of vascular flow and shock
• Thrombosis
• Embolism
Practical: Thrombosis/ embolism
• Infection
• Shock

4.	**ML204**	**Basic Parasitology**	**علم الطفيليات العامة**	**3**	**2**	**2**	

Course aims:
1. Provide students with an understanding of classification, Habitat, Biology of human parasites and life cycles
2. Understanding of pathogenesis and clinical features and treatment of each parasitic infections
3. Students will gain practice in the laboratory diagnosis of parasitic diseases, Control and prevention measures of parasitic infections

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Define the general terms and concepts of medical parasitology.
a.2 Identify and classify the different types of parasites (common and scientific)
a.3 Describe the morphology of each parasite.
a.4 Explain the life cycles of each parasite
a.5 Understand parasitic diseases and modes of diagnosis.
a.6 Describe control of parasitic infections.

b. Intellectual skills:

b.1 The students will be able to identify different parasites causing disease
b.2 The students will be able to describe the life cycle and pathogenesis of parasitic infection.
b.3 Students should describe the control and prevention of parasitic diseases.
b.4 Demonstrate knowledge and performing of the practical methods of parasitology related diseases.

c. Professional and practical skills:

c.1 Right use of microscopes.
c.2 Identification and description of parasites.
c.3 Carrying out routine stool examination

d. General and transferable skills:

d.1 Think independently and access medical parasitology relevant information.
d.2 Communicate with others positively.
d.3 Give clear, well-constructed oral presentations on parasitological topics
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

1. Introduction to medical parasitology and terms used in medical parasitology
Practical: Microscope, structure and uses
2. Basic morphology and biology of human parasites
Practical: Proper collection of stool sample.
3. The amoeba (Entamoeba histolytica)
Practical: Entamoeba histolytica – cyst and trophozoite stages
4. Balantidium coli.
Practical: Balantidium coli- cyst and trophozoite stages
5. Giardia lamblia
Practical: Giardia lamblia – cyst and trophozoite stages
6. Trichomonas vaginalis.
Practical: Trichomonas vaginalis
7. Plasmodium species.
Practical: Plasmodium malaria – types – stages (ring form, trophozoite, schizont, gametocytes)
8. Leishmania causing visceral infection. Practical: Leishmania spp. – types – amastigote, promastigote stages
Leishmania causing cutaneous infection. Practical: Leishmania spp. – types – amastigote, promastigote stages
9. Trypanosome
Practical: Trypanosome spp. – types – stages
10. Schistosomes.
Practical: Schistosoma spp. Types – stages (adult worms, eggs, cercaria)

Snails, intermediate hosts of schistosoma
11. Fascioliasis.
Practical: Fasciola spp. and stages (adult worm, eggs)
Snails, intermediate hosts of fascioliasis
12. Heterophyes heterophyes.
Practical: Heterophyes – heterophyes – stages
Snail intermediate host
13. Taenia and their larval infection
Practical: Taenia spp., Types – stages.
14. Hook worms
Practical: Hook worms–types–stages.
15. Enterobius vermicularis.
Practical: Enterobius vermicularis. Stages (adult worm, eggs)
16. Ascaris lumbricoides.
Practical: Ascaris lumbricoides – stages
17. Trichuris trichiura
Practical: Trichuris trichiura – stages
18. Sarcocystis hominis
Practical: Sarcocystis hominis stages
19. Sarcocystis lendmanni
Practical: Sarcocystis lendmanni stages
20. Pneumocystis carinii
Practical : Pneumocystis carinii stages

5.	**ML205**	**Histology**	**علم الانسجة**	**3**	**2**	**2**	

Course aims:

1. To acquire a basic background in histology and to understand the properties of cells and their interactions with one another as components of tissues and organs.
2. To understand how structure and function correlate at the microscopic level.
3. To be able to describe the normal structure and function of various cell types, tissues, and organs, and to differentiate their histological structures from each other through examination.
4. The ability to differentiate between different types of tissues

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Learning the basic information about Histology.
a.2 Identify the differential characteristics of the cells, tissues and organs.
a.3 Describe the general histological morphology of the different systems and describe the function of the accessory cells.
a.4 Find out the location of different types of tissues
a.5 Explain the relationships of structure and function

a.6 Know the composition, location and normal functions of cell types

b. Intellectual skills:

b.1 The ability to distinguish different tissue types during the slide show process.
b.2 The ability to distinguish between different types of tissue layers.
b.3 The ability to distinguish the distinctive compositions of each tissues.
b.4 Ask critical questions about the course
b.5 The ability to describe the histological structure of different organs of the body.
b.6 The ability to do research on the topics of the course

c. Professional and practical skills:

c.1 The ability to use microscopes
c.2 The ability to differentiate between different types of tissues
c.3 The ability to conduct scientific research
c.4 The ability to translate the course into Arabic
c.5 The ability to do staining's steps
c.6 The ability to do the tissues preparation steps

d. General and transferable skills:

d.1 Interact effectively in team working
d.2 The ability to organize time for study and prepare for periodic exams and tests
d.3 Acquire the ability to learn independently.
d.4 Present information clearly in written, electronic and oral forms.
d.5 Be able to use the Internet to obtain information or books about the course and its topics.

Topics:

1. Introduction to human Histology
2. Types of tissues:
3. Epithelial tissues
4. Connective tissues
5. Cartilage
6. Bone and Bone ossification
7. Muscle tissues
8. Skin and its appendages
9. Nerve Tissue
10. Circulatory system:
11. cardiovascular system
12. lymphatic vascular system
13. Blood and bone marrow
14. Immune lymphoid system
15. Respiratory system
16. Gastrointestinal system
17. Urinary system

18. Endocrine system
19. Male reproductive systems
20. Female reproductive system
21. Preparation of tissues for microscopic examination
22. Types and steps of Histological Staining
23. Types of microscope

6.	**ML206**	**Analytical Chemistry**	**الكيمياء التحليلية**	**3**	**2**	**2**	

Course aims:

1. Provide knowledge and understanding the basic analytical chemistry
2. Recall the basic principles of quantitative chemical methods of analysis including; acid-base, Redox Potentiometry, Gravimetric Analysis and complexometric methods of analysis.
3. Know the differences between qualitative analysis, quantitative analysis and molarity calculations
4. The student will be introduced to the analytical and strategic methods of collecting a representative sample

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Recognize the different analytical techniques used for determination of chemical substances.
a.2 Distinguish between the methods of standardizing chemicals, identifying the mole, and calculating the number of moles and molarity
a.3 Calculation of the activity and activity coefficient of differently charged ions
a.4 Recognize the methods of obtaining the sample, whether it is solid, liquid or gaseous
a.5 Define precision and accuracy and the difference between them and calculate the ionic strength of the ion
a.6 Indicators used in acid - base titration, types of titrations and knowledge of titrant and analyte

b. Intellectual skills:

b.1 Propose suitable methods of chemical analysis.
b.2 Interpret experimental data based on relevant chemical principles

c. Professional and practical skills:

c.1 Show ability to conduct experimental studies and apply different quantitative methods of analysis of chemical compounds.
c.2 Apply proper handling and disposal of chemicals.
c.3 Calculating the concentration of an unknown substance by another substance of known concentration and preparing standard solutions
c.4 Classification of standard methods of analysis according to types of chemical reactions
c.5 Distinguish between different separation methods.

d. General and transferable skills:
d.1 Interact effectively in team working
d.2 Apply calculations for chemical analysis.
d.3 Acquire the ability to learn independently.
d.4 Present information clearly in written, electronic and oral forms
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time management capabilities.

Topics:

Introduction to analytical science:
Analytical science defined
The classification of Analysis
The sample.
The analytical strategy
Review of fundamental concept:
• Formula weight
• The mole
• Calculations involving solutions
• Molarity
Lab: The laboratory notebook :
• The analytical balance
• Obtaining the sample
- Activity and Activity coefficient:
• Definition of activity
• The activity coefficient
• The ionic strength
• Calculation of activity coefficient
• Errors statistic and statistical control:
- Errors [Determinate & indeterminate]
- Elementary statistics
- Normal distributions.
• Precision- Accuracy & calibration statistical control:
- Gravimetric analysis: Introduction
- Weight vs Mass
• Gravimetric Analysis:
- Details of gravimetric methods.
- Physical separation methods and calculations.
- Loss on drying & the residue on ignition
• Sampling and sample preparation:
- Sample preparation/solid Materials.
- Particle size reduction.

- Sample homogenization and Division.
Lab. Titration –strong acid- strong base
Introduction:
- Neutralization titration
- Complex metric titration
- Redox titration
- precipitation titration
Lab: titration- weak acid – strong base
The balance
- Calibration and care of balances
- when to use which balance
Titration curve and detection of the end point
Types of titration:
Direct titration
Indirect titration (Back titration)
Displacement titration
Complex metric titration:
Complexes: formation constants
Ligand EDTA
EDTA titration curve
Redox Potentiometry
• Balancing reduction-oxidation reaction.
• Calculation of the equilibrium constant of a reaction.
• Titration curves and detection of the end point.

7.	**ML207**	**Molecular Cell Biology**	**علم الاحياء الجزيئي الخلوي**	**3**	**2**	**2**	

Course aims:
1. This course will build on the knowledge of cell structure and function and extend students' knowledge of how eukaryotic cells work at the molecular level.
2. Provide an overview of cell structure and function at the molecular level, including the flow of information from genes to proteins, and regulation of cellular processes, signaling and proliferation in eukaryotic cells.
3. introduce some of the major ideas and experimental approaches in molecular cell biology

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Understand and utilize the scientific vocabulary used in communicating information in molecular cell biology
a.2 Describe and discuss the properties and biological significance of the major classes of molecules found in living organisms and the relationship between molecular structure and

biological function
a.3 Represent and illustrate the structural organization of genes and the control of gene expression
a.4 Describe how gene expression is regulated at the transcriptional and post-transcriptional level, replication process

b. Intellectual skills:

b.1 Dissect a problem into its key features by thinking in an integrated manner and examining problems from different perspectives.
b.2 Gather, critically assess, and utilize primary scientific literature to research a topic
b.3 Understand and apply general concepts of molecular cell biology to relevant, specific problems
b.4 Conceptualize and describe protein structure, folding and sorting.

c. Professional and practical skills:

c.1 How to do gel electrophoresis and molecular tools
c.2 Design and implement experimental procedures using relevant techniques.
c.3 Work safely and effectively in the laboratory to generate reproducible and reliable results.
b.4 Ability to achieve mapping of professional data to applying sitting.

d. General and transferable skills

d.1 Practice independent learning needed for continuous professional development
d.2 Work effectively in a team.
d.3 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.
d.4 Mapping the Future concept and applying critical knowledge to produce valuble analysis.

Topics:

History & Intro genetic material (DNA):
• What is Genetic dogma?
• Description of genetic mutations.
• Mendel's experiment.
• How genetic material was traced.
• Chargaff's rules of nitrogenous bases.
• Watson & Crick hypothesis of DNA structure.
Structure of DNA components.
• Experimental changes during DNA isolation.
• Properties of DNA
Mathematic Molecular biology questions
DNA replication:
• What is cell division?
• DNA polymerases.

• How does nucleotide addition happen during DNA replication?
• Steps required for DNA replication.
• Control of DNA replication.
• Topoisomerase.
• Replication elongation.
• Replication termination.
• Telomerase.

DNA damage & repair:

• Alkylating agents.
• Pyrimidine dimers from UV radiation.Modification of the mismatched base.
• Replacing the DNA damage:
- Base excision repair
- Nucleotide excision repair
- Recombination repair
- Mismatch repair

Translesion synthesis.

Eukaryotic transcription:

• Structure of promoter?
• Class II-transcription by RNA polymerase II
• Class I-transcription by RNA polymerase I
• Class III-transcription by RNA polymerase III
• Experiments to identify promoter elements.
• Class II Transcription factors.
• How transcription factors bind to DNA in sequential manner.
• Mediator in transcription.
• Activator proteins in transcription.
• Activator's structure.
• Transcription factory.
• Posttranslational modifications of transcription factors:
- Interaction with ligand.
- Phosphorylation
- Ubiquitylation.
- Sumoylation.
- Methylation.
- Acetylation.
- RNA polymerase II CTD
- Alternative splicing.
• Self-splicing RNAs
• Chromatin structure.
• Histones as structural proteins of chromatin.

• DNA condensation.
• Nucleosome
• Histone acetylation & deacetylation.
• Chromatin remodeling.
• RNA processing (splicing).
Spliceosome
• Post-transcription regulation:
• Splicing factors
• 3’ splice site selection
• Commitment
Bridging proteins
Translation:
• Ribosomes structure.
• T-RNA structure.
• Charging t-RNA with amino acid
• How does translation begin?
• Initiation factors.
• Bacterial translation initiation.
• Eukaryotic translation initiation.
• Control of mRNA translation.
• miRNAs inhibition of translation.
• Translation elongation.
• Molecular basis of peptide formation in ribosome.
• Translation termination.
Post-translational events:
• Protein folding.
Ribosome.
Genomics & proteomics:
• Recombination.
• Mouse knockout.
• Human genome project.
• Single nucleotide polymorphisms.
• Shotgun sequencing versus clone-by-clone sequencing.
• Non-coding RNAs & microRNAs.
• Investigation of protein expression & activity.
• Bioinformatics.
The ER & secretory Proteins
• Structure of ER, its location and function
• Pathways of proteins traffic.
• Targeting proteins to ER.

• Methods to study ER proteins' translocation.
• Methods to identify signal sequences of ER proteins.
• SRP (signal recognition particle) of ER proteins.
• Co-translational translocation of ERproteins.
• Post-translation translocation of ER proteins.
• How do soluble proteins and trans-membrane proteins insert into the ER.
• Proteins folding and modifications.
• Lipids regulation in the ER.
Peroxisome and its function.
Golgi & Intracellular Transport:
• Structure, location and function of Golgi.
• The role of microtubules for ER-Golgi transport.
• Vesicular protein transport from ER to Golgi.
• GTPases as molecular switches.
Molecular markers for Docking, fusion and budding during protein traffic.
• Sorting machinery by signaling sequences.
• Glycosylation and other modifications while passing through the Golgi.
• Models of Golgi organization.
• Golgi to lysosome transport
• Golgi to membrane transport (exocytosis).
• Endocytosis from the plasma membrane to the lysosome.
• Pinocytosis.
Cell Signaling.
• What is the signal
• How is the signal recognized
• How is the signal amplified
• How does the cell respond to the signal
• How is the signal turned off
• Primary and secondary responses to signaling
• Determination of genes' expression experimentally.
• Signaling through cell surface receptors
Ion-channel-coupled receptors
G-protein-coupled receptors
Enzyme-coupled receptors

8.	**ML208**	**Medical Terminology**	**معلم المصطلحات الطبية**	**2**	**2**	**-**	

Course aims:
1. Provide knowledge and understanding the basic medical terms.
2. Understand the prefix, suffix of different medical terms, and introduce concepts of

various diseases within the same organ in the body.
3. Provide all common terms of CNS, CVS, GIT, respiratory, blood and urinary systems….etc
4. Introduce fundamental knowledge of anatomy of organ, signs, symptoms and treatments of various diseases.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the principles of basic medical laboratory as well as common medical terms in laboratory practice.
a.2 Define the principles of body function in health and diseases states; as well as the etiology, laboratory diagnosis, signs, symptoms and therapeutic approaches for different disease within the same organ
a.3 Define the proper medical terminology, abbreviations, prefix, suffix, and symbols in health reports and laboratory practice.
a.4 Recall the basic terms used in medical reports.
a.5 List suffixes, prefixes, and word roots common to medical terminology
a.6 Identify and list the most common used medical abbreviation

b. Intellectual skills:

b.1 Correlate between different medical terms used in medical reports.
b.2 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.
b.3 Correctly use medical terms when given the suffix, prefix, and word root

c. Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.
c.2 Employ proper documentation of terms described the anatomy, function and pathology of specific organ.
c.3 Recognize the basic concepts of medical terminology science to medical laboratory students.
c.4 Recognize the prefix and suffix of any new medical term.
c.5 Distinguish between different signs and symptoms of each body organ.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with patients and other health care professionals.
d.2 Interact effectively in team working.
d.3 Present information clearly in written, electronic and oral forms.
d.4 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.
d.5 Support patient, lab technicians and health care.

Topics:
Introduction to medical terminology
Medicine and its history
Suffixes mean condition of
Suffixes for medical
Plural endings
Prefixes
Prefixes for numbers
Prefixes for colors
Negative Prefixes
Prefixes for direction
Prefixes for degree
Prefixes for size and comparison
Prefixes for time
Prefixes for position
Common roots used in medical terminology
Common roots used in medical terminology
Body Structure: Integumentary System
Gastrointestinal (Digestive) System
Respiratory System
Musculoskeletal System
Cardiovascular System, Blood and Lymphatic System
Urinary System, Female Reproductive System, Male Reproductive System
Endocrine System
Nervous System, Special Senses
Disease
Name that disease
Common infection organism
Response to disease :inflammation ,phagocytosis, immunity…ect
Neoplasia
Case study
Common prefixes used in medicine
Common suffixes used in medicine
Medical abbreviations

9.	**MT201**	**Computer**	**الحاسوب**	**3**	**2**	**2**	

Course aims:
1. This subject prepares a student for basic knowledge using computer to solve data processing problems in daily life.
2. To provide opportunity for the study of modern methods of information processing and its applications.

3. To encourage an understanding of the implications of computers in the modern world
4. To provide opportunity for the study of modern methods of information processing and its applications.
5. To encourage an understanding of the implications of computers in the modern world

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Students should be able to show an awareness of what the major computer components are and how they act as system
a.2 Show an awareness of the effects and impacts of computers on the individual and the society.
a.3 Show an awareness of the capability and limitations of computers.
a.4 Students after completing this subject should be using computer applications easily.
a.5 Defines the basic concepts of the contemporary computer, and shows its different forms and influence in different areas of life
a.6 Learn about the computer system with its physical and software components and their impact on the classification of computer devices
a.7 Identify the types of operating systems.
a.8 Explains the impact of the Internet and networks revolution and Identifying recent trends in the internet world
a.9 Learn about Microsoft windows XP and knowing the Principles of Microsoft windows, Desktop, Anatomy of a window.
a.10 Learn about basic concept of Microsoft ward, Microsoft PowerPoint, Microsoft Excel and knowing their principles.

b. Intellectual skills:

b.1 The student able to identify a problem, analyze the details of the situation, and then formulate an effective solution is an incredibly important aspect of computer science work.
b.2 Be able to demonstrate problem-solving skills

c. Professional and practical skills

c.1 Students should be able to use the personal computer with Windows (7, XP) with confidence, and the ability to use its available facilities
c.2 Students should be able to search information by the internet
c.3 Be able to demonstrate a basic understanding of computer hardware and software.
c.4 Students should be able to utilize Microsoft windows XP. In addition, they supposed to be able to deal with Microsoft windows commands easily, such as: Copy, paste, and cut command, Saving file on desktop, Moving file to folder, Deleting folder, Remove file from folder to folder.
c.5 Students should be able to write documents by Microsoft word and using all the available features such as: Grammar check, Editing and formatting a document, Moving and copying text with a document , Paragraph formatting Column formatting , Inserting a figure, Inserting table, Inserting chart, Inserting picture

c.6 Students should be able to use Microsoft Excel and learn How to modify and format a worksheet.
c.7 Students should be learn to Basic concept of Microsoft PowerPoint such as:creating , enhancing a presentation and Connecting of computer to a data show and how to use function of data show.

d- General and transferable skills

d.1 Work effectively in teams
d.2 Using computer proficiently
d.3 search information by the Internet easily
d.4 Deal easily with Microsoft word, PowerPoint and Excel proficiently
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Essential computing concepts
• Meaning of computer
• Hardware of a PC
• computer software
• Introduction to networks
• Computer Programming Languages
• Operating System
Microsoft windows XP
• Principles of Microsoft windows
• Desktop
• Anatomy of a window
• How to use the help and support center
• 1Deference between folder and file
• Using windows explorer
• Copy, paste, and cut command
• Saving file on desktop
• Moving file to folder
• Deleting folder
• Remove file from folder to folder
• How to use USB
• How to use CD and DVD
Internet explorer and www
• Discusses the importance of www
• Connect to the internet
Difference between search engines
Microsoft word
• An overview on the basics of word processing

• How to use spell check
• Grammar check
• Use thesaurus
• Editing and formatting a document
• How to use the undo and redo commands
• Moving and copying text with a document
• Paragraph formatting
• Column formatting
• Inserting a figure
• Inserting table
• Inserting chart
• Inserting picture
Microsoft Excel
• Introduction to spreadsheets
• How to modify and format a worksheet
How to use a function
How to create and modify tables
How to create and modify a chart
How to create and modify report
Microsoft PowerPoint
• Basic concept of creating and enhancing apresentation
• How to use slide show tools and digital photography
• Tips to avoiding the drawback of bad slides; slide structure, fonts, color, etc..
• Connecting of computer to a data show and how to use function of data show

10.	**DT301**	**Pharmacology I**	**علم الادوية 1**	**3**	**2**	**2**	

Course aims:
1. Provide knowledge and understanding of the basic principles of pharmacology (pharmacokinetics and pharmacodynamics).
2. Introduce concepts of drug action at cell, tissue and system levels.
3. Provide fundamental pharmacological knowledge of the principles of drug action
4. Provide comprehensive coverage of the major drug groups affecting different body systems; autonomic nervous system, respiratory system and gastrointestinal system and autacoids

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Memorize basic principles of pharmacology: pharmacokinetics principles (drug absorption; distribution; metabolism; and excretion) as well as concepts and routes of drug administration) and pharmacodynamic principles (modes of drug action and drug-drug interaction).
a.2 Defend the proper use of medicines in the treatment of diseases and improvement of

patient’s quality of life.
a.3 Demonstrate a fundamental pharmacological knowledge of the principles of drug action and principles of drug-receptor interactions at a molecular level
a.4 Comprehend the etiology of different major diseases and study different therapeutic classes of drugs and medicines including the mechanism of action, the adverse drug reactions and their significance in treatment.
a.5 Outline mechanism of action of different drugs together with their pharmacokinetics; indications and adverse effects.
a.6 Discuss therapeutic use of drugs in various diseases / disorders

b. Intellectual skills:

b.1 Rationalize the pharmacological basis for the therapeutic use of drugs
b.2 Relate pharmacological effects and indications of drugs to different physiological and pathological conditions.
b.3 Compare different drugs in different and the same pharmacological classes and predict the most clinically important therapeutic agents in each class
b.4 Evaluate possible drug interactions, adverse effects, and other drug-related problems, as essential issues in implementing pharmaceutical care
b.5 Demonstrate impeccable skills regarding the calculation of medicine doses and dosage regimens; and give clear advice; which may not only be related to medications but may extend to health promotion; disease prevention; and encouraging self-care.

c. Professional and practical skills:

c.1 Distinguish minor illness from major ones that require prompt medical intervention and make appropriate responses to presented symptoms.
c.2 Demonstrate excellent skills regarding the interpretation of patient clinical data and prescriptions; and other orders for medicines.
c.3 Counsel patients when dispensing OTC and prescription drugs toproper use of medicines
c.4 Justify management and selection of medicines; respond to symptoms; prescribe over the counter drugs; summarize drugs information; and report adverse reactions to medicine and medicine utilization review.

d. General and transferable skills:

d.1 Work effectively in a team; demonstrate critical thinking, problem solving and decision making abilities.
d.2 Communicate effectively in specialized language and expression of complex issues in terms that professionals and patients can understand.
d.3 Transfer properly essential pharmacological knowledge to the patients or other health professionals

Topics:

Introduction to pharmacology:
- Definition of terms, Nature of drugs.

- Routes of administration of drugs.
- Mechanism of drug crossing through the cell membrane

General pharmacology:

A. Pharmacokinetics of drug:

Absorption, Distribution, Metabolism, Excretion.

B. Pharmacodynamics of drugs:

Mechanism of actions, receptors, drug-receptor interactions, dose-response relationship.

Introduction to autonomic pharmacology:

- Anatomy of autonomic nervous system (ANS).
- Neurotransmitters and chemistry of ANS
- Types of autonomic receptors.

Drugs acting on Adrenergic system:

Introduction: Synthesis, storage, release and metabolism and uptake of adrenaline.

- Adrenergic (sympathomimetics(: Adrenaline, Ephedrine.
- Anti-adrenegic drugs (sympatholytics): Types, actions, uses and adverse effects

Drugs acting on Cholinergic system:

Introduction: Synthesis, storage, release and metabolism and uptake of acetylcholine.

- Cholinergics (Parasympathomimetic(: Acetylcholine, Carbichol, Pilocarpine, Neostigmine, & Nicotine
- Anti- Cholinergics drugs (sympatholytics): Types, actions, uses and adverse effects

Drugs acting on Cardiovascular System (CVS):

- Anti-Hypertensive Drugs: for treating BP
- Anti-Anginal Drugs: for treating angina
- Anti-Arrhythmic Drugs: for treating arrhythmia

Congestive Heart Failure Drug: for treating heart failure

Drugs acting on Respiratory System:

- Anti -Asthmatic Drugs: for treatment of Asthma
- Expectorants and Antitussive Agents: for treating Coughs

Drugs acting on Gastrointestinal Tract(GIT):

- Antiulcerant Drugs: used to treat Peptic Ulcers
- Antidiarrheal Drugs: used to treat Diarrhea
- Laxatives Drugs: used to treat Constipation

Drugs Acting on Central Nervous System) CNS)

Antiepileptic Drugs used in treatment of epilepsy

Chemotherapeutic agents:

Introduction: classification according to mechanism of action, types of adverse effects and recent drugs.

Immunotherapy and immunosuppressant

Antimicrobial Therapy:

- Introduction to Antibiotic Agents

- Antibacterial
- Antivirals
- Antifungals

Analgesics and Anti-inflammatory drugs:
NSAIDs and Paracetamol.
Drugs used to treat Endocrine Disorders:
- Drugs used in treatment of Diabetes Mellitus; Insulin and Oral anti-diabetic agents.
- Drugs for Thyroid gland Disorders

Third year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	ML301	Mycology & Virology	علم الفطريات والفيروسات	3	2	2	

Course aims:

1. To review the concepts in microbiology, mycology and virology.
2. To study the classification of fungi, growth, cultivation, structure, transmission.
3. To study mycosis: Transmission, epidemiology, diseases, prevention, and treatment.
4. To know how to isolate and stain fungi from clinical samples.
5. To study Antifungal drugs.
6. Providing the student with theoretical and practical medical information and skills regarding clinical virology.
7. Understanding collection, transportation and preservation method of clinical specimen.
8. To know and practice the Lab safety in mycology and virology lab.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 To know the characteristics of fungi and the difference between them and other microorganisms.
a.2 Known sections fungi, growth, composition, isolate and grow in industrial Media and methods of disease transmission.
a.3 Recognize the antifungals used to treat fungal infection
a.4 To study various fungal diseases in terms of methods of infection, prevention, treatment, diagnosis.
a.5 Be able to identify various groups of human viral diseases either DNA or RNA viruses.
a.6 Be able to recognize clinical manifestations and describe viral diseases in term of transmission, mechanism of viral pathogenicity, symptoms and prevention.

b- Intellectual skills

b.1 Understand and interpret aspects of both laboratory and experimentally derived data
b.2 Conduct appropriate literature-based research/evaluation of current research topic.
b.3 Discuss the rationale of specimen acceptability and rejection protocols

b.4 Perform basic Mycology and Virology laboratory testing, assess laboratory data and report findings according to laboratory protocol.

c- Professional and practical skills

c.1 Use an understanding of medical mycology to make appropriate and effective on-the-job professional decisions.

c.2 Apply mycology laboratory techniques, methodologies, instruments and equipment; and accurately identify, record, and report results to improve patient care.

c.3 Adapt mycology laboratory techniques/procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner

c.4 Gain skills to perform accurate diagnosis of viral infection in the laboratory by different traditional techniques (immunofluorescence , ELISA, indirect hemagglutination test) and by molecular techniques (PCR, Northern blot and sequencing…etc)

c.5 Gain skills on different methods of virus isolation in different cell cultures and other host systems.

c.6 Be able to serve the society and community through providing instructions regarding methods of prevention and control of important and risky viral diseases.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 The ability to organize time for study and prepare for periodic exams and tests

Topics:

Course Introduction (and start)

General Introduction to Medical Mycology:

• General properties of fungi
• Structure of fungi
• Classification of fungi
• Types of reproduction of fungi
• Pathogenesis of fungal diseases (Mycoses)

Systemic mycoses:

• Histoplasmosis
• Coccidioidomycosis
• Blastomycosis
• Paracoccidioidomycosis

Practical: sample collection, laboratory test

Superficial mycoses:

• Pityriasis versicolor (Tinea versicolor)
• Tinea Nigra (Tinea Nigra Palmaris)
• Piedra

Practical: sample collection, laboratory test

Cutaneous mycoses:

- Tinea Pedis
- Tinea Unguium
- Tinea Corporis
- Tinea Cruris
- Tinea Manus
- Tinea Capitis
- Tinea Barbae
- Trichophytid Reaction

Practical: sample collection, laboratory test

Subcutaneous mycoses:

- Sporotrichosis
- Mycetoma
- Chromoblastomycosis

Practical: sample collection, laboratory test

Opportunistic Mycoses:

- Candidiasis
- Cryptococcosis
- Aspergillosis
- Zygomycosis

Practical: sample collection, laboratory test

Virology module syllabus

Introduction to Virology:

- History of virology
- Definition, properties and origin of viruses.
- Classification of virus

Pathogenesis and Control of Viral Diseases:

- Entry and primary replication (acute infection)
- Viral spread and cell tropism
- Cell injury and clinical illness
- Recovery from Infection (convalescence)
- Virus Shedding

Prevention of Viral Infections

- vaccination :
    - Inactivated Vaccines (killed virus)
    - Live, attenuated vaccines
    - Proper use of viral vaccines

Replication of viruses:

- Basic entry, attachment and pentation and uncoating

• Expression of viral genome and synthesis of viral components
• Morphogenesis and release
Viral Genetics:
• Viral mutation
• Exchange of genetic material
Host immune response
Enveloped DNA viruses:
• Hepadnaviridae: Hepatitis B virus
Herpesviridae:
- Herpesviruses:
- Alpha herpesviruses

Practical: sample collection, laboratory test
• Beta herpesviruses
• Gamma herpesviruses
• Poxviridae: Poxviruses
Practical: sample collection, laboratory test
Non- Enveloped DNA viruses:
• Parvoviruses
• Adenoviruses
• Papovaviruses
Practical: sample collection, laboratory test
RNA viruses:
• Hepatitis viruses:
Hepatitis A viruses
Hepatitis B viruses
Hepatitis C viruses
Hepatitis G viruses
Hepatitis E viruses.
Practical: sample collection, laboratory test
RNA viruses:
Rhinoviruses
• Orthomyxoviruses (Influenza virus)
• Paramyxoviruses
Practical: sample collection, laboratory test
• Mumps
• Measles
• Respiratory syncytial disease
• Rubella (German Measles)
Practical: sample collection, laboratory test
• Coronaviruses

Practical: sample collection, laboratory test
Retroviruses: AIDS and Lentiviruses
Practical: sample collection, laboratory test
Cultivation of viruses:

- Principle of virus cultivation
- Type of virus cultivation:
  - Animal Inoculation
  - Inoculation into embryonated egg
  - Cell Culture

2.	**ML302**	**Endocrinology**	**علم الغدد الصماء**	**3**	**2**	**2**	

Course aims:

1. This course aims to provide students with a broad understanding of the major human endocrine glands and their hormones.
2. In addition to understanding hormones, action and their effect on target cell.
3. Provide students with understanding of the medical conditions resulted from abnormal hormone secretion and the laboratory tests that are used to diagnose these conditions.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Define endocrine gland and hormones and explain how endocrine system is important for homeostasis
a.2 Describe the synthesis of different endocrine gland hormones
a.3 Know the development of the endocrine glands
a.4 Know the histological features of the endocrine glands
a.5 Define and categorize the hormones secreted according to their biochemical structure
a.6 Understand the regulation and physiological effect of different hormones
a.6 Describe clinical manifestations of conditions resulting from hyper-and- hypo secretion of each endocrine gland
a.7 Explain recent laboratory methods in diagnosis hormone disorders
a.8 Describe the integration of different endocrine glands to perform function and control homeostasis

b- Intellectual skills:

b.1 Use a wide range of idea based on knowledge in this course to solve unexpected problems in the lab and apply this way of thinking in different life situations
b.2 Interpret hormone test results to diagnose the cause of medical condition
b.3 Integrate the knowledge from this course to describe the correlation between different endocrine glands
b.4 Ability to analyze how an endocrine gland can affect the function of other endocrine glands and homeostasis

c- Professional and practical skills:

c.1 Apply the knowledge from this course while working in medical laboratory to diagnose different hormone disorders
c.2 Apply quality control procedures in the lab
c.3 Ability to analyze and solve problems related to hormone tests
c.4 Follow scientific procedure for solving problems in the lab and make sure to apply quality control procedures in the lab
c.5 Understand different methods used in measuring hormones and apply them in future while working in medical laboratory or research labs
c.6 Practice and apply some of these techniques in the practical part of the course
c.7 Understand the scientific research that have been used to understand endocrine and hormone function

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:

Introduction: definitions, a brief history of endocrinology, important people and research
Methods in endocrinology, classes of hormones, cascades and feedback loops
Hormone sources, Synthesis, receptors and target tissues
The steroid hormones: sources, structure, synthesis, regulation, receptors and effects on target tissues
Steroids, the releasing hormones, structure of the Hypothalamus
Posterior and anterior pituitary hormones: morphology of the pituitary, structure and function.
The anterior pituitary as the central regulatory center.
Thyroid hormones: structure, control, release and function.
Hypo- and hyperthyroidism.
Pancreatic hormones: Insulin and glucagon, and Diabetes.
Parathyroid glands and its disorders.
The adrenal glands: glucocorticoids, Structure and function.
GI hormones.
Androgens, gonadal differentiation and free-martins.
Estrogens and the endocrinology of Pregnancy.
Prostaglandins, pineal gland, cell growth factors.
Practical part:
Techniques for Studying Endocrinology Extirpation/replacement, RIA, etc.

3.	**ML303**	**General Immunology**	**علم المناعة العامة**	**3**	**2**	**2**	

Course aims:

1. Provide students with an understanding of the immune system and its components.
2. Innate and adaptive immunity and antigen processing and presentation.
3. How the immune system work against infection and inflammation.
3. Immune system disorders.

Intended learning outcomes (ILOS)

a- Knowledge and understanding:

a.1 Define the functions of the immune system.
a.2 Distinguish between innate immunity and acquired immunity
Understand the Structure and Function of the molecules, cells, and organs involved in
a.3 Immunity.
Describe how cell mediated and antibody-mediated immunity work to protect a host from
a.4 pathogenic organisms and harmful substances.
Explain how the immune system recognizes foreign antigen (self and non-self
a.5 discrimination.
a.6 Explain the immune system disorder

b- Intellectual skill:

b.1 The students will be able to identify the basis components of immune system
b.2 The students will be able to describe the roles of the immune system in infection.
b.3 Students should describe the immune system disorders such as hypersensitivity, immunodeficiencies and auto immunity.
b.4 Demonstrate knowledge and performing of the practical methods of Immune related diseases.

c- Professional and practical skills:

c.1 Demonstrate knowledge and understanding of the main investigative methods used in Immunology
c.2 Have a basic understanding the principles of different immunological tests
c.3 Carrying out immunological tests
c.4 Analyses and interpret the test results

d- General and transferable skills:

d.1 Think independently and access immunology relevant literature and review information.
d.2 Communicate with others positively.
d.3 Give clear, well-constructed oral presentations on immunological topics

Topics

Introduction to immunology Organs of immune system
Practical: Lab. safety
Components and properties of immune system
Practical: Specimen preparation and preservation
Recognition of microbes by Innate immunity

Practical: Simple dilution.
Antigenicity, immunogenicity, (antigen, immunogen, hapten), properties of antigen, types of antigens.
Practical: Compound dilution
Antibody structure, function and classes
Practical : Serology
Immunity barriers to infection.
Practical: Principle of antigen-antibody interaction
Leukocytes migration
Practical: Precipitation test
Antigen processing and presentation (cell-cell interaction)
Practical: Agglutination test
Innate immune cells and function
Practical: Labelled immunoassay
Adaptive immunity and adaptive receptors
Practical: Labelled immunoassay
Humoral immune responses and its effector mechanism
Practical: Immunohisto chemistry
Cell mediated immune response and its effector mechanism
Practical: Molecular methods
Pathological immune mechanism and tolerance
Apoptosis

4.	**ML304**	**Clinical Parasitology - I**	**علم الطفيليات السريرية 1**	**3**	**2**	**2**	

Course aims:
1. By the end of this course, the student will gain the clinical parasite terminology.
2. Definition of the importance of parasitic diseases and they constitute a significant burden on health organizations in some countries of the world
3. Get the most common pathogenic parasites in the region in particular and some parasites spread globally in general
4. Diagnosis of different stages of parasites optical microscope
5. Get different symptoms caused by parasitic diseases
6. learn some methods of treatment and prevention of parasitic diseases and tanker families

Intended learning outcomes (ILOS):

a- Knowledge and understanding:
a.1 Define the clinical term used in clinical parasitology.
a.2 know the most important parasitic diseases in this region, especially
a.3 Explain the etiology and clinical features of different parasitic diseases.
a.4 Outline the laboratory diagnosis of different parasitic diseases and their therapeutic approaches.

a.5 Outline the most important pathogenic parasites spread
a.6 Description of treatment required for each parasitic disease.
a.7 Identify role tanker families like insects in the transfer of parasites
a.8 Identify parasite diagnosed based on the life cycle and phase of the causative and diagnostic phase with clinical symptoms and place of injury

b- Intellectual skills:

b.1 the distinction between parasitic diseases and their locations and how to diagnose clinically
b.2 Improve appropriate methods for control of different parasitic diseases and promote public health awareness
b.3 Create a systemic method for identification of causative agents and organisms
b.4 Apply the therapeutic principles in the proper selection and use of drugs in various parasitic disease conditions.

c- Professional and practical skills:

c.1 Utilize different measures to monitor and control of parasitic infections.
c.2 Apply laboratory tests for diagnosis of various diseases
c.3 Use appropriate safety protocol when in the laboratory.
c.4 Develop a working knowledge of laboratory techniques and procedures pertaining to specimen collection, concentration, staining and identification of parasites.

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics:

Introduction to Clinical Parasitology with special reference to Clinical Protozology
Practical: Introduction to Parasitology lab
The blood and Tissue flagellates, Leishmania donovani
Practical: Blood and tissues examination:
a. Preparation and examination of thin and thick blood films.
b. Staining of blood film with Giemsa or leishman stains.
Demonstration slides of infected tissues sections of Bone marrow and Spleen showing: amastigote stage of L. donovani and Promastigote stage of Leishmania from cultures.
Leishmania major & L. tropica
Practical: Demonstration of deferent skins lesion of Cutaneous and mucucutanoueus leishmaniasis
Leishmania braziliensis and L. mexicana
Trypanosoma bruci complex
Practical : Blood smear showing trypomastigotes stages of T. gambiense and T. rhodesiense

Trypanosoma cruzi
Practical: Blood smear showing T. cruzi and amastigote stage in heart muscle section.
Plasmodium falciparum and P. vivax
Practical: Erythrocytic stages (Ring , trophozoite , schizont and gametocytes) of Plasmodium falciparum and P. vivax
Plasmodium malaria and P. ovale
Practical: Erythrocytic stages (Ring , trophozoite , schizont and gametocytes) Plasmodium malaria and P. ovale
Coccidia: Toxoplasma gondii
Practical: Demonstration slides of oocyst stages of Cryptosporidium parvum and Isospora belli
Cryptosporidium parvum and Isospora belli
Sarcocystis hominis, Sarcocystis lendmanni and Pneumocystis carinii.
Practical: Demonstration slides of different stages of Sarcocystis and Pneumocystis
Practical: Slide smear of C.S.F and tissues section demonstrate theparasite.

5.	**ML305**	**Clinical Hematology - I**	**علم الامراض الدم السريرية 1**	**3**	**2**	**2**	

Course aims:
1. This course will provide the student with a foundation of the theory and principles of hematology in clinical laboratory.
2. Define the hematopoiesis, erythropoiesis, leukopoiesis
3. Define the basic physiology functions for all normal blood cells and Hemostasis
4. Evaluation the pathophysiology for all Hematology and Hemostasis disease processes
5. Interpret the result for all laboratory tests performed on hematology and hemostasis disease patients
6. Introduce both manual and automated testing in the hematology laboratory

Intended learning outcomes (ILOS)

a-Knowledge and understanding
a.1 Identify the origin of blood cells and articulate the process of erythropoiesis and leukopoiesis as it relates to health and disease.
a.2 List the components of a complete blood count
a.3 Define hematology abbreviations
a.4 Discuss the coagulation process and its role in maintaining hemostasis
a.5 Recognize the Haematologists diagnose and manage disorders of the blood and bone marrow.

b- Intellectual skills:
b.1 It may be possible to transfer into haematology from others specialties. The level of transferable experience will be judged on a case by case basis. Transferring out of

haematology is also possible as there will be many transferable skills. Specialties that share competencies with haematology include clinical and medical oncology, immunology, internal medicine, paediatrics, and palliative care. Trainees may also choose less than full time training programmes.
b.2 Be able to make decisions on further haematological analysis and recommend additional tests where appropriate to help with the diagnostic process.
b.3 Interpret, verify and validate results and report findings to the requesting clinician
b.4 Review initial data that reveals, for example, white or red blood cell abnormalities

c- Professional and practical skills:

c.1 Compare and contrast hematology values under normal and abnormal conditions
c.2 Apply principles of safety, quality assurance and quality control in hematology
c.3 Be able to receive and prepare blood samples for analysis.
c.4 Be able to analyse blood samples using computer-aided and manual techniques

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Be able to attend relevant conferences, undertake a placement in haematology, or undertake a student selected module or project in haematology.

Topics

Introduction to Haematology.
• Bone marrow structure components and their functional properties
Regulation of haematopoiesis kinetics.
• synthesis of haeme
Leukocyte and its types, function
All platelets details
Importance of bone marrow and blood smear.
Diseases of the Red Blood cells
Anaemia diagnosis,lab evaluation
Reticulocyte count and their importance in the diagnosis in anaemia.
Anemia caused by impaired production of Erythrocytes, Iron deficiency anemia
Evaluation of iron deficiency anemia
Lab diagnosis and treatment of iron deficiency anemia
Megaloblastic anemia, properties of cobalamine, folate, and their significance in DNA synthesis.
Peripheral blood film finding
How to Determine the cause of Megaloblastic Anemia.
Sederoblastic Anemia, etiology& pathophysiology
Aplastic Anemia

Haemolytic anemia, hereditary abnormalities of the erythrocyte.
Hereditary spherocytes
Haemoglobinopathies/ Thalasemis syndrome.
Autoimmune haemolytic anaemia, Alloimmune Haemolytic anaemia.
Haemolytic anaemia due to other abnormalities, evaluation, lab investigation of it.
Anaemia due to failure Erythropoiesis
Practical
General introduction to haematology and anticoagulants tubes.
Drabkin reagent preparation and haemoglobin determination.
ESR estimation methods, the normal values of it.
The manual counting of PCV, MCH, MCV, MCHC.
Hematocrite estimation
Preparation and staining method for blood smear
Differential leukocytic count (DLC).
Reticulocyte counts
Serum Bilirubin estimation
Special test, Osmotic Fragility test, Sickling test

6.	**ML306**	**Clinical Biochemistry - I**	**الكيمياء الحيوية السريرية 1**	**3**	**2**	**2**	

Course aims:
1. Generally, syllabus covers the theoretical and practical concepts of Biochemistry such as collection of various type of specimens, principles and procedures of various tests performed in Biochemistry laboratory.
2. Develop the ability to select biochemical investigation of those which are appropriate for the diagnosis of disease as well as management of treatments.
3. Understand the normal and diagnostic value of plasma, serum, urine, and CSF of biomolecules.
4. Study the theoretical and practical application with disorder of carbohydrates, cholesterol, Triglycerides, Uric acid, plasma proteins, plasma lipoproteins. Calcium, magnesium, Iron, Haemoglobin, vitamins, trace elements, GIT,electrolytes and water.
5. Maintain a responsible and critical attitude in the use of diagnostic services provided by Biochemist and Laboratory based specialists.

Intended learning outcomes (ILOS)

a- Knowledge and understanding

a.1 Identify the principles of basic, medical & health sciences.
a.2 Define the principles of liver, kidney and cardiac function in health and diseases states
a.3 Define the etiology, laboratory diagnosis, and clinical features of Diabetes Mellitus, Disorders of metabolism of carbohydrates, protein, amino acids, lipid, Porphyrin, iron, uric

acid and electrolytes.
a.4 Define the collection tubes and their uses in clinical sitting

b- Intellectual skills:

b.1 Correlate histological, physiological and pathological condition with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.
b.2 In-depth knowledge of clinical biochemistry techniques.
b.3 The ability to understand complex biological processes.
b.4 The ability to assemble an argument and engage in debate.

c- Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.
c.2 Carry out laboratory tests for diagnosis of various diseases
c.3 Interpret some nutrition related disease and maintain health by conducting healthy life style and adequate balanced nutrition.
c.4 Able practical laboratory skills.

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 the ability to think outside the box and creatively approach task to successfully complete it

Topics

Identification of particulars of specimen
- Collection and preservation of blood specimen
- Collection and preservation of urine specimen
- Collection and preservation of faecal specimen

Diabetes mellitus- blood glucose & GTT
- Oral glucose tolerance test & other method for GTT

Effect of hormone on blood glucose level:
Insulin, glucagon, adrenaline, Cortisol & growth hormone
Serum cholesterol estimation & interpretation
- The main classes of plasma lipids

Plasma lipoproteins
- Metabolism of plasma lipoproteins

Abnormalities of plasma lipids
- Hyper & hypo Lipidemias

Function of plasma proteins
.Serum protein electrophoresis.

- Commonly used plasma proteins abnormalities like total proteins & AG ratio
Estimation of plasma uric acid
- Hyperurecemia, primary & secondary gout
Hormonal control of plasma calcium
- Metabolic bone diseases, magnesium metabolism &their deficiency syndrome
Iron metabolism, plasma iron level
Porphyrin metabolism & chemical investigations of porphyries
Hemoglobin & its derivatives & Thalassemia's
Essential trace elements
Deficiency of fat soluble vitamins & water soluble vitamins
Water & sodium balance
- Disorder of water & sodium homeostasis
Oedema
Hypo & hypernatraemia , potassium balance
Digestion & absorption of gastrointestinal tract
Abnormality of GIT:
hyper acidity,hypo-acidity, peptic ulcer, diarrhea
- Henderson equation
Acid base balance
-disturbance of acid base balance
- Respiratory acidosis & alkalosis
- Clinical application of acid base & oxygen measurement
Practical Part:
Blood sugar estimation
Glucose tolerance test- GTT.
Plasma proteins & A : G ratio estimation
Serum cholesterol Estimation
Serum Triglyceride Estimation
Serum Uric acid estimation
CSF Biochemistry (Sugar, Protein & chloride estimation)
Serum Iron estimation
Serum TIBC estimation.

7.	**ML307**	**Toxicology**	**علم السموم**	**3**	**2**	**2**	

Course aims:

1. To understand the basic principles of toxicology and the different disciplines of toxicology.
2. To gain knowledge regarding the supportive measures, therapeutic interventions, specific antidotes as general guidelines of treatment modalities.
3. To learn the basics of clinical toxicology that will enable the student to diagnose and manage intoxicated patients.

4. To understand the serious consequences of exposure to therapeutic drugs, environmental and occupational chemicals

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the general principles of poisoning management; explain actions, interactions, uses and toxicity of certain medications.

a.2 List different classes of common toxic substances and environmental pollutants

a.3 Describe the circumstances of intoxication, toxic doses, toxicokinetics, clinical picture, differential diagnosis of different drugs and toxic substances.

b- Intellectual skills:

b.1 Analyze, evaluate and interpret clinical cases of toxicity.

b.2 Criticize different methods for the management of poisoning in individual cases of toxicity

b.3 Apply the knowledge of drug interactions, adverse drug reactions and drug abuse.

c- Professional and practical skills:

c.1 Undertake risk assessments concerning drug-drug interaction, adverse reaction and toxicity profile.

c.2 Learn how to safely handle corrosive substances.

c.3 Advice patients on the safe and effective use of drugs while managing the toxicity condition

d- General and transferable skills:

d.1 Interact effectively in team working.

d.2 Apply calculations for chemical analysis.

d.3 Acquire the ability to learn independently

d.4 Present information clearly in written, electronic and oral forms

d.5 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities..

Topics

Introduction to Toxicology

Definition of the science of Toxicology & different areas of Toxicology.

Definition of LD50, the therapeutic window, safety margin, therapeutic index.

Bioaccumulation and bio magnifications of toxins.

Routes and duration of exposure for toxins.

Air pollutants (Toxicity with CO in details)

Solvents (aliphatic and aromatic hydrocarbons)

Insecticides (Organs phosphorus poisoning in details)

Heavy metals poisoning (Lead and Mercury poisoning in details)

Hepatotoxicity

Nephrotoxicity

Neurotoxicity

Respiratory Toxicity
Factors affecting Toxicity.
Management of the poisoned patient.
Practical part
Laboratory introduction
practical of Toxicokinetics & toxicodynamics
practical in Poisons
Practical of public health hazard
practical of management of poisoning

8.	**ML308**	**Bacteriology**	**علم البكتيريا**	**3**	**2**	**2**	

Course aims:

1. To introduces students to the basics of medical bacteriology.
2. To describe the characteristics of morphology, culturing, biochemical reactions and antigenic structure that aid in recognition of pathogenic bacteria and their disease, and explain how are they distinguished from non-pathogens.
3. To apply knowledge of methods used by clinical laboratories to understand how infections are diagnosed.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Acquire the main knowledge about medically important bacteria considering their structure, physiology, metabolism, control and genetics.
a.2 Understand the general properties of bacteria causing human infections.
a.3 Apply knowledge of methods used by medical laboratories to diagnose infectious disease related to various medical conditions.
a.4 Linking knowledge followed by evaluation from different resources

b- Intellectual skills:

b.1 The ability to compare and contrast between important groups of bacteria
b.2 The ability to apply the gained knowledge to assess and solve microbiological problems in human infections.
b.3 The ability to think critically by analyzing, combining and evaluating quantitative and non-quantitative information
b.4 The ability to deal with critic situation related to problem solving and decision taken

c- Professional and practical skills:

c.1 Identification, preparing and sterilization of various types of culture media
c.2 Performing different basic microbiological procedures such as staining, microscopic examination and reporting, streaking technique.
c.3 Using of culture properties, microscopic examination, biochemical tests and serological analysis in identifying of pathogens in a clinical microbiology laboratory.
c.4 Collaborated with other areas of laboratory for effective patient care and diagnosis.

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 The ability to organize time for study and prepare for periodic exams and tests

Topics:

An introduction to clinical bacteriology
- Morphology and functional structure of bacteria.
- Bacterial nutrition and growth.
- Bacterial genetics and exchange of genetic information.
- Sterilization and disinfection.

GRAM POSITIVE BACTERIA:
Gram positive cocci:
- Genus of staphylococci includes S. aureus, S. epidermidis and S. saprophyticus.
- Genus of Streptococci includes S. pyogenes, S. viridans, S. agalactiae, S. pneumonia
- Genus of Enterococci including E. feacalis and E. faecium.

Gram positive bacilli:
Gram positive spore forming rods: includes:
Genus of Bacillus includes B. anthracis and B. cereus.
Genus of Clostridium includes C. perfringens, C. botulinum, C. tetani and C. difficile.
Gram positive non-spore forming rods: includes:
Genus of Corynebacteria: C. diphtheriae
Genus of Listeria: L. monocytogenes.

GRAM NEGATIVE BACTERIA.
- Gram negative diplococci: Genus of Neisseriae: includes N. gonorrhoeae and N. meningitides.
- Gram negative coccobacilli: includes Genus Haemophilus, Bordetella, Brucella, Francisella and Genus of Pasteurella.
- Gram negative rods: includes Genus of Escherichia, Klebsiella, Proteus, Salmonella, Shigella, Enterobacter, Citrobacter, Yersinia and Pseudomonas.

Curved bacteria: includes Genus of Vibrios, Genus of Campylobacter and Genus of Helicobacter.
SPIROCHAETES: Includes:
- Genus of Treponema.
- Genus of Borrelia
- Genus of Leptospira.

RICKETTSIA
CHLAMYDIA

ATYPICAL BACTERIA: Genus of Mycoplasma
MYCOBACTERIA: includes:
-Mycobacterium tuberculosis
Mycobacterium leprae.

9.	**ML309**	**Clinical Training – I**	**التدريب السريري 1**	**6**	**-**	**12**	

Course aims:
The aim of this course is to train students who will be capable of planning and managing a multidisciplinary basic Laboratory tasks in specialism of medical laboratory.
Intended learning outcomes (ILOS):
a- Knowledge and understanding
a.1 Knowledge on the understanding of the concepts and fundamental principles of medical laboratory departments.
a.2 To acquire the knowledge of pathophysiology of diseases involving Biochemical, Hematology, Microbiological, Endocrinological & Immunological aspects.
a.3 Test Selection & Interpretation of results in context of a clinical condition along with concerned clinical specialty.
a.4 The operational knowledge for performing the laboratory investigations, which include: instrumentation, methodologies and quality assessment and assurance.
b- Intellectual skills:
b.1 Diagnosis of routine and complex clinical problems based on Laboratory investigations.
b.2 Interpret laboratory data in relation to clinical findings with reasonable accuracy
b.3 Advice on the nature of appropriate specimens and the tests necessary to arrive at a diagnosis in a difficult or problematic case.
c- Professional and practical skills:
c.1 Able to perform most of the routine tests in a Laboratory including gross sampling of specimens, processing, and instrumentation.
c.2 Able to collect specimen by routinely performed non-invasive out-patient procedures such as venepuncture and finger-prick.
c.3 Should be familiar with the operation, function and routine maintenance of equipment.
d- General and transferable skills:
d.1 Use appropriate lab equipment and methods.
d.3 Understand the etiology and the pathophysiological basis of diseases in children and adults.
Topics
1. Laboratory Safety: Prevention of Physical, Chemical & Biological Hazards.
2. First Aid in Lab. Accidents.
3. Organization of the Laboratory
4. Instrumentation; To know the: i) Principle ii) Parts iii) Working manual and iv)

Preventive maintenance of the following instruments.
5. Clinical Haematology & Transfusion Medicine including; Collection, transport and processing of blood samples for different hematological investigations ii) Performance of routine CBC.
Basic immunohematology ii)ABO and Rh grouping iii)Clinical significance of other blood groups iv)
6. Clinical Microbiology including; Medically important microbes in general. Enterobacteriaceae and other gram negative bacilli like Salmonella, Shigella, Ecoli etc. Gram positive cocci & bacilla and Mycobacteria, Epidemiology of infectious diseases, Hospital Acquired Infections/Nosocomial infections, Medically important parasites, Medically important viruses, Medically important fungi.
7. Clinical Immunology including; Physiology of Immune System, Hypersensitivity Reactions, Autoimmune Diseases, Host-Parasite interaction.
8. Clinical Physiology including; Theory (Knowledge) and Practical (Skill), Liver function test, Kidney function test.
9. Molecular Biology including Structure of DNA & RNA, Genetic configuration of commonly used Genomic vectors/host and their uses in molecular biology, blotting technology (Southern, Northern, Western), DNA hybridization, RNA hybridization, Polymerase Chain Reaction (PCR) and its variants in various diseases.

10.	**ML310**	**Medical instrumentation**	**الأجهزة الطبية**	**2**	**2**	**1**	

Course aims:
1. Give the principle of instrumental and applied analytical methods, including chromatographic methods, electrochemical analysis, capillary electrophoresis and mass spectrometry.
2. Cover the application of these methods to pharmaceutical compounds
3. Understand the theoretical and practical preparation enabling students to maintain medical instrumentation.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Recognize the different analytical techniques used for determination of chemical substances
a.2 Identify the principles of various analytical techniques and instruments.
a.3 define basic medical terms and physical values that can be handled by medical instrumentation
a.4 Theoretical and practical preparation enabling students to maintain medical instrumentation

b- Intellectual skills

b.1 Determine suitable methods of analysis
b.2 Interpret experimental data

b.3 Demonstrate measuring of basic medical parameters
b.4 Recommend problem solving and service procedures for electrical equipment

c- Professional and practical skills

c.1 Show the ability to conduct experimental studies and apply different quantitative methods of analysis of pharmaceuticals
c.2 Analyze and interpret quantitative analytical data
c.3 Understanding basic principles and phenomena in the area of medical diagnostic instrumentation
c.4 Understanding basic principles and phenomena in the area of medical diagnostic instrumentation

d- General and transferable skills

d.1 Interact effectively in team working
d.2 Apply calculations for chemical analysis
d.3 Present information clearly in written, electronic and oral forms
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.
d.5 Acquire the ability to learn independently

Topics

General Introduction about Instrumentation Analysis
Principle of instrumentation :

- Properties of light
- Dispersion of light
- Measurement of light

Molecular absorption of spectroscopy:

- Component of spectroscopy
- Single beam and double beam of spectrometers
- Parameters of operation
- Applications

Atomic Emission and absorption of spectroscopy :

- Emission plarae photometry
- Atomic absorption photometry
- Applications

Molecular Emission spectroscopy:

- Fluorometer design
- Variable affecting fluorescence
- Applications

Electrophoresis and Densitometry :

- Theory
- Experimental
- Equipment

- Densitometry
- Analysis
- Applications

Potentiometery and Iron selectivity:

- electrodes
- The basic principle
- The reference electrode
- Iron selective electrode

Chromatography

- Theory of chromatography
- Gas chromatography
- Instrumentation in gas chromatography
- Liquid chromatography
- Instrumentation in liquid chromatography
- Thin-layer chromatography

Osometery

- Osmolatiy
- Collgatiye properties and osometery
- Freezing. Point depression osometery
- Vapor pressure osometery
- Colloid osometery

Nephelometery and Turbidimetery

- Principles
- Detection of scattered light
- Limitations
- Refractivity
- Applications

Radio isotope counters

- Beta isotope (C14) counter
- Gamma isotope (1251) counter

Principles and methods

Automation

- The common Denominators of Automated Chemical Analyzers
- A continuous Flow Analyzer
- A discrete sample analyzer
- A bath (centrifugal) analyser

11.	**MT301**	**Research Methodology**	**طرق البحث**	**2**	**2**	**-**	

Course aims:

1. Understand some basic concepts of research and its methodologies

2. raise awareness of crucial aspect of the nature of Knowledge and the value of scientific method
3. Introduce the concept at the heart of every research project –the research problem- and to discuss what a researchable problem is.
4. Identify appropriate research topic
5. Write research report and thesis
6. Evaluate literature, form a variety of sources, pertinent to the research objectives.
7. Identify and justify the basic components of the research framework, relevant to the tackled research problem.
8. Discuss how to cite sources, using the American Psychological Association (APA), and justify this choice.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Understand the general definition of research design
a.2 Understand the limitation of particular research methods
a.3 Know and understand different types of research
a.4 Understand and Know how to write References by using one of the two types(Alphabetic or Numbered) when using different sources in their Research Project in 4th year.
a.5 The internet has made locating information more accessible, but not every source is credible. It is important to know how to find reliable sources and analyze information to determine whether or not it is credible. To ensure are gathering accurate information, try to verify information from one source by sing another. Locate the original information source to verify its reliability.

b- Intellectual skills:

b.1 Develop advanced critical thinking skills
b.2 Discuss the criteria of good research and the different types of research.
b.3 present some aspects of the debate about the nature of knowledge and the value of scientific method

c- Professional and practical skills:

c.1 Develop skills in qualitative and quantitative data analysis and presentation
c.2 Demonstrate enhanced writing skills
c.3 Demonstrate the ability to choose method appropriate to research aims and objectives.
c.4 Be able to demonstrate Research skills are essential to employers because they help the company develop new products or services, identify the need and wants of their customers, improve what they do, keep up with changes in their industry and compete in their market. Knowing how to develop excellent research skills and highlight them for employers can help in several ways throughout the career.

d- General and transferable skills:

d.1 Practice independent learning needed for continuous professional development

d.2 Work effectively in a team.
d.3 Be able to gain problem-solving skills to break a problem down into its parts
d.4 Learn to use advanced search techniques.
d.5 Think critically about each element, analyze the information you find and use that information to form an effective solution.

Topics

Introduction to research

- Definition
- Types of radiation
  - ✓ **Historical**
  - ✓ **Observation**
  - ✓ **Systematic**
  - ✓ **Descriptive and etc.**

Basic elements of scientific research

- Problem definition
- Selecting a research problem
- Interest
- Uniqueness

Basic elements of scientific research

- Capability
- Availability of data
- Financial support
- Time factor

Writing a research proposal

Sample survey and questionnaire

- Reasons
- Types

Hypothesis

- Definition
- Formulation
- Sources
- Examples

Research writing

- Title page
- Approval page
- Abstract

Research writing

- Acknowledgement
- Table of content
- List of figures

Research writing

- Chapters of research projects
  - Chapter one (Introduction)
  - Chapter two (review of literature)
  - Chapter three (methodology)

Research writing

- Chapters of research projects
  - Chapter four (results)
  - Chapter five (discussion)
  - Chapter six (conclusion and recommendation)

Research writing

- References
- Appendixes

Reference page

- Reference list
- Books reference
- One other reference
- No author reference
- Unknown author reference

Reference page

- Two or three authors reference
- Four or more authors reference
- Edited or translated books
- Article or chapter in a book
- Government document

How to drawing graphic inserting table, spelling check etc.

Plagiarism and Toronto

Citation

- Definition
- Example
- Verbs used
- References
- Quotation
- When to cite

Paraphrasing

- Definition
- Examples
- How to avoid plagiarism
- When to paraphrase

Linking words and phrase used in projects

Skills of searching on the internet and using the scientific sources
Modern language association (MLA)
- Style 7th quick guide
- Library search guides
- Killam library MLA
- The reasons of using MLA handbook effective April 2009

Articles
- Types of articles
- Referencing
- How to cite

Some consideration and limitation facing post-gradation students
Presenting a research paper and writing a critical review
- Introduction
- Body
- Conclusion
- Purpose of research paper

Oral presentation
- How to make good presentation
- Good starting
- Clear voice
- Eye contact
- Good timing
- Confidence

Fourth year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	**ML401**	**Clinical Microbiology**	**علم الاحياء الدقيقة السريري**	**3**	**2**	**2**	

Course aims:
1. To introduces students to normal microbial flora of human body definitions and sources, beneficial and harmful roles
2. To learning of bacterial pathogenesis, reasons for getting infections, bacterial virulence factors and stages of diseases in addition to basics of epidemiology.
3. To learning principles and procedures of diagnostic microbiology. Study of antimicrobial agents and antimicrobial chemotherapy, and their mechanisms of action and resistance.
4. To understand microbial diseases of human by body systems including anatomy,

microbial involved, sources and mode of infections. Additionally apply knowledge of methods used by clinical laboratories to understand how infections are diagnosed.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Acquire the main knowledge about medical microbiology considering their pathogenicity, prevention and control.

a.2 Understand the general properties of pathogenic bacteria causing human infections.

a.3 Apply knowledge of methods used by medical laboratories to diagnose infectious disease related to various medical conditions.

a.4 Linking knowledge followed by evaluation from different resources

b- Intellectual skills:

b.1 The ability to compare and distinction between important groups pathogens and none pathogens and normal microbial flora.

b.2 The ability to apply the gained knowledge to assess and solve microbiological problems in human infections

b.3 The ability to think critically by analyzing, combining and evaluating quantitative and non-quantitative information.

b.4 The ability to deal with critic situation related to problem solving and decision taken

c- Professional and practical skills:

c.1 Collection, handling, storing and transferring of various types of clinical samples.

c.2 Performing different main microbiological procedures such as staining, microscopic examination and reporting, streaking technique, culturing of bacteria.

c.3 Using of culture properties, microscopic examination, biochemical tests and serological analysis in identifying of pathogens in a clinical microbiology laboratory.

c.4 Collaborated with other areas of laboratory for effective patient care and diagnosis.

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 The ability to organize time for study and prepare for periodic exams and tests

Topics

Normal microbial flora of human body.

- Definitions of terms
- Sources of normal microbial flora.
- Time of getting normal flora.
- Basis for associations between humans and normal flora.
- Beneficial roles
- Harmful roles

Bacterial pathogenesis.

- Definition of terms and the concepts
- Factors important for getting infections
- Virulence factors of pathogenic bacteria.
- Functions and stages of diseases.
- Koch's Postulates

Basics of Epidemiology.

- Definition of terms.
- Classification of Disease.
- Transmission of infections.

Principles and procedures of diagnostic microbiology.

- Microscopic examination.
- Culturing, Isolation and Identification.
- Biochemical reactions.
- Serological identification.
- Molecular identification.

Antimicrobial agents and antimicrobial chemotherapy.

- Brief historical aspects.
- Definition of terms.
- Physical antimicrobial agents.
- Sources and spectrum of activity of antibacterial drugs.
- Classification of antimicrobial agents: Antibacterial, Antiviral, Antifungal, and Antiparasitic drugs.
- Beta-lactamase inhibitors.
- Antimicrobial combination.
- Mechanisms of action of antimicrobials.
- Mechanisms of antimicrobial resistance.
- Antimicrobial susceptibility testing: Disc diffusion, Serial dilution and E-test (diffusion & dilution) methods.

Nosocomial infections.

- Introduction and definitions.
- Types of nosocomial infections.
- Microbiology of nosocomial infections.
- Sources and transmission of nosocomial pathogens.
- Therapeutic strategies.
- Prevention and control.

Microbial diseases of urinary system.

- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Genital tract infections.
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial infections of Oral and Gastrointestinal tract (GIT).
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial infections of respiratory tract.
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial infections of circulatory and lymphatic system.
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial diseases of Eye.
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial diseases of Nervous system.
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Microbial diseases of Skin, Ear, Nails and Hair
- Anatomy and diseases.
- Microbial involved.
- Sources and mode of infection
- Laboratory diagnosis strategy.

Applied microbiology.
- Scope of applied microbiology.
- Enumeration of microorganisms.
- Bacteriological analysis of water.
- Bacteriological analysis of milk

2.	**ML402**	**Medical Genetic**	**علم الوراثة الطبية**	**3**	**2**	**2**	

Course aims:

1. Introduce students to genetics and its specialized fields
2. Highlight the central role of genetic material, and the relationship with some various vital fields such as technology, medical, social and economic.
3. Determine the patterns of genetic diversity and classify genetic disorders.
4. Explain the nature of chromosomal abnormalities in clinical syndromes associated with cytogenetic disorder
5. Discuss the nature of chromosomal abnormalities in the disorders of sexual differentiation
6. Analyze and explain the chromosomal map, mutations, and diseases resulting from chromosomal aberrations.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Identify the structure of the chromosomes of eukaryotic cells and study their types, morphological characteristics and the basis for their classification

a.2 Learn about different genetic theories and concepts, 2 mm, on how to benefit from the genetic basis in health and social aspects

a.3 Understands the practical basis of ways to benefit from desired genetic factors and eliminate genetics.

a.4 Memorize and describe the genetic control of cell functions.

b- Intellectual skills:

b.1 Estimate the risk of recurrence of various inherited disorders in affected families

b.2 Calculate and interpret the cytogenetic data and Pedigree.

b.3 Explain the mechanism of occurrence of chromosomal and genetic mutations and the link between these differences and some genetic traits

b.4 Explaining the cytological basis of Mendelian laws and discussing the hereditary behavior of chromosomes and genes in the different stages of the cell cycle

c- Professional and practical skills:

c.1 Estimate the risk of recurrence of various inherited disorders in affected families

c.2 Calculate and interpret the cytogenetic data and Pedigree

c.3 Evaluate appropriately the family pedigree and the population and ethnic aspects of inherited disorders

c.4 Understands the practical basis of ways to benefit from desired genetic factors and eliminate genetics

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development

d.3 Interact effectively in team working

Topics

1. Introduction of medical genetic and its applications
2. Teratogenesis & Mutagenesis
3. Causes of Chromosomal aberration

- Nondisjunction during the first division of Meiosis (Meiosis I).
- Nondisjunction during the Second division of Meiosis (Meiosis II).

Classification of Chromosomal aberration

1. Structural chromosome aberration
2. Numerical chromosome aberration

Structural chromosome aberration

classification of structural chromosome aberrations

- Deletion
- Duplication
- Inversion, (Paracentric & Pericentric).
- Translocation, (Reciprocal & Robertsonian)
- Isochromosom

Chromosome Deletion Syndromes.

- Cri-du-chat (46,XX/XY5p-)
- Wolf – Hirschhorn (46,XX/XY4p-)

Micro deletion Syndrome.

- Wilm's tumor

The Angleman & Prader Willi Syndrome

2. Numerical chromosome aberrations

Type of Numerical chromosome aberrations

- Aneuploidy

Monosomy
Trisomy
Nullismoy
polyploidy

Numerical chromosome aberrations syndromes

Autosomal abnormality syndromes.

- Trisomy 21, Down's syndrome
- The chromosomes in Down's syndrome
- Trisomy 18, Edward's Syndrome
- Trisomy 13, Patau's Syndrome.

Numerical chromosome aberrations syndromes

Sex Chromosome abnormality syndrome

- Klinefelter Syndrome (47,XXY)
- Turner's Syndrome (45,X)

- XXX Female
- XYY Male
- The fragile X Syndrome
- Mosaicism.
- Chimaerism, (Dispermic).

Chromosome Nomenclature.
Chromosome Breakage Syndrome
- Ataxia Telangiactasia
- Bloom's Syndrome
- Fanchoni's Anemia

Xeroderma Pigmentation
Mandalian's disorders (Single gene disorders
Neurofibromatosis
- Clinical Features
- NF1 gene
- NF2 gene

Cystic Fibrosis
Clinical Features
Confirmation of the diagnosis
C F gene
Duchene Muscular Dystrophy
Clinical Features
Confirmation of the diagnosis
Mode of Inheritance
Mapping of the DMD locus
Biochemical genetics
- The Inborn Errors of Metabolism
- Disorders of amino acid metabolism
- Phenylketonuria
- Heterogeneity of Phenylketonuria
- Mutational basis
- Diagnosis
- Treatment.
- Alkaptonuria
- Oculocutaneous Albinism
- Homocystinuria

Maple Syrup urine Disease
Disorders of Amino acid Transport
- Cystinuria
- Urea cycle disorders

- Ornithine Transcarbamylase deficiency
- Disorders of carbohydrate Metabolism

Disorders of carbohydrate

- Galactosaemia
- Glycogen storage disease
- McArdle disease
- Pomp's disease

Disorders of steroid metabolism

- Congenital adrenal hyperplasia
- Testicular feminization

Lipoprotein metabolism

- Familial hypercholesterolemia
- Lysosomal storage disease

Mucopolysaccharhidosis

- hunter syndrome
- Hurler syndrome
- Sphingiolipidosis
- Tay-Sachs disease

Gaucher's disease

- Purine / Pyrimidine metabolism
- Lesh-Nyhan Syndrome
- Porphyran metabolism

Hepatic porphyries

- Acute Intermittent porphyria
- Hereditary coproporphyria
- Congenital Erythropoietic porphyria
- Porphyria Variegata
- Erythropoietic porphyria

Organic Acid Disorders

- Copper metabolism
- Menke's disease
- Wilson's disease

Thyroid Hormone Biosynthesis

- Congenital Thyroxin deficiency
- Peroximal Disorders
- Zellweger's Syndrome
- Adrenoleuko dystrophy
- Miscellaneous inborn errors
- Antitrypsin deficiency
- Hereditary Angioneurotic oedema

- Vitamin D resistant rickets

Haemoglobin & the heamoglobinopathies

- Structure of haemoglobin
- Protein Analysis

Disorders of haemoglobin structure

Sickle – cell disease

3.	**ML403**	**Clinical Immunology**	**علم المناعة السريرية**	**3**	**2**	**2**	

Course aims:

1. On completion of the course, the student will be able to explain principals of the immune system and its regulation in health and disease.
2. Describe the molecular basis of immune recognition, transplantation immunology, immune deficiency and autoimmune diseases, and compare mechanism of host response against pathogenic agents.
3. Performance of routine serological test

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 To know the basic principle of clinical immunology
a.2 To know the acquired immunodeficiency disease.
a.3 To know the hypersensitive disease.
a.4 To know and apply the serological tests
a.5 To understand the role of immune system against the tumour.
a.6 Understand the principles governing vaccination and the mechanisms of protection against disease
a.7 To know the principle of routine clinical immunology procedures.

b- Intellectual skills:

b.1 Discuss critically current understanding of the molecular and cellular basis of the immune system in health and disease as scientific reports or case studies interpretation
b.2 To be able to differentiate between the hypersensitivity disease
b.3 To be able to differentiate between the immunodeficiency disease
b.4 To be able to analyse and explain serological result

c- Professional and practical skills:

c.1 To be able to utilize the suitable serological test and calibrate the vaccines.
c.2 Understand and interpret aspects of both laboratory and experimentally derived data
c.3 Conduct appropriate literature-based research/evaluation of current research topic.
c.4 To be able to use the appropriate samples and serological controls to evaluate the lab quality.
c.5 To be able to use the suitable immunological tests with organ transplantation to avoid the bodys rejection of transplanted organs

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Retrieve and critically evaluate of clinical laboratory data from different sources to improve professional competencies.

Topics

Vaccination
Hypersensitivity disorders
Immunologic Tolerance and Autoimmunity
Immunity to Tumors
Transplantation Immunology
Congenital and Acquired Immunodeficiencies
Immunoproliferative Diseases
Prevention and Therapy of Immunologic Diseases
Diagnostic Immunology
Particle part:
Safety
Specimens preparation and processing(review)
Radioimmunoassay
Enzyme Immunoassay
Fluorescent Immunoassay
Cell isolation technique
Antigenic –specific tests
Tests of B-cell Function
Test of T- cell Function

4.	**ML404**	**Clinical Parasitology - II**	**علم الطفيليات السريري 2**	**3**	**2**	**2**	

Course aims:

1. Provide students with an understanding of classification, Habitat, Biology of the helminthic parasites and life cycles
2. Understanding of pathogenesis and clinical features and treatment of human helminthic parasitic infections
3. Students will gain practice in the laboratory diagnosis of human helminthic
4. Control and prevention measures of helminthic infections

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Define the general terms and concepts of medical parasitology.
a.2 Give the names of the taxonomic group of human helminthic parasites(common and

scientific) .
a.3 Recognize morphological characteristics for identification of different life cycle stages of parasitic helminthes.
a.4 Present the life cycle of well as infective stages and mode of transmission of each parasitic helminthes
a.5 Recognize the pathogenesis of parasitic infections and clinical signs and symptoms
a.6 Recognize the basic and up-to-date diagnostic procedures needed to carry out accurate diagnosis of helminthic diseases.
a.7 List the effective therapeutic medications of each parasitic infections and also describe how to prevent and control of each parasitic diseases.

b- Intellectual skills:

b.1 Point out the most appropriate and cost effective diagnostic laboratory investigations for each helminthic infection to reach the proper final diagnosis within short time.
b.2 Integrate the most important signs and symptoms of important parasitic infections and the laboratory test findings into a meaningful diagnostic significance (using case study) .
b.3 Express systemic thinking and personal judgment for differential diagnosis of the common possibilities for each parasitic infection.
b.4 Assess the effective therapeutic measures of parasitic infections and also describe how to prevent and control parasitic diseases.

c- Professional and practical skills:

c.1 Practice examination of macro and microscopically of stool sample
c.2 Practice examination of mounted slides microscopically to identify, draw and label diagrams of parasites and their different stages (eggs, cysts, larvae,) or any of their body parts (segment, hooks, scolices…etc).
c.3 Have a basic understanding the principles of different parasitological tests
c.4 Conduct procedures related to isolation and identification of some parasites

d- General and transferable skills:

d.1 Ensure the ability for health education in conjunction with prevention and control of parasitic diseases.
d.2 Acquire self learning using the available electronic facilities to update his/her knowledge and gain presentation abilities (present information clearly in written, electronic and verbal forms).
d.3 Work collaboratively in a team, adopt ethical behavior and respect the role of staff and co-staff members regardless of degree or occupation.

Topics

Introduction to helminthes and clinical Helminthology. Classification, basic morphology and biology of helminthes
Practical: Different techniques used in lab. diagnosis of parasitic infection .
Wet preparation in saline and Iodine Stool examination.
Sedimentation and Flotation technique

Intestinal Nematodes:
• Ascaris lumbricoides
• Strongyloide stercoralis.
Practical: Demonstration of slides for egg and adult worm of A. lumbricoides, And larva of S. stercoralis
Hook worms
Ancylostoma duodenale. Necator americanus.
Practical: Demonstration of slides for egg and adult worm of A. duodenale. N. americanus.
Visceral larva migrans; cutaneous larva migrans.
Practical: Data show Demonstration for visceral and Cutaneous larva migrans
Trichinella spiralis.
Practical: Demonstration of slides for adult worm and encysted larva of T. spiralis. in muscle biopsy
Capillaria philippinensis and C. hepatica.
Practical: Demonstration of slides for adult worm and eggs of C. philippinensis and C. hepatica.
Enterobius vermicularis.
Trichuris trichiura.
Practical: Demonstration of slides for adult worm and eggs of E. vermicularis and T. trichiura.
Blood and tissue Nematodes; Wuchereria bancrofti. Brugia malayi.
Practical: Demonstration of slides for adult worm and microfilaria stages of W. bancrofti and B. malayi.
Onchocerca volvulus.
Mansonella ozardi.
Practical: Demonstration of slides for adult worm and microfilaria of O. volvulus and M. ozardi.
Dracunculus medinensis.
Angiostrongylus cantonensis
Practical: Demonstration of slides for adult worm and larval stages of D. medinensis A. cantonensis
Platyhelminthes (Flatworms):
Introduction. Classification, basic morphology and biology of helminthes.
Practical: Snails act as intermediate host for Trematodes
Intestinal Trematodes
Heterophyes heterophyes.
Practical: Demonstration of slides for adult worm and eggs of H. heterophyes. With its snail host
Fasciolopsis buski

Metagonimus yokogawi
Practical: Demonstration of slides for adult worm and eggs of F. buski and M. yokogawi
Fasciola hepatica. Fasciola gigantica.
Practical: Demonstration of slides for adult worm and eggs of F. hepatica and F. gigantica With its snail host
Clonorchis sinensis. Opisthorchis viverrini .
Practical: Demonstration of slides for adult worm and eggs of C. sinensis and O. felinus.
Pulmonary trematode Paragonimus westermani.
Practical: Demonstration of slides for adult worm and eggs of P. westermani.
Blood Trematodes:
Schistosoma haematobium,
Schistosoma mansoni,
Practical: Demonstration of slides for adult worm cercaria and eggs of S. haematobium, S. mansoni, With its snail host
Schistosoma japonicum,
Schistosoma intercalatum
Schistosomal dermatitis
Practical: Demonstration of slides for adult worm and eggs of S. japonicum and S. intercalatum With its snail host
Intestinal Cestodes: Taenia saginata.
Practical: Demonstration of slides for adult worm Mature segments, gravid segments, scolices, and ova of T. saginata and Cysticercus in beef.
Taenia solium.
Practical: Demonstration of slides for adult worm, Mature segments, gravid segments, scolices, and ova of T. solium and Cysticercus in pork.
Diphyllobothrium latum, Dipylidium caninum
Practical: Demonstration of slides for adult worm, Segments, scolices, and ova of D. latum and D. caninum
Hymenolepis nana, H. diminuta.
Practical: Demonstration of slides for adult worm, Segments, scolices, and ova of H. nana and H. diminuta
Extra-intestinal larval Cestodes:
Cysticercosis (T. solium)
Sparganosis (Spirometra)
Practical: Demonstration of Specimens of cysts removed from human cases (Cysticercosis)
Coenurus (M. multiceps),
Hydatidosis (Echinochoccus granulosus, E. multilocularis)
Practical: Demonstration of slides for Adults and larva of Echinococcus granulosus and E. multilcoularis. Hydatid cysts in infected sheep liver. Specimens of cysts removed

from human cases. Sections of hydatid and alveolar cysts

5.	**ML405**	**Clinical Hematology - II**	**علم امراض الدم السريري 2**	**3**	**2**	**2**	

Course aims:

1. This course will provide the student with a foundation of the theory and principles of haematology in clinical laboratory.
2. Define the basic physiology functions for all normal blood cells. Also, define the haemostasis and discuss it in more details
3. Evaluation the pathophysiology for all haematology and Haemostatic disease processes
4. Follow written procedures and accurately perform and interpret the following tests: Set up and read an ESR, Dilute, charge haemacytometer, count, and classify the white blood cells of a spinal fluid and other body fluids, Differential on cerebrospinal fluid and other body fluids, Prothrombin time Activated partial thromboplastin time, Quantitative fibrinogen

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Discuss the coagulation process and its role in maintaining haemostasis

a.2 Recognize the Haematologists diagnose and manage disorders of the blood and bone marrow

a.3 Learn basic principles and procedures of routine and special haemostasis assays and the tests used to evaluate common abnormalities in coagulation and fibrinolysis

a.4 To know the basic of haemostasis system and platelets function, disorders, andmonitoring testing

b- Intellectual skills:

b.1 Interpret the result for all laboratory tests performed on hematology and haemostasis disease patients

b.2 Perform basic haematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.

b.3 Distinguish normal and abnormal haematological laboratory findings to predict the diagnosis of haematological disorders and diseases

b.4 Adapt haematology laboratory techniques and procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner.

c- Professional and practical skills

c.1 To demonstrate competence in the performance and interpretation of complete blood count, including platelets and white blood cells differential, by automated or manual techniques with appropriate quality control.

c.2 Biomedical scientists are the clinical worker who link between the laboratory and the hospital and community medical teams.

c.3 Student should be able to cover laboratory sciences, haemato-pathology, general and liaison haematology, haemostasis and thrombosis, blood transfusion, red cell and haemoglobinopathy disorders, haemato-oncology, paediatric haematology, bone marrow transplant and other cellular therapies.
c.4 Be able to provide a clinical opinion on results and advice on the management of patients and there is an absolute need for haematology consultants to provide the clinical competency for laboratory services for the foreseeable future. This is in addition to providing direct clinical care for patients with haematological disorders

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Integrate knowledge and make informed judgments about general safety in daily life

Topics

Introduction to Blood + Haemostasis
Primary + Secondary Haemostasis
Coagulation Factors
Role of platelets
Fibrinoloysis
Von-well brands disease
Tests used in Haemostasis
Vitamin-K deficiency
Anticoagulant in vivo

6.	**ML406**	**Clinical Biochemistry - II**	**الكيمياء الحيوية السريرية 2**	**3**	**2**	**2**	

Course aims:

1. Generally, syllabus covers the theoretical and practical concepts of Biochemistry such as collection of various type of specimens, principles and procedures of various tests performed in Biochemistry laboratory.
2. Develop the ability to select biochemical investigation of those which are appropriate for the diagnosis of disease as well as management of treatments.
3. Understand the normal and diagnostic value of plasma, serum, urine, and CSF of biomolecules.
4. Study the theoretical and practical application with disorder of: Liver, Kidney, Heart, Gastric Pancreatic & Intestinal disorder, Inherited metabolic disorders, Geriatrics, Cancer and Neuro- psychiatric disorders
5. Maintain a responsible and critical attitude in the use of diagnostic services provided by Biochemist and Laboratory based specialists.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Identify the principles of basic, medical & health sciences.

a.2 Define the principles of liver, kidney and cardiac function in health and diseases states

a.3 Define the etiology, clinical features of Diabetes Mellitus, Disorders of metabolism of carbohydrates, protein, amino acids, lipid, Porphyrin, iron, uric acid and electrolytes.

a.4 Define the laboratory diagnosis of Diabetes Mellitus, Disorders of metabolism of carbohydrates, protein, amino acids, lipid, Porphyrin, iron, uric acid and electrolytes

b- Intellectual skills

b.1 Correlate the laboratory and clinical data for the diagnosis of the disease to follow the treatment

b.2 exercise judgment to interpret and comment on data collected during practical/clinical sessions and the interpretation of clinical case studies.

b.3 reflect on current skills, knowledge and attitudes, in order to plan and implement ongoing personal and professional development needs, relevant to clinical biochemistry and working as a professional medical laboratory scientist;

c- Professional and practical skills

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.

c.2 Carry out laboratory tests for diagnosis of various diseases

c.3 Interpret some nutrition related disease and maintain health by conducting awareness of healthy life style and adequate balanced nutrition.

c.4 apply recognized methods and tools of clinical biochemistry in a clinical/medical investigative context;

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively with specialized working team.

d.4 Carry out laboratory tests for diagnosis of various diseases

d.5 Interpret some nutrition related disease and maintain health by conducting awareness of healthy life style and adequate balanced nutrition.

A.

1. Structure of the liver
2. Carbohydrate metabolism

3. lipid metabolism
4. protein metabolism
5. Hepatocellular uptake & transport system
6. Liver function tests , Bilirubin excretion
7. Abnormality of bilirubin metabolism
8. Plasma protein abnormalities
9. Plasma enzyme test in liver diseases, Jaundice
10. Cholestasis, Infiltration of the liver & liver Cirrhosis

B.

1. Glomerular filtration rate
2. inulin clearance
3. Creatinine clearance
4. Plasma urea
5. Tubular function
6. Sodium excretion
7. Potassium excretion
8. Proteinuria
9. Acute renal failure & Chronic renal failure
10. Renal stones & renal transplant.

C.

A. Gastric , Pancreatic & Intestinal function & disorders

1. Malabsorption & Intraveneous feeding
2. Pancreatic (Exocrine) diseases

D.

1. Enzyme activities in plasma
2. LD enzyme
3. AST enzymes
4. ALT enzymes
5. Ck enzymes
6. ALP and ACP enzymes
7. GGT enzymes

E.

1. Inherited metabolic disorders
2. Parental diagnosis
3. test for metabolic disorders

F. Clinical Biochemistry in geriatrics

1. Reference values
2. Screening for disease in elderely patients

G. Biochemistry of Cancers

1. Cancers, etiology and risk factor

2. Tumour (Biochemical) markers in diagnostic and monitoring therapy
H. Neuro- psychiatric disorders

Practical part:

Serum Total bilirubin
Direct & Indirect bilirubin
Blood and urine urea
Serum and urine creatinine
Serum and urine amylase
Serum electrolyte Sodium estimations
Serum electrolyte Potassium estimations
Estimation of serum Calcium
Estimation of serum Phosphate
Estimation of serum Magnesium
Estimation of blood pH & blood gas analysis
Estimation of SGOT, SGPT, Alkaline phosphate ALP, GGT
Estimation of CK, LDH
Estimation of Chloride estimation
Hormone assays, T3, T4, TSH

7.	**ML407**	**Blood Banking**	**مصرف الدم**	**3**	**2**	**2**	

1. This course is intended to provide the student with a foundation of the fundamentals of blood bank
Focus is placed on red blood cell immunology as it relates to ABO/Rh typing procedures, antibody detection and identification techniques and compatibility testing
2. Hemolytic disease of the newborn, component therapy, transfusion reaction investigation, quality control and problem solving will be introduced.
3. Blood donor program regulations will also be introduced.
4. By the end of this course the students also should know all blood components: composition, indications, dose and infusion rate expected outcomes. and pheresis techniques.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Describe the principals involved in the blood donor selection and collection process.
a.2 List the requirements for the donation of blood; and describe the preparation, storage, and use of blood components.
a.3 Identify and list common signs and symptoms of the adverse effects of blood transfusion:
a.4 detection and identification, and compatibility testing necessary for successful patient blood transfusions.
a.5 Recognize red blood cell immunology an articulate its role in ABO/Rh blood group systems.

a.6 Demonstrate the procedures involved in ABO/Rh blood typing, antibody detection and identification, and compatibility testing necessary for successful patient blood transfusions.
a.7 List the procedures included in the routine compatibility test, and explain their purpose
a.8 Define compatibility testing and cross matching

b Intellectual skills:

b.1 Predict all suspected reactions, Follow a protocol for follow- up of reported reactions
b.2 Evaluate laboratory test results; select additional procedures to be performed; correlate test results with patient conditions; and describe the principles of and perform routine blood bank tests.
b.3 Be able to demonstrate good problem-solver skills and pay close attention to detail, as small differences can be crucial to a diagnosis.
b.4 Distinguish between direct and indirect antiglobulin tests (DATs and IATs)
b.5 Discuss the different sources of possible errors in the performance of antiglobulin testing

c- Professional and practical skills:

c.1 Be able to collect, label and store blood and blood component.
c.2 Be able to do screen potential donors, draws and maintain documentation and records
c.3 Be able to make donors comfortable during the procedure and monitor their vital signs.
c.4 check compatibility blood before issuing it out for transfusion
c.5 Read and review the procedure manual.
c.6 Perform and correctly interpret direct antiglobulin test.
c.7 Select appropriate blood for transfusion.
c.8 Select the appropriate specimen, the method of handling and storage for: Routine serologic and compatibility testing, Newborns and pediatric patients, Elective surgical patients, Emergency and crisis patients, Patients with cold antibodies, HDN exchange transfusion patients, Obstetrical patients to evaluate antibody titer and Multi-transfused patients
c.9 Apply principles of safety, quality assurance and quality control in blood banking
c.10 Be able to work in a variety of laboratory settings: Community blood centers, Private hospital blood banks, University-affiliated blood banks, Transfusion services and independent laboratories

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.
d.4 This certificate program is best for those who have successfully completed a bachelor's degree, typically in a science such as biology, chemistry or microbiology, and want to pursue the laboratory science profession without completing another bachelor's degree.
d.5 They also have exceptional communication skills when working with physicians during blood transfusion therapies and investigating harmful transfusion responses.
Topics:
Blood Transfusion Basics

- History of blood transfusion
- Parts of the blood
- Blood Donation (The blood donor)
- Other reasons preventing donation

Volume of donation.
Conditions which may disqualify a donor
Untoward effects during or shortly after venesection
Autologous Blood Transfusion, and Machines for Red cell salvage operation
Why autologous blood transfusion, Disadvantages and advantages of it,
pre- surgical autologous blood donation
testing of pre surgical autologous blood pre-operative autologous donation handling and storage
Acute Normovolemic haemodilution, intra-operative blood collection, practical considerations and concepts, and postoperative blood collection
Types of anticoagulants(Citrate, heparin, oxalate compounds, and EDTA.
Each anticoagulant with its mechanism and function and how it's working.
Expiration of stored blood components
effects of storage on blood components
options available for providing blood in emergency situation,
Blood type test
RH
basic information about Ag- Ab of ABO
Rh blood system.
Compatibility testing(cross matching)
Blood warmers, why and how do we warm it and general technician errors should not be doing during warm it.
Blood components:

- Whole blood, RBCs,
- Leukocyte
- Reduced Red Blood Cells,
- washed RBCs,

- platelets,
- fresh frozen plasma,
- cryoprecipitate,
- granulocytes,
- Factor VIII concentrate,

Plasma, immunoglobulin, and Rh immunoglobulin.
Each component in each session should have composition, indication, dose and infusion rate, and expected outcome.
Whole blood, RBCs and leukocyte reduced red blood cells. Each one composition, indication, DI, and expected outcome
Washed RBCs, platelets

- thrombocytopenia secondary to bone marrow failure
- Thrombocytopenia secondary to platelet destruction

fresh frozen plasma (FFP) Each one composition, indication, DI, and expected outcome.
Cryoprecipitate, granulocyte transfusion, plasma derived volume expanders (albumin and plasma protein fraction) Each one composition, indication, DI, and expected outcome..
Factor VIII concentrate, immunglobulins, and Rh immunglobulins Each one composition, indication, DI, and expected outcome.
New blood products of the future
Acute transfusion reaction, and common symptoms and treatments
Fibrile non hemolytic reactions

- Transfusion related lung injury
- allergic reactions
- anaphylactic reactions

Bacterial sepsis.
Delayed transfusion reaction, and post transfusion graft- versus host disease.
Other risks and complications of a blood transfusion are there alternatives to blood transfusion.
Hypervolemia
Non immune hemolysis,
Complications of massive transfusion.

Practical parts:

Blood donation (conditions, donor preparation and procedures)
Blood donation bag (content, use), CPDA: Citrate Phosphate dextrose adenine
Anticoagulants types and showing different types of tubes.
Blood storage conditions and expiration
Perform an ABO blood grouping system and Rh
Cross matching: use, materials, procedures, and reporting
Normal saline washing procedure of RBC
DU test (materials, use, procedures, reporting)

Direct & indirect coombs test (uses, materials, procedures, reporting).
Blood component separation(materials, use, procedures)
Donor blood testing for infectious disease (HIV, HBSAg, HCV).

8.	**ML408**	**Clinical Histopathology**	**علم الانسجة المريضة السريري**	**3**	**2**	**2**	

1. At the end of this course the student should know normal tissue and organ structure (histology)
distinguish different between normal tissue and pathological tissues
2. Correlation of tissue architecture with normal physiologic function, and comparison to microscopic processes and lesions observed in the diseased state (histopathology).
3. It will focus on recognition of diseased tissue as compared to normal tissue structure, as well as application of appropriate terminology and light microscopic techniques used in histologic and histopathologic analysis.
4. Comparative microscopic analysis across human and across fundamental disease processes (inflammation, necrosis, neoplasia, etc.)

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Identify and describe in details the microscopic structure of the major organs, tissues and cells of the body.
a.2 Identify all the histopathology terms
a.3 Outline the key features of a number of pathological processes.
a.4 Relate the histological appearance of affected tissues to underling pathology
a.5 Recognize the histological appearance of a number of pathological tissues
a.6 Explain the theoretical background to tissues fixation, tissue processing, microtomy and specialized techniques.
a.8 Define and correctly use terminology related to microscopes, cellular morphology (shape), tissue architecture, component parts of cells, tissues, and organs, and fundamental disease processes.
a.9 Categorize tissues into organ systems based upon epithelial or muscle type visualized and other unique characteristics.
a.10 Identify or describe the diseased area of a given tissue when given a tissue diagram or photomicrograph and a comparison “normal” tissue.

b- Intellectual skills:

b.1 Differentiate between normal and pathological tissues
b.2 Correlate anatomic and microscopic tissue structure with functional purpose in a given organ or tissue and the pathologic processes occurring to produce lesions observed

c- Professional and practical skills:

c.1 Be able to apply the histopathology techniques such as tissues fixation, tissue processing, microtomy and specialized techniques.

c.2 Be able to demonstrate proficiency in haematoxylin and eosin staining, selected special stains and immunohistochemical methods
c.3 be able to utilize the safety procedures pertinent to the histopathology laboratory
c.4 Demonstrate appropriate light microscopic techniques (operate microscope independently and show a histologic structure or lesion on a tissue section

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Introduction to histopathology. (organ system).
Neoplasia
Skin tumors- benign & malignant
The Female breast- Fibrocystic diseases, Tumors :-Benign & Malignant
Practical: Demonstration of slides:
Female breast disease
The Endocrine system disorders
Tumors : Benign & Malignant
Practical: Demonstration of slides:
Endocrine system disorder
The Osteo- articular & Muscular system
Practical: Demonstration of slides:
Osteo-articular & mascular system
Tumors of Eye
Practical: Demonstration of slides:
Tumors of eye
Diseases of the digestive system:

- Inflammatory
- benign tumours.
- Malignant tumours.

Practical: Demonstration of slides:
Digestive system disease
Diseases of the liver :

- Normal structure of the liver
- jaundice.
- Infective hepatitis.
- Bilirubin metabolism.
- Cirrhosis liver.
- Necrosis liver.

Practical: Demonstration of slides:
Biliary disease
Biliary diseases :

- Chole lithiasis.
- Chole cystitis
- Tumours of the gall-bladder.

Practical:
The pancreas :

- Pancreatitis
- tumour of pancreas
- Diabetes mellitus.
- Islet cell tumours.

Practical: Demonstration of slides:
Pancreatic disease
The urinary system:

- Normal function of kidney.
- Congenital anamolies of kidney.
- Glomerular diseases .
- Obstructive diseases.
- Renal failure.
- Tumours of the kidney

Practical: Demonstration of slides:
Urinary system disease
female genital system:

- Pelvic Inflammatory diseases.
- Acute & chronic cervicitis .
- Benign & malignant tumours of the cervix.
- Dysfunctional uterine bleeding.
- Inflammation of Fallopian tubes.
- Ovary –ovarian cyst.
- Classification of placental disorders.

Practical: Demonstration of slides:
Female genital system
Male genital tract:

- Inflammatory diseases.
- Tumours of undescended testes .
- Enlargement of prostate

Practical: Demonstration of slides:
Male genital disease
The nervous system:

- infection.
- tumours.
- degenerative diseases.

Practical: Demonstration of slides:
Nervous system disease
Practical: Demonstration of Histo-pathology techniques:
- Tissue processing
- Tissue embedding
- Trimming & microtomy

Staining & Mounting

9.	**ML409**	**Clinical Training - II**	**التدريب السريري 2**	**6**	**-**	**12**	

1. To train students of various medical faculties on basic skills, in all educational stages prior to the clinical stage
2. Clinical laboratories are healthcare facilities providing a wide range of laboratory procedures which aid the physicians in carrying out the diagnosis, treatment, and management of patients
3. To provide a stimulating atmosphere for the laboratory staff.
4. Allows for practice of hematology analytical skills and correlation of laboratory findings with patient symptoms and clinical history

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 To carried out the quantitative measurement, or qualitative assessment, of any substance which can be assayed in any type of biological fluid of any animal species, thus including humans, for either medical or research purposes

a.2 Understand use of a vast array of analytical methods, especially including – though not essentially limited to – colorimetric, enzymatic, turbidimetric, electrochemical, immunochemical, separation, nuclear magnetic resonance, cytochemical, clotting, molecular, cytogenetic and flow cytometry techniques

a.3 Appropriate use of laboratory testing is essential for achieving safe and effective care to patient

a.4 Syllabus for undertgraduate education and training for Specialists in Laboratory Medicine" for garnering specific indications on the skills, knowledge and competence of specialists in Laboratory Medicine

b- Intellectual skills:

b.1 Enhancing mastery of science subject matter, developing scientific reasoning abilities, Laboratory training is also frequently used to develop skills necessary for more advanced study or research

b.2 Increasing understanding of the complexity and ambiguity of empirical work, developing practical skills, increasing understanding of the nature of science, cultivating

b.3 Data analysis skills, Most experiments yield large amounts of data. The medical laboratory scientist will need to be adept at multiple data analysis techniques in order to handle the data and draw a conclusion from it. Most data analysis is done with the assistance of computer software.

c- Professional and practical skills:

c.1 Distinguish normal and abnormal laboratory findings to predict the diagnosis of vast majority of disorders and diseases

c.2 To demonstrate competence in the performance and interpretation of several tests, by automated or manual techniques with appropriate quality control.

c.3 Be able to provide a clinical opinion on results and advice on the management of patients and there is an absolute need for medical consultants to provide the clinical competency for laboratory services for the foreseeable future. This is in addition to providing direct clinical care for patients with disorders

c.4 Work safely in a laboratory and beware of potential hazards and their associated risk

d- General and transferable skills:

d.1 Each students will spend at least four hours on Tuesdays to work in lab by themselves

d.2 By the end of this course they should be able to collect sample, analyzing and record the results

d.3 Ability to work with clients, also ability to learn quickly

Basic medical laboratory skills
Haematology
Stool analysis
Blood Bank
Clinical Biochemistry
Clinical Histopathology
Microbiology
Immunology
Safety skills
Serology

10.	**MT401**	**Research Project**	**مشروع البحث**	**3**	**2**	**2**	

Course aims:

1. During this course, the students should know how to handle and develop specific research problem and then put forward the idea of research.
2. Preparing for scientific research methodology and research planning.
3. Data collection and analysis
4. Solve problems that hinder the method adopted in the search.
5. Results tab and develop scientific solutions to the problem of finding.
6. Writing a final report and then present and discuss the results in the form of scientific

research reached by the student through research and throw him in the form of a seminar.
7. Develop the skills necessary to undertake a research project
8. Assist the student in identifying appropriate research topics and methodologies.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Identify the essential steps the usage of library and electronic search
a.2 Know types of scientific papers, thesis and journals
a.3 Learn the classification of collected information in priority order
a.4 Design a complete and basic research proposal.
a.5 know how to collect and analyze data
a.6 Know how to write a final research format and present it
a.7 Know how to use relevant scientific literature.
a.8 Identify the suitable experimental methods that used to solve a given scientific task

b- Intellectual skills

b.1 Be able to Analyze data and synthesize research findings
b.2 Be able to show independence, critical and creative thinking
b.3 formulate new scientific questions that came up during project performance
b.4 Independently gain the necessary knowledge to undertake meaningful research
b.5 To acquire and critically assess original source references from databases and libraries [published scientific papers, books, etc.]
b.6 Articulate the contributions of qualitative and quantitative methods to a specific discipline such as environmental health research
b.7 Be able to draft an academic paper appropriately structured for publication
b.8 To assess the significance of project outcomes against what is already known in the area of your project topic via a critical assessment of the literature

c- Professional and practical skills

c.1 Conduct practical research
c.2 Be able to perform a research project according to an individual study plan
c.3 Be able to present and discuss the research results with colleagues and senior researchers
c.4 Be able to show a professional attitude regarding time planning, collaboration, and the link between theoretical and practical knowledge
c.5 The student shall be able to perform the project work in an ethical correct manner
c.6 The student shall be able to reflect upon and discuss the relevance of the work in written and oral form
c.7 The student shall be able to work independently and plan and organize effectively to achieve the project goals
c.8 Apply tools of research preparation including problem formulation, undertaking a literature review, research designs, developing a hypothesis, ethical implications, time management, and assessing resourcing implications

c.9 Be able to communicate the project outcomes in a final written report
c.10 be able to collaborate with project partners (internal and external) and with other research group members
c.11 To systematically and contemporaneously record the project work carried out in a paper (hard-bound) or electronic notebook
c.13 To use research and write background material and use advanced research methods and techniques to conduct a scientific investigation

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Draft an academic paper appropriately structured for publication.
d.5 Perform basic data management tasks and analyses using a computer

Topics:

Conduct practical research
Collect data
Analyze data
Trouble shooting
Write research progress reports
Write a final "paper" format with presentation in form of seminar

Radiology Department

Second year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	RD201	Radiation Chemistry	الكيمياء الاشعاعية	3	2	2	

Course aims:

1. Provide knowledge of the basics of classical and molecular radiation chemistry.
2. Provide the student with the basics of radiation chemistry, physical chemistry of

radiation,
3. Illustrates the interaction of particles with matter, decay series and the main sources of radionuclides

Intended learning outcomes (ILOS):

a- Knowledge and understanding

b.1 Recall the chemical and physical basis of radiation and radioactivity.
b.2 List the different ways by which radiation particles may interact with matter.
b.3 Recognize the ways by which photons may interact with matter
b.4 List different types of radiochemical techniques.
Recall the different methods of radioisotopes production

b- Intellectual skills

b.1 Differentiate between types of ionizing radiation.
b.2 Compare different aspects of interaction of particles with matter.
b.3 Review the analytical applications of nuclear reactions.
b.4 Distinguish the chemical reactions underlying the production of radionuclides

c- Professional and practical skills

c.1 Solve problems involving basic units of radiation and radioactivity
c.2 Apply some radioanalytical techniques.
c.3 Demonstrate different methods and equipments used for production of radionuclides.
c.4 Illustrate short lived radionuclides and their medical uses.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

An Overview of radiation chemistry of liquids

- Radiation chemistry of water
- Radiation chemistry of organic liquids

Aqueous solution

- Properties of the primary radicals from water radiolysis
- Generation of secondary radicals
- One electron reduction and oxidation in organic solvents
- Alcohols, Chlorinated hydrocarbons,

Acetonitrile, Hydrocarbons
Tools for radiolysis studies

- Types of ionizing radiation and their methods of generations X- and γ-rays

Particle accelerators for radiolysis

- Experimental detection techniques for ultrafast radiolysis

Heavy ion sources
Chemical structure of Carbohydrates
Monosaccharides
Disaccharides
Polysaccharides
Radiosterilization of drugs
- Nature of Sterility
- Sterilization methods
- Steam or dry heating
- Filtration

Gas sterilization
- Aseptic processes Radiosterilization
- Radiosterilization Advantage
- Radiosterilization Disadvantage
- Dose distribution
- Solid state sterilization
- Aqueous solution sterilization
- Radioprotection of drugs-

Frozen aqueous solutions
Radiation damage to DNA
- From model compounds to cells
- Radiation induced degradation pathways of DNA monomers
- OH radicals induced damage to nucleobases,

One electron oxidation reactions
- Radiation induced damage to oligonucleotides and double stranded DNA
- Sugar damage
- Radiation induced base damage within isolated DNA

Tandem lesions
- Charge transfer
- Radiation Induced damage to cellular DNA
- Radiation induced DNA damage in cells,

Clustered damage
Genome maintenance mechanisms in response to radiation induced DNA damage
- Excision repair pathways for removing base damage
- Base excision repair
- Double strand base repair by homologous recombination

and non-homologous end joining
- Mutagenesis
- Chemistry and structural biology of DNA glycosylates

Nucleoside chemistry to obtain stable complexes of Fpg bound to DNA,

- DNA binding and nucleobases flipping by Fpg,
- Fpg recognition mode of FpgyG residue

Mechanism of catalyzing N-glycoside bond cleavage.
Pulse radiolysis study of free radicals processes in peptides and proteins

- The simplest amino acids,
- Glycine
- From amino acids to proteins
- Thiyal radicals, Disulfide radicals,

One electron oxidation of methionine

- Thiyal radicals
- Disulfide radicals

One electron oxidation of methionine
Radiation Induced damage of membrane lipids and Lipoproteins

- Composition of membrane lipids
- Lipid aggregates and model systems

Water radiolysis

- Water radiolysis
- Radical chain mechanism of lipid peroxidation

Quantitative determination of hydro-peroxides

- Inial markers of lipid peroxidation In micelles
- In liposomes
- Oxidative fragmentation of lipids

Peroxidation of low-density lipoproteins
Predicting radiation damage distribution in biomolecules

- RADACK (An original model of radiolytic attack to biomolecules)

Sequence and structure dependent damage distribution in free DNA

- Protection of DNA by a specifically bound protein (radiolytic foot-printing)

Protection of protein by the specifically bound DNA
Chemical protection against ionizing radiation

- Chemical protection against radiation

Criteria for an efficient radioprotector

- Organometallic radioprotectors

Phosphorous radioprotectors

2.	**RD202**	**Principles of Radiation**	**مبادئ الاشعاع**	**4**	**2**	**4**	

Course aims:
1. Define the glossary of radiology terms.
2. Explain the basic of radiologic imaging modalities in relation major components and operation.
3. Understand briefly the advantages and disadvantages of the imaging modalities.

4. Identify the importance of the imaging modalities such as CT ,NM ,US and, MRI units ,and their relationship with the main X- ray department
5. Describe the departmental management and function of radiology department.
6. Outline the basic components of the X-ray tube.
7. Recognize the basic concept and the cardinal principle of radiation protection.
8. Improve their abilities to communicate effectively both verbally and written.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Explain the basic concept of different modalities in radiology department.

a.2 Outline the basic principles concepts to use minimum radiation exposure and protect the patients and other from high doses

b- Intellectual skills

b.1 Engage with the principals for the tasks of analyzing& evaluating the information that related to different types of imaging modalities.

c- Professional and practical skills

c.1 Demonstrate well development cognitive skills for the analysis of the complex information in different modality images.

c.2 Apply and understand effectively the advance modalities in radiology departments.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

Overview to nature of our surroundings
and discovery of radiation
Classification of radiation

- Ionizing
  - Electromagnetic radiation
  - Particulate radiation

Non-ionizing radiation
Definition of radiology

- Development of radiology
- Uses of radiology
  - Diagnosis
  - Therapy

Meaning of radiographers
Basic principle of general x-rays

- X-ray

- Advantages
- Disadvantages

How image obtained

- Properties of x-rays
- Basic physics of x-ray imaging
  - The nature of x-rays

Wavelength and frequency

- Propagation of x-rays
- Refraction of x-rays
- Diffraction of x-rays

Generation of x-rays

Concept of x-ray production

- A bit of history
- Types of x-ray equipment

Features of x-ray equipment

- X-ray tube design
- X-ray production

X-ray tube and x-ray emission

- X-ray unit components
  - Control console
  - High voltage generator

X-ray tube

- Collimator
- Grid
- Bucky

X-ray film

- X-ray generated
  - Characteristic radiation

Bremsstrahlung radiation

- X-ray spectrum

Factors affecting the x-ray emission spectrum

- Applications of x-ray

Principles of fluoroscopy

- An overview on fluoroscopy
- Fluoroscopic technique

Fluoroscopic image monitoring

- Fluoroscopy quality control
- Fluoroscopic clinical applications

Principles of mammography

- Soft tissue radiography
- Basis for mammography
  - Type of mammography

The mammographic imaging system
Principles of computed Tomography
- Introduction and definition

Basic principle of CT
- Advantages
- Disadvantages

Clinical application of CT
Principles of MRI
- Introduction and definition
- Physical principles of MRI

Comparison with radiography
- Comparison with CT
- Limitation and advantages of MRI
- Clinical applications of MRI

Basic safety considerations
Principles of Ultrasound
- Introduction and definition

Physical principle of US
- Limitation and advantages of US

Clinical applications of US
Diagnostic and therapeutic modalities
- Diagnostic modalities
  - Definition of gamma camera
  - Definition of PET
- Therapeutic modalities
  - Definition of External beam irradiation

Brachytherapy
Practical:
Introduction to principle of Radiation
Types of radiation
X-ray
x-ray equipment
x-ray tube design
Control console and generator
x-ray tube and collimator
Grid and Bucky
applications of x-ray

fluoroscopy unit
applications of fluoroscopy
mammography unit
CT unit
applications of CT
MRI unit
applications of MRI
US unit
clinical applications of US

3.	**RD203**	**Medical Terminology**	**علم المصطلحات الطبية**	**2**	**2**	**-**	

Course aims:

1. Provide knowledge and understanding the basic medical terms.
2. Understand the prefix, suffix of different medical terms, and introduce concepts of various diseases within the same organ in the body.
3. Provide all common terms of CNS, CVS, GIT, respiratory, blood and urinary systems….etc
4. Introduce fundamental knowledge of anatomy of organ, signs, symptoms and treatments of various diseases.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the principles of basic medical laboratory as well as common medical terms in laboratory practice.
a.2 Define the principles of body function in health and diseases states; as well as the etiology, laboratory diagnosis, signs, symptoms and therapeutic approaches for different disease within the same organ
a.3 Define the proper medical terminology, abbreviations, prefix, suffix, and symbols in health reports and laboratory practice.
a.4 Recall the basic terms used in medical reports.
a.5 List suffixes, prefixes, and word roots common to medical terminology
a.6 Identify and list the most common used medical abbreviation

b. Intellectual skills:

b.1 Correlate between different medical terms used in medical reports.
b.2 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.
b.3 Correctly use medical terms when given the suffix, prefix, and word root

c. Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care

professionals.
c.2 Employ proper documentation of terms described the anatomy, function and pathology of specific organ.
c.3 Recognize the basic concepts of medical terminology science to medical laboratory students.
c.4 Recognize the prefix and suffix of any new medical term.
c.5 Distinguish between different signs and symptoms of each body organ.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with patients and other health care professionals.
d.2 Interact effectively in team working.
d.3 Present information clearly in written, electronic and oral forms.
d.4 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.
d.5 Support patient, lab technicians and health care.

Topics:

Introduction to medical terminology
Medicine and its history
Suffixes mean condition of
Suffixes for medical
Plural endings
Prefixes
Prefixes for numbers
Prefixes for colors
Negative Prefixes
Prefixes for direction
Prefixes for degree
Prefixes for size and comparison
Prefixes for time
Prefixes for position
Common roots used in medical terminology
Common roots used in medical terminology
Body Structure: Integumentary System
Gastrointestinal (Digestive) System
Respiratory System
Musculoskeletal System
Cardiovascular System, Blood and Lymphatic System
Urinary System, Female Reproductive System, Male Reproductive System
Endocrine System
Nervous System, Special Senses

Disease
Name that disease
Common infection organism
Response to disease :inflammation ,phagocytosis, immunity…ect
Neoplasia
Case study
Common prefixes used in medicine
Common suffixes used in medicine
Medical abbreviations

4.	**RD204**	**Radiation Biophysics**	**الفيزياء الحيوية الاشعاعية**	**4**	**2**	**4**	

1. This course lists the basic concept of quantities, units and radiation measurements .
2. It discusses the principle of theory of electromagnetic radiation, atomic structure, radioactive decay, interaction of radiation and energy transfer
3. It applies physics methods and theories to understand how biological or biological systems work, where biophysics is important in understanding how the molecules of matter are formed, and how the different parts of the cell move and work.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 The student must apply the theories used in the structure of the atom
a.2 The student should know the basic units and physical quantities
a.3 The student must enumerate the units used in the radioactive measurements

b- Intellectual skills

b.1 It also distinguishes between mechanisms of energy transfer from gamma rays
b.2 The student must differentiate between interaction of radiation and interaction of charged with matter
b.3 The student distinguishes between negative and positive electron emission decay

c- Professional and practical skills

c.1 After understanding and recognizing the importance of Compton processes in tissue systems, so biophysics is a science concerned with the application of physical theories and methods related to the human body and medicine as it relates to the study of devices and their uses, and
c.2 the study of devices' configurations and uses on the human body in order to make physiological or pathological discoveries within the human body.

d- General and transferable skills

d.1 Practice independent learning needed for continuous professional development.
d.2 Communicate clearly by verbal and written means with teaching staff during the learning process
d.3 Interact effectively in team working.

Topics

Quantities and units

- Fundamental units
- Derived units
- Special units

Radiation Measurement

- Definitions
  - Directly ionizing particles
  - Indirectly ionizing particles
  - Gamma rays
  - X-rays
- Quantities and units
  - Exposure
  - Dose (absorbed dose)
  - Energy imparted
  - Equivalent dose
  - Relative biological effectiveness
  - Particle fluence
  - Particle flux density
  - Energy Fluence
  - Energy flux density
  - Kerma
  - Linear energy transfer
  - Charge particles equilibrium

Radioactive Measurements

- Decay constant
- Activity

Electromagnetic Radiation

- Quantum theory of electromagnetic Radiation
- Special relativity
  - Mass- energy equivalence (Einstein's formulations)
- Atomic structure
  - Thomson charge cloud model
  - Rutherford's planetary model of the atom
  - Rutherford-Bohar model of the atom

Radioactivity

- Units of radioactivity
- Law of radioactivity
  - Definition od activity
  - Mean life

- Radioactive decay of mixtures
  - Chain decay
  - General cases for chain decay
  - Secular equilibrium
  - Transient Equilibrium
  - Nonequilibrium
- Branching Decays process
- Charting of decay schemes
- Nuclear stability
- Nuclear mass and Binding energy
  - Mass defect
  - Mass decrement

Radioactive decay by Alpha particle emission

- Properties of Alpha Decay

Negative electron emission Decay

Positive electron emission Decay

- Annihilation Reaction

Decay by electron capture

Internal conversion

- Auger electron

Interaction of Radiation with matter

- Linear attenuation coefficient
- Energy transfer and energy absorption
- Mechanisms of energy transfer from gamma rays
  - Photoelectric scattering process
- Compton scattering process
- Pair production
- Bremsstrahlung

Energy transfer processes

- Importance of the Compton process in tissue systems
  - Total attenuation coefficient
  - Total Attenuation coefficient for mixtures
  - Energy transfer and energy absorbed relationship

Interaction od charged particles with matter

Final steps in energy absorption

- Multiple collision energy transfer
- Photoelectric process
- Direct collision
- Bremsstrahlung generation

Neutron interaction in tissue

- Elastic scatter
- Inelastic scatter
- Nonelastic scatter
- Neutron capture
- Spallation
- Kerma and dose from neutron

Track structure and microdosimetry

- Linear energy transfer
- Local energy density

5.	**RD205**	**Patient Care**	**العناية بالمريض**	**3**	**2**	**2**	

Course aims:

1. Transfer disabled patient to and from the x-ray table for examination.
2. Protect the patient and other personals from unnecessary radiation.
3. Perform first aid in the department
4. Perform CPR if needed.
5. Take care of patient in the X-ray department.
6. Properly handle sterilized objects and how deal with infected patients.
7. Assess the patient's vital signs.
8. Understand the different types of shocks and reactions.
9. Apply the necessary method of moving the patient_
10. Understand risks and hazards in the Radiology department.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Integrate theoretical knowledge in different perspectives of the patient care procedures as well as the infection control process

a.2 Outline the appropriate care and safety for the different patient attitudes during the procedures of routine & special imaging modalities,

b- Intellectual skills

b.1 Care the patients ethically with high moral standards in personal and public attitudes along through the radiographic setting

b.2 Synthesize current evidence and clinical reasoning in planning, implementing, and coordinating patient-centered care.

c- Professional and practical skills

c.1 Operate the care equipment and accessories in the different practices to ensure the patient safety.

c.2 Apply the basic principle of research and evidence-based approach for routine and emergency cases.

c.3 Apply the appropriate procedures necessary for the patient care as well as solve the care problems arising during the practice

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

Scheduling & Sequencing Exams
Legal Aspects of Radiography
Patients' rights.
Intentional misconduct
Unintentional misconduct/negligence
Ethical Principles
Charting
Patient history
Preparing for transfer
Patient positions
Infection Control
Standard Precautions
Techniques for Infection Control
Disinfection
Asepsis
Handling Biohazardous Materials
First Aid Guidelines
Medical Emergencies
Shock
Diabetic Emergencies
Syncope – Fainting
Wounds
Support Equipment
Routes of Administration
Practical Part
Infection prevention and control principles
Hand washing
Use of personal protective equipment (PPE)
Medical Disinfection
Medical Asepsis
Proper body mechanics and safe lifting
Counting a respiration
Taking a radial (wrist) pulse
Taking a temperature by axilla

Taking a blood pressure
Positioning
Administering intravenous injections
Cardio – Pulmonary resuscitation
Administering intramuscular injections
Intravenous therapy
First Aid Guidelines

6.	**RD206**	**Radiographic Anatomy**	**التشريح الاشعاعي**	**3**	**2**	**2**	

1. The course discusses mainly the basic principles and fundamental concepts of radiographic of different body organ systems (cardiovascular system - Respiratory system – Digestive system –Urogenital system –Central nervous system & Musculoskeletal system.
2. Describing the major anatomical structures for each body system.
3. It also covers the radiographic appearance of each system using different radiographic modalities & in different radiographic projections.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

1. Identify the basic concepts of normal radiographic anatomy related to different body regions and cavities on different radiographic projections
2. Identifying major anatomical structures for each body system on drawings
3. The student distinguishes and knows all parts of body system
4. The student will demonstrate knowledge of structure organization.

b- Intellectual skills

b.1 The student will classify the bones.
b.3 The student distinguishes and knows all parts of the body.
b.3 The student able to classify determine the site of joints .
b.4 Compare& correlate between radiographic &Cross sectional anatomy of all human systems using different radiographic protocols &planes.

c- Professional and practical skills

c.1 The student distinguishes and classifies the joints.
c.2 The student will identify and describe the main anatomical structures of each body system.
c.3 The student will uses of anatomical models . And learn the nomenclature for the parts of the body
c.4 The student gets to know Various plastic models and Charts (Bones , Human Body Systems, etc

d- General and transferable skills

d.1 Practice independent learnin g needed for continuous professional development
d.2 Communicate clearly by verbal and written means with teaching staff during the

learning process.
d.3 Interact effectively in team working.

Topics

Introduction to General anatomy

- Structural organization
  - Cells
  - Tissues
  - Organs
  - System

Organism

Introduction to Systemic Anatomy

- Body Systems
  - Skeletal System
  - Circulatory System
    - Cardiovascular organs

Lymphatic organs

  - Digestive System

Muscular System

  - Respiratory System

Urinary System

  - Reproductive System
    - Female
    - Male

Nervous System

  - Endocrine System

Integumentary System

Skeletal Anatomy

- Osteology
  - Classification of bones
  - Long bones
  - Short bones
  - Flat bones
  - Irregular bones

Composition of bone

  - Development of bones
  - Blood cell production

Bone formation

  - Classification of adult skeleton

1. Axial Skeleton
   - Skull

o Cranial Bones
Facial Bones
 Vertebral Column
o Cervical spine
Thoracic spine
o Lumbar spine
o Sacrum
Coccyx
o Bony thorax
o Sternum
Ribs
2. Appendicular Skeleton
 Shoulder Girdle
Humerus
 Elbow joint
Forearm
 Wrist
Hand
 Pelvic Girdle
 Femur
Hip bone
 Knee joint
Leg
 Ankle
Foot
Skeletal Anatomy
 Arthrology
 Classification of joints
o Functional
o Structural
 Fibrous joints
 Cartilaginous joints
Synovial joints
Respiratory system
 Larynx
 Trachea
 Bronchi
Lungs
Abdominal Organ systems
• Digestive System

- Oral cavity
- Pharynx
- Esophagus
- Stomach
- Small intestine

Large intestine

- Spleen
- Pancreas
- Liver

Gallbladder

Urinary system

- kidney
- Trachea
- Bronchi

Lungs

Female reproductive system

- Vagina
- Uterus
- Uterine tube

Ovaries

7.	**ML203**	**Basic Pathology**	**اساسيات علم الامراض**	**3**	**2**	**2**	

1. Definition of pathology and diseases, aetiology
2. Explain the basic nature of disease processes from standpoint of causation,
3. Definition of pathology specimens and methods of pathological studies and their relation to clinical aspects
4. Discuss tissue injury and diseases processes, using appropriate vocabulary.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Provide the knowledge, technical skills to medical students to understand human disease.

a.2 Illustrate the molecular and cellular response of the living body when exposed to injurious agent

a.3 Recognizing key of congenital, haemodynamic, inflammatory, infectious. Moreover, developing knowledge needed to interpret laboratory data

a.4 Describe the mechanisms of pathological alterations

b. Intellectual skills:

b.1 By the end of studying this course, the graduate should be able to;

Differentiate between tissue/organ appearance in health and diseased specimens

b.2 Score good selection of tissue specimens for pathological diagnosis on print finger bases
b.3 Integrating and predicting the prognosis and sequllae of diseases
b.4 Analyse various gross and microscopic pathologic data resulting from the general pathological process.

c. Professional and practical skills:

c.1 Collect the experience in gross examination, sampling and reporting
c.2 Perform good management in microscopy and description of different changes in different tissues
c.3 Use the light microscope to examine and identify microscopic findings of some selected examples of studied diseases
c.4 Prepare the graduate to get the ability of decision making

d. General and transferable skills:

d.1 Demonstrate the ability of problem definition
d.2 Utilize the computer, microscope and internet. Therefore, will Increase the ability of problem solving
d.3 Utilize the pathology as a diagnostic tool
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Introduction to pathology
Practical: 1. Machines and reagents used.
2. Types of stains
Cell injury and adaption
(Causes& mechanisms)
Morphology of cell injury)
Practical: Demonstration on slides
• Morphology of cell injury
• Necrosis
•Lysosomes: hetrophagy and autophagy, Causes and mechanisms
•Intracellular accumulations
•Lipids and other intracellular accumulations.
Practical: demonstration on slides
• Intracellular accumulations
• Fatty change
• Intracellular accumulations
• Lipids and other intracellular accumulations
Practical: demonstration of slides
• Cellular adaptation
• Hypertrophic tissue

• Cellular adaptation of growth and differentiation
• Pathologic calcification
Practical: demonstration of slides
• Hyperplastic tissue
Inflammation :
• Acute inflammation
• Vascular change and cellular events
• Chemical mediators of inflammation
Practical: acute inflammation
• Margi nation of leucocytes
• Cellular elements of exudates neutrophils, eosinophil
• Chronic inflammation
• Definition and causses
Practical: chronic inflammation
• Monocytes
• Macrophages
• Lymphocytes
• Chronic inflammation cells
• Granulomatous inflammation
Practical: chronic inflammation
• Plasma cells
• Giant cells
• Granuloma
• Tuberculosis granuloma
Role of lymphatic and lymphoid tissue
• Systemic manifestations of inflammation
Tissue renewal &fibrosis
• Cell growth.
• Regeneration.
• Cutaneous wound healing.
Practical: Repair in wound healing
• Granulation tissue
• Hymodynamic Disorders
• Oedema
• Hyperemia or congestion.
Practical: Oedema/ Congestion tissue
Disorders of vascular flow and shock
• Thrombosis
• Embolism
Practical: Thrombosis/ embolism

• Infection
• Shock

8.	**MT201**	**Computer**	**الحاسوب**	**3**	**2**	**2**	

1. This subject prepares a student for basic knowledge using computer to solve data processing problems in daily life.
2. To provide opportunity for the study of modern methods of information processing and its applications.
3. To encourage an understanding of the implications of computers in the modern world
4. To provide opportunity for the study of modern methods of information processing and its applications.
5. To encourage an understanding of the implications of computers in the modern world

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Students should be able to show an awareness of what the major computer components are and how they act as system
a.2 Show an awareness of the effects and impacts of computers on the individual and the society.
a.3 Show an awareness of the capability and limitations of computers.
a.4 Students after completing this subject should be using computer applications easily.
a.5 Defines the basic concepts of the contemporary computer, and shows its different forms and influence in different areas of life
a.6 Learn about the computer system with its physical and software components and their impact on the classification of computer devices
a.7 Identify the types of operating systems.
a.8 Explains the impact of the Internet and networks revolution and Identifying recent trends in the internet world
a.9 Learn about Microsoft windows XP and knowing the Principles of Microsoft windows, Desktop, Anatomy of a window.
a.10 Learn about basic concept of Microsoft ward, Microsoft PowerPoint, Microsoft Excel and knowing their principles.

b. Intellectual skills:

b.1 The student able to identify a problem, analyze the details of the situation, and then formulate an effective solution is an incredibly important aspect of computer science work.
b.2 Be able to demonstrate problem-solving skills

c. Professional and practical skills

c.1 Students should be able to use the personal computer with Windows (7, XP) with confidence, and the ability to use its available facilities
c.2 Students should be able to search information by the internet
c.3 Be able to demonstrate a basic understanding of computer hardware and software.

c.4 Students should be able to utilize Microsoft windows XP. In addition, they supposed to be able to deal with Microsoft windows commands easily, such as: Copy, paste, and cut command, Saving file on desktop, Moving file to folder, Deleting folder, Remove file from folder to folder.
c.5 Students should be able to write documents by Microsoft word and using all the available features such as: Grammar check, Editing and formatting a document, Moving and copying text with a document , Paragraph formatting Column formatting , Inserting a figure, Inserting table, Inserting chart, Inserting picture
c.6 Students should be able to use Microsoft Excel and learn How to modify and format a worksheet.
c.7 Students should be learn to Basic concept of Microsoft PowerPoint such as:creating , enhancing a presentation and Connecting of computer to a data show and how to use function of data show.

d- General and transferable skills

d.1 Work effectively in teams
d.2 Using computer proficiently
d.3 search information by the Internet easily
d.4 Deal easily with Microsoft word, PowerPoint and Excel proficiently
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Essential computing concepts
• Meaning of computer
• Hardware of a PC
• computer software
• Introduction to networks
• Computer Programming Languages
• Operating System
Microsoft windows XP
• Principles of Microsoft windows
• Desktop
• Anatomy of a window
• How to use the help and support center
• 1Deference between folder and file
• Using windows explorer
• Copy, paste, and cut command
• Saving file on desktop
• Moving file to folder
• Deleting folder
• Remove file from folder to folder

• How to use USB
• How to use CD and DVD
Internet explorer and www
• Discusses the importance of www
• Connect to the internet
Difference between search engines
Microsoft word
• An overview on the basics of word processing
• How to use spell check
• Grammar check
• Use thesaurus
• Editing and formatting a document
• How to use the undo and redo commands
• Moving and copying text with a document
• Paragraph formatting
• Column formatting
• Inserting a figure
• Inserting table
• Inserting chart
• Inserting picture
Microsoft Excel
• Introduction to spreadsheets
• How to modify and format a worksheet
How to use a function
How to create and modify tables
How to create and modify a chart
How to create and modify report
Microsoft PowerPoint
• Basic concept of creating and enhancing apresentation
• How to use slide show tools and digital photography
• Tips to avoiding the drawback of bad slides; slide structure, fonts, color, etc..
• Connecting of computer to a data show and how to use function of data show

9.	**BE208**	**Mathematics I**	**الرياضيات**	**2**	**2**	**-**	

1. Learn to think about problems mathematically and solve problems independently
2. Be able to state and explain basic calculus definitions and theorems
3. Help student to be aproblem solver
4. Understand concepts and developing skills to calculate, analyze and interpret results
5. Understand the major problems of differential and integral calculus
6. Understand the important applications of the concepts

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 understand the meaning of the derivative interms of the rate of change *

a.2 understand the relationship between derivatives and integrals

a.3 understand the meaning and the important applications of the concepts

a.4 understand the relationship between the process and its inverse

a.5 understand the meaning and the important applications of the concepts

a.6 demonstrate knowledge of curve sketching

b- Intellectual skills

b.1 recognize other important functions as logarithmic and exponential functions

b.2 introduce mind to the scientific methods of analysis

b.3 learn to think about problems mathematically and to solve problems independently

c- Professional and practical skills

c.1 analyze and evaluate limits graphically, numerically and analytically

c.2 evaluate definite integrals using Fundamental Theorem of Calculus

c.3 analyze functions for continuity and differentiability

c.4 use the differentiation techniques to find the derivative of the function ,tangent lines, normal lines and rate of change

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 General Skill hone the ability to do reality checks on calculations

Topics

The rate of Change of a function

- Coordinates & Increments.
- Slope / Equation of a straight line .

Functions and graphs.

- Domain and range.

Way of combining functions.

- Derivative of a function.
- Velocity and rates.

Slope of a curve.

Limits

Definition of the limit of a function.

- Theorems about limits.
- Infinity.

Derivatives of algebraic functions

- Polynomial and composite functions.

Parametric function.

- The differential dx & dy.

Second & higher order derivatives.

- Trigonometric functions.

Inverse functions.

- Exponential & logarithmic functions.
- Partial derivatives & continuity.

Applications

Increasing or decreasing functions.

- Significance of the sign of the secondary derivative.

Curve plotting.

- Maximal & minimal theory.

Integration

- The indefinite integral & applications

The general properties of the indefinite integral.

Integration of trigonometric function.

Methods of integration

- Basic formula.

Power of trigonometric functions.

Integrals with different terms.

- Integration by parts.

Area under curve by calculus.

o Computation of area as limits.

Geometrical applications of the definite integral

Plane area between two curves

o Distance.

Volumes & solids of revolution.

- Surfaces of revolution.
- Length of a plane curve.
- Calculus Of variations, Lagrange's equations,

Third year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	RD301	Patho-Anatomical Radiology	التشريح المرضي الاشعاعي	3	2	2	

Course Aims:

1. This course will provide students a unique opportunity to learn the anatomy of human

body and related pathology in the context of multiple different projections
2. In addition, it will focus on routine and special projection of trauma and not trauma conditions.

Intended learning outcomes (ILOS):

a-Knowledge and understanding

a.1 Know anatomy, patient positioning, examination techniques, equipment protocols, radiation safety, radiation protection and basic patient care. Many radiologic technologists specialize in a particular area of medical imaging, such as mammography or computed tomography (CT scans).

a.2 Know muscular, skeletal, respiratory and skin systems, plus organ and system names, their locations, and their specific functions. Because imaging can affect the human body, it's important to know about diseases and conditions that exist before imaging takes place.

b- Intellectual skills

b.1 Communication skills required for direct patient care

b.2 Entry-level technical skills in radiologic technology

b.3 Basic abilities, employability skills, and an appreciation for the value of lifelong learning.

b.4 Critical thinking and problem solving skills.

c- **Professional and practical skills**

c.1 The ability to manipulate portable imaging equipment and other medical/technical equipment.

c.2 The ability to physically operate all types of imaging equipment.

c.3 The ability to orally communicate in English.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 the ability to work well with others

Topics

Introduction to the main projections of chest, abdomen and pelvis

Introduction to the main projections of upper limbs

Routine of chest x-ray

- PA
- Lateral
- AP

Special projections of chest x-ray

- Lateral decubitus

- AP lordotic
- Anterior oblique
- Posterior oblique

Routine and special projection of abdomen

- PA supine
- PA prone
- Lateral (AP)
- AP erect,
- Dorsal decubitus (lateral)
- Lateral

Routine and special projection of pelvic

- AP pelvis
- AP bilateral
- AP axial outlet
- AP axial inlet

Routine and special projection hip and proximal femur

- AP unilateral hip
- Axiolateral, inferosuperior
- Unilateral frog leg mediolateral
- Modified Axiolateral

Routine projection of fingers

- PA
- PA oblique
- Lateral

Routine projection of thumb

- AP
- PA oblique
- Lateral
- AP, Modified Robert's method
- PA stress

Routine projection of hand

- AP
- PA oblique
- Fan Lateral
- Lateral in extension and flexion
- Bilateral AP oblique

Routine projection of wrist

Routine and special projection of forearm

Routine and special projection of elbow
Routine and special projection of humorous
Routine and special projection of shoulder (nontrauma)
Routine and special projection of shoulder (trauma)
Routine and special projection of clavicle and AC joints
Routine projection of scapula

2.	**RD302**	**Diagnostic Radiology**	**الاشعة التشخيصية**	**4**	**2**	**4**	

Course Aims:

1. This course discusses the essential concept of radiologic science and the standard units radiation measurement. In addition, it has introduced the structure of matter and how they interact with the different types of ionizing radiations.
2. During the practical part this course has provided a great knowledge about different x-ray imaging system, x-ray production, x-ray emission, and the concept of image quality. Furthermore, it outlined the advanced diagnostic modalities available in modern radiology department.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the different types of ionizing radiation.
a.2 Recognize X-ray machine construction and components.
a.3 Understand the standard units and measurement that have been used in radiologic units.

b- Intellectual skills

b.1 Identify the basic concepts of X-Ray production and interaction.
b.2 The student understands how rays interact with matter.

c- Professional and practical skills

c.1 Recognize the types of X-ray generators.
c.2 Operate the x-ray tube, accessory devices and procedures to produce high quality beam.
c.3 Identify the principles of operation and components of X-ray tube.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 General and transferred skills are achieved through: the ability to communicate and communicate, the ability to team work, the ability to manage time, the ability to present and present, the ability to use the computer and the international information network (the Internet).

d.5 General and transferred skills are measured through: writing scientific reports and articles, making oral presentations, teamwork skills ..... etc.

Topics:

Essential concept of radiologic science
• Nature of our surroundings
• Matter and energy
• Sources of ionizing radiation
Essential concept of radiologic science
• Discovery of x-rays
• Development of modern radiology
Standard units of measurement
• Radiologic units
The structure of matter
• Fundamental particle
• Atomic structure
Radioactivity
• Radioisotopes
• Radioactive half-life
Types of ionizing radiation
• Particulate Radiation
Types of ionizing radiation
• Electromagnetic radiation
Photons
• Velocity and amplitude
• Frequency and wavelength
Electromagnetic spectrum
• Measurement of electromagnetic spectrum
• Visible light
• Radiofrequency
• Ionizing radiation
X-ray imaging system
• Operating console
• Autotransformer
X-ray imaging system
• Exposure times
• High voltage generator
The x-ray tube
• External components
The x-ray tube
• Internal components

- Cathode

The x-ray tube

- Internal components

o Anode

X-ray production

- Electron target interaction

X-ray production

- X-ray emission spectrum

X-ray production

- Factors affecting the x-ray emission

X-ray Emission

- X-ray quantity
- Factors Affect x-ray quantity

X-ray Emission

X-ray quality

- Factors Affect x-ray quality
- Types of filtration

x-ray interaction with matter

- Five x-ray interaction with matter
  - o Coherent scattering
  - o Compton scattering
  - o Photoelectric effect
  - o Pair production

o Photodisintegration

X-ray interaction with matter

- o Differential absorption

o Contrast examination

Concept Radiographic image quality

- Definition
- Resolution
- Noise
- Speed

Production of scatter radiation

- Control scatter radiation
- Gird performance

Diagnostic modalities

- Radiographic image
- Fluoroscopy
- CT
- Ultrasound

- MRI
- Mammography

3.	**RD303**	**Radiation Protection**	**الوقاية من الاشعاع**	**4**	**2**	**4**	

Course Aims:

1. Understand Radiation protection quantities and dosimetric quantities and their measurement units
2. Identfy an appropriate level of protection for people (pateints, medical staff and public) and the environment
3. Describe the origin and properties of ionizing radiation and identify the interaction mechanisms between radiation and matter
4. Clarify the reduction of unnecessary patient radiation dose and main fluoroscopic - Radiographic protection features
5. Identify the different types of radiation detectors and their operating principles, types of sheilding
6. Describe the principles of radiation protection of radiotherapy and nuclear medicine

Intended learning outcomes (ILOS):

a- Knowledge and understanding

Students will be able to knowledge

a.1 The fundamental principles of the radiation protection system and her applications, as laid down in national and international legislation

a.2 The main risks related to exposure to ionizing radiation on healthcare and environmental level

a.3 The Reduction of unnecessary patient radiation dose and main fluoroscopic - Radiographic protection features

a.4 The Different measurement methods and equipment for environmental and personal dosimetry and types of shielding inside radiology departments

b- Intellectual skills

b.1 Explained the reasoning behind the great significance of radiation protection for the public, patients, and medical staff

b.2 Evaluate the concepts of occupational radiation protection in developing a radiation protection programme for any practice.

b.3 Apply the radiation protection principles to medical exposures (diagnostic and interventional radiology, radiotherapy and nuclear medicine).

b.4 Analyze the factors affecting the exposure rate of primary and secondary radiation

c- Professional and practical skills

c.1 Apply effectively the basic principles of radiation protection for the staff, patients and public

c.2 Prevent Harmful effects of diagnostic radiation that are, in principle, preventable

c.3 Reduce the risk of cancer and heritable effects to the extent reasonably achievable

c.4 Demonstrate the suitable means used for dose control; protective types & thickness, dosimeters and workplace.
c.5 Evaluate effectively the dose received from different radiation types in a safe mode using web sites and computer programs

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development
d.3 Interact effectively in team working.

Topics

Introduction to radiation dose and unit
- Radiation Exposure
- Absorbed dose
- Effective dose

Radiation and health
Cardinal principles of radiation protection
- Minimize time
- Maximize distance
- Use shielding

Radiation dose calculation
- Inverse square law

Interaction of radiation with matter
- Interactions of Alpha Particles and Heavy Nuclei
- Dose of alpha particle
- Ionization and specific ionization
- Range of Alpha Particles

Interaction of radiation with matter
- Interactions of Beat Particles
- Dose of beta particle
- Ionization and specific ionization
- Range of beta Particles

Interaction of radiation with matter
- Interactions of Photon
- Photoelectric Interactions
- Compton Interactions
- Pair Production

Effective dose
- Patient effective dose
- Radiologic technologist effective dose

Radiation dose limits

- Whole body dose limits
- Dose limits for tissue and organs
- NCRP

Radiation protection principles

- Patient protection in radiography
- ALARP
- Justification

Legislation and regulation related to radiological protection

- ICRP
- IRR

Legislation and regulation related to radiological protection

- Definition of annual effective dose
- Annual effective dose

Radiographic protection features

- Protective x-ray tube housing
- SID
- Collimation
- Filtration
- Operator shield
- Mobile x-ray imaging system

Fluoroscopic protection features

- Source to skin distance
- Primary protective barrier
- Collimation
- Filtration
- Exposure control

Design of protective barriers consider

- Useful beam
- Leakage radiation
- Scatter radiation

Radiation detection and measurement

- Gas-filed detector
- Scintillation detectors
- Thermoluminescence dosimetry
- Optically stimulated luminescence dosimetry

Reduction of unnecessary patient radiation dose

- Unnecessary examination
- Repeat examination
- Radiographic technique
- Patient positioning

- Specific area shielding
- Image receptor

Shielding of Radiographic Room

- Radiation Shielding - Design Concepts
- Source Shielding
- Structural Shielding
- Personnel shielding
- Patient shielding

Shielding in Computed Tomography

Shielding in fluoroscopy

Radiation protection in radiotherapy department

- External machines
- Brachytherapy

Radiation protection in nuclear medicine department

- Radioactive isotopes
- Radioactive Waste
- Indications for Patient

4.	**RD304**	**X-ray electronics accessories**	**ملحقات الاشعة السينية**	**4**	**2**	**4**	

Course Aims:

1. This course lists the basic concept of electricity, capacities, and inductance.
2. It discusses the principle of electric current, alternating current, transformer, rectification, magnetic field, and electromagnetic induction.
3. Furthermore; it provides an introduction to the x-ray machine
4. give an overview of the basic principles of x-ray production

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Classify the materials used in electricity and knows the laws used in electricity.

a.2 Enumerate the devices used to measure the electric voltage and also to know the capacities and inductance used in changing and storing the electric charge

a.3 student must distinguish between the units used to measure the electric current, must also formulate the laws used in electricity

Ex: Colum's law-ohm's law- faraday's law

a.4 The student identify the basic components used in x-ray machine

b- Intellectual skills

b.1 The student should differentiate between alternating current and direct current.

b.2 It also differentiates between electric generator and electric motor

b.3 The student distinguishes between the basic components used in x-ray machine

Ex: x-ray tube and power supply.

b.4 The student distinguishes between production wanted and unwanted of the radiation, and the reasons heat problems in x ray machine

c- Professional and practical skills

c.1 After understanding and getting acquainted with the components of the X-ray machine, the student should apply this by visiting hospitals specializing in the field of radiation, and he must:

1- To recognize the components of the x-ray machines and differentiate between the function of each component, and for the student to learn how to draw a x-ray tube

c.2 It also recognizes the cooling system, operating console and safety interlock

c.3 it recognizes how to filter the x-rays without increasing the dose for the patient.

c.4 Able to initially evaluate the medical images of different modalities and differentiate between the normal and abnormal appearance

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 General and transferred skills are achieved through: the ability to communicate and communicate, the ability to team work, the ability to manage time, the ability to present and present, the ability to use the computer and the international information network (the Internet).

d.5 General and transferred skills are measured through: writing scientific reports and articles, making oral presentations, teamwork skills ..... etc.

Topics

Electricity

- Coulomb's law
- Electric potential energy

Electricity

- Potential difference
- Electron volt

Capacities and inductance

- Electric field energy and storage of electric energy
- Capacitance

Capacities and inductance

- Parallel plate capacitor
- Dielectric Constance

Electric current

- Ohm's law
- Electric power
- Resistor in series

- Interaction neutron sources

Electric current

- Resistor in parallel
- Electromotive force
- Electric circuit and electric equation

Magnetic field

- Magnetic field of a current
- Force on a moving charge
- Force on a current
- Force between two currents

Electromagnetic induction

- Electromagnetic induction
- Moving wire in magnetic field
- Faraday’s law

Electromagnetic induction

- The generator
- The electric motor

Magnetic field energy Inductance

- Self inductance
- Time constants

Alternating current

- Effective current and voltage
- Phases
- Inductive

Alternating current

- Capacities
- Impedance
- Resonance

Transformer

- Physical principles
- Construction
- Types

Rectification

- Semiconductor
- Solid state rectifier
- Semiconductor diode
- Rectification in x-ray tube

Rectification

- Half wave rectification
- Full wave rectification

- Bridge rectifier

Photoelectric effect and thermionic emission

x-ray machine

- X-ray tube

o Cathode

X-ray machine

- X-ray tube
  - o Anode
  - o Voltage across the tube

X-ray machine

- Production of x-ray
- x-ray spectrum

X-ray machine

- o Heat generator
- o Heat problems
- o Cooling of x-ray tube

X-ray machine

- o Operating console
- o Safety interlock

Beam restricting devices radiation

- X-ray absorption
- Production unwanted radiation

Beam restricting devices radiation

- Leakage radiation
- Secondary radiation
- Scattered radiation

Filtration

- Inherent
- Added

5.	**RD305**	**Radiographic positioning I**	**أوضاع التصوير الاشعاعي 1**	**4**	**2**	**4**	

Course Aims:

1. General introduction to the radiographic positioning part one (chest, upper part, abdomen and pelvis) main projections.
2. Practicing the main projections in the Lab of radiology department.
3. Applied the main projections that studied during the course; on real patients under supervision of experienced radiographer.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Applied a suitable project according to the patient's clinical indications.
a.2 Understanding the technical factors that can influence the quality of image produced.
a.3 Knowledge trauma projections for patients who required adaption in position and care.
a.4 Explain the radiographic appearances of both normal and common abnormal conditions.

b- Intellectual skills

b.1 The ability to combine their knowledge about human anatomy and physics (e.g. x-ray nature) to produce a good projection with good image quality.
b.2 Introducing their confidential to deal with real patients.
b.3 Be able to distinguish between the radiographic appearances of both normal and common abnormal conditions.
b.4 Analyze alternative positioning techniques for trauma radiography etc
b.5 Demonstrate critical thinking skills applicable to related positioning skills.

c- Professional and practical skills

c.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
c.2 Choose proper position during radiography.
c.3 Application of equipments while working in radiology departments.
c.4 Apply special positioning skills for different pathological and physical conditions.
c.5 Apply the appropriate radiographic technical parameters and proper patient positioning including the modification of the imaging protocol for non routine radiographic procedures

d- General and transferable skills

d.1 After understanding the main radiographic projections, the students will be confident to practice their knowledge.
d.2 The ability to communicate with different types of patients according to their age, sex and general conditions.
d.3 Practice independent learning needed for continuous professional development.
d.4 Interact effectively in team working.

Topics:

Introduction to the main projections of chest, abdomen, and pelvis.
Introduction to the main projections of upper limbs
Routine of chest x-ray

- PA
- Lateral
- AP

Special projections of chest x-ray

- Lateral decubitus

- AP lordotic
- Anterior oblique
- Posterior oblique

Routine and special projection of abdomen

- PA supine
- PA prone,
- Lateral decubitus (AP),

Routine and special projection of abdomen

- AP erect,
- Dorsal decubitus (lateral),
- Lateral

Routine and special projection of pelvic

- AP pelvis,
- AP bilateral “frog-leg”
- AP axial outlet (Taylor method),
- AP axial inlet,

Routine and special projection of hip and proximal femur

- AP unilateral hip
- Axiolateral, inferosuperior
- Unilateral frog leg mediolateral (modified Cleaves method),
- Modified Axiolateral

Routine projection of fingers

- PA
- PA oblique
- Lateral

Routine projection of thumb

- AP
- PA oblique
- Lateral

Special projection of thumb

- AP, Modified Robert’s method
- PA stress (Folio method) projection,

Routine and special projection of hand

- PA
- PA oblique
- “Fan” lateral

Routine and special projection of hand

- Lateral in extension and flexion
- Bilateral AP oblique

Routine projection of wrist

- PA
- PA oblique
- Lateral

Special projection of wrist

- Scaphoid views
- CR angle, ulnar deviation,
- Modified Stecher method,
- Radial deviation,
- Carpal canal inferosuperior,
- Carpal bridge,

Routine and special projection of Forearm

- AP,
- Lateral,

Routine projection of elbow

- AP
- AP oblique
- Lateral

Special projection of elbow

- Acute flexion (Jones method),
- Trauma axial laterals
- Radial head laterals,

Routine and special projection of humerus

- AP
- Rotational lateral,
- Horizontal beam lateral,
- Transthoracic lateral

Routine and special projection of Shoulder (nontrauma)

- AP external rotation (AP),
- AP internal rotation (lateral),
- Inferosuperior axial
- PA transaxillary (Hobbs modification),

Routine and special projection of Shoulder (nontrauma)

- Inferosuperior axial (Clements modification),
- Posterior obliqueglenoid cavity (Grashey method),
- Tangential projection intertubercular groove (Fisk modification),

Routine and special projection of Shoulder (trauma)

- AP neutral rotation (AP),
- Transthoracic lateral (Lawrence method),
- Scapular Y lateral,
- Tangential projection— supraspinatus outlet (Neer method),

- AP apical oblique axial (Garth method),

Routine projection of clavicle and AC joints

- AP and AP axial,
- AP bilateral with weights and AP bilateral without weights,

Routine projection of scapula

- AP,
- Lateral,
- Erect,
- Recumbent,

6.	**RD306**	**Clinical Training – I**	**التدريب السريري 1**	**6**	**-**	**12**	

Course Aims:

1. The purpose is to improve his/ her skills in handing different X-RAYS requests form,
2. To train how to deal with different patients (different age, case and gender)
3. To train him/ her in the regular work procedures in different Radiology departments, and how to use different equipment's, like and various Instrumentation.
4. To train him/ her to manage and operate the different medical imaging modalities effectively and accurately.
5. Perform the medical imaging procedures with high competence
6. Apply patient's safety rules with emphasis on patient care and radiation protection.
7. Able to initially evaluate the medical images of different modalities and differentiate between the normal and abnormal appearance.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the social and ethical responsibilities

a.2 knowledge the methods of different medical imaging procedures

a.3 Understand patient's safety rules with emphasis on patient care and radiation protection.

b- Intellectual skills

b.1 Display a broad understanding of social and ethical responsibilities

b.2 Apply patient's safety rules with emphasis on patient care and radiation protection.

b.3 manage and operate the different medical imaging modalities effectively and accurately

c- Professional and practical skills

c.1 Practice basics and medical sciences applications and imaging procedures in medical laboratories with the optimal patient care and protection.

c.2 Operate effectively and safely the different medical imaging modalities.

c.3 Evaluate the medical images of different modalities and differentiate between the normal and abnormal appearance.

c.4 Demonstrate basics management and research skills

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

1. The student will apply the principles of professionalism in the performance of duties by:

a. Demonstrating professionalism and ethics consistent with the profession and by:

(1) Maintaining punctual attendance.

(2) Remaining in assigned area.

(3) Maintaining patient confidentiality

(4) Being receptive to constructive suggestions from supervisors.

(5) Following supervisor's instructions.

(6) Showing initiative and enthusiasm toward clinical education.

(7) Maintaining a neat appearance.

b. Demonstrating effectiveness in interpersonal relations with patients and staff.

c. Respecting the rights of each patient.

2. The student will complete radiographic examinations to accurately record anatomical structures on radiographs by:

a. Stating the department routines for spine, and thorax examinations.

b. Passing competency evaluations on routine chest, stretcher or wheelchair chest, and supine abdomen examinations.

c. Describe the structural and functional differences of the greater and lesser pelvis, and the structural difference between male and female pelvis.

d. Describe the basic and special projections of the toes, foot, ankle, calcaneus, knee, patella, intercondylar fossa and femur to include CR placement and angulation, correct film size and placement, part positioning, technical factors, and evaluation criteria.

e. Describe the basic and special projections of the fingers, hand, arm, elbow, forarm, correct film size and placement, part positioning, technical factors, and evaluation criteria.

3. The student will apply patient care principles to provide safe, effective care for patients by:

a. Explaining radiographic procedures to the patient and answering questions clearly and concisely.

b. Providing a clean environment for patients.

c. Showing a caring attitude toward patients.

d. Accurately checking the patient's identification.

e. Providing maximum patient safety from equipment and room hazards.

f. Locating the oxygen and suction apparatus in the department.
g. Recognizing the need for patient comfort and modesty.
h. Stating the Standard Precaution procedures.
4. The student will apply technical skills and understanding of radiographic equipment to obtain quality radiographs by:
a. Critically analyzing radiographs to assess image quality.
b. Independently selecting technical factors for chest and abdomen exams.
c. Identifying and demonstrating the proper use of the following equipment:
(1) Dedicated chest unit, if available
(2) Image intensifier and TV monitor
(3) Tube and table travel controls
(4) Foot stand, and compression bands
(5) Collimator controls
(6) Cones and filters
(7) Milliamperage seconds (mAs), milliamperage (mA), timer, and kilovolt Peak (kVp) selectors.
(8) Computed radiography (CR) equipment
(9) Digital radiography (DR) equipment
d. Setting a technique when given the technical factors by the technologist.
e. Assembling required accessories and supplies for routine exams.
f. Actively assisting in all aspects of technique selection.
g. Identifying the different CR and DR equipment employed throughout the department
5. The student will apply the principles of radiation safety to protect the patient, self, and others from unnecessary exposure to ionizing radiation by:
a. Showing evidence of collimation on radiographs.
b. Asking all females of the child-bearing age for the date of their last menstrual period and/or question the possibility of pregnancy.
c. Using lead aprons and gloves appropriately.
d. Wearing a dosimeter on the collar.
e. Offering protection devices to people who may be incidentally exposed to radiation, e.g. roommates during the use of portables, surgical personnel, personnel restraining patients.
f. Stating the hospital policy regarding gonadal shielding.
g. Stating the hospital policy for obtaining pregnancy information.

7.	**MT301**	**Research Methodology**	**طرق البحث**	**2**	**2**	**-**	

Course Aims:
1. Understand some basic concepts of research and its methodologies
2. raise awareness of crucial aspect of the nature of Knowledge and the value of scientific method

3. Introduce the concept at the heart of every research project –the research problem- and to discuss what a researchable problem is.
4. Identify appropriate research topic
5. Write research report and thesis
6. Select and define appropriate research problem and parameters
7. Evaluate literature, form a variety of sources, pertinent to the research objectives.
8. Identify and justify the basic components of the research framework, relevant to the tackled research problem.
9. Discuss how to cite sources, using the American Psychological Association (APA), and justify this choice.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Understand the general definition of research design
a.2 Understand the limitation of particular research methods
a.3 Know and understand different types of research
a.4 Understand and Know how to write References by using one of the two types(Alphabetic or Numbered) when using different sources in their Research Project in 4th year.
a.5 The internet has made locating information more accessible, but not every source is credible. It is important to know how to find reliable sources and analyze information to determine whether or not it is credible. To ensure are gathering accurate information, try to verify information from one source by sing another. Locate the original information source to verify its reliability.

b- Intellectual skills:

b.1 Develop advanced critical thinking skills
b.2 Discuss the criteria of good research and the different types of research.
b.3 present some aspects of the debate about the nature of knowledge and the value of scientific method

c- Professional and practical skills:

c.1 Develop skills in qualitative and quantitative data analysis and presentation
c.2 Demonstrate enhanced writing skills
c.3 Demonstrate the ability to choose method appropriate to research aims and objectives.
c.4 Be able to demonstrate Research skills are essential to employers because they help the company develop new products or services, identify the need and wants of their customers, improve what they do, keep up with changes in their industry and compete in their market. Knowing how to develop excellent research skills and highlight them for employers can help in several ways throughout the career.

d- General and transferable skills:

d.1 Practice independent learning needed for continuous professional development
d.2 Work effectively in a team.

d.3 Be able to gain problem-solving skills to break a problem down into its parts
d.4 Learn to use advanced search techniques.
d.5 Think critically about each element, analyze the information you find and use that information to form an effective solution.

Topics

Introduction to research

- Definition
- Types of radiation
  - ✓ **Historical**
  - ✓ **Observation**
  - ✓ **Systematic**
  - ✓ **Descriptive and etc.**

Basic elements of scientific research

- Problem definition
- Selecting a research problem
- Interest
- Uniqueness

Basic elements of scientific research

- Capability
- Availability of data
- Financial support
- Time factor

Writing a research proposal

Sample survey and questionnaire

- Reasons
- Types

Hypothesis

- Definition
- Formulation
- Sources
- Examples

Research writing

- Title page
- Approval page
- Abstract

Research writing

- Acknowledgement
- Table of content
- List of figures

Research writing

- Chapters of research projects
  - Chapter one (Introduction)
  - Chapter two (review of literature)
  - Chapter three (methodology)

Research writing

- Chapters of research projects
  - Chapter four (results)
  - Chapter five (discussion)
  - Chapter six (conclusion and recommendation)

Research writing

- References
- Appendixes

Reference page

- Reference list
- Books reference
- One other reference
- No author reference
- Unknown author reference

Reference page

- Two or three authors reference
- Four or more authors reference
- Edited or translated books
- Article or chapter in a book
- Government document

How to drawing graphic inserting table, spelling check etc.

Plagiarism and Toronto

Citation

- Definition
- Example
- Verbs used
- References
- Quotation
- When to cite

Paraphrasing

- Definition
- Examples
- How to avoid plagiarism
- When to paraphrase

Linking words and phrase used in projects

Skills of searching on the internet and using the scientific sources

Modern language association (MLA)

- Style 7th quick guide
- Library search guides
- Killam library MLA
- The reasons of using MLA handbook effective April 2009

Articles

- Types of articles
- Referencing
- How to cite

Some consideration and limitation facing post-gradation students

Presenting a research paper and writing a critical review

- Introduction
- Body
- Conclusion
- Purpose of research paper

Oral presentation

- How to make good presentation
  - Good starting
  - Clear voice
  - Eye contact
  - Good timing
  - Confidence

8.	**AN408**	**Psychology**	**علم النفس**	**2**	**2**	**-**	

Course Aims:

1. The objective of this course is to introduce students to the principle domains of psychology that are most relevant to Physiotherapy.
2. Its aim is to teach students the key areas of psychology that would provide the basis for viewing people not only as biological but also as psychological beings.
3. Furthermore the course also aims to introduce students to the application of psychology in the wider practice of Physiotherapy
4. In this course, students are introduced to the interaction between psychological and medical principles in the development, assessment and diagnosis and in the treatment of medical illnesses.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Knowledge and understanding of psychological theories, concepts, research paradigms and research findings, and the ability to make links to the relevant historical background

a.2 Identify and reflect on personal strengths, weaknesses and professional development in relation to placement provider/employers' needs

a.3 Recognize and help with the psychological factors involved in disability, pain, disfigurement, unconscious patients, chronic illness, death, bereavement and medical surgical patients/conditions.
a.4 Understand the concept of stress and its relationship to health, sickness and one's profession.
a.5 An awareness of applications and implications of psychological theories and research
a.6 Understand Ego defense mechanisms and learn counselling techniques to help those in need

b- Intellectual skills

b.1 Use critical thinking effectively in evaluating information quality, recognizing thinking fallacies, and making connections between observations, facts, and theories of psychology.
b.2 Be able to critically evaluate and analyze theoretical perspectives, historical trends and empirical findings that address psychology.
b.3 Be able to do psychosocial assessment of patients in various developmental stages.

c- Professional and practical skills

c.1 Apply psychological skills to professional work, exhibit self-regulation, refine project management skills, enhance teamwork ability, and develop life direction in the area of psychology.
c.2 Practice ethical behavior in all aspects of the science and practice of psychology.
c.3 Apply psychological theories and principles to professional employment and recruitment processes
c.4 Research skills, including statistical and other data analysis skills, which will equip you to contribute to psychological knowledge

d- General and transferable skills

d.1 Practice independent learning needed for continuous professional development.
d.2 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.3 Interact effectively in team working

Topics

What’s psychology ?
Fast facts on psychology
Subject of psychology
Branches of psychology
What’s behaviour
Classification of behaviour
Psychology goals
Intelligence
Emotion

Perception
Communication
Conflict
Autism
Abnormality
Parent-child relationship
The role of genetics
Mental disorders
Anxiety disorders
Specific phobias
Obsessive- compulsive disorder
Somatoform disorders
Dissociative disorders
Personality disorders

Forth year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	RD401	Medical Devices	الأجهزة الطبية	4	2	4	

Course Aims:

1. At the completion of this course, the student should be able to list and define the components of each device.
2. Discuss the history and the generations of each device.
3. List and explain the applications.
4. Identify the advantages and disadvantages.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define and explain the main idea of device work and mechanism.

a.2 Outline the basic components of the X-ray tube, Conventional radiography, Computed radiography , Digital radiography , CT scan , Mammogram, MRI Ultrasound

b- Intellectual skills

b.1 Understanding and choosing the suitable device for each clinical exam.

b.2 Demonstrate well development cognitive skills for the analysis of the complex information in different device.

c- Professional and practical skills

c.1 Interact effectively in team working.

c.2 Communicate clearly by verbal and written means with teaching staff during the learning process.

c.3 Practice independent learning needed for continuous professional development.

d- General and transferable skills

d.1 After understanding the main medical devices , the students will be confident to practice their knowledge in the real life.

d.2 Demonstrate responsibly in personal and professional relationships

d.3 Apply and understand effectively the different device in radiology departments.

Topics

x-ray tube
Conventional radiography
Computed radiography
Digital radiography
CT scan
Mammogram
MRI
Ultrasound

2.	**RD402**	**Special Investigation**	**الفحوصات الخاصة**	**4**	**2**	**4**	

Course Aims:

1. This course has introduced the main characteristics of the common daily used of contrast media in imaging departments worldwide
2. As a result, the students will be familiar with the types, classifications, indications, contraindications, techniques, films and side effects of radiographic contrast media

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Describe the knowledge in different perspective of thought that related to the field of Fluoroscopy of various systems.

a.2 Recognize the procedures and steps in a process of radiographic examination of different Fluoroscopic procedures.

b- Intellectual skills

b.1 Demonstrate the operation of fluoroscopic equipment using Contrast Media to facilitate the interpretation of radiographic image.

b.2 Apply the appropriate radiographic technical parameters related to the fluoroscopic equipment to produce high quality medical imaging.

c- Professional and practical skills

c.1 Act ethically in personal and public attitudes along through the radiographic clinical setting of the Fluoroscopy field of study.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working
d.4 General and transferred skills are measured through: writing scientific reports and articles, making oral presentations, teamwork skills ..... etc.
d.5 General and transferred skills are achieved through: the ability to communicate and communicate, the ability to team work, the ability to manage time, the ability to present and present, the ability to use the computer and the international information network (the Internet).

Topics

Introduction to special investigation
• Methods
• Indications
• Contraindications
– Due to Radiation
– Due to the contrast media
– Due to the technique
• Contrast medium
• Equipment
Introduction to special investigation
• Patient preparation
• Preliminary film
• Technique
• Films
• Additional techniques or Modifications of technique
• Aftercare
• Complications
Contrast Media
• Types of contrast media
• Positive contrast media
• Negative contrast media
• Barium Sulphate
• Water soluble iodinated contrast media
Contrast Media
• Ionic vs. Nonionic contrast media
• Advantages of barium Sulphate
• Complications of barium Sulphate
• Indications of water soluble contrast media
• Complications of water soluble contrast media
The most common Pharmaceutical Agents used in contrast radiology:
• Buscopan
• Glucagon

- Maxolon

METHODS OF IMAGING THE GASTROINTESTINAL TEACT (GIT)

1. Barium Swallow
- Definition
- Methods
- Indications
- Contraindication
- Contrast medium
- Equipment

Barium Swallow
- Patient preparation
- Preliminary film
- Technique
- Films
- Modifications of technique
- Aftercare
- Complications

2. Barium Meal
- Definition
- Methods
- Indications
- Contraindication

Barium Meal
- Contrast medium
- Equipment
- Patient preparation
- Preliminary film
- Technique

Barium Meal
- Films
- Modifications of technique
- Aftercare
- Complications

3. Barium follow-through
- Definition
- Methods
- Indications
- Contraindication
- Contrast medium
- Equipment

Barium follow-through

- Patient preparation
- Preliminary film
- Technique
- Films
- Modifications of technique
- Aftercare
- Complications

4. Barium Enema

- Definition
- Methods
- Indications
- Contraindication
- Contrast medium
- Equipment

METHODS OF IMAGING THE URINARY TEACT

1. Excretion Urography (IVU)

- Definition
- Methods
- Indications
- Contraindication

Excretion Urography (IVU)

- Contrast medium
- Equipment
- Patient preparation
- Preliminary film
- Technique

Excretion Urography (IVU)

- Films
- Modifications of technique
- Aftercare
- Complications

2. Micturating cystourethrography (MCU)

- Definition
- Methods
- Indications
- Contraindication
- Contrast medium
- Equipment

Micturating cystourethrography (MCU)

Patient preparation
- Preliminary film
- Technique
- Films
- Modifications of technique
- Aftercare
- Complications

METHODS OF IMAGING THE FEMALE REPRODUCTIVE SYSTEM

1. Hysterosalpingography
- Definition
- Methods
- Indications
- Contraindication
- Contrast medium
- Equipment

Hysterosalpingography
- Patient preparation
- Preliminary film
- Technique
- Films
- Modifications of technique
- Aftercare
- Complications

SPECIAL PROCEDURES OF CONTRAST MEDIA

1. Arthrograms
2. Myelograms
3. Sialography
4. Venograms
5. Cardiac Catheterization

CONTRAST MEDIA in CT Scan
- Type of contrast media
- Administration
- Indications
- Side effects

CONTRAST MEDIA in MRI
- Type of contrast media
- Administration
- Indications
- Side effects

3.	**RD403**	**Radiobiology**	**الاشعاع**	**4**	**2**	**4**	

			الحيوي				

Course Aims:

1. Provide an introduction to human cell biology
2. Explain the formulae of tissue tolerance
3. Provide the students with the basic understanding of cellular and sub-cellular events associated with radiation.
4. Describe the biological basis for current approaches to the improvement of radiotherapy including novel fractionation schemes, retreatment, , modification of hypoxia, biological modifiers of tumour and normal tissue effects

a- Knowledge and understanding

a.1 Identify the Effects of low and high doses of radiation on the biological systems.
a.2 Possess the basics knowledge of radiosensitivity and cell cycle thoery Stochastic and Deterministic effects of radiation and the direct and indirect effects on DNA
a.3 Explain acute and delayed effects of ionizing radiation and the effect of radiation on the cell cycle.
a.4 Describe direct and indirect interactions between radiation and cells.
a.5 Describe the long term effects of radiation.

b- Intellectual skills

b.1 Evaluate the radiosensitivity of tissue and organs and physical and biological factors that affect them.
b.2 Distinguish radiation damage signaling and repair.
b.3 Classify molecular damage due to radiation and damage detection.
b.4 Differentiate between cell survival curves of varying LET radiations, hypoxic and aerated cells as well as cell cycle phases.

c- Professional and practical skills

c.1 Interpret radiation effect on scope of models for cell survival.
c.2 Illustrate the preparation of samples vitro .
c.3 Practice the principles of dose rate and fractionation

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Introduction to Cell biology

- Cell function
- Cell types

Cell biology

- Cell cycle
- Mitosis

- Meiosis

Human Radiation Response

- Tissues and organs systems
- Radiosensitivity depending on cell type, tissue, organs

Law of Bergonie and tribondeau

Radiosensitivity of living tissue varies with maturation and metabolism

Physical factors that affect radiosensitivity

- Linear Energy Transfer (LET)
  - Low LET
  - High LET

Physical factors that affect radiosensitivity

- Relative Biologic Effectiveness
- Protraction and fractionation

Biological factors that affect radiosensitivity

- Oxygen effect
- Age

Biological factors that affect radiosensitivity

- Recovery
- Chemical effect

Radiation dose –response relationship

- Linear dose response relationship.
- Nonlinear dose response relationship.

Irradiation of Macromolecules

- Main- chain scission
- Cross-linking
- Point lesions

Radiation effects on DNA

Direct action of radiation

Radiation effects on DNA

Indirect action of radiation

Cell cycle effects

- Target theory
- Cell generation time

Cell cycle effects

Different phases and different responses to radiation

Linear energy transfer, relative biologic effectiveness, and oxygen enhancement ratio And cell survival curve

Deterministic effects of radiation

- Principle of deterministic effect
- Acute radiation lethality

Deterministic effects of radiation
- Local tissue damage
  - Effects on skin
  - Effects on gonads

Deterministic effects of radiation
- Gastrointestinal syndrome
- Cerebrovascular syndrome.

Deterministic effects of radiation
- Hematologic effects

Stochastic effects of radiation
- Principle of Stochastic effect

Stochastic effects of radiation
- Local tissue damage
  - Skin
  - Chromosomes
  - Cataract

Risk Estimates
- Relative risk
- Excess risk
- Absolute risk

Radiation- induced malignancy
- Leukemia
- Cancer

Radiation and pregnancy
- Effects on fertility
- Irradiation in utero
- Genetic effects

4.	**RD404**	**Radiotherapy**	**العلاج بالإشعاع**	**4**	**2**	**4**	

Course Aims:

1. The aim of this course is to provide an introduction to the radiotherapy and give an overview of the basic principles of the radiotherapy.
2. It describes the basic components of linac, cobalt 60, brachytherapy, and the design of the basic conventional radiotherapy simulator.
3. The students will understand the temporary and permanent side effects.
4. It describe the fundamental physics principles behind radiotherapy treatment planning and the basics of isodose curves, methods of beam modification and fundamental beam parameters.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know the principle of radiotherapy, their mechanism and side effect,
a.2 Describe the methods and management of the common diseases and its radiological imaging findings
a.2 Demonstrate the role of different radiological modalities scans in diagnosis of Disease
a.3 demonstrate the appropriate knowledge of radiation therapy procedures
a.4 Recognize the fundamentals of ethical and legal aspects of radiological practice.
a.5 Recognize the quality standards of radiological practice

b- Intellectual skills

b.1 Students will demonstrate knowledge of current and emerging radiation therapy methodologies and technologies
b.2 Demonstrate an understanding of value of different radiological positions in variable cases
b.3 Demonstrate knowledge and understanding of essential facts, advances and principles of different radiological modalities and their applications
b.4 Recognize the main scientific advances in radiological field
a.5 Demonstrate ability to perform mathematical calculation of treatment times and radiation doses

c- Professional and practical skills

c.1 Be able to apply principles of radiation protection for patient, self and others
c.2 Be able to perform radiation therapy simulation procedure; perform basic radiation therapy dose calculations and access treatment plans; and deliver radiation therapy treatments as prescribed by a radiation oncologist.
c.3 Be able to evaluate patient for effects, reactions and therapeutic responses;
c.4 Demonstrate effective oral and written communication skills; apply basic research methods; and formulate methods for the pursuit of lifelong learning.
c.5 Demonstrate ability to operate radiation producing equipment in all phases of treatment set-up and delivery
c.6 Demonstrate proper utilization of immobilization and beam directional devices and the protection from sources of radiation exposure

d. General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Recognize the main scientific advances in radiological field.

Topics

Introduction to radiotherapy

- What is Radiotherapy?
- What are the types of radiation?

- How does radiotherapy work?

What is the goal of Radiotherapy

Introduction to radiotherapy

- How radiotherapy is given?
- Why Radiotherapy is given?

Is radiation therapy used with other types of cancer treatment?

What are the principles of Radiotherapy?

- Precisely locate the target
- Hold the target still
- Accurately aim the radiation beam
- Shape the radiation beam to the target

Deliver a radiation dose that damages abnormal cells but spares normal

Side effects of radiation therapy

- Temporary Side Effects
  - Skin Changes
  - Fatigue
  - Feeling Sick
  - Hair Loss
  - Sexual Changes
  - Throat Changes

Urinary and Bladder Changes

Side effects of radiation therapy

Side effects of radiation therapy

- Permanent Side Effects

Second Cancer

Machines For External Radiotherapy:

Kilovoltage Units

- Contact units
- Superficial units

Orthovoltage units

Radiotherapy X-ray Machine

- X-ray Power Generator
- Control Console
- Tube Mounting

X-ray Tube

Radiotherapy X-ray Machine

- Cooling System
- Collimation
- Added filtration

Typical X-ray Tube Operation

Machines For External Radiotherapy
Megavoltage Units
- Teletherapy Machines
  - Cobalt 60 Unit
    - Head
    - Radioactive source
    - Source housing
Collimator
Cobalt 60 Unit
- Gantry
- Couch

Machine console
Linear Accelerator (LINAC)
- Linear Accelerator Types
- Linear Accelerator Generations

The major components of LINAC are: -
1. Gantry
- Radiofrequency Generators
- Feed wave guide
- Modulator
- Circulator
- Electron gun

Accelerator Waveguide
The major components of LINAC are: -
- Treatment head
  - Bending magnets
  - Target or scattering foils
  - Flattening filter or electron cone
  - Ionization chamber
  - Collimators
  - Multi- leave collimator

5.	**RD405**	**Radiographic positioning II**	**أوضاع التصوير الاشعاعي 2**	**4**	**2**	**4**	

Course Aims:
1. General introduction to the radiographic positioning part two .
2. Practicing the main projections in the Lab of radiology department.
3. Applied the main projections that studied during the course; on real patients under supervision of experienced radiographer.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Applied a suitable project according to the patient's clinical indications.

a.2 Understanding the technical factors that can influence the quality of image produced.

a.3 Knowledge trauma projections for patients who required adaption in position and care.

b- Intellectual skills

b.1 The ability to combine their knowledge about human anatomy and physics (e.g. x-ray nature) to produce a good projection with good image quality.

b.2 Introducing their confidential to deal with real patients.

b.3 Be able to distinguish between the radiographic appearances of both normal and common abnormal conditions.

b.4 Analyze alternative positioning techniques for trauma radiography etc

b.5 Demonstrate critical thinking skills applicable to related positioning skills.

c- Professional and practical skills

c.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

c.2 Choose proper position during radiography.

c.3 Application of equipments while working in radiology departments.

c.4 Apply special positioning skills for different pathological and physical conditions.

d- General and transferable skills

d.1 After understanding the main radiographic projections, the students will be confident to practice their knowledge.

d.2 The ability to communicate with different types of patients according to their age, sex and general conditions.

d.3 Practice independent learning needed for continuous professional development.

d.4 Interact effectively in team working.

Topics:

Introduction to the main projections of lower limbs and skull.

Introduction to the main projections of vertebral columns,

Routine and special projections of Toes and metatarsal

• AP,

• Oblique–medial or lateral rotation,

Routine and special projections of Foot

• AP,

• Oblique,

• Lateral,

Routine and special projections Calcaneus

• Plantodorsal (axial), • Lateral,

Routine and special projections of Ankle joint
• AP,
• AP mortise (15° to 20° oblique),
• AP oblique (45°)
• Lateral,
Routine and special projections of Leg
• AP,
• Lateral,
Routine projections of Knee
• AP,
• Oblique–medial rotation,
• Oblique–lateral rotation,
• Lateral,
• AP weight bearing bilateral,
Routine and special projections of Patella and femoropatellar joint
• PA,
• Lateral,
• Tangential—axial or sunrise/skyline
Routine and special projections of Femur
• AP–mid and distal,
• Lateral-mediolateral or lateromedial:
• Lateral-mediolatera:
Routine of Cervical spine
• AP open mouth (C1 and C2),
• AP axial,
• Anterior and posterior obliques,
• Lateral, erect,
Special projections of cervical spine
• Lateral—hyperflexion and hyperextension,
Routine and Special projections of Thoracic spine
• AP,
• Lateral,
• Oblique,
Routine of Lumbar spine,
• AP or PA,
• Obliques,
• Lateral,
Special positioning of Lumbar spine,
• AP (PA) right and left bending,
• Lateral—hyperextension and hyperflexion,

Routine and special position of Sacrum and coccyx,
• AP axial sacrum,
• AP axial coccyx,
• Lateral sacrum and coccyx,
• Lateral coccyx,
Routine and special projections of sternum and ribs
• RAO,
• Lateral,
• Posterior ribs (AP),
• Anterior ribs
Routine of skull
• AP axial
• Lateral,
• PA axial 15° (Caldwell method)
• PA,
Routine and special positioning of facial bones,
• Lateral,
• PA axial
Routine and special positioning of Nasal bones,
• Lateral,
Routine and special positioning of
Mandible
• Axiolateral oblique,
• PA or PA axial,
Routine and special positioning of TMJs
• AP axial,
• Axiolateral oblique
Routine of Sinuses
• PA,
• Axiolateral oblique
Special positioning of Sinuses
• SMV,
• Parietoacanthial transoral (open mouth Waters method),

6.	**RD406**	**Clinical Training - II**	**التدريب السريري 2**	**6**	**0**	**12**	

Course Aims:
1. Training the students on how to deal with various pathological conditions within the radiology department and ways to care for them, and justify radiation exposure to them.
2. Preparing students with professional and administrative ethical foundations and

imaging quality in the Department of Radiology.
3. Teaching radiological technology and medical imaging.
4. The student will apply the principles of the radiation safety to patient.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 knowledge of patient care, physics, human anatomy, physiology, pathology, and radiology to evaluate patients, develop optimal radiological techniques, and evaluate the resulting radiological media.

a.2 Preparing highly qualified graduates in the cognitive and intellectual fields, neuromuscular coordination skills, and effective interaction behavior in the fields of medical diagnostic learning.

a.3 Work as a specialist with the ability to assist in conducting and completing appropriate examinations, reading and interpreting the resulting radiographs, and using the results obtained in diagnosis.

a.4 The student will apply the principles of professionalism in the performance of duties.

b- Intellectual skills

b.1 Gain hands-on experience when you complete clinical placements as part of your studies.

b.2 Work with specialized equipment and computer systems to analyses patient data.

b.3 Ability to communicate with patients and explain important procedures.

b.4 Expand your knowledge and master the art of handling medical imaging equipmen

c- Professional and practical skills

c.1 The student will complete contrast radiography examinations of gastrointestinal system to accurately record anatomical structures on radiographs

c.2 The student will apply technical skills and understanding of CT Scan Technology Computed tomography: operate CT equipment to produce cross-sectional images of a patient’s bones, organs and tissues.

c.3 Describe the basic and special projections of the HSG examinations to include CR placement and angulation, correct image receptor size and placement, part positioning, and evaluation criteria.

c.4 Using lead aprons and gloves appropriately.

d- General and transferable skills

d.1 Describe methods the student radiographer can employ to safely work and effectively reduce radiation exposure to themselves and their patients when performing fluoroscopy examinations of HSG.

d.2 The student will apply the principles of radiation safety to protect the patient, self, and others from unnecessary exposure to ionizing radiation.

d.3 Determine the different types of contrast media employed for GIT procedures.

Topics

1. The student will apply the principles of professionalism in the performance of duties
a. Demonstrating professionalism and ethics consistent with the profession and by:
b. Demonstrating effectiveness in interpersonal relations with patients and staff.
2. The student will complete special projections for more common projections that are taken as extra or additional projections to demonstrate better certain pathologic conditions or specific body parts
.3. The student will complete contrast radiography examinations of urinary system to accurately record anatomical structures on radiographs
The student will complete contrast radiography examinations of gastrointestinal system to accurately record anatomical structures on radiographs.
The student will apply technical skills and understanding of CT Scan Technology.
The student will apply the principles of radiation safety to protect the patient, self, and others from unnecessary exposure to ionizing radiation.

7.	**RD407**	**Nuclear Medicine**	**الطب النووي**	**4**	**2**	**4**	

Course Aims:

1. This course will cover the cardinal principles of gamma ray emission
2. Names of the recommended Radioactive tracer, Generators &Radioactivity
3. The clinical applications of NM tech
4. The technique selection for Nuclear Medicine
5. The advantages and limitations of Nuclear Medicine

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Recognize the protocols and steps for radiographic procedures in the field of nuclear technology.
a.2 Outline the proper use of radiation protection to practice safely during different procedures of nuclear medicine technology.
a.3 Define the basic information in Nuclear Medicine & instrumentations of nuclear medicine field.
a.4 The student describe the physical half life and biologic half –life and effective half-life
a.5 The student must know the atomic structure and isotopes and radioisotopes
a.6 Describe the outlines of radiation protection laws during the imaging processes.
a.7 Demonstrate knowledge of radiopharmaceuticals, their characteristics, and bio distribution that are used for specific nuclear medicine procedures.

b- Intellectual skills

b.1 The student distinguishes the production methods of radionuclides and agents that used in clinical application.
b.2 Student compares alpha, beta and gamma rays in terms of origin, charge, and skin penetration.

b.3 Evaluate the operating parameters& the radioisotope used with the evidence based practices to solve specific problems.
b.4 The student concludes natural radioisotopes and artificial radioisotopes.

c- Professional and practical skills

c.1 Operate the nuclear imaging equipment, accessory devices and procedures to produce high quality medical imaging.
c.2 Apply the appropriate nuclear technical parameters and proper patient positioning
c.3 Implement evidence-based approach in all radiological practice and interpretation.
c.4 Practice effective communication skills via computer based information programs, web materials & modern communication technology.

d- General and transferable skills

d.1 Demonstrate effectively the appropriate interpersonal skills either independently or in teamwork for the nuclear technical practice.
d.2 Act ethically and consistently in personal and public attitudes along through the radiographic clinical setting.
d.3 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.4 Interact effectively in team working.

Topics

Atomic and nuclear structure
o Atomic structure
- The nucleus
o Proton and Neutron
- Energy shell
o Electron
Classification of nuclei
o Nuclide and radionuclide
o Isotopes and radioisotopes
o Other isos
o General classification of radioisotopes
o Natural radioisotopes
Artificial radioisotopes
Atomic Energy Levels
 Orbital energy levels
1. Binding energy
2. Energy state of the electron
 Nuclear energy levels
1. Binding energy
Energy state of the nucleons
Radioactive decay

- Radioactive decay
- Radioactive decay law
- Units of radioactivity

Methods of radioactive decay

- Alpha Emission

Definition- Origin -Interaction with matter- Penetration

Methods of radioactive decay

- Beta Emission

1. Beta minus particle

Definition- Origin -Interaction with matter- Penetration

2. Beta plus particle

Definition- Origin -Interaction with matter- Penetration

Methods of radioactive decay

- Beta Emission

3. Electron Capture (ε, EC)

Definition- Origin -Interaction with matter- Penetration

Methods of radioactive decay

- Gamma Emission

Definition- Origin -Interaction with matter- Penetration

Radiopharmaceutical

- Definition
- Measurements

o Vivo

Vitro

Principle of radioactive decay

- Physical half-life,
- Biological half -life,
- Effective half-life,

Ideal characteristics of radiopharmaceutical

The production methods of radionuclides

1. Fission
2. Fusion

Neutron activation

The production methods of radionuclides

4. Transmutations
5. Generator
6. Particle Accelerators

Nuclear medicine imaging system

- Gamma Cameras

o Introduction

- Definition
- Components

1. Collimator Detector

Nuclear medicine imaging system

- Gamma Cameras
  - Components

2. Photomultiplier tubes
3. Preamplifier
4. Signals processing
5. Pulsed-height analyzer (PHA)

Display or recording device

Nuclear medicine imaging system

Mode of operation of the Gamma Cameras

Nuclear medicine imaging system

- PET
  - Definition
  - Concept of PET cancer

Use of positrons

Nuclear medicine imaging system

- PET

Operation of PET scan

Nuclear medicine imaging system

- SPECT
  - Definition
  - Description

Operation

Clinical application

- Bone scan
  - Agent in clinical used
  - Administration method
  - Activity
  - Time imaging

Effective dose

Clinical application

- Ventilation perfusion imaging (lung scan)
  - Agent in clinical used
  - Administration method
  - Activity
  - Time imaging

Effective dose

Clinical application
- Renal scan
  - Agent in clinical used
  - Administration method
  - Activity
  - Time imaging

Effective dose
Clinical application
- Thyroid imaging
  - Agent in clinical used
  - Administration
  - Time imaging

Effective dose
Clinical application
Radioimmunoassay
Radionuclide therapy
Practical:
overview on atomic energy level
overview on radioactive decay law
overview on ways of alpha emissions
overview on ways of Beta emissions
overview on ways of gamma emissions
Measurements of radiopharmaceutical.
production methods of radionuclide
components of gamma camera
operation of gamma camera
operation of PET scan
overview on bone scan
overview on Ventilation perfusion imaging (lung scan)
overview on Renal scan
overview on thyroid imaging
radionuclide therapy method

8.	**RD408**	**Detectors of Radiation**	**كاشفات الاشعاع**	**4**	**2**	**4**	

Course Aims:
1. The aim of this course is to provide an introduction to the theory of doses measurement and understand measurement units .
2. Identify the different types of radiation detectors
3. understand operation of different types of dosimeters encountered in the diagnostic radiology and radiotherapy, radiation protection department

4. Describe the origin and properties of ionizing radiation and identify the interaction mechanisms between radiation and matter

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 know the sources of radiation, know and measure radiation, provide the necessary information on it,

a.2 know the amount of negative effects it may have on humans and the environment

a.3 The awareness of the levels of radiation around them. Also the boundaries of a radioactive area.

a.4 This is primarily accomplished through the use of radiation detectors of varying types

b- Intellectual skills

b.1 the student able to distinguish between uses of dosimetry systems

b.2 The able to compeer between advantage and disadvantage of the dosimetric systems

b.3 Also to the distinguish between radiation monitoring instruments used in:

1. Area survey meters
2. Individual monitoring

b.4 the student able to distinguish between dosimetric quantities and their measurement unit

c- Professional and practical skills

c.1 The student able to work on appliances and equipment used in dosimetry systems and monitoring instruments .

Ex: dosimetry systems

1. Ionization chamber dosimetry system (brachytherapy chambers)
2. Film dosimetry (radiographic film)
3. Gel dosimetry (polymer gels)

Ex: Area survey meters (Geiger muller counter, Semiconductor detector)
individual monitoring (film badge, TLD)

c.2 The student able to apply the radiation protection principles to medical exposures (diagnostic and radiotherapy)

c.3 The students will be pointed towards the best sources of information for both the strengthening their theoretical understanding of particle-matter interaction and for further developing their understanding on particle detection devices and experiments in practice

c.4 The student will be pointed towards not only the more common literature type, such as textbooks and journal papers, but also the Technical Design Reports (TDRs) of various experiments

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 General and transferred skills are achieved through: the ability to communicate and communicate, the ability to team work, the ability to manage time, the ability to present and present, the ability to use the computer and the international information network (the Internet).
d.5 General and transferred skills are measured through: writing scientific reports and articles, making oral presentations, teamwork skills ..... etc.

Topics

Radiation saucers
- Units and definition

Radiation sources
- Heavy charged particle sources
- Fast electron sources

Radiation sources
- Sources of electromagnetic radiation
- Neutron sources

Radiation interaction
- Interaction of heavy charged particle sources
- Interaction of fast electron sources

Radiation interaction
- Interaction sources of electromagnetic radiation
- Interaction neutron sources

Radiation dosimeters
- Properties of dosimeters
  - o Accuracy and precision
  - o Linearity
  - o Dose rate dependence
  - o Energy dependence

Radiation dosimeters
- Properties of dosimeters
  - o Directional dependence
  - o Spatial resolution and physical size
  - o Readout convenience
  - o Convenience of use

Ionization chamber dosimetry system
- Chambers and electrometers
- Cylindrical ionization chambers
- Parallel-plate ionization chamber

Ionization chamber dosimetry system
- Brachytherapy chambers

Extrapolation

Film dosimetry
- Radiographic film
- Radiochromic film

Luminescence dosimetry
- Thermoluminescence
- Thermoluminescent dosimeter system (TLDs)

Semiconductor dosimetry
- Silicon diode dosimetry systems
- MOSFET dosimetry

Other dosimetry systems
- Alanine/electron paramagnetic resonance dosimetry systems
- Plastic scintillator dosimetry system

Other dosimetry systems
- Diamond dosimeters
- Gel dosimetry

Main advantages and disadvantages of the commonly used dosimetric systems

Radiation monitoring instruments in monitoring external exposure
- Operational quantities for radiation monitoring
- Area survey meters
- Individual monitoring
- Area survey meters commonly used
  - o Ionization chambers
  - o Proportional chambers
- Area survey meters commonly used

o Neutron area survey meters

o Geiger-Muller counters
- Area survey meters commonly used
  - o Scintillator detectors

o Semiconductor detectors
- Properties of survey meters
  - o Sensitivity
  - o Energy dependence
  - o Directional dependence
  - o Dose equivalent range

o Discrimination between different types of radiation
- Individual monitoring commonly used
  - o Film badge

- o Thermoluminescence dosimetry
- Individual monitoring commonly used
  - o Optically stimulated luminescence system
  - o Direct reading personal monitors
- Properties of personal monitors
  - o Sensitivity
  - o Energy dependence
  - o Directional dependence
  - o Dose equivalent range
  - o Response time
  - o Overload characteristics
  - o Long term stability
  - o Discrimination between different types of radiation

Comparative between different radiation monitoring instruments available for monitoring external exposure

9.	**RD409**	**Oncology**	**علم الأورام**	**3**	**2**	**2**	

Course Aims:

1. Illustrate introduction of oncology science
2. Clarify the epidemiology and etiology emphasizes predisposing factors
3. Identify pathology and natural history, diagnosis, staging systems and prognostic factors
4. Clarify prevention and early detection and management briefly

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 The student will able to understanding of DNA structure and replication, the biology of carcinogenesis and the development of malignant cells and their metastasis,

a.2 Knowledge an important information aetiology, epidemiology, classification of cancer, general symptoms of cancer, Diagnosis

a.3 Knowledge Specific types of cancer such as breast cancer and primary and scondary prevention of cancer

a.4 Understanding the therapeutic options in a variety of tumour types. In addition, radiotherapy techniques have improved dramatically to further increase therapeutic options.

b- Intellectual skills

b.1 The student should able to effectively determine which particular type of cancer their patients have, as well as which phase the cancer is in.

b.2 Evaluate of general situation of patients

b.3 Communicating Effectively with Patients in case of need

c- Professional and practical skills

c.1 Express important information aetiology, epidemiology, and genetics which can be passed on to patients when, they ask about why they have developed cancer
c.2 Be able to caring and compassionate towards patients who may have to deal with difficult diagnoses and radiotherapy
c.3 The medical and psychosocial needs of cancer survivors, and develop strategies to address those needs
c.4 Apply updated evidence and tools to enhance the delivery and coordination of care for cancer survivors

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Demonstrate effectively the appropriate interpersonal skills either independently

Topics

DNA
- DNA
- DNA structure,

DNA
- DNA replication
- DNA Mutation

Tumour
- Definition of tumour
- Tumour types,
  - Benign tumors
  - Malignant tumour

Malignant tumour
- Classification of cancer
  - Carcinoma,
  - Sarcoma,
  - Lymphoma,
  - Leukaemia,
  - Adenoma,

Epidemiology of cancer
- Environmental factors
- Life style factors,
- Genetic factors,
- Pharmacologic factors,
- Smoking
- Alcohol

- Diet
- Infections

Malignant tumour

- Primary tumour
- Secondary tumour
- Metastasis

Malignant tumour

- Metastasis
  - Local invasion
  - Lymphatic and vascular channels

Malignant tumour

- Staging
- TNM staging of cancer
- Grading

Symptoms and signs of cancer

- Pain
- Bleeding
- Weigh loss
- Ulcer
- Swellings

Symptoms and signs of cancer

- Interference with tissue or organ function
- Bleeding and evidence of blood loss
- Lymph node enlargement

Swellings

Diagnostic of cancer

- Biopsy

Histopathology

Diagnostic of cancer

- Heamatology
- Tumour marking

Diagnostic of cancer

- Medical Imaging
  - X-ray
  - CT scan
  - MRI
  - Ultrasound
  - Nuclear medicine (ex:-PET)

Breast cancer

- Signs and symptoms

- Medical history
- Grade

Diagnosis of Breast cancer

- Self examination,
- Ultrasound
- Mammographic screening,
- MRI,
- Biopsy and CA15-3.

Ovarian cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Colon cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Prostate cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Lung cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Liver cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Leukemia, lymphoma, and brain cancer

- Symptoms
- Diagnosis
- Treatment
- Prevention

Cancer prevention

- Primary prevention

Secondary prevention
Principle of treatment
- Surgical oncology
- Principle of Radiotherapy

Principle of chemotherapy
Principle of treatment
- Hormone therapy
- Immunotherapy of cancer

10.	**MT401**	**Research Project**	**مشروع التخرج**	**3**	**2**	**2**	

Course Aims:

1. During this course, the students should know how to handle and develop specific research problem and then put forward the idea of research.
2. Preparing for scientific research methodology and research planning.
3. Data collection and analysis
4. Solve problems that hinder the method adopted in the search.
5. Results tab and develop scientific solutions to the problem of finding.
6. Writing a final report and then present and discuss the results in the form of scientific research reached by the student through research and throw him in the form of a seminar.
7. Develop the skills necessary to undertake a research project
8. Assist the student in identifying appropriate research topics and methodologies.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Identify the essential steps the usage of library and electronic search
a.2 Know types of scientific papers, thesis and journals
a.3 Learn the classification of collected information in priority order
a.4 Design a complete and basic research proposal.
a.5 know how to collect and analyze data
a.6 Know how to write a final research format and present it
a.7 Know how to use relevant scientific literature.
a.8 Identify the suitable experimental methods that used to solve a given scientific task

b- Intellectual skills

b.1 Be able to Analyze data and synthesize research findings
b.2 Be able to show independence, critical and creative thinking
b.3 formulate new scientific questions that came up during project performance
b.4 Independently gain the necessary knowledge to undertake meaningful research
b.5 To acquire and critically assess original source references from databases and libraries [published scientific papers, books, etc.]
b.6 Articulate the contributions of qualitative and quantitative methods to a specific discipline such as environmental health research

b.7 Be able to draft an academic paper appropriately structured for publication
b.8 To assess the significance of project outcomes against what is already known in the area of your project topic via a critical assessment of the literature

c- Professional and practical skills

c.1 Conduct practical research
c.2 Be able to perform a research project according to an individual study plan
c.3 Be able to present and discuss the research results with colleagues and senior researchers
c.4 Be able to show a professional attitude regarding time planning, collaboration, and the link between theoretical and practical knowledge
c.5 The student shall be able to perform the project work in an ethical correct manner
c.6 The student shall be able to reflect upon and discuss the relevance of the work in written and oral form
c.7 The student shall be able to work independently and plan and organize effectively to achieve the project goals
c.8 Apply tools of research preparation including problem formulation, undertaking a literature review, research designs, developing a hypothesis, ethical implications, time management, and assessing resourcing implications
c.9 Be able to communicate the project outcomes in a final written report
c.10 be able to collaborate with project partners (internal and external) and with other research group members
c.11 To systematically and contemporaneously record the project work carried out in a paper (hard-bound) or electronic notebook
c.13 To use research and write background material and use advanced research methods and techniques to conduct a scientific investigation

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Draft an academic paper appropriately structured for publication.
d.5 Perform basic data management tasks and analyses using a computer

Topics:

Conduct practical research
Collect data
Analyze data
Trouble shooting
Write research progress reports
Write a final “paper” format with presentation in form of seminar

Physiotherapy Department

Second year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	PT201	Exercise Physiology	فسيولوجي التمرينات	4	2	4	

Course aims:

1. The aim of course is to enable the student to effectively apply the exercise bioenergetics in rehabilitating the patient.
2. Describe general physiological responses to exercise.
3. Describe the responses of the major physiological systems to exercise.
4. Describe the lab assessment used to determine the cardiorespiratory fitness & human performance.
5. This course also aims at regulation of various systems like neuromuscular ,cardio respiratory & metabolic adaptations to various types of exercise training.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define the role of aerobic & anaerobic systems & the fuels require performing various physical activities.

a.2 Recognize the physiological principles related to muscular endurance , strength & flexibility training.

a.3 Label the environmental effects of temperature, humidity , altitude , & pollution upon the physiological response to exercise.

a.4 Able to design & explain an exercise program, able to justify , measure & interpret the specific physiological responses over training & performance.

a.5 Able to compare & differentiate between energy systems, general & specific physiological responses in relation to various physical activities.

b- Intellectual skills

b.1 Assess lifestyle behaviours, including physical activity patterns, eating habits,

stress levels and readiness to exercise
b.2 Perform comprehensive functional capacity evaluations, including physical fitness, posture and muscle balance ,task-specific biomechanical analysis and motor control assessments.

c- Professional and practical skills

c.1 Perform exercise tests, in particular assessment of cardioresperatory and metabolic function.
c.2 Liaise with medical and other allied-health professionals for amulti-disciplinary approach to health care.
c.3 Access and evaluate the scientific and clinical evidence base for continued improvement of professional.

d- General and transferable skills

d.1 Prescribe physical activity and exercise programs to maintain and promote good health.
d.2 Implement proven motivational and exercise-counselling strategies to facillatete behaviour change and enhance self-management.
d.3 Educate students on the benefits of physical activity for prevention and management of disease ,injury and disability.

Topics

introduction and overview – physiology of exercise & homeostasis
Principles of training .
skeletal muscle structure , muscle contraction ,skeletal muscle adaptation to use circulatory response to exercise.
Cardiovascular system adaptation to training
Respiratory system adaptation to training.
Measurement of work, power & energy expenditure.
Bioenergetics & exercise metabolism.
Temperature & environment & physiology of training.
Anaerobic system , phosphaatase system, lactic acid system, lactic threshold performance & lactic threshold training
Adaptation of training.

2.	**PT202**	**Electro therapy**	**العلاج الكهربائي**	**4**	**2**	**4**	

Course aims:

1. Recall the physics principles & Laws of Electricity, Electromagnetic spectrum, & ultra sound
2. Describe effects of environmental & made electromagnetic field at the cellular level & risk factors on prolonged exposure.
3. Describe the Main electrical supply, Electric shock, precautions
4. Enumerate Types & Production of various Therapeutic electrical currents & describe

the panel diagrams of the machines
5. Describe & identify various types of electrodes used in therapeutics, describe electrical skin resistance & significance of various media used to reduce skin resistance.
6. Test the working of the various electrotherapeutic equipment's

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 To understand ,biophysical basic of electrotherapy
a.2 To able to explain of basics of electrotherapy
a.3 Understand the flow of electric charges
a.4 To familiarize the student with the basic principal in electrical therapy

b- Intellectual skills

b.1 Student understanding of the devices used
b.2 The student understand mentally how to use the currents
b.3 The students ability to distinguish between current
b.4 That the student has the ability to understand the patient
b.5 To know Amplitude &Intensity

c- Professional and practical skills

c.1 The student ability to distinguish between types of currents and how to treat them
c.2 The student ability to use the physical therapy devices
c.3 The student ability to distinguish between indication and contraindication
c.4 The ability of the student to explain to the patient before starting use the device
c.5 To know What are Waveform & Time-depend parameters

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 The student has the ability to understand the new devices and the ways to use them
d.5 The student acquires the skills of using current to treat appropriate cases

Topics

A. Low Frequency Currents:

1. Nerve Muscle Physiology: brief outline

Faradic current:

- Indications, contraindications, Techniques, parameters, Group muscle stimulation.
- Faradic footbath, Faradism under pressure and muscle re-education.

Galvanic current:

- Indications, contraindications, precautions and therapeutic effects of stimulation.
- Techniques, parameters, Dosimetry

Electro-Diagnosis:

- S. D. Curve, Reaction of degeneration, Chronaxie&Rheobase

- Outline of EMG & Nerve conduction velocity

Iontophoresis:

- Definition and principles & factors
- Indications, effects, techniques, contraindications, precautions and Potential harmful effects.

TENS therapy:

- Principle of therapy, Parameters and therapeutic uses.
- Theories of pain and pain control.
- Indications and contra-indications, Dosimetry.

B. Infrared Therapy:

- Therapeutic effects and uses, Techniques of application.
- Indications, contraindications precautions and Potential harmful effects.

C. Heating Modalities:

- Therapeutic effects and uses, Techniques and applications.
- Indications, contraindications, precautions and Potential harmful effects of various heat modalities:

Paraffin wax bath therapy, Hydro collator packs, Whirlpool and moist heat Heating pads, Hot air chambers.

D. Cold-therapy:

- Indications, contraindications and therapeutic effects.
- Technique, precautions and Potential harmful effects of treatment, Dosimetry

E. Medium frequency currents:

- Definitions, effects, indications, techniques of application, contraindications.

Interferential therapy:

- Physiological, therapeutic effects & dangers, Indications & contra indications.
- Technique and method of applications, Dosimetry.

F. High Frequency currents:

Short wave Diathermy: Continuous & Pulsed

- Indications, contraindications and therapeutic effects.
- Methods of application-capacitor and induction electrode, precautions and Potential harmful effects of treatment, Dosimetry.

Microwave Diathermy:

- Characteristics and therapeutic effects.
- Application techniques, indications, contraindications, precautions and potential harmful effects, Dosimetry.

G. Ultrasonic Therapy:

- Physiological and therapeutic effects & potential harmful effects.
- Indications, contraindications, methods of application and precautions, Dosimetry.

H. Laser:

- Introduction, effects and potential harmful effects.

• Indication, contraindications, precautions, method of application, dosimetry

H. Ultraviolet therapy:

• Physiological and therapeutic effects- photosensitization
• Indications, contraindications, and Potential harmful effects.
• Methods of application, Sensitizes, Filters, Dosage, wavelength, penetration, tolerance, Treatment / Application condition wise
• Comparison between UVR& IR Therapy

I. Advanced electrotherapy:

Computerization of modalities Programming of parameter.

• Selection and combination of parameters.
• Combined therapy-U.S.+TENS-Principles, uses, indications etc.
• Principles of Bio-feedback, indications & uses.

J. Traction instruments:

• Rationale, technique, indications, contraindications, precautions of electric traction equipment's.

F. Shock wave therapy

• Physiological effects & potential harmful effects.
• Indications, contraindications, methods of application and precautions, Dosimetry.

3.	**PT203**	**Medical terminology**	**علم المصطلحات الطبية**	**2**	**2**	**-**	

Course aims:

1. Provide knowledge and understanding the basic medical terms.
2. Understand the prefix, suffix of different medical terms, and introduce concepts of various diseases within the same organ in the body.
3. Provide all common terms of CNS, CVS, GIT, respiratory, blood and urinary systems….etc
4. Introduce fundamental knowledge of anatomy of organ, signs, symptoms and treatments of various diseases.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the principles of basic medical laboratory as well as common medical terms in laboratory practice.

a.2 Define the principles of body function in health and diseases states; as well as the etiology, laboratory diagnosis, signs, symptoms and therapeutic approaches for different disease within the same organ

a.3 Define the proper medical terminology, abbreviations, prefix, suffix, and symbols in health reports and laboratory practice.

a.4 Recall the basic terms used in medical reports.

a.5 List suffixes, prefixes, and word roots common to medical terminology

a.6 Identify and list the most common used medical abbreviation

b. Intellectual skills:

b.1 Correlate between different medical terms used in medical reports.

b.2 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.

b.3 Correctly use medical terms when given the suffix, prefix, and word root

c. Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.

c.2 Employ proper documentation of terms described the anatomy, function and pathology of specific organ.

c.3 Recognize the basic concepts of medical terminology science to medical laboratory students.

c.4 Recognize the prefix and suffix of any new medical term.

c.5 Distinguish between different signs and symptoms of each body organ.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with patients and other health care professionals.

d.2 Interact effectively in team working.

d.3 Present information clearly in written, electronic and oral forms.

d.4 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.

d.5 Support patient, lab technicians and health care.

Topics:

Introduction to medical terminology
Medicine and its history
Suffixes mean condition of
Suffixes for medical
Plural endings
Prefixes
Prefixes for numbers
Prefixes for colors
Negative Prefixes
Prefixes for direction
Prefixes for degree
Prefixes for size and comparison
Prefixes for time
Prefixes for position
Common roots used in medical terminology

Common roots used in medical terminology
Body Structure: Integumentary System
Gastrointestinal (Digestive) System
Respiratory System
Musculoskeletal System
Cardiovascular System, Blood and Lymphatic System
Urinary System, Female Reproductive System, Male Reproductive System
Endocrine System
Nervous System, Special Senses
Disease
Name that disease
Common infection organism
Response to disease :inflammation ,phagocytosis, immunity…ect
Neoplasia
Case study
Common prefixes used in medicine
Common suffixes used in medicine
Medical abbreviations

4.	**PT204**	**Anatomy II**	**علم التشريح**	**4**	**2**	**4**	

Course aims:

1. To know the different body system such as bone structure, bone development, muscle classification , muscle development, upper limb, and lower limp
2. To identify relevant anatomical features, understand the topographical relationships of anatomical structures and be able discuss the basic structure and function of the major components of each body system.
3. To use correct anatomical terminology
4. To provide structural basis for understanding the function of nervous system & musculoskeletone

Intended learning outcomes (ILOS):

a1 to Familiarize the student with the basic principles of anatomy

a.2 To demonstrate knowledge in human anatomy as in necessary for the study and practical of physiotherapy

a.3. Identify the differences types of tissues in the body

a.4. To identify all gross anatomical structures, particular will be placed on description of bones, joints, muscles, brain, cardio-pulmonary and nervous systems as theses relate the application of physiotherapy

b- Intellectual skills

b.1 Encouraging the students to research and study the existing problems and how to treated by physiotherapy team

b.2 Evaluate and analyze the results obtained from anatomy
b.3 Analyzes and plans to deal with some problems and cases in the physiotherapy from an anatomical points of view and works to solve them.
b.4 Supporting the information with constant updating by review the latest scientific research in the anatomy's' field and physical therapy.

c- Professional and practical skills

c.1 The student's ability to distinguish between the muscular system, the bone system, the respiratory system, and the nervous system.
c.2 The student's ability to identify accurate points in the body and how to treat them with physical therapy
c.3 Also to apply special exercises for each device in the human body
c.4 Identify each part of our body and how many times to work with effectively.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means teaching staff during the learning process.
d.2 Develop an understating of the mechanisms of injury and the biological processes involved in physical rehabilitation
d.3 Interact effectively in team work

Topics

Introduction to anatomy, anatomical position
Region of the body, cavities and system
Cell structure and function
Connective tissue
Muscle classification
Nerve-structure, classification
Bone structure, blood supply, growth, ossification and classification
Bone of upper limb
Introduction to upper limb
Muscle of upper limb
Develop of limb bone
Introduction to thorax
Pleural cavities and pleura
Lungs and respiratory tree
Mediastinum and pericardium
Heart and great vessels
Introduction to lower bone
Bone of lower limb
Muscle of lower limb
Develop of limb bones
Abdominal and pelvis

Head and neck
Parasympathetic nervous system
nerve plexus

5.	**PT205**	**Kinesiology &Measurements & &Testing**	**علم الحركة والقياسات والاختبار**	**4**	**2**	**4**	

Course aims:

1. To introduce students to biomechanics, its branches and objectives.
2. To realizes the importance of studying biomechanics in the physiotherapy field and the role it plays in improving and developing the processes of teaching, learning, training, injury prevention and rehabilitation after injury
3. That the student be able to distinguish between the initial movements of the main parts of the body and to determine the surface or interstitial plane in which they take place and the axis that occurs around it.
4. To Introduce students to quantum and units of measurement used in biomechanics.
5. To Introduce the student to each of the concept of movement and relative motion, its causes types, factors determining it - factors affecting it.
6. The student's familiarity with the kinematics of linear motion, and the kinematics of angular motion in terms of concepts, laws and their applications.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 To acquaint the student with the science of biomechanics and its branches
a.2 That the student mention the goals of biomechanics
a.3 The student must explain the importance of studying biomechanics and its role in physical therapy
a.4 List examples of both scalar and vector quantities
a.5 That the student explains how to deal with the factors affecting the change of movement type with clear examples.
a.6 That the student knows the kinematics variables for both linear motion and angular motion.

b- Intellectual skills

b.1 The student distinguishes between dynamics and static science.
b.2 The student should be able to analyze any movement skill and determine the surfaces and axes of the spatial movement that is performed through and around them.
b.3 The student applies what he has learned about “movement type determinants “as law of intra, law of acceleration.
b.4 The student distinguish between different types of joints as structure,function also the change occur to them with diseases, injuries and exercise.
b.5 Identify major bony features of a typical cervical, thoracic & lumbar vertebrae.
b.6 That the student is familiar with all the structures and functions of the different body

organs and the movement performed by each member or different muscle separately

c- Professional and practical skills

c.1 The student will be able to distinguish between the initial movements of the main parts of the body such as: flexion and extension, adduction and abduction, pronation and supination, rolling out and inward, Inversion and Eversion.

c.2 The student should be able to analyze any movement skill and determine the surfaces and axes of the spatial movement that is performed through and around them.

c.3 The student applies what he has learned about "movement type determinants".

c.4 That the student distinguishes between a different types and examples of levers in our body

c.5 The student differentiate between various biomechanical modalities and should know use every one, as shoulder wheel, shoulder ladder and shoulder pulleys.

c.6 The student should know specific density, weight, force, movement, and the laws of flotation.

c.7 That the student apply the mechanical laws he learned in solving many problems (examples, duty, examinations) to deduce the values of the kinematic variables required for both linear motion and angular motion.

d- General and transferable skills

d.1 The ability to link what he studies theoretically and what he applies in practice in the laboratory.

d.2 Utilizing mechanical laws and rules to improve both teaching, learning and training processes.

d.3 Developing the capabilities of analysis, linking and application when solving problems by analyzing data and linking the laws that they learned with the variables to be found, then applying those laws to find the values of the required variables.

d.4 The student must be able to work in study groups.

d.5 The student must be able to use modern technology.

Topics

Mechanics: Definition of mechanics and Biomechanics.

Motion: definition, types of motion, plane and axis of motion, factor determining the kind and modification of motion.

Force: Definition, diagrammatic representation, classification of forces, concurrent, coplanar and co-linear forces, composition and resolution of forces, angle of pulls of muscle.

Momentum: principles, and practical application.

Gravity: Definition, line of gravity, Centre of gravity.

Equilibrium: Supporting base, types, and stability of equilibrium.

Energy work and power: Energy (potential and kinetic) works and power

Levers: Definition, function, classification and application of levers in physiotherapy & order of levers with example of lever in human body.

Pulleys: system of pulleys, types and application.
Elasticity: Definition, stress, strain, HOOKE'S Law.
Springs: properties of springs, springs in series and parallel, elastic materials in use.
Aims and scope of various biomechanical modalities:
shoulder wheel, shoulder ladder, shoulder pulleys, pronator-supinator instrument, static cycle, rowing machine, ankle exerciser, balancing board, springs, weights, etc.
Hydrostatics and Hydrodynamics:
Specific gravity, Hydrostatic pressure, Archimedes, principle, Properties of water, and other liquids, Buoyancy-law of floatation, factors determining up-thrust, and effect of buoyancy on movements performed in water. Equilibrium of a floating body, Bernoulli's theorem.
Suspension Therapy:
Principles of suspension, types, components of suspension apparatus, effects and uses of suspension therapy – their therapeutic application.
Muscular system
Definition, properties of muscle, muscular contraction, structural classification, action of muscle in moving bone, direction of pull, angle of pull, functional classification, coordination of muscular system.
Joint structures and functions:
Joint design, Structure of Connective Tissue, Properties of ConnectiveTissue, joint function, changes with disease, injury, immobilization, exercise, over use.
Innervation & joint movement , Assessment of range of motion & strength of shoulder joint muscles ,Structure and functions .
Innervation & joint movement ,Assessment of range of motion & strength of elbow joint muscles ,Structure and functions .
Innervation & joint movement ,Assessment of range of motion & strength of wrist and hand joint muscles ,Structure and functions .
Innervation & joint movement ,Assessment of range of motion & strength of lower extremity joints – hip joint, knee joint, muscles ,Structure and functions .
Ankle and foot complex.
Structure and functions of axial skeletal joints vertebral column – craniocervical, thorax, lumbar, lumbo pelvic region.
Assessment of Chest Wall Expansion & Limb Length Discrepancies
Posture :dynamic and static posture, kinetic and kinematics of posture, analysis of posture, effect of age, pregnancy, occupation on posture.
Gait: kinematics and kinetics of gait, gait in running and stair climbing.
Abdominal muscle assessment
Demonstration of Biomechanical principles.
Study of structure, function and application of various Biomechanical modalities:
shoulder wheel, shoulder ladder, shoulder pulleys, pronator-supinator instrument, static

cycle, rowing machine.
Practical parts:
Ankle exercise, balancing board, springs, weights, etc.
Study of structure, function and application of suspensions
Demonstrations of suspensions on various parts of body.
Demonstration and practice of soft tissue manipulative techniques.
Goniometry – measurement of joint ROM
Identify Muscle work of various movements in body at different angle.
Identify normal and abnormal posture.
Normal gait with it parameters and identify abnormal gait with the problems in it.

6.	**ML201**	**General Biochemistry**	**الكيمياء الحيوية**	**3**	**2**	**2**	

Course aims:
1. Understand the chemical structure of different classes of biochemical compounds including; Carbohydrates, proteins lipids, enzymes and Hormones.
2. Learn the function of essential micro- and macromolecules; such as enzymes and co-enzymes in human body.
3. Utilize the provided knowledge in biochemical field and apply it in advanced courses of biochemistry.
4. Learn and know the main differences between quantitative and qualitative tests for detecting Carbohydrates, Lipids.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Identify the chemical processes, which transform diet into compounds that are characteristics of the cells of a particular species. The catalytic functions of enzymes
a.2 Identify the principles and chemical behavior of oxidative phosphorylation and energy production
a.3 Know the potential energy obtained from the oxidation of foodstuff consumed for the various energy-requiring processes of the living cell.
a.4 Know Cell Biology deals with the structure and functions of cells in living organisms.

b. Intellectual skills:
b.1 Able to design experiments and understand the limitations of the experimental approach
b.2 Able to interpret experimental data and identify consistent and inconsistent components.
b.3 Recommend good safety practice (GSP) guidelines in biochemical research.
b.4 Determine suitable methods of identifying macronutrient in biological fluids.

c. Professional and practical skills:
c.1 Utilize the proper biochemical terminology to communicate with the staff members and other health care professionals

c.2 Handle and dispose hazardous chemicals and biological reagents and compounds safely
c.3 Carry out laboratory tests for identification skillfully with understanding of the mechanism of reaction
c.4 Apply appropriate methods for identification of biochemical compounds of different classes including; lipids, carbohydrates, proteins and other non-protein nitrogenous compounds.
c.5 Be able to express a good "quantitative" skills such as the ability to accurately and reproducibly prepare reagents for experiments

d. General and transferable skills:

d.1 Ability to dissect a problem into its key features.
d.2 Awareness of the major issues at the forefront of the discipline.
d.3 Interact effectively in team working.
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Carbohydrate of Physiologic Importance.
Monosaccharides
• Cyclic structure of sugars
• Asymmetric carbon atom and isomeris
• Disaccharides
• Polysaccharides
• Proteoglycans and glycoproteins
Digestion and absorption of carbohydrates, Glycolysis
Hexoses monophosphate cycle (HMP cycle), Metabolism of Fructose,
Gluconeogenesis, Disorder of carbohydrate metabolism with special reference to diabetic mellitus
Lipids of physiologic Importance
•Classification of lipids
• Fatty acid
• Simple lipids and triacylglycerol's
• Complex lipids
Derived lipids (sterols and steroids)
Digestion and absorption of lipids, Metabolism of fatty acids, β-oxidation, Synthesis of fatty acids
Phospholipids biosynthesis, Sphingomyelin biosynthesis, Triacylglycerol synthesis, Lipolysis,
Cholesterol synthesis and metabolism, Transportation of lipids in humen body by lipoproteins, Atherosclerosis
Ketone bodies formation and their metabolism , Citric acid Cycle

Amino acids
• Peptides
• Protein structure
• Simple proteins
• Conjugated proteins
• Derived proteins
• Techniques for separation of amino acids and proteins
• Hemoproteins
Overview, Protein digestion and absorption, Transamination, Deamination, Urea formation, Phenylketonuria, Alkaptonuria, Albinism, Kwashikor marasmus
Porphyrin & Haem biosynthesis, Bilirubin formation & jaundice, Creatinine , Histamine, Serotonine
Enzymes
Classification,Nomenclature,Coenzymes, Intracellular enzymes, Enzyme Kinetics,Michaelis menten equation, Enzyme Inhibition,
Regulation of enzymes. Enzyme catalysis, Isoenzymes and use of enzymes in clinical diagnosis
Respiratory Chain andOxidative phosphorylation
Nucleic acids (structure and functions)
• DNA synthesis (replication) and DNA repair
• RNA synthesis (transcription)
• Protein synthesis (translation)
Hormones

7.	**ML202**	**General Microbiology**	**علم الاحياء الدقيقة**	**3**	**2**	**2**	

Course aims:
To provide students with the basis to face the study of the major fundamentals of microbiology including bacteriology, virology and immunology.
Intended learning outcomes (ILOS):
a. Knowledge and understanding:
a.1 knowledge on the understanding of the concepts and fundamental principles of microbiology
a.2 key features of the structure, growth, physiology and behavior of bacteria, viruses, fungi and protozoa.
a.3 Basic knowledge to deal with the study of genetic, metabolic strategies and ecology of microorganisms.
a.4 Basic knowledge of the main microbiological techniques to be applied in the laboratory
b. Intellectual skills:
b.1 Identify and evaluate critically the principles and the mechanisms underlying the

different fields of microbiology.
b.2 Analyze the different applications of microbiology in biotechnology, industry and medicine.
b.3 Use the acquired knowledge to the use of bacteria in the lab and the main sterilization techniques.

c. Professional and practical skills:

c.1 Use aseptic technique in handling microorganisms.
c.2 Demonstrate the proper use of PPE and code of conduct for Biosafety
c.3 Proficiently prepare and view specimens for examination using appropriate staining techniques and microscopy (bright field)
c.4 Use pure culture and selective techniques to enrich for and isolate microorganisms.

d. General and transferable skills:

d.1 Use appropriate microbiological lab equipment and methods.
d.2 Document and report on experimental protocols, results and conclusions.
d.3 Interact effectively in team working
d.4 Present information clearly in written, electronic and oral forms.

Topics:

1. Scope and History of Microbiology
2. Microscopy and Staining
3. Characteristics of Prokaryotic And Eukaryotic Cells
4. Growth and Culturing of Bacteria
5. Microbial Genetics
6. Gene Transfer and Genetic Engineering
7. Viruses
8. Sterilization and Disinfection
9.Host-Microbe Interaction and Disease Process
10. Epidemiology and Nosocomial Infections
11. Applied Microbiology
12. Laboratory Health and Safety
13. Safety Quiz
14. Microscopy (Compound Light Microscope)
15. Instruments used in Microbiology Laboratory
16. Preparation of bacterial smear for microscopy examination
17. Simple Stains
18. Differential Stains (Gram stain)
19. The Ziehl-Neelsen Acid-Fast stain
20. Preparation of Media
21. Culturing Bacteria
22. The Streak-Plate Technique
23. Performing an Antibiotic Sensitivity Test

24. Anaerobic Culturing
25. Sterilization and Disinfection
26. Microscopic Examination of a range of ready-made slides

8.	**ML203**	**Basic Pathology**	**اساسيات علم الامراض**	**3**	**2**	**2**	

Course aims:

1. Definition of pathology and diseases, aetiology
2. Explain the basic nature of disease processes from standpoint of causation,
3. Definition of pathology specimens and methods of pathological studies and their relation to clinical aspects
4. Discuss tissue injury and diseases processes, using appropriate vocabulary.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Provide the knowledge, technical skills to medical students to understand human disease.
a.2 Illustrate the molecular and cellular response of the living body when exposed to injurious agent
a.3 Recognizing key of congenital, haemodynamic, inflammatory, infectious. Moreover, developing knowledge needed to interpret laboratory data
a.4 Describe the mechanisms of pathological alterations

b. Intellectual skills:

b.1 By the end of studying this course, the graduate should be able to;
Differentiate between tissue/organ appearance in health and diseased specimens
b.2 Score good selection of tissue specimens for pathological diagnosis on print finger bases
b.3 Integrating and predicting the prognosis and sequllae of diseases
b.4 Analyse various gross and microscopic pathologic data resulting from the general pathological process.

c. Professional and practical skills:

c.1 Collect the experience in gross examination, sampling and reporting
c.2 Perform good management in microscopy and description of different changes in different tissues
c.3 Use the light microscope to examine and identify microscopic findings of some selected examples of studied diseases
c.4 Prepare the graduate to get the ability of decision making

d. General and transferable skills:

d.1 Demonstrate the ability of problem definition
d.2 Utilize the computer, microscope and internet. Therefore, will Increase the ability of problem solving
d.3 Utilize the pathology as a diagnostic tool

d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Introduction to pathology

Practical: 1. Machines and reagents used.

2. Types of stains

Cell injury and adaption

(Causes& mechanisms)

Morphology of cell injury)

Practical: Demonstration on slides

• Morphology of cell injury

• Necrosis

•Lysosomes: hetrophagy and autophagy, Causes and mechanisms

•Intracellular accumulations

•Lipids and other intracellular accumulations.

Practical: demonstration on slides

• Intracellular accumulations

• Fatty change

• Intracellular accumulations

• Lipids and other intracellular accumulations

Practical: demonstration of slides

• Cellular adaptation

• Hypertrophic tissue

• Cellular adaptation of growth and differentiation

• Pathologic calcification

Practical: demonstration of slides

• Hyperplastic tissue

Inflammation :

• Acute inflammation

• Vascular change and cellular events

• Chemical mediators of inflammation

Practical: acute inflammation

• Margi nation of leucocytes

• Cellular elements of exudates neutrophils, eosinophil

• Chronic inflammation

• Definition and causses

Practical: chronic inflammation

• Monocytes

• Macrophages

• Lymphocytes

• Chronic inflammation cells
• Granulomatous inflammation
Practical: chronic inflammation
• Plasma cells
• Giant cells
• Granuloma
• Tuberculosis granuloma
Role of lymphatic and lymphoid tissue
• Systemic manifestations of inflammation
Tissue renewal &fibrosis
• Cell growth.
• Regeneration.
• Cutaneous wound healing.
Practical: Repair in wound healing
• Granulation tissue
• Hymodynamic Disorders
• Oedema
• Hyperemia or congestion.
Practical: Oedema/ Congestion tissue
Disorders of vascular flow and shock
• Thrombosis
• Embolism
Practical: Thrombosis/ embolism
• Infection
• Shock

9.	**MT201**	**Computer**	**الحاسوب**	**3**	**2**	**2**	

Course aims:
1. This subject prepares a student for basic knowledge using computer to solve data processing problems in daily life.
2. To provide opportunity for the study of modern methods of information processing and its applications.
3. To encourage an understanding of the implications of computers in the modern world
4. To provide opportunity for the study of modern methods of information processing and its applications.
5. To encourage an understanding of the implications of computers in the modern world
Intended learning outcomes (ILOS):
a. Knowledge and understanding:
a.1 Students should be able to show an awareness of what the major computer components are and how they act as system

a.2 Show an awareness of the effects and impacts of computers on the individual and the society.
a.3 Show an awareness of the capability and limitations of computers.
a.4 Students after completing this subject should be using computer applications easily.
a.5 Defines the basic concepts of the contemporary computer, and shows its different forms and influence in different areas of life
a.6 Learn about the computer system with its physical and software components and their impact on the classification of computer devices
a.7 Identify the types of operating systems.
a.8 Explains the impact of the Internet and networks revolution and Identifying recent trends in the internet world
a.9 Learn about Microsoft windows XP and knowing the Principles of Microsoft windows, Desktop, Anatomy of a window.
a.10 Learn about basic concept of Microsoft ward, Microsoft PowerPoint, Microsoft Excel and knowing their principles.

b. Intellectual skills:

b.1 The student able to identify a problem, analyze the details of the situation, and then formulate an effective solution is an incredibly important aspect of computer science work.
b.2 Be able to demonstrate problem-solving skills

c. Professional and practical skills

c.1 Students should be able to use the personal computer with Windows (7, XP) with confidence, and the ability to use its available facilities
c.2 Students should be able to search information by the internet
c.3 Be able to demonstrate a basic understanding of computer hardware and software.
c.4 Students should be able to utilize Microsoft windows XP. In addition, they supposed to be able to deal with Microsoft windows commands easily, such as: Copy, paste, and cut command, Saving file on desktop, Moving file to folder, Deleting folder, Remove file from folder to folder.
c.5 Students should be able to write documents by Microsoft word and using all the available features such as: Grammar check, Editing and formatting a document, Moving and copying text with a document , Paragraph formatting Column formatting , Inserting a figure, Inserting table, Inserting chart, Inserting picture
c.6 Students should be able to use Microsoft Excel and learn How to modify and format a worksheet.
c.7 Students should be learn to Basic concept of Microsoft PowerPoint such as:creating , enhancing a presentation and Connecting of computer to a data show and how to use function of data show.

d- General and transferable skills

d.1 Work effectively in teams

d.2 Using computer proficiently
d.3 search information by the Internet easily
d.4 Deal easily with Microsoft word, PowerPoint and Excel proficiently
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Essential computing concepts
• Meaning of computer
• Hardware of a PC
• computer software
• Introduction to networks
• Computer Programming Languages
• Operating System

Microsoft windows XP
• Principles of Microsoft windows
• Desktop
• Anatomy of a window
• How to use the help and support center
• 1Deference between folder and file
• Using windows explorer
• Copy, paste, and cut command
• Saving file on desktop
• Moving file to folder
• Deleting folder
• Remove file from folder to folder
• How to use USB
• How to use CD and DVD

Internet explorer and www
• Discusses the importance of www
• Connect to the internet

Difference between search engines

Microsoft word
• An overview on the basics of word processing
• How to use spell check
• Grammar check
• Use thesaurus
• Editing and formatting a document
• How to use the undo and redo commands
• Moving and copying text with a document
• Paragraph formatting

• Column formatting
• Inserting a figure
• Inserting table
• Inserting chart
• Inserting picture
Microsoft Excel
• Introduction to spreadsheets
• How to modify and format a worksheet
How to use a function
How to create and modify tables
How to create and modify a chart
How to create and modify report
Microsoft PowerPoint
• Basic concept of creating and enhancing apresentation
• How to use slide show tools and digital photography
• Tips to avoiding the drawback of bad slides; slide structure, fonts, color, etc..
• Connecting of computer to a data show and how to use function of data show

Third year :

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	PT301	Medicine	باطنة	4	2	4	

Course aims:

1. Aims to perform competent and comprehensive assessment of people with respiratory.
2. Aims to provide competent and effective management for people with respiratory Different treatment measures of some abdominal genetic disorders.
3. Demonstrate effective clinical reasoning to select and perform appropriate assessments and treatments in the area of medical physiotherapy, applicable across cultural and age groups.
4. To provide the physical therapy student a knowledge to understand evaluative value and limitations.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the basic principal of medicine.
a.2 Know the student Genetic, hormonal, nutritional, environmental, psychological, and social factors affecting medicine patients
a.3 Identify the pathological changes, pharmacological interaction and related clinical features of medical patient conditions commonly encountered by Physical Therapist.

a.4 To equip students with knowledge, skills and attitudes in general and specific areas of internal medicine.

b- Intellectual skills

b.1 Demonstrate a general understanding of the medicine diseases that students would encounter in their practice.

b.2 Accommodating Understand the etiology and pathology, the patient's symptoms and the resultant functional disability.

b.3 Discuss the signs and symptoms, management, and danger signs of esoteric diseases

b.4 Describe indications for a screening test and laboratory test

c- Professional and practical skills

c.1 Be able to describe Aetiology, Path physiology, signs & Symptoms & Management of the various esoteric diseases .

c.2 ability of history taking and clinical examination of esoteric diseases as a part of clinical teaching

c.3 Describe the diagnostic tests used to detect problems in esoteric diseases and how to treat by physical therapy

c.4 the ability Acquire knowledge of various drugs used for each medical condition to understand its effects and its use during physical therapy

d- General and transferable skills

d.1 The student should be able to deal with cases of esoteric patients

d.2 Ability of student treat the esoteric diseases by physiotherapy .

d.3 The student ability to discuss the causes and management of esoteric diseases and their effects.

d. 4 The student ability to Preparing appropriate treatment programs for treating esotrics diseases as well as how to apply the appropriate physiotherapy treatment in practice.

Topics

Introduction: Brief outline of subject of medicine, a medical patient, common signs & symptoms of disease.

History Taking

Physical examination:

- The vital sign
- Blood pressure
- Arterial pulse
- Respiratory rate
- Temperature

Investigation, normal values commonly encountered

Body systems and organs

Poisoning : Clinical features – general management – common agents in poisoning –

pharmaceutical agents – drugs of misuse – chemical pesticides – Envenomation

Infection : Effects of Infection on the body – Pathology – source and spread of infection – vaccinations – generalized infections – rashes and infection –
food poisoning and gasteroenteritis – sexually transmitted diseases – HIV infections and Aids

Nutritional & Metabolic Diseases: Brief description of following diseases along with outline of management: Diabetes Mellitus, Vitamins & Minerals Deficiencies, and Obesity.

Diseases of skin:

Brief description of manifestations along with outline of management of common skin diseases- infections (scabies, pediculosis, taeniasis, impetigo) & psoriasis.

Cardio-vascular system disorders:

- Introduction related to anatomy & physiology & function
- Common symptoms related
- The investigations used to detect the related disorder
- The specific disease which include:
- Ischemic heart disease which include : Angina pectoris

Myocardial infarction :

- Cardiogenic shock
- Congestive cardiac failure

Hypertension:

- Classification
- Risk factors
- Nursing management
- Drugs in common use

Respiratory Disease :

Examination of the Respiratory System – Investigations : Chest Radiographs, Pulmonary Function Testing, Arterial Blood Gas Analysis ; Clinical manifestations of Lung disease ; Patterns of lung disease

Chronic Obstructive Lung

Disease and Restrictive Lung Disease ;

Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following lung diseases

Chronic Bronchitis, Emphysema, Asthma,

Lung Diseases:

Diseases of the pleura, diaphragm and chest wall ;

Respiratory failure – Definition, types, causes, clinical features, diagnosis and management.

Disorders related to endocrine:

Common presenting symptoms of Endocrine disease – common classical disease presentations, clinical features and its management; Diabetes Mellitus : Etiology and pathogenesis of diabetes – clinical manifestations of the disease – management of the disease – Complications of diabetes.

Disorders related to haemopoietic system:

- Introduction related to blood formation & function of the cellular compartment.
- Common symptoms related to anemia
- The investigations used to detect the types of anemia
- Classification
- Management

Disorders related to gastrointestinal systems

- Introduction related to anatomy & physiology & function
- Common symptoms related to disorders
- The investigations used to detect the related disorders
- Specific disorders:
  - Peptic ulcer & its complications
  - Diarrhea- acute & chronic

Disorders related to urinary systems

- Introduction related to anatomy & physiology & function of urinary system
- Common symptoms related to disorders
- The investigations used to detect the related disorders
- Specific disorders:
  - Acute & chronic renal failure
  - U.T.I

Disorders of CNS

- Introduction related to anatomy & physiology & function of CNS
- Common symptoms related to disorders
- The investigations used to detect the related disorders
- Specific disorders:
  - Cerebrovascular accident
  - Epilepsy

Food and Nutrition :

Assessment – Nutritional and Energy requirements; Deficiency diseases – clinical features and treatment; Protein – Energy Malnutrition

Clinical features and treatment; Obesity and its related disorders : Causes – Complications – benefits of weight loss – management of Obesity – diet, exercise and medications.

Diseases of the blood:

Brief description of manifestations along with outline of management of common blood diseases- Anaemia, Leukaemia, Coagulopathy.

Geriatrics:
Brief outline of ageing, manifestations of diseases in old people and general principles of management. Implications of aging in physical therapy.

2.	**PT302**	**Pediatrics Physiotherapy**	**العلاج الطبيعي للأطفال**	**4**	**2**	**4**	

Course aims:

1. Evaluation in pediatrics
2. Normal growth and development.
3. Different treatment measures for neuropediatric problems.
4. Different treatment measures for orthopedic problems in children
5. Different treatment measures of some genetic disorders.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understandand identify the principles of Normal motor and mental development related to child health and diseases, which underpin physical therapy.

a.2 Demonstrate the ability to extract pertinent information for a given pediatric patient through reviewing the provided medical document.

a.3 Identify the pathological changes, pharmacological interaction and related clinical features of pediatric conditions commonly encountered by Physical Therapist.

a.4 The student can describe biological and physiological changes, which developed as normal consequences of aging process and those resulting from pediatric disorders.

a.5 Know the student Genetic, hormonal, nutritional, environmental, psychological, and social factors affecting normal growth

b- Intellectual skills

b.1 Demonstrate a general understanding of the diseases that students would encounter in their practice.

b.2 Accommodating Understand the etiology and pathology, the patient's symptoms and the resultant functional disability.

b.3 Student understanding of treating children with neuromuscular disabilities,Delayed neurodevelopment, impaired neurodevelopment and other common conditions in children

c- Professional and practical skills

c.1 Be able to describe a etiology, Path physiology, signs & Symptoms & Management of the various Neurological & Pediatric conditions.

c.2 ability of history taking and clinical examination of Neurological & Pediatric conditions as a part of clinical teaching

c.3 the ability Acquire knowledge of various drugs used for each medical condition to understand its effects and its use during therapy

c.4 Be able to describe normal development & growth of a child, importance of Immunization, breastfeeding& psychological aspect of development.

d- General and transferable skills

d.1 The student should be able to deal with cases of children
d.2 Ability of student treat neonatal and pediatric .
d.3 Preparing appropriate treatment programs for treating children as well as how to apply the appropriate treatment in practice.
d.4 ability to demonstrate Safe practical skills in pediatrics physiotherapy

Topic

Review normal foetal development & child birth, including assessment of neonate

1. Growth and Development of a normal child

Neuro motor, physical growth, cognitive, mental, intellectual, social etc. (in detail) normal and pathological.

The examination & assessment of a pediatric patient

Congenital & acquired musculoskeletal disorders

Etiogenesis, clinical manifestation & principles of management

Congenital & acquired Cardio- pulmonary disorders

- Etiogenesis, clinical manifestation & principles of management

Congenital & acquired neurological disorders (CNS&PNS):

Etiogenesis clinical manifestation & principles of management

Hereditary disorders

Etiogenesis clinical manifestation & principles of management

Nutritional Vitamins, Deficiency & development disorders:

Etiogenesis clinical manifestation & principles of management

Burns, Injuries & accident:

Types & principles of management including preventive care.

Surgical intervention:

- Indications & common surgical procedure.

Common infectious diseases in children:

Brief description of following infectious diseases along with outline of management:

Tetanus, diphtheria, Mycobacterial, measles, chicken pox,

Gastroenteritis, HIV, and Malaria. Immunization programmes –WHO schedule, different vaccinations, rationale; special consideration to various disease eradication programmes like Pulse-Polio.

Nutritional requirements, malnutrition syndrome and management in brief.

Clinical presentation, management & prevention (in detail) of the following:

Cerebral palsy, Poliomyelitis, Muscular dystrophy, and Spina bifida.

Clinical presentation, management & prevention (in detail) of the following: - Muscular dystrophy, and Spina bifida.

Childhood rheumatism-types, clinicalpresentation, & management in brief.

Acute CNS infections: clinical presentation, complications and management of bacterial and tubercular infections in brief

3.	PT303	Sport Medicine	الطب الرياضي	3	2	2	

Course aims:

1. The course will cover role the Sports physiotherapist research has focused injury prevention strategies to help athletes reduce the risk of injury
2. Differentiate between different sports injures clinically
3. To understand sports physiotherapy and physical therapies not only at the time of competition but also through all stages of the athlete's sporting career
4. To provide the knowledge and skills necessary to work as a sports physiotherapist
5. Identify basic equipments and supplies used for evaluation and treatment of sports injuries
6. Apply appropriate physical therapy management for each joint injury

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 The student Know how to deal with sports injuries
a.2 Describe the principles of prevention of muscle and skeleton injuries related to physical exercise and sports
a.3 The student Know first aid for sport injury
a.4 Identify different types of bone fractures and joints related to accedents outside fields
a.5 Explain selected joint injuries of upper and lower extremities
a.6 Give examples of adequate examination and treatment of muscle and skeleton injuries related to physical exercise and sports.

b- Intellectual skills

b.1 Learn first aid
b.2 Deal with different injuries
b.3 Describe the sports medicine models
b.4 Explain the principles of an effective physical therapy training program for different sports
injuries

c- Professional and practical skills

c.1 The student able to deal with various sports injuries
c.2 The student able to treat and help the athlete to return to the stadiums in the least time
c.3 The student able to treat according to the protocol followed by the institution or according to the evidence based practice.
c.4 The student able to Diagnosis and treatment of injury during exercise

d- General and transferable skills

d.1 Practice independent learning needed for Education in mechanical origin of sports injuries and their complications.

d.2 The student able to differentiate between the meniscal & ligamentous knee injuries clinically
d.3 The students have the ability to diagnosis of symptoms and signs of sports injure
d.4 Work effectively in a team; demonstrate critical thinking, problem solving and decision making abilities.
d.5 Communicate effectively in specialized language and expression of complex issues in terms that professionals and patients can understand.
d.6 Transfer properly essential physiotherapy knowledge to the patients or other health professionals

Topics

Introduction
General introduction
The IOC Medical and Scientific
Commission Protecting Athletes' Health
-Sport and performance:
A challenge for the Athlete's health.
-The Advancing Role of Sports Physical Therapies
-The Role of Physiotherapy in
Injury Prevention
-Injury Prevention –
Preparation for Exercise
and Physical Exertion
-Physiotherapy Treatment
and Rehabilitation
-PRICE Technique
-What should Athletes avoid doing during the first 24 to 48 hours following injury?
-Physiotherapy Treatment and Rehabilitation
Physiotherapy and Recovery
The Role of Physiotherapy in
Doping Control
Physiotherapy and Physical Therapies Services during the Olympic Games
Prevent Injury and Maintain Optimal Health During the Games. Useful Tips for Athletes
General AC Joint Injuries
What AC, type, causes.
Ankle sprain
General Anterior Cruciate Ligament Injuries What ACL, causes
ARTICULAR CARTILAGE INJURIES
Concussion
HEAT ILLNESS
Carpal tunnel syndrome

Shoulder Dislocation
Shoulder Instability
OVERUSE INJURIES
SUDDEN CARDIAC
DEATH IN ATHLETES.

4.	**PT304**	**Basic Radiology**	**أسس الاشعة**	**3**	**2**	**2**	

Course aims:

1. This course covers an overview of relevant radiology and its significance for the practicing clinical physical therapist.
2. Know how x-rays are produced, identify the component parts of the x-ray machine and its accessories, 3. list, and describe the possible interactions of x-rays with matter.
4. List, discuss and practice the step-by-step procedures for both manual and automatic processing.
5. Identify the quality of x-ray image regarding the radiographic, contrast, sharpness, magnification and distortion. Also, knows what is required to produce an ideal radiographic image.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the basic concept of radiation.
a.2 Know different types of Hazards &the protection of radiography.
a.3 List and define common radiographic and imaging terminology
a.4 Understand and know Factors relating to the production of radiography.
a.5 Describe multi-technique imaging in investigation of common clinical condition and justify the choice of imagine techniques.

b- Intellectual skills

b.1 The ability to manipulate portable imaging equipment and other medical/technical equipment
b.2 The ability to physically operate all types of imaging equipment
b.3 The physical ability to assist in lifting patients from a carto, bed or wheelchair to the radiographic table.
b.3 The ability to orally communicate in English
b.4 The ability to visually observe (see) the patient at a minimum distance of 20 feet. The ability to read the requisition in the execution of a radiographic procedure, and the visual acuity to see the X-ray control panel.
Auditory perception is required in the care and management of the patient. The applicant (student) must be able to respond to the auditory needs of the patient, respond to the auditory communication of the physicians(s), nurse(s) and co-workers.

c- Professional and practical skills

c.1 The ability to manipulate portable imaging equipment and other medical/technical equipment.

c.2 The ability to physically operate all types of imaging equipment
c.3 Be able to practice and learn the necessary skills
c.4 Ability to agile communication style so that the student can communicate effectively with anyone who crosses your lab or table.

d- General and transferable skills

d.1 Work effectively in a team; demonstrate critical thinking, problem solving and decision making abilities.
d.2 Communicate effectively in specialized language and expression of complex issues in terms that professionals and patients can understand.
d.3 Transfer properly essential physiotherapy knowledge to the patients or other health professionals.
d.4 Intraoral techniques for periapical radiographic film intraoral techniques for bitewing.
d.5 Radiographic film intraoral techniques for occlusal radiographic film dark room film processing.

Topics

Introduction Radiology and list of diagnostic imaging studies.
Basic X-ray physics
Projection radiograph Fluoroscopy
Computed tomography, Definition, parts.
Ultrasound, Definition, parts.
Magnetic Resonance Imaging, Definition, parts.
Nuclear Medicine
Interventional Radiology
Tele radiology
Radiation Dose and Risk
Principle of Radiation Protection
Technique of radiology
High Kilo Voltage
PA/AP
X-Ray Tube
X-Ray Detectors
Position Emmision
Production Of X-Ray
Interaction Of X-Ray

5.	**PT305**	**Therapeutic Exercise**	**التمارين العلاجية**	**4**	**2**	**4**	

Course aims:

1. Applying on one of his/her colleagues the different types of movements and exercises used in muscle re-education for any parts of the body

2. Basic principles, indications, and precautions to be considered when performing different forms of exercises
3. Able to express in writing and demonstration the different steps to be used in the progressive strengthening of any muscle group of the human body, specification made on the use of gravity, the patient and therapist starting positions, the therapist grasps
4. The type of muscle contraction used and the procedures of application or assistance or manual resistance

Intended learning outcomes (ILOS):

Knowledge and understanding

a.1 Learn the principles, technique and effects of exercise as a therapeutic modality in the restoration of physical function

a.2 Recognise physics and basic principles used in ROM in physical therapy

a.3 Able to express in writing and demonstration of different exercises to be used in the postural rehabilitation, traction (Manual & Mechanical), suspension therapy, relaxation exercises, group exercises & Balance & coordination exercises including the patient and therapist starting positions

a.4 Recognise the human movements and define the concepts of functional excursion, active and passive insufficiency

a.5 Describe procedure to apply different techniques of mobilisation

a.6 Define and record indications, goals, limitations, and contraindications to various therapeutic exercises methods

b- Intellectual skills

c.1 Analyse the human movement and concepts of rhythm, starting position, co-ordination and progression in therapeutic exercises

c.2 Utilise the concepts of progression by adopting various positions and techniques in therapy (
Same as before)

c.3 Examine, interpret, analyse & reconstruct all exercises rehab programs according to the patient's need & preferences in a safe & effective manner.

c.4 Demonstrate & analyse various exercises programs like, suspension therapy, relaxation exercises group exercises & traction

c- Professional and practical skills

b.1 The students must be able to apply the basic principles of physics to exercise therapy in human body.

b.2 The students must able to incorporate biomechanical principles in to exercise therapy.

b.3 The students must be able to apply anatomy, physiology and biochemistry knowledge to plan and execute exercise regimens

b.4 The students must be clinically competent for independent decision making regarding the best therapeutic treatment

a.5 Students must be aware of how to applythe techniques in the restoration of physical functions

d- General and transferable skills

d.1 Identify common orthopedic conditions related to the lower extremity and apply
d.2 appropriate treatment interventions as measured by performance
d.3 Identify common orthopedic conditions related to the upper extremity and apply

Topics

Goniometry
What coniometry, Type GONIOMETRY
Upper limb range of motion
lower limb range of motion
Starting position
What starting position, type, use and affects
Movement
Passive movement
What passive movement, type, principle, and use and affect.
Active movement.
What is active movement, type, principle, uses and affects.
Joint mobility
What joint mobility, classification
Stretching
What stretching, Flexibility, Hypomobility, Contracture, Types of stretching
Posture
What posture, The postural mechanism,The postural
Walking aids and Gait training
Definition , Types, Preparation for crutch walking
Frenkle's Exercises
General breathing exercises.
Aims of breathing exercises, Types of breathing, Coughing,
The cough mechanism, Therapist assisted techniques.
PNF TECHNIQUES
Definition, Basic techniques, Effects and uses,
TECHNIQUES OF EMPHASIS
Hydrotherapy
What hydrotherapy, Indications for hydrotherapy, Goals, Properties of water
Exercise Therapy Equipment
Mat Exercises, Purpose And Uses, Re Education Board, Continuous Passive Movement (Cpm)

6.	**PT306**	**Clinical Training I**	**التدريب السريري 1**	**6**	**-**	**12**	

Course aims:

1. To develop the physiotherapy competencies among students.
2. To integrate theoretical knowledge, attitudes, behaviours and technical learning in the management of a wide range of clinical problems.
3. To emphasise the role of the physical therapist in the development of effective, comprehensive, management plans for the delivery of competent services to clients in a variety of settings.
4. Effective assessment and management of various disorders related to the old age, frequently seen by an physiotherapist
5. Effective assessment and management of various cardio respiratory disorders frequently seen by an physiotherapist

Intended learning outcomes (ILOS):

Knowledge and understanding

a.1 That the student learn about all diseases that affect young and old in all disciplines

a.2 To draw up the treatment plan and define the goal that he wants to reach for treating the patient

a.3 Remembers the ethics of the profession before starting to treat patients

b- Intellectual skills

b.1 Understanding the student how to use the devices and how to deal with them

b.2 Understanding the students' problems and how to deal with them

b.3 That the student distinguishes the therapeutic exercises used for each case separately

b.4 accommodating Students are to apply his or her skills of assessment and effective management in dealing with the common cardio respiratory conditions

c- Professional and practical skills

c.1 the ability Student obtain information about any condition with relative ease
the ability of Student modify and employ the most effective method of rehabilitation

c.2 The student's ability to focus on physical therapy for patients with brain injuries, accidents and Musculoskeletal injuries and disorders of the upper limbs also includes examination and treatment For patients with internal medicine and orthopedic departments.

c.3 Students able to apply his or her skills of assessment and effective management in dealing with the common neurological conditions.

d- General and transferable skills

d.1 That the student has the skills of working through the team, whether with their colleagues or others in other professions

d.2 The student should be able to communicate in the field related to professional practice processes such as study, diagnosis, treatment and evaluation.

d.3 Providing students with professional values and professional ethics through field practice and professional growth.

Topics

Exercises :

Types of exercise :

a) Active exercise
b) passive exercise
c) Active assistive exercise
d) Resistive exercise
e) Stretching exercise
f) Strengthing exercise
g) Balance exercise
h) Frankles exercise
i) Brething exercise

Electro therapy :

Low Frequency Currents:

Faradic current:

- Indications, contraindications, Techniques, parameters, Group muscle stimulation.

Faradic footbath, Faradism under pressure and muscle re-education.

Galvanic current:

Indications, contraindications, precautions and therapeutic effects of stimulation.
Techniques, parameters, Dosimetry .

Heating Modalities:

Infrared Therapy:

- Therapeutic effects and uses, Techniques of application.

Indications, contraindications precautions and Potential harmful effects.

High Frequency currents:

Short wave Diathermy: Continuous & Pulsed

Indications, contraindications and therapeutic effects.

Methods of application-capacitor and induction electrode, precautions and Potential harmful effects of treatment, Dosimetry.

Physiotherapy for pregnancy

Orthopedic :

- Flat foot
- Shortening heel tendon .

Fracture of upper limp :

a) Fracture of shoulder and rehabilitation protocol
b) Fracture of elbow joint and rehabilitation protocol
c) Fracture of wrist joint and rehabilitation protocol

Neurology:

1. Stroke, meningitis,
2. encephalitis, Parkinson’s disease,

3. C.P., Ataxia (all types), Brain tumors.
4. Quadriplegia

The speciat tests for various sports injuries

Physiotherapy of respiratory system

Recognize & understand the use of ICU

Prosthetics & orthotics:

a) Splint and type of splint ,Uses and Material
b) Upper limb splint and Orthotic
c) Upper limb prosthesis

Amputation and stump

Causes of amputation and Level of amputation

Applied physiotherapy skills:

- Demonstrate safe manual handling techniques
- Demonstrate skill in the performance of massage ,Preparations, Contraindications

TECHNIQUES

1. Stroking manipulations.
2. Pressure or petrissage manipulations.
3. Percussive or tapotement manipulations.

Demonstrate skill in the use of hydrotherapy:

- Definition,
- Physical principles of water.
- Bio physiological effect of water.
- Benefits of Hydrotherapy Exercises

7.	**DT301**	**Pharmacology I**	**علم الادوية 1**	**3**	**2**	**2**	

Course aims:

1. Provide knowledge and understanding of the basic principles of pharmacology (pharmacokinetics and pharmacodynamics).
2. Introduce concepts of drug action at cell, tissue and system levels.
3. Provide fundamental pharmacological knowledge of the principles of drug action
4. Provide comprehensive coverage of the major drug groups affecting different body systems; autonomic nervous system, respiratory system and gastrointestinal system and autacoids

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Memorize basic principles of pharmacology: pharmacokinetics principles (drug absorption; distribution; metabolism; and excretion) as well as concepts and routes of drug administration) and pharmacodynamic principles (modes of drug action and drug-drug interaction).

a.2 Defend the proper use of medicines in the treatment of diseases and improvement of patient's quality of life.
a.3 Demonstrate a fundamental pharmacological knowledge of the principles of drug action and principles of drug-receptor interactions at a molecular level
a.4 Comprehend the etiology of different major diseases and study different therapeutic classes of drugs and medicines including the mechanism of action, the adverse drug reactions and their significance in treatment.
a.5 Outline mechanism of action of different drugs together with their pharmacokinetics; indications and adverse effects.
a.6 Discuss therapeutic use of drugs in various diseases / disorders

b. Intellectual skills:

b.1 Rationalize the pharmacological basis for the therapeutic use of drugs
b.2 Relate pharmacological effects and indications of drugs to different physiological and pathological conditions.
b.3 Compare different drugs in different and the same pharmacological classes and predict the most clinically important therapeutic agents in each class
b.4 Evaluate possible drug interactions, adverse effects, and other drug-related problems, as essential issues in implementing pharmaceutical care
b.5 Demonstrate impeccable skills regarding the calculation of medicine doses and dosage regimens; and give clear advice; which may not only be related to medications but may extend to health promotion; disease prevention; and encouraging self-care.

c. Professional and practical skills:

c.1 Distinguish minor illness from major ones that require prompt medical intervention and make appropriate responses to presented symptoms.
c.2 Demonstrate excellent skills regarding the interpretation of patient clinical data and prescriptions; and other orders for medicines.
c.3 Counsel patients when dispensing OTC and prescription drugs toproper use of medicines
c.4 Justify management and selection of medicines; respond to symptoms; prescribe over the counter drugs; summarize drugs information; and report adverse reactions to medicine and medicine utilization review.

d. General and transferable skills:

d.1 Work effectively in a team; demonstrate critical thinking, problem solving and decision making abilities.
d.2 Communicate effectively in specialized language and expression of complex issues in terms that professionals and patients can understand.
d.3 Transfer properly essential pharmacological knowledge to the patients or other health professionals

Topics:

Introduction to pharmacology:

- Definition of terms, Nature of drugs.
- Routes of administration of drugs.
- Mechanism of drug crossing through the cell membrane

General pharmacology:

A. Pharmacokinetics of drug:

Absorption, Distribution, Metabolism, Excretion.

B. Pharmacodynamics of drugs:

Mechanism of actions, receptors, drug-receptor interactions, dose-response relationship.

Introduction to autonomic pharmacology:

- Anatomy of autonomic nervous system (ANS).
- Neurotransmitters and chemistry of ANS
- Types of autonomic receptors.

Drugs acting on Adrenergic system:

Introduction: Synthesis, storage, release and metabolism and uptake of adrenaline.

- Adrenergic (sympathomimetics(: Adrenaline, Ephedrine.
- Anti-adrenegic drugs (sympatholytics): Types, actions, uses and adverse effects

Drugs acting on Cholinergic system:

Introduction: Synthesis, storage, release and metabolism and uptake of acetylcholine.

- Cholinergics (Parasympathomimetic(: Acetylcholine, Carbichol, Pilocarpine, Neostigmine, & Nicotine
- Anti- Cholinergics drugs (sympatholytics): Types, actions, uses and adverse effects

Drugs acting on Cardiovascular System (CVS):

- Anti-Hypertensive Drugs: for treating BP
- Anti-Anginal Drugs: for treating angina
- Anti-Arrhythmic Drugs: for treating arrhythmia

Congestive Heart Failure Drug: for treating heart failure

Drugs acting on Respiratory System:

- Anti -Asthmatic Drugs: for treatment of Asthma
- Expectorants and Antitussive Agents: for treating Coughs

Drugs acting on Gastrointestinal Tract(GIT):

- Antiulcerant Drugs: used to treat Peptic Ulcers
- Antidiarrheal Drugs: used to treat Diarrhea
- Laxatives Drugs: used to treat Constipation

Drugs Acting on Central Nervous System) CNS)

Antiepileptic Drugs used in treatment of epilepsy

Chemotherapeutic agents:

Introduction: classification according to mechanism of action, types of adverse effects and recent drugs.

Immunotherapy and immunosuppressant

Antimicrobial Therapy:

- Introduction to Antibiotic Agents
- Antibacterial
- Antivirals
- Antifungals

Analgesics and Anti-inflammatory drugs:
NSAIDs and Paracetamol.

Drugs used to treat Endocrine Disorders:
- Drugs used in treatment of Diabetes Mellitus; Insulin and Oral anti-diabetic agents.
- Drugs for Thyroid gland Disorders

8.	**AN408**	**Psychology**	**علم النفس**	**2**	**2**	**-**	

Course aims:

1. The objective of this course is to introduce students to the principle domains of psychology that are most relevant to Physiotherapy.
2. Its aim is to teach students the key areas of psychology that would provide the basis for viewing people not only as biological but also as psychological beings.
3. Furthermore the course also aims to introduce students to the application of psychology in the wider practice of Physiotherapy
4. In this course, students are introduced to the interaction between psychological and medical principles in the development, assessment and diagnosis and in the treatment of medical illnesses.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Knowledge and understanding of psychological theories, concepts, research paradigms and research findings, and the ability to make links to the relevant historical background

a.2 Identify and reflect on personal strengths, weaknesses and professional development in relation to placement provider/employers' needs

a.3 Recognize and help with the psychological factors involved in disability, pain, disfigurement, unconscious patients, chronic illness, death, bereavement and medical surgical patients/conditions.

a.4 Understand the concept of stress and its relationship to health, sickness and one's profession.

a.5 An awareness of applications and implications of psychological theories and research

a.6 Understand Ego defense mechanisms and learn counselling techniques to help those in need

b- Intellectual skills

b.1 Use critical thinking effectively in evaluating information quality, recognizing thinking fallacies, and making connections between observations, facts, and theories of

psychology.
b.2 Be able to critically evaluate and analyze theoretical perspectives, historical trends and empirical findings that address psychology.
b.3 Be able to do psychosocial assessment of patients in various developmental stages.

c- Professional and practical skills

c.1 Apply psychological skills to professional work, exhibit self-regulation, refine project management skills, enhance teamwork ability, and develop life direction in the area of psychology.
c.2 Practice ethical behavior in all aspects of the science and practice of psychology.
c.3 Apply psychological theories and principles to professional employment and recruitment processes
c.4 Research skills, including statistical and other data analysis skills, which will equip you to contribute to psychological knowledge

d- General and transferable skills

d.1 Practice independent learning needed for continuous professional development.
d.2 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.3 Interact effectively in team working

Topics

What’s psychology ?
Fast facts on psychology
Subject of psychology
Branches of psychology
What’s behaviour
Classification of behaviour
Psychology goals
Intelligence
Emotion
Perception
Communication
Conflict
Autism
Abnormality
Parent-child relationship
The role of genetics
Mental disorders
Anxiety disorders
Specific phobias
Obsessive- compulsive disorder
Somatoform disorders

Dissociative disorders
Personality disorders

9.	**MT301**	**Research Methodology**	**طرق البحث**	**2**	**2**	**-**	

Course aims:

1. Understand some basic concepts of research and its methodologies
2. raise awareness of crucial aspect of the nature of Knowledge and the value of scientific method
3. Introduce the concept at the heart of every research project –the research problem- and to discuss what a researchable problem is.
4. Identify appropriate research topic
5. Write research report and thesis
6. Select and define appropriate research problem and parameters
7. Evaluate literature, form a variety of sources, pertinent to the research objectives.
8. Identify and justify the basic components of the research framework, relevant to the tackled research problem.
9. Discuss how to cite sources, using the American Psychological Association (APA), and justify this choice.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Understand the general definition of research design
a.2 Understand the limitation of particular research methods
a.3 Know and understand different types of research
a.4 Understand and Know how to write References by using one of the two types(Alphabetic or Numbered) when using different sources in their Research Project in 4th year.
a.5 The internet has made locating information more accessible, but not every source is credible. It is important to know how to find reliable sources and analyze information to determine whether or not it is credible. To ensure are gathering accurate information, try to verify information from one source by sing another. Locate the original information source to verify its reliability.

b- Intellectual skills:

b.1 Develop advanced critical thinking skills
b.2 Discuss the criteria of good research and the different types of research.
b.3 present some aspects of the debate about the nature of knowledge and the value of scientific method

c- Professional and practical skills:

c.1 Develop skills in qualitative and quantitative data analysis and presentation
c.2 Demonstrate enhanced writing skills
c.3 Demonstrate the ability to choose method appropriate to research aims and objectives.

c.4 Be able to demonstrate Research skills are essential to employers because they help the company develop new products or services, identify the need and wants of their customers, improve what they do, keep up with changes in their industry and compete in their market. Knowing how to develop excellent research skills and highlight them for employers can help in several ways throughout the career.

d- General and transferable skills:

d.1 Practice independent learning needed for continuous professional development

d.2 Work effectively in a team.

d.3 Be able to gain problem-solving skills to break a problem down into its parts

d.4 Learn to use advanced search techniques.

d.5 Think critically about each element, analyze the information you find and use that information to form an effective solution.

Topics

Introduction to research

- Definition
- Types of radiation
  - ✓ **Historical**
  - ✓ **Observation**
  - ✓ **Systematic**
  - ✓ **Descriptive and etc.**

Basic elements of scientific research

- Problem definition
- Selecting a research problem
- Interest
- Uniqueness

Basic elements of scientific research

- Capability
- Availability of data
- Financial support
- Time factor

Writing a research proposal

Sample survey and questionnaire

- Reasons
- Types

Hypothesis

- Definition
- Formulation
- Sources
- Examples

Research writing

- Title page
- Approval page
- Abstract

Research writing

- Acknowledgement
- Table of content
- List of figures

Research writing

- Chapters of research projects
  - Chapter one (Introduction)
  - Chapter two (review of literature)
  - Chapter three (methodology)

Research writing

- Chapters of research projects
  - Chapter four (results)
  - Chapter five (discussion)
  - Chapter six (conclusion and recommendation)

Research writing

- References
- Appendixes

Reference page

- Reference list
- Books reference
- One other reference
- No author reference
- Unknown author reference

Reference page

- Two or three authors reference
- Four or more authors reference
- Edited or translated books
- Article or chapter in a book
- Government document

How to drawing graphic inserting table, spelling check etc.

Plagiarism and Toronto

Citation

- Definition
- Example
- Verbs used
- References
- Quotation

- When to cite

Paraphrasing

- Definition
- Examples
- How to avoid plagiarism
- When to paraphrase

Linking words and phrase used in projects

Skills of searching on the internet and using the scientific sources

Modern language association (MLA)

- Style 7th quick guide
- Library search guides
- Killam library MLA
- The reasons of using MLA handbook effective April 2009

Articles

- Types of articles
- Referencing
- How to cite

Some consideration and limitation facing post-gradation students

Presenting a research paper and writing a critical review

- Introduction
- Body
- Conclusion
- Purpose of research paper

Oral presentation

- How to make good presentation
- Good starting
- Clear voice
- Eye contact
- Good timing
- Confidence

Forth year

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	**PT401**	**Neurology Physiotherapy**	**العلاج الطبيعي للأعصاب**	**4**	**2**	**4**	

Course aims:

1. integrates the principles of neuroanatomy, neurophysiology, neuropathology and

movement dysfunction to the asses
2. To help the student understand the importance of Physiotherapy given to Neurological diseases.
3. Equip themselves with the knowledge of using materials that would provide adequate reinforcement of learning.
4. analyze and manage the neurological disorders

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 A deeper understanding of the basic sciences and their integration with neurological Physical Therapy clinical practice
a.2 Define the neurological diseases and its causes and prevention.
a.3 Understand the meaning of each medical terms given in each topic.
a.4 Understand and apply basic clinical reasoning skills and an evidence-based approach to decision making in neurological physiotherapy practice;
a.5 Describe the aetiology, epidemiology, pathogenesis and clinical presentation of stroke patients, with particular emphasis on motor and sensory problems;

b- Intellectual skills

b.1 Effectively develop and appropriately present a critical discussion in written form
b.2 Apply the Physiotherapy learned to increase the knowledge on the subject matter.
b.3 Discuss relevant lifespan, gender, cultural, legal and ethical considerations in performing basic neurological physiotherapy evaluation and management procedures;
b.4 apply research findings from basic science and applied clinical research in the selection and justification of assessment and management in individuals with neurological conditions.

c- Professional and practical skills

c.1 Appropriately select, modify as necessary, and correctly demonstrate basic measurement and testing procedures commonly used in assessing neurological dysfunction;
c.2 Apply biomedical and behavioural scientific knowledge to the physiotherapy evaluation and management of basic neurological disorders across the lifespan;
c.3 Conduct an appropriate basic examination of the neurological system in adults, including history and physical examination

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Critically use decision-making skills with an awareness of the factors that inform their decisions.

Topics

Anatomy and physiology of nervous system
Evaluation of neurological patients.
general outline of electro diagnostic procedure
interpretation and prognosis in different neurological condition
Assessment and principle of therapeutic management of the following neurological conditions:
1. development of disorder , brain injury
Stroke, meningitis, encephalitis, Parkinson's disease, C.P, ataxia (all types), brain tumours
classify spinal cord injury:
2. Motor neuron disease, disseminated sclerosis, transverse myelitis, tumour, polio, spinal cord degeneration and Syringomyelia
Neuropathies and myopathies
Brief Description of Headache, migraine, raised intra-cranial pressure
Development programs
3. Re education and re training techniques in neurological conditions
approaches like: Bobaths, Roods, Kabats, Vojta techniques, biofeedback etc.
Spinal cord injury: anatomy and physiology:
4. Assessment of spinal cord injury.
5. Principle of physiotherapy at various stages of spinal cord injury
Rehabilitation goals and ADL training.
Peripheral nerve injuries:
6. Classification and type
7. Functional assessment, investigation, diagnosis, prognosis
Physiotherapeutic management
Head injury:
8. Types and Mechanisms of head injury
9. Clinical Features, potential complications
Principle of immediate and postoperative therapeutic management
Neurosurgery
Physical therapy in complications ofvarious neurosurgical conditions
10. Cerebral vascular accident.
Extra pyramidal syndromes- Parkinson's disease, Chorea, Athetosis, Dystonia, Hemi-ballismus
Cranial Nerves and special senses with major emphasis on V, VII, X, XI, & XII
Assessment and principles of therapeutic management of following neurological conditions:
Stroke, meningitis, encephalitis, Parkinson's disease, C.P., Ataxia (all types), Brain tumors
Anatomy and physiology of nervous system
Evaluation of neurological patients.
11. general outline of electro diagnostic procedure

interpretation and prognosis in different neurological condition
Assessment and principle of therapeutic management of the following neurological conditions:
12. development of disorder , brain injury
Stroke, meningitis, encephalitis, Parkinson's disease, C.P, ataxia (all types), brain tumours classify spinal cord injury:
13. Motor neuron disease, disseminated sclerosis, transverse myelitis, tumour, polio, spinal cord degeneration and Syringomyelia
Neuropathies and myopathies
Brief Description of Headache, migraine, raised intra-cranial pressure
Development programs
14. Re education and re training techniques in neurological conditions
approaches like: Bobaths, Roods, Kabats, Vojta techniques, biofeedback etc.
Spinal cord injury: anatomy and physiology:
15. Assessment of spinal cord injury.
16. Principle of physiotherapy at various stages of spinal cord injury
Rehabilitation goals and ADL training.
Peripheral nerve injuries:
17. Classification and type
18. Functional assessment, investigation, diagnosis, prognosis
Physiotherapeutic management
Head injury:
19. Types and Mechanisms of head injury
20. Clinical Features, potential complications
Principle of immediate and postoperative therapeutic management
Neurosurgery
Physical therapy in complications ofvarious neurosurgical conditions

2.	**PT402**	**Orthopedic Physiotherapy**	**العلاج الطبيعي للعظام**	**4**	**2**	**4**	

Course aims:
1. To conduct appropriate subjective examination musculoskeletal condition of upper and lower extremities
2.To define basic terminology related to musculoskeletal disorders
3.To demonstrate a critical understanding of the impact of diseases of muscles and bones on human function
4.To describe the causes and mechanism of bone and soft tissue disorders, injuries, and the mechanism of recovery
5.To describe common orthopedic disorders of upper and lower extremities
6.To prescribe manual therapy and therapeutic exercise for treatment of lower extremities

and spine disorders

Intended learning outcomes (ILOS):

a-Knowledge and understanding

a.1 Understand the anatomy and physiology of the musculoskeletal system, with emphasis on the upper and lower extremities and joints

a.2 The student knows the requirements for examination and treatment for each injury

a.3 Demonstrate knowledge of the elements of the orthopaedic examination of the injured patient.

a.4 Demonstrate understanding of the management of complex soft tissue injuries as they relate to the musculoskeletal system.

to describe the ortho- injuries, including fracture and tendon injuries; and infections

b- Intellectual skills

b.1 The student must mentally understand how to distinguish a muscle, joint, or bone injury

b.2 To have an idea to understand muscles, joints and bones

b.3 The student understands the remedial exercises for each injury

b.4 The ability of the student to complete manual tests of the joints

C- Professional and practical skills

c.1 The student's ability to distinguish between types of injuries and methods of treatment

c.2 The ability of the student to how to detect the infected case

c.3 The student's ability to identify joint and muscle pain

c.4 The student's ability to treat cases after fractures and dislocations surgeries

d- General and transferable skills

d.1 The student should have the ability to diagnose the affected cases

d.2 The student evaluate peripheral vascular circulation in orthopaedic injuries.

d.3 The student demonstrate ability to utilize scientific studies to provide high quality Orthopaedic surgical care.

d.4 That the student has the ability to deal with the affected cases

d.5 The ability to discuss and apply the basic principles of wound healing, bone physiology, bone healing, musculoskeletal biomechanics, and amputation

surgery with rehabilitation.

Topics

1.Physical evaluation of an orthopedic patient

2.General principles of physiotherapy in fracture management including complications at different stages.

3.General principles of physiotherapy in dislocations management including complications.

4.Specific assessment and management of: Fractures of upper limb, lower limb

5.Specific assessment and management of: Fractures of spine with or without neurological involvement

6.Assessment and therapeutic management of:

Soft tissue injuries – Sprains, strains, ligament and cartilage tear/rupture.

7.General principles of assessment, physiotherapy management in surgical conditions likes:

- Bones and joint surgeries: joint replacements, arthodesis, Illizarov's technique, etc.
- Tendon transplant, soft tissue release.
- Spinal stabilization, surgeries in C.P. & Polio.

8.Assessment, management and treatment goals of:

Osteoarthritis, Spondylosis, spondylolisthesis

Periarthritis, rotator cuff lesion of shoulder

Tuberculosis of the spine, bone and major joints

Avascular bony necrosis at different joints.

Rheumatoid arthritis Ankylosing spondylitis

9.Deformities: (Congenital-Torticollis, cervical rib, CTEV, pescavus, pesplanus, etc., Acquired-Scoliosis, kyphosis, lordosis, coxavara, genu valgum-varum-recurvatum)

10.Amputation:

1. Levels of amputation of lower
2. and upper extremities.
3. Complications of amputation and their management.

11.Stump care: bandaging, pre and post prosthetic assessment and training.

12.Complications of amputation and their management.

13 Manipulation therapy:

- Introduction to manipulation therapy.
- Assessment, principles of various schools of manipulation

3.	**PT403**	**Cardiopulmonary Physiotherapy**	**العلاج الطبيعي للقلب والصدر**	**4**	**2**	**4**	

Course aims:

1. To perform competent and comprehensive assessment of people with respiratory, cardiac, and/or surgical, conditions, across the lifespan.
2. To provide competent and effective management for people with respiratory, cardiac, and/or surgical, conditions, across the lifespan.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know the theory and rationales of treatment interventions available in cardiothoracic physiotherapy, applicable across the lifespan.

a.2 learn about the diseases related to the heart and lungs and how to treat them

a.3 Know how to perform Breathing exercises, Chest Mobility Exercises, Relaxed positions, Techniques of Coughing and Huffing, Postural Drainage, Mechanical ventilators

a.4 That the student knows the requirements for examination and treatment for each case

a.5 Describe the aetiology, epidemiology, pathogenesis and clinical presentation of complex pulmonary and cardiovascular disorders

a.6 Demonstrate a well-developed understanding of the physiotherapist's role in promoting wellness as relevant to the pulmonary and cardiovascular systems.

a.7 Understand the functions of the multidisciplinary team in the management of cardiopulmonary patients, including intensive care and cardiopulmonary rehabilitation, and describe the physiotherapists role in the multidisciplinary team.

a.8 students will learn the practical skills and develop treatment strategies to effectively manage respiratory problems

b- Intellectual skills

b.1 to accommodating the student mentally Anatomy and physiology of Cardiorespiratory
b.2 Accommodating Students are to apply his or her skills of assessment and effective management in dealing with the common cardio respiratory conditions.
b.3 Discuss relevant lifespan, gender, cultural, legal and ethical considerations in performing physiotherapy evaluation and management procedures for complex cardiopulmonary disorders.
b.4 Appropriately select, modify as necessary, and correctly demonstrate advanced physiotherapeutic treatment procedures commonly used in the management of complex cardiopulmonary dysfunction.

c- Professional and practical skills

c.1 The student's ability to distinguish common diseases that afflict heart and lung patients, in addition to methods examination and treatment related to physiotherapy methods.
c.2 the ability of student to ably therapeutic skills that apply to cardiovascular and pulmonary patients with a potential need for physiotherapy services
c.3 Students' ability to train on modern methods of examination and rehabilitation for heart and lung diseases and surgery.
c.4 the ability of student to perform Percussion ,Vibration, Shaking to patients in intensive care unit and how to treat those patient
c.5 Apply biomedical and behavioural scientific knowledge to the physiotherapy evaluation and management of complex pulmonary and cardiovascular dysfunction.
c.6 Effectively assess and treat complex paediatric cardiopulmonary disorders
c.7 Apply advanced treatment evaluation and outcome processes appropriate for cardiopulmonary physiotherapy practice
c.8 Conduct an appropriate examination of patients with complex cardiopulmonary dysfunction, including history and physical examination

d- General and transferable skills

d.1 The student ability know how to Procedures, Indications, Contraindications, procedure, Physiological effects, and Mechanism of action.
d.2 the ability of student to keep the body in right position for treatment
d.3 The student should be able to apply therapeutic exercises used for the heart and lungs

Topics

Anatomical and Physiological differences between the Adult and Paediatric lung
Sign &symptom of respiratory disease
Physiotherapy of respiratory system
Factors affecting normal heart rate &blood pressure
Myocardial infarction and heart failure
Systemic problems associated with cardiac disease &their treatment

Explain the different type of cough
Recognize & understand the use of ICU
Cardiac arrthymia& cardiac surgery
Explain the Libyan health care system
COPD (bronchitis, emphysia, asthma &Cystic Fibrosis
Inhalation therapy
Bronchiectasis
Pneumonia & pneumothorax
Cardiopulmonary resuscition
Theory of postural drainage& techniques of external manipulation of thorax
Cardiac Rehabilitation

4.	**PT404**	**Orthotics & Prosthetics**	**مساعدات المشي والأجهزة التعويضية**	**4**	**2**	**4**	

Course aims:

1. To conduct appropriate subjective examination musculoskeletal condition of upper and lower extremities
2. To define basic terminology related to musculoskeletal disorders
3. To demonstrate a critical understanding of the impact of diseases of muscles and bones on human function
4. To describe the causes and mechanism of bone and soft tissue disorders, injuries, and the mechanism of recovery
5. To describe common orthopedic disorders of upper and lower extremities
6. To prescribe manual therapy and therapeutic exercise for treatment of lower extremities and spine disorders

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the anatomy and physiology of the musculoskeletal system, with emphasis on the upper and lower extremities and joints
a.2 That the student knows the requirements for examination and treatment for each injury
a.3 Demonstrate knowledge of the elements of the orthopaedic examination of the injured patient.
a.4 Demonstrate understanding of the management of complex soft tissue injuries as they relate to the musculoskeletal system.
a.5 to describe the ortho injuries, including fracture and tendon injuries; and infections

b- Intellectual skills

b.1 The student must mentally understand how to distinguish a muscle, joint, or bone injury

b.2 To have an idea to understand muscles, joints and bones
b.3 The student understands the remedial exercises for each injury
b.4 The ability of the student to complete manual tests of the joints

c- Professional and practical skills

c.1 The student's ability to distinguish between types of injuries and methods of treatment
c.2 The ability of the student to how to detect the infected case
c.3 The student's ability to identify joint and muscle pain
c.4 The student's ability to treat cases after fractures and dislocations surgeries

d- General and transferable skills

d.1 The student should have the ability to diagnose the affected cases
d.2 The student evaluate peripheral vascular circulation in orthopaedic injuries.
d.3 The student demonstrate ability to utilize scientific studies to provide high quality Orthopaedic surgical care.
d.4 That the student has the ability to deal with the affected cases
d.5 The ability to discuss and apply the basic principles of wound healing, bone physiology, bone healing, musculoskeletal biomechanics, and amputation surgery with rehabilitation.

Topics

Splint and type of splint
Uses
Material
Upper limb splint
-Orthotic
REGIONAL ORTHOSIS CLASSIFICATION AND TERMINOLOGY IN ORTHOSIS
Lowe limb orthosis
Foot orthosis(FO)
Shoe and modification
Ankle-foot orthosis (AFO)
Knee-ankle-foot orthosis (KAFO)
Hip-knee-ankle-foot (HKAFO)
Spinal orthosis
Lumbar-sacral orthosis
Head cervical orthosis
Head cervical thotacic orthosis
Prosthetic
Classification of prosthesis
Material used
Component of prothesis
Upper limb prosthesis

Amputation and stump
Causes of amputation
Level of amputation
Character of good stump
Character of bad stump
Pre-prosthetic preparation of stump
lower limb prosthetics
definition
Type of lower limb stump
Pre-prosthetic preparation
Type of prosthesis

5.	**PT405**	**Gynecological / Surgical Physiotherapy**	**العلاج الطبيعي لأمراض النساء والولادة والجراحة**	**4**	**2**	**4**	

Course aims:

1. Describe the concepts, and principles of different diseases, and abnormalities in woman.
2. Emphasis is on early assessment and appropriate treatment of the diseases
3. To be able to distinguished complications of pregnancy, labor, and delivery
4. To be able to know the correct techniques for caring a pregnant women with the existing health problems
5. To be able to know the pathologic changes during intra partum and post-partum period
6. This course further deals with the common problems occurring in women after menarche to post-menopause

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Utilize the nursing process in holistic care of client for the promotions and maintenance of health
a.2 To assess with the clients health condition and risk factor affecting health
a.3 Plan with the client an appropriate interventions to prevent complications
a.4 Implement correct intervention taking into consideration on the client's culture and beliefs.

b- Intellectual skills

b.1 Describe medical and nursing management for the patient with Pre gestational condition.
b.2 Discuss the signs and symptoms, management, and danger signs of pregnancy
b.3 Use the nursing process as a framework for care of the patient in addressing the needs and discomforts

b.4 Describe indications for a screening test and laboratory test

c- Professional and practical skills

c.1 Describe medical and nursing management for the patient with Pre gestational condition.

c.2 Discuss the signs and symptoms, management, and danger signs of pregnancy

c.3 Use the nursing process as a framework for care of the patient in addressing the needs and discomforts

c.4 Describe indications for a screening test and laboratory test

d- General and transferable skills

d.1 Develop a teaching plan for prenatal exercises

d.2 Use the nursing process as a framework for care of the patient with Pre gestational condition.

d.3 Compare nursing interventions indicated for the patient with danger signs of pregnancy like ectopic pregnancy, RH incompatibility

Topics

Anatomy and physiology of Reproductive system
Physiology of Menstrual and ovarian Cycle
Fertilization and early development.
Placenta and the fetus
Infertility
Physiologic changes in Pregnancy
scope of physiotherapy in antenatal care
Management of labor
Manifestation of gynecological and obstetric disorder
Describe the anatomy of the pelvis and perineum regions
Describe different stages of labor
Complication associated with labor
Describe the manifestation of surgical disorder
Different surgical operation and incision
Role of physiotherapy in preoperative periods for different surgeries
Psychological aspects during preoperative period
List of postoperative complication
Anatomy of the peripheral vascular system
Anatomy of the skin
Classification of burns
Classification of amputation

6.	**PT406**	**Clinical Training II**	**التدريب السريري 2**	**6**	**-**	**12**	

Course aims:

1. To develop the physiotherapy competencies among students.

2. To integrate theoretical knowledge, attitudes, behaviours and technical learning in the management of a wide range of clinical problems.
3. To emphasise the role of the physical therapist in the development of effective, comprehensive, management plans for the delivery of competent services to clients in a variety of settings.
4. Effective assessment and management of various disorders related to the old age, frequently seen by an physiotherapist
5. Effective assessment and management of various cardio respiratory disorders frequently seen by an physiotherapist

Intended learning outcomes (ILOS):

a-Knowledge and understanding

a.1 To develop the physiotherapy competencies among students.
a.2 To integrate theoretical knowledge, attitudes, behaviours and technical learning in the management of a wide range of clinical problems.
a.3To emphasise the role of the physical therapist in the development of effective, comprehensive, management plans for the delivery of competent services to clients in a variety of settings.
a.4Effective assessment and management of various cardio respiratory disorders frequently seen by an physiotherapist
a.5 Effective assessment and management of various disorders related to the old age, frequently seen by an physiotherapist

b- Intellectual skills

b.1That the student learn about all diseases that affect young and old in all disciplines
b.2That the student remembers the ethics of the profession before starting to treat patients
b.3To draw up the treatment plan and define the goal that he wants to reach for treating the patient

c- Professional and practical skills

c.1 The ability Student obtain information about any condition with relative ease
c.2 The ability of Student modify and employ the most effective method of rehabilitation
c.3 The student's ability to focus on physical therapy for patients with brain injuries, accidents and Musculoskeletal injuries and disorders of the upper limbs also includes examination and treatment For patients with internal medicine and orthopaedic departments.
c.4 ability of Students are able to apply his or her skills of assessment and effective management in dealing with the common neurological conditions.

d- General and transferable skills

d.1That the student has the skills of working through the team, whether with their colleagues or others in other professions
d.2 The student should be able to communicate in the field related to professional practice processes such as study, diagnosis, treatment and evaluation.

d.3 Providing students with professional values and professional ethics through field practice and professional growth.

Topics

Therapeutic exercise :

- Joint mobility
- Goniometry
- Definition of goniometry, Type ,Measurement of various joints range in normal and
- disease condition.
- Different techniques of goniometry

Classification of spinal disorder:

A) Deformity:

1. Spinal curvature
2. Kyphosis
3. Lordosis
4. Scoliosis

B) spondylopathy:

Inflammatory:

1. Spondylosis
2. Ankylosing

Non inflammatory :

1. Spondylosis
2. Spinal stenosis
3. Spondylolisthesis

C) intervertebral disc disorder :

Degenerative disc disease .

1.Spinal disc prolapsed.

2.Herniation

Shoulder disorder:

1. Dislocation and Separation
2. Frozen shoulder ,(adhesive capsulitis)
3. Tendinitis ,bursitis ,impingement syndrome ,and rotator cuff tear.

Neurology :

1. Facial palsy
2. Mayopathies .
3. Hemiplegia and paraplegia
4. Parknosim

Lower leg ,Ankle &foot injuries ::

- Lower leg pain ,muscle strains ,stress fracture and stress reaction ,ankle sprain.

Cardiac rehabilitation .

Pulmonary rehabilitation .

Prosthetics & orthotics :

- Lower limb orthosis
- Foot orthosis(FO)
- Ankle-foot orthosis (AFO)
- Knee-ankle-foot orthosis (KAFO)

Applied physiotherapy skills :

MASSAGE:

- Myofascial release.
- Trigger pointing and
- Acupressure.
- Manipulative physiotherapy

7.	**PT407**	**Geriatric Physiotherapy**	**العلاج طبيعي لكبار السن**	**3**	**2**	**2**	

Course aims:

1. To study and understand the differences in psychological and functional changes between the elderly and adults
2. And to know the special health care needs that the elderly need
3. Basic knowledge in dealing the Geriatric population
4. The students are expected to know the following skills specifically for each & every patient.
5. How to treat a patient.
6. How to read a case sheet

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Knowing the diseases and changes that occur with the elderly
a.2 Understanding the psychological and behaviours of the elderly
a.3 How to get the information from the patient by using an open ended question
a.4 How to give confidence to the patient & psychological support
a.5 How to establish privacy
a.6 How to provide proper care & support to the patient
a.7 How to give instructions before the start of a new treatment

b- Intellectual skills

b.1 Learn to deal with the elderly
b.2 Abstract thinking & decision making by using clinical reasoning
b.3 Knowing that the elderly have special needs and care
b.4 Knowing that there are differences between the elderly and adults
b.5 What to ask to the patient during the treatment
b.6 The explanation of do’s & don’ts to the patient before, during & after the treatment

c- Professional and practical skills

c.1 Know how to deal with the elderly

c.2 Knowing the health care needs of the elderly

c.3 To select the proper method of application of treatment by using specific equipment.

c.4 Comprehend the concept of aging process.

c.5 Demonstrate professional skills and confidence necessary in the Assessment & Management of some common clinical conditions found in the elderly population.

c.6 Appreciate the implications and complications of aging in all its ramifications.

d- General and transferable skills

d.1 Select and perform the best tests/scales and measures for examination of aging adults & Provide a safe and effective exercise prescription for the aging adult

d.2 working in groups as a teaching teams

d.3 Communicate clearly by verbal and written means with teaching staff during the learning process

Topics

Different systems change in geriatric

Change in different system and care

Geriatric assessment

Rheumatoid arthritis

What RA, Symptoms, treatment by physiotherapy.

Fall

- What falls, causes, how can do tests, how physiotherapist can help them.
- gait imbalance
- Balance Assessment

Home Safety Assessment

Osteoporosis

Fractures

Upper limb

Lower limb

Diabetics mellitus

Dementia

- What dementia, causes
- Alzheimer’s Disease
- What Alzheimer, causes

Hypertension

What hypertension, Causes.

stroke, causes, treatment by physiotherapy

Parkinson's disease .

Assistive devices

Rehabilitation

COPD							
8.	**PT408**	**Applied Physiotherapy skills**	**مهارات العلاج الطبيعي التطبيقية**	**3**	**2**	**2**	

Course aims:

1. Define and understanding physical therapy and overview of its history.
2. Clarify the therapeutic exercise as massage ,hydrotherapy and suspension and how to apply them as a treatment.
3. This course aims to provide students with a broad understanding of Applied physiotherapy techniques

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Describe the manual handling techniques to protect your self and the patient.
a.2 define the massage and clarify it types and cases that can be used
a.3 Give the student a knowledge about basics principle of physiotherapy.
a.4 Explain the method of using hydrotherapy and different between it and heat and cold therapy.

b- Intellectual skills

b.1 Use range of information to familiarize the massage types and their uses.
b.2 The students know of the concept of physiotherapy method.
b.3 Understanding the suspension therapy and compare between its types.
b.4 Describe indications and contradiction when using each type of physiotherapy

c- Professional and practical skills

c.1 Apply the manipulation to the patient
c.2 The students ability to apply therapeutic techniques methods .
C.3 Apply knowledge from the course to treatment instruments and Rehabilitation programs when working at the hospital.
c.4 Diagnose the physiological problems by understanding different types of physiotherapy treatment

d- General and transferable skills

d.1 The students must be able to participate in the quantify centre
d.2 working in groups as a teaching teams
d.3 Communicate clearly by verbal and written means with teaching staff during the learning process

Topics

1. Demonstrate safe Manual handling techniques
2. Massage introduction and defination of massage.history, purpose of massage,principe,point should be considered when given the massage,mechanical effect of massage stroking manipulation..effleurage..petrissage..tapoment. hacking,cupping,beating

and pounding)
3.Explain underpinning theory of selected physiotherapy
4.Demonstrate skills in application the heat and cold
5.demonstrate skills in applying suspension therapy
6.introduction to hydrotherapy &physical properties of water
Physiological effects of water
Therapeutic uses of hydrotherapy
Indications and contraindication and reverse effect of hydrotherapy
Clinical applications of hydrotherapy for different diseases
Whirlpool Tank..hubbard tankard cryotherapy
7explian the scope of physiotherapy and Rehabilitation
8.manipulative physiotherapy
9.Immobilization

9.	**MT401**	**Research Project**	**مشروع التخرج**	**3**	**2**	**2**	

Course aims:

1. During this course, the students should know how to handle and develop specific research problem and then put forward the idea of research.
2. Preparing for scientific research methodology and research planning.
3. Data collection and analysis
4. Solve problems that hinder the method adopted in the search.
5. Results tab and develop scientific solutions to the problem of finding.
6. Writing a final report and then present and discuss the results in the form of scientific research reached by the student through research and throw him in the form of a seminar.
7. Develop the skills necessary to undertake a research project
8. Assist the student in identifying appropriate research topics and methodologies

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Identify the essential steps the usage of library and electronic search
a.2 Know types of scientific papers, thesis and journals
a.3 Learn the classification of collected information in priority order
a.4 Design a complete and basic research proposal.
a.5 know how to collect and analyze data
a.6 Know how to write a final research format and present it
a.7 Know how to use relevant scientific literature.
a.8 Identify the suitable experimental methods that used to solve a given scientific task

b- Intellectual skills

b.1 Be able to Analyze data and synthesize research findings
b.2 Be able to show independence, critical and creative thinking
b.3 formulate new scientific questions that came up during project performance

b.4 Independently gain the necessary knowledge to undertake meaningful research
b.5 To acquire and critically assess original source references from databases and libraries [published scientific papers, books, etc.]
b.6 Articulate the contributions of qualitative and quantitative methods to a specific discipline such as environmental health research
b.7 Be able to draft an academic paper appropriately structured for publication
b.8 To assess the significance of project outcomes against what is already known in the area of your project topic via a critical assessment of the literature

c- Professional and practical skills

c.1 Conduct practical research
c.2 Be able to perform a research project according to an individual study plan
c.3 Be able to present and discuss the research results with colleagues and senior researchers
c.4 Be able to show a professional attitude regarding time planning, collaboration, and the link between theoretical and practical knowledge
c.5 The student shall be able to perform the project work in an ethical correct manner
c.6 The student shall be able to reflect upon and discuss the relevance of the work in written and oral form
c.7 The student shall be able to work independently and plan and organize effectively to achieve the project goals
c.8 Apply tools of research preparation including problem formulation, undertaking a literature review, research designs, developing a hypothesis, ethical implications, time management, and assessing resourcing implications
c.9 Be able to communicate the project outcomes in a final written report
c.10 be able to collaborate with project partners (internal and external) and with other research group members
c.11 To systematically and contemporaneously record the project work carried out in a paper (hard-bound) or electronic notebook
c.13 To use research and write background material and use advanced research methods and techniques to conduct a scientific investigation

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Draft an academic paper appropriately structured for publication.
d.5 Perform basic data management tasks and analyses using a computer

Topics:

Conduct practical research
Collect data

Analyze data
Trouble shooting
Write research progress reports
Write a final “paper” format with presentation in form of seminar

Nutrition Department

Second year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	NT201	Principle of Nutrition	مبادئ التغذية	2	2	-	

Course aims:

1. Provide an overview of the major macro and micronutrients relevant to human health.
2. Discuss the scientific rationale for defining nutritional requirements in healthy individuals and populations, with reference to specific conditions such as pregnancy, lactation, and older age.
3. Present current evidence for the role of key nutrients in the prevention of chronic diseases.
4. Discuss major nutrition-related diseases in a global context.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand what an adequate and well-balanced diet is.
a.2 To identify different role of nutritions and List rules of adequate and balanced diet
a.3 Explain elements of nutrition
a.4 Have knowledge about the diseases caught by the elderly people and their nutritive demands.
a.5 Learn the energy and food demands of human .
a.6 Learn the changes in a body taking place during the ageing period of life
a.7 Understand the principle of food labelling and how it can be applied in practice.
a.8 Describe the roles of macronutrients and micronutrients in the body

b- Intellectual skills

b.1 Take notice of whether their own nutritive behaviors comply with those learned during the course

b.2 Able to understand relationship between nutrition and human health.
b.3 Discuss the nutritive value of different foods
b.4 Discuss the effects of acute or chronic deficiency on the body
b.5 Evaluate the major and minor food components in the diet and their classification

c- Professional and practical skills

c.1 Examine the several concepts of nutrition
c.2 Able to make samples of menu planning suitable for the young and elderly people.
c.3 Assess dietary practices of individuals using the appropriate dietary assessment methodology
c.4 Appreciate the important professional skills at university and in workplace.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Search the scientific literature and critically evaluate a scientific article in nutrition

Topics

Introduction to food science and nutrition:
Basic Terms Used in Study of Food and Nutrition
Introduction to food science and nutrition:
Understanding Relationship between Food, Nutrition and Health
Balanced Diet:
Concept of balanced diet, Carbohydrates
Balanced Diet:
Proteins and Amino Acids
Balanced Diet:
Lipids
Balanced Diet:
Minerals – calcium, iron, iodine
Balanced Diet:
Minerals –fluorine, copper and zinc
Balanced Diet:
Vitamins, Water Soluble Vitamins–Thiamin, Riboflavin
Balanced Diet:
Vitamins, Water Soluble Vitamins–Niacin, Pyridoxine
Balanced Diet:

Vitamins, Water Soluble Vitamins folate, vitamin B12 and vitamin C
Balanced Diet:
Vitamins, Fat Soluble Vitamins-A,
Balanced Diet:
Vitamins, Fat Soluble Vitamins-E ,K
Food Pyramid:
History, Concept, Components
Food Pyramid:
Advantages, Limitations
Nutrients:
Classification, Digestion, Functions,
Nutrients:
Dietary Sources, RDA, Energy
Nutrients:
Clinical Manifestations of Deficiency and Excess and Factors Affecting Absorption
Concept of Meal Planning:
- Factors affecting meal planning, Understanding specific considerations for planning meal for different groups of people

Concept of Meal Planning:
Understanding Specific Considerations for Planning meal for Different Groups of People Continuation
Methods of Cooking:
Dry, Moist Microwave Cooking, Advantages, Disadvantages
Methods of Cooking:
Frying Microwave Cooking, Advantages, Disadvantages
Methods of Cooking:
Effect of various methods of Cooking on Foods
Nutritional Labeling:
Laws, Consideration
Nutritional Labeling:
History, Importance, Global Trends and Guidelines

2.	**NT202**	**Instrumental Analysis**	**التحليل الالي**	**2**	**1**	**2**	

Course aims:
1. Give the principle of instrumental and applied analytical methods, including chromatographic methods, electrochemical analysis, capillary electrophoresis and mass spectrometry.
2. Cover the application of these methods to pharmaceutical compounds
3. Understand the theoretical and practical preparation enabling students to maintain medical instrumentation.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Recognize the different analytical techniques used for determination of chemical substances

a.2 Identify the principles of various analytical techniques and instruments.

a.3 define basic medical terms and physical values that can be handled by medical instrumentation

a.4 Theoretical and practical preparation enabling students to maintain medical instrumentation

b- Intellectual skills

b.1 Determine suitable methods of analysis

b.2 Interpret experimental data

b.3 Demonstrate measuring of basic medical parameters

b.4 Recommend problem solving and service procedures for electrical equipment

c- Professional and practical skills

c.1 Show the ability to conduct experimental studies and apply different quantitative methods of analysis of pharmaceuticals

c.2 Analyze and interpret quantitative analytical data

c.3 Understanding basic principles and phenomena in the area of medical diagnostic instrumentation

c.4 Understanding basic principles and phenomena in the area of medical diagnostic instrumentation

d- General and transferable skills

d.1 Interact effectively in team working

d.2 Apply calculations for chemical analysis

d.3 Present information clearly in written, electronic and oral forms

d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

d.5 Acquire the ability to learn independently

Topics

General Introduction about Instrumentation Analysis

Principle of instrumentation :

- Properties of light
- Dispersion of light
- Measurement of light

Molecular absorption of spectroscopy:

- Component of spectroscopy
- Single beam and double beam of spectrometers
- Parameters of operation
- Applications

Atomic Emission and absorption of spectroscopy :

- Emission plarae photometry
- Atomic absorption photometry
- Applications

Molecular Emission spectroscopy:

- Fluorometer design
- Variable affecting fluorescence
- Applications

Electrophoresis and Densitometry :

- Theory
- Experimental
- Equipment
- Densitometry
- Analysis
- Applications

Potentiometery and Iron selectivity:

- electrodes
- The basic principle
- The reference electrode
- Iron selective electrode

Chromatography

- Theory of chromatography
- Gas chromatography
- Instrumentation in gas chromatography
- Liquid chromatography
- Instrumentation in liquid chromatography
- Thin-layer chromatography

Osometery

- Osmolatiy
- Collgatiye properties and osometery
- Freezing. Point depression osometery
- Vapor pressure osometery
- Colloid osometery

Nephelometery and Turbidimetery

- Principles
- Detection of scattered light
- Limitations
- Refractivity
- Applications

Radio isotope counters

- Beta isotope (C14) counter
- Gamma isotope (1251) counter

Principles and methods

Automation

- The common Denominators of Automated Chemical Analyzers
- A continuous Flow Analyzer
- A discrete sample analyzer
- A bath (centrifugal) analyser

3.	**NT203**	**Medical Terminology**	**علم المصطلحات الطبية**	**2**	**2**	**-**	

Course aims:

1. Provide knowledge and understanding the basic medical terms.
2. Understand the prefix, suffix of different medical terms, and introduce concepts of various diseases within the same organ in the body.
3. Provide all common terms of CNS, CVS, GIT, respiratory, blood and urinary systems….etc
4. Introduce fundamental knowledge of anatomy of organ, signs, symptoms and treatments of various diseases.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the principles of basic medical laboratory as well as common medical terms in laboratory practice.

a.2 Define the principles of body function in health and diseases states; as well as the etiology, laboratory diagnosis, signs, symptoms and therapeutic approaches for different disease within the same organ

a.3 Define the proper medical terminology, abbreviations, prefix, suffix, and symbols in health reports and laboratory practice.

a.4 Recall the basic terms used in medical reports.

a.5 List suffixes, prefixes, and word roots common to medical terminology

a.6 Identify and list the most common used medical abbreviation

b. Intellectual skills:

b.1 Correlate between different medical terms used in medical reports.

b.2 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.

b.3 Correctly use medical terms when given the suffix, prefix, and word root

c. Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.

c.2 Employ proper documentation of terms described the anatomy, function and pathology of specific organ.
c.3 Recognize the basic concepts of medical terminology science to medical laboratory students.
c.4 Recognize the prefix and suffix of any new medical term.
c.5 Distinguish between different signs and symptoms of each body organ.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with patients and other health care professionals.
d.2 Interact effectively in team working.
d.3 Present information clearly in written, electronic and oral forms.
d.4 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.
d.5 Support patient, lab technicians and health care.

Topics:

Introduction to medical terminology
Medicine and its history
Suffixes mean condition of
Suffixes for medical
Plural endings
Prefixes
Prefixes for numbers
Prefixes for colors
Negative Prefixes
Prefixes for direction
Prefixes for degree
Prefixes for size and comparison
Prefixes for time
Prefixes for position
Common roots used in medical terminology
Common roots used in medical terminology
Body Structure: Integumentary System
Gastrointestinal (Digestive) System
Respiratory System
Musculoskeletal System
Cardiovascular System, Blood and Lymphatic System
Urinary System, Female Reproductive System, Male Reproductive System
Endocrine System
Nervous System, Special Senses
Disease

Name that disease
Common infection organism
Response to disease :inflammation ,phagocytosis, immunity…ect
Neoplasia
Case study
Common prefixes used in medicine
Common suffixes used in medicine
Medical abbreviations

4.	**NT204**	**Organic Chemistry**	**الكيمياء العضوية**	**3**	**2**	**2**	

Course aims:

1. Gain an understanding of the basic principles of the chemistry of organic compounds.
2. Have a good idea about the chemical synthesis of compounds.
3. Enable the student to understand the basics of the chemical reactions of different classes.
4. Recognize the chemical properties of organic compounds and their functional groups.
5. Recognize the main concept, the basics and the reactions of aromatic compounds.
6. Know the basics of the chemistry of biologically active molecules e.g. alcohols and amines

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Identify the principles of basic and pharmaceutical, medical, behavioral, management, health and environmental sciences as well as pharmacy practice

a.2 Determine the basic science of alkenes, alkynes, Polyunsaturated Hydrocarbons

a.3 Define the physical, and chemical properties of various substances used in preparation of medicines and the properties of different pharmaceutical dosage forms.

b- Intellectual skills

b.1 Propose novel methods for isolation, synthesis of Alkenes, Alkynes, Poly unsaturated hydrocarbons, Aromatic hydrocarbons, Alcohols, Phenols, Ethers, and Epoxide

b.2 Predict the physical and chemical properties and biological activity of natural and synthetic compounds based on molecular structure

b.3 Propose novel methods for isolation, synthesis of Alkenes, Alkynes, Poly unsaturated hydrocarbons , Aromatic hydrocarbons, Alcohols, Phenols, Ethers, and Epoxides.

b.4 Deduce biological activity of Alkenes, Alkynes, Poly unsaturated hydrocarbons ,

Aromatic hydrocarbons, Alcohols, Phenols, Ethers, and Epoxides based on molecular structure.

c- Professional and practical skills

c.1 Handle and dispose hazardous chemicals, biological and pharmaceutical preparations safely.

c.2 Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins

c.3 Conduct experimental and research studies and present, analyze and interpret the results.

c.4 Employ screening methodologies and some assay mechanism and structure-based design of natural drugs and their in-vitro and in-vivo testing.

d- General and transferable skills

d.1 Practice independent learning needed for continuous professional development

d.2 Exploit calculations and statistical methods as well as information technology (IT) tools

d.3 Estimate lab safety and chemical toxicity.

d.4 Work effectively in a team.

d.5 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics

Carbon Compounds and Chemical Bonds

- The structural Theory of Organic Chemistry.
- Chemical Bonds: The Octet Rule
- Writing Lewis Structure

Hybridization sp3, sp2, sp3

Alkanes: Nomenclature

- Introduction to Alkanes and cycloalkanes
- Shapes of Alkanes
- IUPAC Nomenclature of Alkanes

Nomenclature of Cycloalkanes

- Physical Properties of Alkanes and Cycloalkanes
- Chemical Reactions of Alkanes

Synthesis of Alkanes and Cycloalkanes

Alkenes and Alkynes I: Properties and Synthesis.

- The (E)—(Z) System for Designating Alkene Diastereomers
- Cycloalkenes

Synthesis of Alkenes via Elimination Reactions

- Synthesis of Alkynes by Elimination
- Reactions

The Acidity of Terminal Alkynes
Alkenes and Alkynes II: Addition Reactions
- Introduction: Additions to Alkenes
- Addition of Hydrogen Halides to Alkenes: Markovnikov's Rule
- Stereochemistry of the Ionic Addition to an Alkene
- Addition of Sulfuric Acid to Alkenes

Addition of Water to Alkenes: Acid-Catalyzed Hydration
- Alcohols from Alkenes Through Oxymercuration-Demercuration: Markovnikov Addition
- Alcohols from Alkenes through Hydroboration-Oxidation:Anti-Markovnikov Syn Hydration
- Addition of Bromine and Chlorine to Alkenes

Halohydrin Formation
- Addition of Bromine and Chlorine to Alkynes
- Addition of Hydrogen Halides to Alkynes

Oxidative Cleavage of Alkynes
Alcohols and Ethers
- Structure and Nomenclature
- Physical Properties of Alcohols and Ethers

Synthesis of Alcohols
- Reactions of Alcohols
- Synthesis of Ethers

Reactions of Ethers
Aromatic Compounds
- Nomenclature of Benzene Derivatives
- Reactions of Benzene
- Halogenation of Benzene

Nitration of Benzene
- Sulfonation of Benzene
- Friedel-Crafts Alkylation
- Friedel-Crafts Acylation

Limitations of Friedel-Crafts Reactions
Aldehydes and Ketones
- Nomenclature of Aldehydes and Ketones
- Physical Properties
- Synthesis of Aldehydes

Synthesis of Ketones
- The Addition of Organometallic Reagents: The Reformatsky Reaction
- Oxidation of Aldehydes and Ketones

Chemical Analysis of Aldehydes and Ketones

Carboxylic Acids and Their Derivatives.

- Nomenclature and Physical Properties
- Preparation of Carboxylic Acids

Acid Chlorides

- Carboxylic Acid Anhydrides
- Esters

Amides

Amines

- Nomenclature
- Physical Properties and Structure of Amines

Preparation of Amines

- Reactions of Amines

Analysis of Amines

Phenols and Aryl Halides:

- Structure and Nomenclature of Phenols
- Synthesis of Phenols

Reactions of Phenols as Acids

Stereochemistry: Chiral Molecules

- Isomerism: Constitutional Isomers and Stereoisomers

Enantiomers and Chiral Molecules

- Test for Chirality: Plane of Symmetry
- Nomenclature of Enantiomers: The R, S System

Properties of Enantiomers: Optical Activity

- The Origins of Optical Activity
- The Synthesis of Chiral Molecules
- Chiral Drugs

Molecules with More than One Stereogenic

- Center
- Stereoisomerism of Cyclic Compounds

Separation of enantiomers: resolution

Practical part

A. Identification of the Function Groups of Unknown Organic Compounds:

Determination of melting points and boiling points

Solubility Tests

Test for the Elements (N, S, X)

Test for Unsaturation

Test for Aromaticity

Tests for Aldehyde and ketones

Test for Carboxylic Acids

Test for Phenols

Test for Amines
Test for Alcohols
Test for Esters

5.	**ML201**	**General Biochemistry**	**الكيمياء الحيوية العامة**	**3**	**2**	**2**	

Course aims:

1. Understand the chemical structure of different classes of biochemical compounds including; Carbohydrates, proteins lipids, enzymes and Hormones.
2. Learn the function of essential micro- and macromolecules; such as enzymes and co-enzymes in human body.
3. Utilize the provided knowledge in biochemical field and apply it in advanced courses of biochemistry.
4. Learn and know the main differences between quantitative and qualitative tests for detecting Carbohydrates, Lipids.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Identify the chemical processes, which transform diet into compounds that are characteristics of the cells of a particular species. The catalytic functions of enzymes

a.2 Identify the principles and chemical behavior of oxidative phosphorylation and energy production

a.3 Know the potential energy obtained from the oxidation of foodstuff consumed for the various energy-requiring processes of the living cell.

a.4 Know Cell Biology deals with the structure and functions of cells in living organisms.

b. Intellectual skills:

b.1 Able to design experiments and understand the limitations of the experimental approach

b.2 Able to interpret experimental data and identify consistent and inconsistent components.

b.3 Recommend good safety practice (GSP) guidelines in biochemical research.

b.4 Determine suitable methods of identifying macronutrient in biological fluids.

c. Professional and practical skills:

c.1 Utilize the proper biochemical terminology to communicate with the staff members and other health care professionals

c.2 Handle and dispose hazardous chemicals and biological reagents and compounds safely

c.3 Carry out laboratory tests for identification skillfully with understanding of the mechanism of reaction

c.4 Apply appropriate methods for identification of biochemical compounds of different classes including; lipids, carbohydrates, proteins and other non-protein nitrogenous compounds.
c.5 Be able to express a good "quantitative" skills such as the ability to accurately and reproducibly prepare reagents for experiments

d. General and transferable skills:

d.1 Ability to dissect a problem into its key features.
d.2 Awareness of the major issues at the forefront of the discipline.
d.3 Interact effectively in team working.
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Carbohydrate of Physiologic Importance.
Monosaccharides
• Cyclic structure of sugars
• Asymmetric carbon atom and isomeris
• Disaccharides
• Polysaccharides
• Proteoglycans and glycoproteins
Digestion and absorption of carbohydrates, Glycolysis
Hexoses monophosphate cycle (HMP cycle), Metabolism of Fructose, Gluconeogenesis, Disorder of carbohydrate metabolism with special reference to diabetic mellitus
Lipids of physiologic Importance
•Classification of lipids
• Fatty acid
• Simple lipids and triacylglycerol's
• Complex lipids
Derived lipids (sterols and steroids)
Digestion and absorption of lipids, Metabolism of fatty acids, β-oxidation, Synthesis of fatty acids
Phospholipids biosynthesis, Sphingomyelin biosynthesis, Triacylglycerol synthesis, Lipolysis,
Cholesterol synthesis and metabolism, Transportation of lipids in humen body by lipoproteins, Atherosclerosis
Ketone bodies formation and their metabolism , Citric acid Cycle
Amino acids
• Peptides
• Protein structure
• Simple proteins

• Conjugated proteins
• Derived proteins
• Techniques for separation of amino acids and proteins
• Hemoproteins
Overview, Protein digestion and absorption, Transamination, Deamination, Urea formation, Phenylketonuria, Alkaptonuria, Albinism, Kwashikor marasmus
Porphyrin & Haem biosynthesis, Bilirubin formation & jaundice, Creatinine , Histamine, Serotonine
Enzymes
Classification,Nomenclature,Coenzymes, Intracellular enzymes, Enzyme Kinetics,Michaelis menten equation, Enzyme Inhibition,
Regulation of enzymes. Enzyme catalysis, Isoenzymes and use of enzymes in clinical diagnosis
Respiratory Chain andOxidative phosphorylation
Nucleic acids (structure and functions)
• DNA synthesis (replication) and DNA repair
• RNA synthesis (transcription)
• Protein synthesis (translation)
Hormones

6.	**ML202**	**General Microbiology**	**علم الاحياء الدقيقة العام**	**3**	**2**	**2**	

Course aims:
1. Provide knowledge and understanding the basic medical terms.
2. Understand the prefix, suffix of different medical terms, and introduce concepts of various diseases within the same organ in the body.
3. Provide all common terms of CNS, CVS, GIT, respiratory, blood and urinary systems….etc
4. Introduce fundamental knowledge of anatomy of organ, signs, symptoms and treatments of various diseases.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Identify the principles of basic medical laboratory as well as common medical terms in laboratory practice.
a.2 Define the principles of body function in health and diseases states; as well as the etiology, laboratory diagnosis, signs, symptoms and therapeutic approaches for different disease within the same organ
a.3 Define the proper medical terminology, abbreviations, prefix, suffix, and symbols in health reports and laboratory practice.
a.4 Recall the basic terms used in medical reports.
a.5 List suffixes, prefixes, and word roots common to medical terminology

a.6 Identify and list the most common used medical abbreviation

b. Intellectual skills:

b.1 Correlate between different medical terms used in medical reports.

b.2 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.

b.3 Correctly use medical terms when given the suffix, prefix, and word root

c. Professional and practical skills:

c.1 Utilize the proper medical terminology, to communicate with other health care professionals.

c.2 Employ proper documentation of terms described the anatomy, function and pathology of specific organ.

c.3 Recognize the basic concepts of medical terminology science to medical laboratory students.

c.4 Recognize the prefix and suffix of any new medical term.

c.5 Distinguish between different signs and symptoms of each body organ.

d. General and transferable skills:

d.1 Communicate clearly by verbal and written means with patients and other health care professionals.

d.2 Interact effectively in team working.

d.3 Present information clearly in written, electronic and oral forms.

d.4 Promote critical thinking, problem-solving, decision-making, and time managing capabilities.

d.5 Support patient, lab technicians and health care.

Topics:

Introduction to medical terminology
Medicine and its history
Suffixes mean condition of
Suffixes for medical
Plural endings
Prefixes
Prefixes for numbers
Prefixes for colors
Negative Prefixes
Prefixes for direction
Prefixes for degree
Prefixes for size and comparison
Prefixes for time
Prefixes for position
Common roots used in medical terminology

Common roots used in medical terminology
Body Structure: Integumentary System
Gastrointestinal (Digestive) System
Respiratory System
Musculoskeletal System
Cardiovascular System, Blood and Lymphatic System
Urinary System, Female Reproductive System, Male Reproductive System
Endocrine System
Nervous System, Special Senses
Disease
Name that disease
Common infection organism
Response to disease :inflammation ,phagocytosis, immunity…ect
Neoplasia
Case study
Common prefixes used in medicine
Common suffixes used in medicine
Medical abbreviations

7.	**ML203**	**Basic Pathology**	**اساسيات علم الامراض**	**3**	**2**	**2**	

Course aims:
1. Definition of pathology and diseases, aetiology
2. Explain the basic nature of disease processes from standpoint of causation,
3. Definition of pathology specimens and methods of pathological studies and their relation to clinical aspects
4. Discuss tissue injury and diseases processes, using appropriate vocabulary.

Intended learning outcomes (ILOS):

a. Knowledge and understanding:
a.1 Provide the knowledge, technical skills to medical students to understand human disease.
a.2 Illustrate the molecular and cellular response of the living body when exposed to injurious agent
a.3 Recognizing key of congenital, haemodynamic, inflammatory, infectious. Moreover, developing knowledge needed to interpret laboratory data
a.4 Describe the mechanisms of pathological alterations

b. Intellectual skills:
b.1 By the end of studying this course, the graduate should be able to;
Differentiate between tissue/organ appearance in health and diseased specimens
b.2 Score good selection of tissue specimens for pathological diagnosis on print

finger bases
b.3 Integrating and predicting the prognosis and sequllae of diseases
b.4 Analyse various gross and microscopic pathologic data resulting from the general pathological process.

c. Professional and practical skills:

c.1 Collect the experience in gross examination, sampling and reporting
c.2 Perform good management in microscopy and description of different changes in different tissues
c.3 Use the light microscope to examine and identify microscopic findings of some selected examples of studied diseases
c.4 Prepare the graduate to get the ability of decision making

d. General and transferable skills:

d.1 Demonstrate the ability of problem definition
d.2 Utilize the computer, microscope and internet. Therefore, will Increase the ability of problem solving
d.3 Utilize the pathology as a diagnostic tool
d.4 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Introduction to pathology
Practical: 1. Machines and reagents used.
2. Types of stains
Cell injury and adaption
(Causes& mechanisms)
Morphology of cell injury)
Practical: Demonstration on slides
• Morphology of cell injury
• Necrosis
•Lysosomes: hetrophagy and autophagy, Causes and mechanisms
•Intracellular accumulations
•Lipids and other intracellular accumulations.
Practical: demonstration on slides
• Intracellular accumulations
• Fatty change
• Intracellular accumulations
• Lipids and other intracellular accumulations
Practical: demonstration of slides
• Cellular adaptation
• Hypertrophic tissue
• Cellular adaptation of growth and differentiation

• Pathologic calcification
Practical: demonstration of slides
• Hyperplastic tissue
Inflammation :
• Acute inflammation
• Vascular change and cellular events
• Chemical mediators of inflammation
Practical: acute inflammation
• Margi nation of leucocytes
• Cellular elements of exudates neutrophils, eosinophil
• Chronic inflammation
• Definition and causses
Practical: chronic inflammation
• Monocytes
• Macrophages
• Lymphocytes
• Chronic inflammation cells
• Granulomatous inflammation
Practical: chronic inflammation
• Plasma cells
• Giant cells
• Granuloma
• Tuberculosis granuloma
Role of lymphatic and lymphoid tissue
• Systemic manifestations of inflammation
Tissue renewal &fibrosis
• Cell growth.
• Regeneration.
• Cutaneous wound healing.
Practical: Repair in wound healing
• Granulation tissue
• Hymodynamic Disorders
• Oedema
• Hyperemia or congestion.
Practical: Oedema/ Congestion tissue
Disorders of vascular flow and shock
• Thrombosis
• Embolism
Practical: Thrombosis/ embolism
• Infection

• Shock

8.	**ML206**	**Analytic Chemistry**	**الكيمياء التحليلية**	**3**	**2**	**2**	

Course aims:

1. Provide knowledge and understanding the basic analytical chemistry
2. Recall the basic principles of quantitative chemical methods of analysis including; acid-base, Redox Potentiometry, Gravimetric Analysis and complexometric methods of analysis.
3. Know the differences between qualitative analysis, quantitative analysis and molarity calculations
4. The student will be introduced to the analytical and strategic methods of collecting a representative sample

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Recognize the different analytical techniques used for determination of chemical substances.
a.2 Distinguish between the methods of standardizing chemicals, identifying the mole, and calculating the number of moles and molarity
a.3 Calculation of the activity and activity coefficient of differently charged ions
a.4 Recognize the methods of obtaining the sample, whether it is solid, liquid or gaseous
a.5 Define precision and accuracy and the difference between them and calculate the ionic strength of the ion
a.6 Indicators used in acid - base titration, types of titrations and knowledge of titrant and analyte

b. Intellectual skills:

b.1 Propose suitable methods of chemical analysis.
b.2 Interpret experimental data based on relevant chemical principles

c. Professional and practical skills:

c.1 Show ability to conduct experimental studies and apply different quantitative methods of analysis of chemical compounds.
c.2 Apply proper handling and disposal of chemicals.
c.3 Calculating the concentration of an unknown substance by another substance of known concentration and preparing standard solutions
c.4 Classification of standard methods of analysis according to types of chemical reactions
c.5 Distinguish between different separation methods.

d. General and transferable skills:

d.1 Interact effectively in team working
d.2 Apply calculations for chemical analysis.

d.3 Acquire the ability to learn independently.
d.4 Present information clearly in written, electronic and oral forms
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time management capabilities.

Topics:

Introduction to analytical science:
Analytical science defined
The classification of Analysis
The sample.
The analytical strategy
Review of fundamental concept:
• Formula weight
• The mole
• Calculations involving solutions
• Molarity
Lab: The laboratory notebook :
• The analytical balance
• Obtaining the sample
- Activity and Activity coefficient:
• Definition of activity
• The activity coefficient
• The ionic strength
• Calculation of activity coefficient
• Errors statistic and statistical control:
- Errors [Determinate & indeterminate]
- Elementary statistics
- Normal distributions.
• Precision- Accuracy & calibration statistical control:
- Gravimetric analysis: Introduction
- Weight vs Mass
• Gravimetric Analysis:
- Details of gravimetric methods.
- Physical separation methods and calculations.
- Loss on drying & the residue on ignition
• Sampling and sample preparation:
- Sample preparation/solid Materials.
- Particle size reduction.
- Sample homogenization and Division.
Lab. Titration –strong acid- strong base
Introduction:

- Neutralization titration
- Complex metric titration
- Redox titration
- precipitation titration

Lab: titration- weak acid – strong base

The balance
- Calibration and care of balances
- when to use which balance

Titration curve and detection of the end point

Types of titration:

Direct titration

Indirect titration (Back titration)

Displacement titration

Complex metric titration:

Complexes: formation constants

Ligand EDTA

EDTA titration curve

Redox Potentiometry

• Balancing reduction-oxidation reaction.
• Calculation of the equilibrium constant of a reaction.
• Titration curves and detection of the end point.

9.	**ML303**	**Basic Immunology**	**أساسيات علم المناعة**	**3**	**2**	**2**	

Course aims:

1. Provide students with an understanding of the immune system and its components.
2. Innate and adaptive immunity and antigen processing and presentation.
3. How the immune system work against infection and inflammation.
4. Immune system disorders.

intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define the functions of the immune system.

a.2 Distinguish between innate immunity and acquired immunity.

a.3 Understand the Structure and Function of the molecules, cells, and organs

a.3 Describe how cell mediated and antibody-mediated involved in Immunity immunity work to protect a host from pathogenic organisms and harmful

a.4 substances.

a.5 Explain how the immune system recognizes foreign antigen (self and non-self discrimination

a.6 Explain the immune system disorders

b- Intellectual skill

b.1 The students will be able to identify the basis components of immune system

b.2 The students will be able to describe the roles of the immune system in infection.

b.3 Students should describe the immune system disorders such as hypersensitivity, immunodeficiencies and auto immunity.

b.4 Demonstrate knowledge and performing of the practical methods of Immune related diseases.

c- Professional and practical skills

c.1 Demonstrate knowledge and understanding of the main investigative methods used in Immunology

c.2 Have a basic understanding the principles of different immunological tests

c.3 Carrying out immunological tests

c.4 Analyses and interpret the test results

d- General and transferable skills

d.1 Think independently and access immunology relevant literature and review information.

d.2 Communicate with others positively.

d.3 Give clear, well-constructed oral presentations on immunological topics

Topics

Introduction to immunology Organs of immune system

Practical: Lab. safety

Components and properties of immune system

Practical: Specimen preparation and preservation

Recognition of microbes by Innate immunity

Practical: Simple dilution.

Antigenicity, immunogenicity, (antigen, immunogen, hapten), properties of antigen, types of antigens.

Practical: Compound dilution

Antibody structure, function and classes

Practical : Serology

Immunity barriers to infection.

Practical: Principle of antigen-antibody interaction

Leukocytes migration

Practical: Precipitation test

Antigen processing and presentation (cell-cell interaction)

Practical: Agglutination test

Innate immune cells and function

Practical: Labelled immunoassay

Adaptive immunity and adaptive receptors

Practical: Labelled immunoassay
Humoral immune responses and its effector mechanism
Practical: Immunohisto chemistry
Cell mediated immune response and its effector mechanism
Practical: Molecular methods
Pathological immune mechanism and tolerance
Apoptosis

10.	**MT201**	**Computer**	**الحاسوب**	**3**	**2**	**2**	

Course aims:

1. This subject prepares a student for basic knowledge using computer to solve data processing problems in daily life.
2. To provide opportunity for the study of modern methods of information processing and its applications.
3. To encourage an understanding of the implications of computers in the modern world
4. To provide opportunity for the study of modern methods of information processing and its applications.
5. To encourage an understanding of the implications of computers in the modern world

Intended learning outcomes (ILOS):

a. Knowledge and understanding:

a.1 Students should be able to show an awareness of what the major computer components are and how they act as system
a.2 Show an awareness of the effects and impacts of computers on the individual and the society.
a.3 Show an awareness of the capability and limitations of computers.
a.4 Students after completing this subject should be using computer applications easily.
a.5 Defines the basic concepts of the contemporary computer, and shows its different forms and influence in different areas of life
a.6 Learn about the computer system with its physical and software components and their impact on the classification of computer devices
a.7 Identify the types of operating systems.
a.8 Explains the impact of the Internet and networks revolution and Identifying recent trends in the internet world
a.9 Learn about Microsoft windows XP and knowing the Principles of Microsoft windows, Desktop, Anatomy of a window.
a.10 Learn about basic concept of Microsoft ward, Microsoft PowerPoint, Microsoft Excel and knowing their principles.

b. Intellectual skills:

b.1 The student able to identify a problem, analyze the details of the situation, and then formulate an effective solution is an incredibly important aspect of computer science work.
b.2 Be able to demonstrate problem-solving skills

c. Professional and practical skills

c.1 Students should be able to use the personal computer with Windows (7, XP) with confidence, and the ability to use its available facilities
c.2 Students should be able to search information by the internet
c.3 Be able to demonstrate a basic understanding of computer hardware and software.
c.4 Students should be able to utilize Microsoft windows XP. In addition, they supposed to be able to deal with Microsoft windows commands easily, such as: Copy, paste, and cut command, Saving file on desktop, Moving file to folder, Deleting folder, Remove file from folder to folder.
c.5 Students should be able to write documents by Microsoft word and using all the available features such as: Grammar check, Editing and formatting a document, Moving and copying text with a document , Paragraph formatting Column formatting , Inserting a figure, Inserting table, Inserting chart, Inserting picture
c.6 Students should be able to use Microsoft Excel and learn How to modify and format a worksheet.
c.7 Students should be learn to Basic concept of Microsoft PowerPoint such as:creating , enhancing a presentation and Connecting of computer to a data show and how to use function of data show.

d- General and transferable skills

d.1 Work effectively in teams
d.2 Using computer proficiently
d.3 search information by the Internet easily
d.4 Deal easily with Microsoft word, PowerPoint and Excel proficiently
d.5 Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities.

Topics:

Essential computing concepts
• Meaning of computer
• Hardware of a PC
• computer software
• Introduction to networks
• Computer Programming Languages
• Operating System
Microsoft windows XP
• Principles of Microsoft windows

• Desktop
• Anatomy of a window
• How to use the help and support center
• 1Deference between folder and file
• Using windows explorer
• Copy, paste, and cut command
• Saving file on desktop
• Moving file to folder
• Deleting folder
• Remove file from folder to folder
• How to use USB
• How to use CD and DVD

Internet explorer and www

• Discusses the importance of www
• Connect to the internet

Difference between search engines

Microsoft word

• An overview on the basics of word processing
• How to use spell check
• Grammar check
• Use thesaurus
• Editing and formatting a document
• How to use the undo and redo commands
• Moving and copying text with a document
• Paragraph formatting
• Column formatting
• Inserting a figure
• Inserting table
• Inserting chart
• Inserting picture

Microsoft Excel

• Introduction to spreadsheets
• How to modify and format a worksheet

How to use a function

How to create and modify tables

How to create and modify a chart

How to create and modify report

Microsoft PowerPoint

• Basic concept of creating and enhancing apresentation
• How to use slide show tools and digital photography

• Tips to avoiding the drawback of bad slides; slide structure, fonts, color, etc..
• Connecting of computer to a data show and how to use function of data show

Third year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	NT301	Nutritional Biochemistry	الكيمياء الحيوية الغذائية	3	2	2	

Course aims:

1. By completion of this course, the students should be able to : Understand the biochemistry of the carbohydrate, lipid and protein metabolism.
2. Chemical structures and chemical properties of macro- and micronutrients
3. Discuss the biochemistry of minerals metabolism and body fluids
4. Processes involved in digestion and absorption of macro- and micronutrients Major pathways for metabolism of nutrients and key mechanisms regulating these pathways.
5. Describe the basic biochemistry of hemoglobin metabolism and biological oxidation.
6. Essential functions of nutrients in human cells and tissues
7. Pathologies associated with nutrient deficiencies, nutrient toxicities, and with common metabolic disorders.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define the metabolic pathways of carbohydrates, lipids, proteins, nucleotides and their micro-molecules and determine the site of each.

a.2 The Student should know Dietary Requirement and Efficient Amount For Each Nutrient?

a.3 Understanding Techniques For Assessment of Human Nutrition..

a.4 Knowing The Best Fit For A Person Through A Scientific Food-Chemistry Background

a.5 Clarify, Explain Relation Between The Food And Health

b. Intellectual skills

b.1 Compare the different characteristics of water- and fat-soluble vitamins.

b.2 Express the relation of cholesterol to heart diseases.

b.3 Predict the effects of methods of food production, preparation, preservation, fortification and format on the chemical composition and nutritional quality of food

b.4 Interpret some nutrition related disease and maintain health by conducting healthy life style and adequate balanced nutrition.

C- Professional and practical skills

c.1 The student be able to apply the specific methods to analyse the composition of foods

c.2 Apply quality control procedures in the lab

c.3 The students able to work with techniques in a chemical laboratory and follow safety instructions.

c.4 Diagnose the symptoms of nutritional problems as increased or decreased in nutritional value of components.

D. General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

Introduction to nutritional biochemistry
Proteins
Enzyme
Basel metabolic rate
Vitamin occurrence and physiological functions
Mineral occurrence and physiological function
Technique of human nutrition(nutritional assessment)
Lipid.
Carbohydrates : Glycolysis, gluogensis
Introduction to human nutrition and nutritive values. Requirement daily amount.
Dietary requirements
Deficiency diseases of different nutrient

2.	**NT302**	**Food Analysis**	**تحليل الغذاء**	**3**	**2**	**2**	

Course aims:

1. Familiarize determine the chemical nature of foods (carbohydrates, proteins, lipids, vitamins, mineral elements, and water).
2. Provide hands-on experience to apply the analytical techniques of food chemistry in real context.
3. Understand the effect of processing, storage, and cooking on major components of foods
4. Identify changes associated with mechanism of browning reactions and lipid oxidation and the effects on food quality.

5. Awareness of traditional analyzed methods of protein, lipid, carbohydrate, minerals and vitamins

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define the major and minors components of foods.

a.2 Identify the functional properties of major components of foods

a.3 Describe the nature and properties of compounds that give color and flavor to food products.

a.4 Define the chemical reactions of major components of foods during processing and storage.

a.5 Identify the chemical reactions of major components of foods during processing and storage.

b- Intellectual skills

b.1 Be able to do a critical comparison between traditional and modern analyzed food methods.

b.2 Be able to clarify how individual food components contributes to the overall quality of foods.

b.3 Be able to Analyse, interpret and report on results obtained in a scientific format.

b.4 Compare advanced and conventional techniques and instruments to analyse chemical and physical properties of food

b.5 interpret analytical data including use of common calculations, and resources relevant to food analysis.

c- Professional and practical skills

c.1 Be able to choose appropriate methods for the analyze and/or food system of interest

c.2 Apply various techniques in analyzing food samples

c.3 Be able to analyze the gross chemical composition of food, and perform laboratory procedures to determine food components and to obtain reliable results

c.4 Apply valid sampling techniques to food materials having widely diverse properties and volumes

c.5 Apply a range of chemical analyses of food components

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 Demonstrate oral and written communication skills to effectively communicate scientific ideas related with food analysis

Topics

Introduction:
Sampling and sample preparation
Buffers and Standard Solution
Moisture Analysis
Titratable acidity and pH
Mineral Analysis
Protein Analysis
Carbohydrate analysis
Lipid Analysis
Vitamin analysis
Pigment Analysis
Dietary Fiber Analysis
Water Analysis
Sensory Analysis
Spectroscopy and Chromatography
Practical part
Overview: Guidelines and Safety
Moisture Analysis
Acids, Bases, pH, and Titratable Acidity
Mineral and Ash Analysis
Protein Analysis
Milk protein by Folin method
Protein content by kjeldahl method
Carbohydrate Analysis
Lipid Analysis
Platform Tests in Milk (Acidity, Specific Gravity) - Milk fat by Gerber method
Vitamin C Analysis
Pigment Analysis
Water Analysis
Dietary Fiber Analysis
Sensory Analysis

3.	**NT303**	**Human Nutrition**	**تغذية الأنسان**	**3**	**2**	**2**	

Course aims:

1. To know the physiological requirements and functions of proteins, carbohydrates, lipids , and major minerals and vitamins on human population
2. Introduction to prepare planning meal for special cases of people who have such as high blood pressure, diabetes, pregnancy, lactation women, elderly and sport people and people who allergic to specific nutrition

3. Identification to basic and order priority of food nutrition (food pyramid) and deficiency diseases of different nutrition
4. How to calculate body mass for determination the appropriate weight and also shed light on the most cases suffering (obesity , thinnest and malnutrition)

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a1 to Familiarize the student with the functional of human nutrition

a.2 To identify all sources of nutrition and the calories quantities in for appropriate utilize or prescription as healthy meal

a.3. Understanding the nutritional standards for measuring them in terms of human body weight

a.4. To know all cases of people by particular steps to ensure how to provide them advices and diets (gain weight or loss weight) and who suffer from malnutrition.

b- Intellectual skills

b.1 Being aware of community health

b.2 Qualify to giving specific information and advices to particular cases to live a healthy life

b.3 Participate in raise efficiency for who work in nutrition field

b.4 Supervision and guidance as healthy food healthy life

c- Professional and practical skills

c.1 General nutrition specialist certificate : The task of a general nutritionist is to educate people about healthy food, the effect of its components on them, and provide them with information on how to change their dietary lifestyles into healthy and balanced patterns to get active and energetic and avoid disease.

c.2 Health awareness worker

c.3 Health advisor for companies and institutions

c.4 Work at Fitness centers and Weight loss centers.

d- General and transferable skills

d.1 A student Participate with government institution (hospitals and health center) for training

d.2 Training students for research heath projects

d.3 Food services and management in private companies

Topics

Introduction to human nutrition
Nutritive values of foods
Tecniques for assessment of human nutrition
Body mass index measurements
Dietary requirements
Food lists: three lists, four lists, six lists
Food pyramid

Body mass index measurements
Obesity
Thinness
Deficiency diseases of different nutrition
Nutrition before pregnancy, during pregnancy and after pregnancy
Nutrition during lactation and weaning
Nutrition of elderly and sport people
Mal-nutrition diseases

4.	**NT304**	**Food Microbiology I**	**علم الكائنات الدقيقة الغذائي 1**	**3**	**2**	**2**	

Course aims:

1. This course covers: the characteristic of microbial growth, intrinsic and extrinsic factors and their relationship to microbial growth.
2. the principles of food fermentation and the role of beneficial microbes;
3. The role of microorganisms and food spoilage; pathogenic microorganisms, infection and intoxication, mycotoxin, viruses and parasites.
4. the principles to control microbial growth; as well as qualitative and quantitative microbiological analysis
5. various techniques for enumeration and control of microorganisms in food;

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Recall the history of microorganisms in food
a.2 Identify the microorganisms found in food
a.3 Explain the factors that affect microbial growth in food
a.4 Discuss microbial spoilage of food
a.5 List foodborne diseases
a.6 Identify the importance and properties of indicator organisms
a.7 learn various techniques for enumeration and control of microorganisms in food;

b- Intellectual skills

b.1 Compare various physical and chemical methods used in the control of microorganisms
b.2 Analyse the potential causes and possible solutions and making thoughtful recommendations
b.3 applying critical thinking skills to new situations, commitment to the highest standards of professional integrity and ethical values

c- Professional and practical skills

c.1 Able the Experiment techniques in control of food spoilage

c.2 Practice the methods for microbial examination for food
c.3 learn various techniques for enumeration and control of microorganisms in food

d- General and transferable skills

d.1 Be able to working and/or interacting with individuals from diverse cultures, working effectively with others, dealing with individual and/or group conflict,
d.2 independently researching scientific and non-scientific information, and facilitating group projects
d.3 Be able to oral and written communication

Topics

Introduction to Food Microbiology:
History , Development, Definition , Scope Food of microbiology
Introduction to Food Microbiology:
Inter-Relationship of Microbiology with other Sciences.
Characteristics of Microorganisms in Foods: Types of Microorganisms, Classification and Nomenclature
Characteristics of Microorganisms in Foods: Morphology and Structure and their Importance in Food (Bacteria, Fungi, Viruses and Protozoans and others), Significance of Spores.
Microbial Growth in Food: Microbial Growth Characteristics- Bacterial Growth Curve
Microbial Growth in Food: Microbial Reproduction and Microbial Growth in Food, Factors Affecting the Growth of Microorganisms in Food.
Microbial Food Spoilage:
Sources of Microorganisms in Foods, Some Important Food Spoilage Bacteria
Microbial Food Spoilage:
Changes Caused by Micro-organisms during Spoilage (Breakdown of Proteins, Carbohydrates, Fats and other Constituents).
Microbial Food Spoilage:
Spoilage of Specific Food Groups- Milk and Dairy Products, Meat, Poultry and Sea foods, Cereal and Cereal Products, Fruits and Vegetables and Canned Products
Foodborne Diseases:
Types of Food Borne Infections, Food Borne Intoxications and Toxicities infections
Foodborne Diseases:
Origin, Symptoms and Prevention of Some Commonly Occurring Food Borne Diseases, Emerging Pathogens of Concern
Infection Incidence during Food Preservation:
Principles and Methods of Preservation
Infection Incidence during Food Preservation:
Infection Incidence during Food Pasturization, Dehydration

Infection Incidence during Food Preservation:
Infection Incidence during Food Freezing, Blanching
Infection Incidence during Food Preservation:
Infection Incidence during Food Canning and Irradiation.
Cultivation of Micro-organisms: Pure Culture Technique
Cultivation of Micro-organisms: Methods of Isolation and Cultivation
Cultivation of Micro-organisms: Methods of Enumeration of Microorganisms-Qualitative and Quantitative Methods.
Food Fermentations:
Definition, Type of Starter Microorganisms
Food Fermentations:
Common Food Fermentation Methods
Trends in Food Microbiology: Introduction to Hurdle Concept
Trends in Food Microbiology: Introduction to Predictive Microbiology
Trends in Food Microbiology: Introduction to Minimal Processing, Genetically Modified Foods
Trends in Food Microbiology: Introduction to Probiotics, Rapid Methods of Detection of Food Borne Pathogens.
Practical part:
Introduction to Lab Guidelines and Safety
Introduction to the Basic Microbiology Laboratory Practices and Equipment.
Components and Use of a Microscope
Cleaning and Sterilization of Glassware
Preparation and Sterilization of Nutrient Broth
Cultivation and Sub-Culturing of Microbes Using Slant, Stab and Agar Plates
Morphological Study of Bacteria and Fungi Using Permanent Slides
Simple staining
Gram's staining Continuation
Negative staining
Endospore staining

5.	**NT305**	**Community Nutrition**	**التغذية المجتمعية**	**2**	**2**	**-**	

Course aims:
1. To provide students with the basic knowledge and understanding of the following:
Responsibilities of the community nutritionist
Nutrition program planning and evaluation strategies
Methods of nutritional assessment and intervention
2. Identification of nutrition programs and policies for various stages of the life cycle
Tools needed to solve nutritional and health problems in a community setting

Intended learning outcomes (ILOS):

a- Knowledge and understanding

By the End of this Course Students should be able to:

a.1 Understand basics of epidemiology and Nutritional epidemiology and evidence-based nutrition.

a.2 Determine the Role of food supply and nutrition in population health.

a.3 Understand dietary requirements and reference values.

a.4 Nutritional supplementation.

a.5 Developmental origins of adult disease.

a.6 Infant feeding – breast and bottle.

a.7 History of food policy.

a.8 Food labelling and retailing.

a.9 Marketing food to children.

a.10 Dental health and food.

b- Intellectual skills

b.1 The student be able to acquire skills of critical thinking about children problems and problem solutions.

b.2 Integrate the knowledge from this course to describe the correlation between healthy diet and disease

b.3 Distinguish between local, state and federal food and nutrition programs

b.4 critically analyse the political forces that influence large-scale nutrition education programs

b.5 Critically evaluate formal and informal community programs that promote nutrition objectives

c- Professional and practical skills

c.1 Describe the different methods for assessing nutritional status and health in the community, and give examples of the appropriate use of each method.

c.2 Be Able to solve nutritional and health problem

c.3 Apply knowledge from other disciplines such as epidemiology, anthropology, and health
education to a community nutrition assessment

c.4 Demonstrate the processes involved in designing, implementing and evaluating a community
nutrition program through a service-learning project

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development

d.3 Interact effectively in team working.

Topics

1. Concept of Community Nutrition.
2. Nutritional problems: Causes of mal nutrition
3 . Methods of assessment of nutritional status
4. Malnutrition & Infection.
5. National and International agencies in community nutrition

ICDS, SNP, AMP, WHO, UNICEF, NIN,

6. Nutrition Education:

- Importance of nutrition education
- Nutrition education methods: -

Posters, Charts, Audio visual aids, lectures.

7. Strategies to combat Nutritional problems:

- Fortification, supplementation
- Immunization Program

8. Breast Feeding and its advantages:

- Weaning foods
- Importance of correct and timely weaning.

6.	**NT306**	**Food Hygiene**	**الصحة الغذائية**	**3**	**2**	**2**	

Course aims:

1. Provide basic food hygiene principles and the importance of food hygiene and sanitation in food premise.
2. Provide food handlers with the knowledge and the skills to ensure production of safe food for the consumer.
3. To explain the benefit of HACCP in food industry.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand food hygiene & safety standards required for licensed food premises.

a.2 Understand the principles of food safety and the diversity of food spoilage agents (physical and chemical) that affect the food and food pathogens involved in foodborne disease

a.3 Understand the importance of ensuring food remains free from contamination at all stages of food production and the important role they play in maintaining the standards at their level of operation

b- Intellectual skills

b.1 The student be able to acquire skills of critical thinking and problem solutions.

b.2 Ability to healthy problems solution and alternatives use

b.3 To be able to, synthesis current information and develop a presentation related

to food safety and food quality

c- Professional and practical skills

c.1 Apply HACCP criteria in different food production settings

c.2 Apply fundamentals of food hygiene management in food processing and manufacturing industry.

c.3 Apply fundamentals of water quality ,sanitation and management

c.4 Implement and maintain a strong system for food safety at work

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development

d.3 Interact effectively in team working.

Topics

1. Introduction to Food Hygiene

2.Water Quality:

- Water Components.
- Safe Water Supply
- Sector Policy and Planning

Sanitation and Hygiene Practices Promotion.

3 .Pest Control

4.Food Contamination and Incidence

5.Food Hazards

Chemical, physical, and microbial hazards.

6.Food Management

- Food Guidelines:

food production, and food safety

7. Food Plant Hygiene and Sanitation

Waste disposal, Pest and Rodent Control, ETP Design and Layout food storage sanitation, transport sanitation.

8.Water Sanitation System:

Sector Policy and Planning, Sanitation and Hygiene Practices Promotion

9.Water Sanitation System:

Waste disposal, Pest and Rodent Control

10.Water Management:

Quality Control and Assurance

11. Water Management:

Quality Control and Assurance Continuation

12.Food Hazards and Pollution:

Chemical, physical, microbial hazards

13.Food Hazards and Pollution:

Chemical, physical, microbial hazards Continuation
14.Food Management:
Food Production, Safety, Guidelines
15.Food Management:
Food Production, Safety, Guidelines Continuation
16.Food Management:
Food Quality Control and Assurance
17.Food Plant Hygiene and Sanitation
Waste disposal, Pest and Rodent Control
18.Food Plant Hygiene and Sanitation:
ETP Design and Layout Food Storage Sanitation
19.Food Plant Hygiene and Sanitation :
- Transport Sanitation, HACCP
20.Food Plant Hygiene and Sanitation:
- Considerations, Recommendations
21.Food Plant Hygiene and Sanitation :
- Guidelines for Safety and Quality

7.	**NT307**	**Food Technology**	**علم تقنية غذائية**	**3**	**2**	**2**	

Course aims:
1. The objectives of this course are to: Understand the different methods of food preservation
2. Provide the knowledge about principles of food technology, and its applications.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 At the end of this course, the student would be able to : Acquire in depth understanding of the principles underlying the food processing methods and technologies used.

a.2 Understand the emerging technologies of food processing, packaging and preservation.

a.3 Know the principles behind analytical techniques associated with food.

b- Intellectual skills

b.1 Evaluate and solve problems regarding food processing operations that affect the quality of food

b.2 Critically assess and analyze food science information available in the public domain in an innovative and ethical way.

b.3 Design food products that meet the various food regulations and laws.

c- Professional and practical skills

c.1 Acquire technical knowledge and skills required for successful food production.

c.2 Apply scientific principles in solving food processing problems.
c.3 Utilize advanced instruments and technologies to process and analyze food products and to solve food safety problems.
c.4 Communicate technical and other relevant information effectively in both oral and written format to a diverse audience including supervisors, colleagues, and consumers.
c.5 Apply knowledge gained in food chemistry, microbiology, engineering, and sensory evaluation to the development, processing, and preservation of safe, nutritious, and high-quality food products.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.
d.4 Be able to work in a team with different backgrounds, adaptive, and responsive to the different situations.

Topics

1. Food processing operations:

A) Refrigeration and Freezing:

- Requirements of refrigerated storage.
- controlled low temperature
- air circulation and humidity

Changes in food during refrigerated storage.

- Progressive freezing.
- Changes during freezing.
- Concentration effect and ice crystal damage, and freezer burn.
- Refrigeration load

Factors determining freezing rate-food composition and non-compositional influence.

- Freezing methods -direct and indirect,
- still air sharp freezer,
- blast freezer,
- fluidized freezer,
- plate freezer,

Spiral freezer and cryogenic freezing.

B) Dehydration:

- Normal drying curve
- Effect of food properties on dehydration

change in food during drying

- drying methods and equipments air convection dryer
- tray dryer
- tunnel dryer
- continuous belt dryer

fluidized bed dryer

- dryer
- drum dryer
- vacuum dryer
- freeze drying

foam mat drying

C) Thermal Processing of Foods:

- Classification of thermal processes

Principles of thermal processing

- commercial canning operations
- Commercial retort types
- Aseptic Processing
- UHT.
- Canning.
- Pasteurization.
- Methods of Cooking:

Dry, moist, frying and microwave cooking, advantages and disadvantages and the effect of various methods of cooking on foods.

2. Water Disposal and Sanitation:

Waste water, hardness of water, break point chlorination, physical and chemical nature of impurities, waste water treatment, milk plant sanitation, CIP system, sanitizers used in food industry.

3. Packaging:

Aims of packaging,
Types of Packaging Materials-Glass,
Paper and paper board,
Metal,
Plastics, properties of plastics.

Practical part:

Canning of foods:
To study the steps of can making process.
Estimation of pH and acidity of products.
Preservation of food by the process of freezing.
Dehydration of foods:
Drying of food using Tray dryer/other dryers.
Analysis of water.

Testing of Packaging Materials.

8.	**NT308**	**Food Chemistry**	**كيمياء الغذاء**	**3**	**2**	**2**	

Course aims:

1. To provide an optimum environment for students to gain an understanding of the chemical bases of food component reactivity and functionality.
2. To provide an opportunity for students to develop skills for experimenting with food systems and to test various approaches for manipulating the chemical and/or functional properties of foods.
3. To provide students an opportunity to enhance and test their critical thinking skills through structured problem solving.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Students will be able to name and describe the general chemical structures of the major components of foods (water, proteins, carbohydrates, and lipids).

a.2 Students will be able to give a molecular rationalization for the observed physical properties and reactivity of major food components.

a.3 Students will be able to provide a theoretical explanation for observed extents and rates of reactions that are common to foods

a.4 Describe and characterise the chemical, structural and functional properties of food proteins, food lipids and food carbohydrates

a.5 Explain and discuss (structures, functions and stability) of micro-food components: vitamins, minerals

a.6 describe reactions and mechanisms important in food chemistry

b- Intellectual skills

b.1 Students will be able develop hypotheses, design experiments, and evaluate experimental data pertaining to chemistry-based food phenomena.

b.2 Students will be able to critically evaluate original research papers in food chemistry.

b.3 Can present and explain results achieved in the lab

b.4 Explain and predict the effects of water in food systems.

b.5 Students will be able to predict how processing conditions are likely to change the reactivity of food components.

b.6 Students will be able to predict how changes in overall composition are likely to change the reactivity of individual food components

Students will be able, through critical evaluation, to determine approaches that may be used to control the reactivity of those food components that are likely to impact the overall quality of finished products.

c- Professional and practical skills

c.1 apply their knowledge and laboratory skills to measure, control and modify

the chemical and physical properties of food
c.2 be capable of designing and conducting experiments and interpreting data to understand important food chemistry principles
c.3 implement a selection of laboratory techniques common to basic and applied food chemistry
c.4 Able to research the literature for advanced information for some of these food components

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Water: Functional Properties
Water Activity and Stability
Protein:
Structure, Denaturation, Properties
Proteins: Changes During Processing/ Storage
Enzymes: Kinetics
Enzymes:
Factors Affecting Activity
Carbohydrates:
Types and Structure
Carbohydrates:
Maillard Browning Reaction
Lipids:
Types, Structure and Properties
Lipids:
Oxidation Reaction
Lipids: Hydrogenation
Natural occurring toxicants in foods
Practical part:
Overview: Guidelines and Safety
Moisture Isotherms
Moisture Isotherms Continuation
Determination of Protein in a food sample
Determination of ash in a food sample
Determination of vitamin C in food sample
Determination of acidity and pH in food beverages

Maillard Browning Reaction
Maillard Browning Reaction Continuation
Lipids (melting points and viscosity)
Lipid Oxidation
Lipid Oxidation Continuation

9.	**NT309**	**Clinical Training I**	**التدريب السريري 1**	**5**	**-**	**10**	

Course aims:
The aim of this course is to train students who will be capable of understanding concepts and fundamental principles of the Foods and Nutrition Services in nutrition management of patients/clients.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Demonstrating nutritional interviewing and counseling skills

a.2 Assessing and monitoring the nutritional status and needs that hospitalized patients have using appropriate tools and pertinent medical terminology.

a.3 Using the principles involved in planning and implementing nutrition care, including those necessary for the interpretation of nutrition data, the recommendation of appropriate diet orders and the implementation of physicians' orders.

b- Intellectual skills

b.1 The ability to engage in thinking characterized by the rational, informed, independent, and open-minded exploration of issues, ideas, and events before accepting or formulating a conclusion.

b.2 The ability to ask questions, examine issues, and reach informed conclusions by breaking down complex issues, exploring evidence, and describing relationships among persons, things, or events

b.3 Interpret and translate scientific knowledge and principles related to nutrition into practical information

c- Professional and practical skills

c.1 Be able to do nutrition principles and their application to disease prevention and treatment in adults.

c.2 Be able to use medical and nutritional terminology associated with a variety of nutrition related disease states.

c.3 Be able to apply principles of nutrition assessment associated with nutrition related diseases and conditions.

c.4 Collect, organise and assess data relating to the health and nutritional status of individuals.

d- General and transferable skills

d.1 The ability to exchange information and meaning across cultures, space, and time appropriately and correctly.
d.2 This competency includes oral, written, and interpersonal communication, and the ability to use current or innovative media
d.3 Be able to continues reading and do research related to health nutrient

Topics

1. Nutrition for weight management: Disorders of energy balance, Obesity Assessment of obesity, Management of obesity
2. Underweight/Excessive Leanness/Undernutrition
3. Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders
4. Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders
5. MNT for Diseases of the Hepato - Biliary Tract

a) Nutritional care in liver disease in context with results of specific liver function tests
- Dietary care and management in viral hepatitis(different types) , cirrhosis of liver, hepatic encephalopathy, Wilson's disease

6. A. Assessment of Nutritional Status- reliability, validity accuracy, precision

Measurement of weight and height – assessment of nutritional status for adults, young and older children
Calculation of BMI, interpretation

7. Nutrition for Endocrine Disorders

Nutrition for Diabetes Mellitus and hypoglycemia

8. Nutrition in Cardiovascular Diseases and Pulmonary Disorders

10.	**MT301**	**Research Methodology**	**طرق بحث**	**2**	**2**	**-**	

Course aims:

1. Understand some basic concepts of research and its methodologies
2. raise awareness of crucial aspect of the nature of Knowledge and the value of scientific method
3. Introduce the concept at the heart of every research project –the research problem- and to discuss what a researchable problem is.
4. Identify appropriate research topic
5. Write research report and thesis
6. Select and define appropriate research problem and parameters

7. Evaluate literature, form a variety of sources, pertinent to the research objectives.
8. Identify and justify the basic components of the research framework, relevant to the tackled research problem.
9. Discuss how to cite sources, using the American Psychological Association (APA), and justify this choice.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Understand the general definition of research design
a.2 Understand the limitation of particular research methods
a.3 Know and understand different types of research
a.4 Understand and Know how to write References by using one of the two types(Alphabetic or Numbered) when using different sources in their Research Project in 4th year.
a.5 The internet has made locating information more accessible, but not every source is credible. It is important to know how to find reliable sources and analyze information to determine whether or not it is credible. To ensure are gathering accurate information, try to verify information from one source by sing another. Locate the original information source to verify its reliability.

b- Intellectual skills:

b.1 Develop advanced critical thinking skills
b.2 Discuss the criteria of good research and the different types of research.
b.3 present some aspects of the debate about the nature of knowledge and the value of scientific method

c- Professional and practical skills:

c.1 Develop skills in qualitative and quantitative data analysis and presentation
c.2 Demonstrate enhanced writing skills
c.3 Demonstrate the ability to choose method appropriate to research aims and objectives.
c.4 Be able to demonstrate Research skills are essential to employers because they help the company develop new products or services, identify the need and wants of their customers, improve what they do, keep up with changes in their industry and compete in their market. Knowing how to develop excellent research skills and highlight them for employers can help in several ways throughout the career.

d- General and transferable skills:

d.1 Practice independent learning needed for continuous professional development
d.2 Work effectively in a team.
d.3 Be able to gain problem-solving skills to break a problem down into its parts
d.4 Learn to use advanced search techniques.
d.5 Think critically about each element, analyze the information you find and use that information to form an effective solution.

Topics

Introduction to research

- Definition
- Types of radiation
  - ✓ **Historical**
  - ✓ **Observation**
  - ✓ **Systematic**
  - ✓ **Descriptive and etc.**

Basic elements of scientific research

- Problem definition
- Selecting a research problem
- Interest
- Uniqueness

Basic elements of scientific research

- Capability
- Availability of data
- Financial support
- Time factor

Writing a research proposal

Sample survey and questionnaire

- Reasons
- Types

Hypothesis

- Definition
- Formulation
- Sources
- Examples

Research writing

- Title page
- Approval page
- Abstract

Research writing

- Acknowledgement
- Table of content
- List of figures

Research writing

- Chapters of research projects
  - Chapter one (Introduction)
  - Chapter two (review of literature)
  - Chapter three (methodology)

Research writing

- Chapters of research projects
- Chapter four (results)
- Chapter five (discussion)
- Chapter six (conclusion and recommendation)

Research writing

- References
- Appendixes

Reference page

- Reference list
- Books reference
- One other reference
- No author reference
- Unknown author reference

Reference page

- Two or three authors reference
- Four or more authors reference
- Edited or translated books
- Article or chapter in a book
- Government document

How to drawing graphic inserting table, spelling check etc.

Plagiarism and Toronto

Citation

- Definition
- Example
- Verbs used
- References
- Quotation
- When to cite

Paraphrasing

- Definition
- Examples
- How to avoid plagiarism
- When to paraphrase

Linking words and phrase used in projects

Skills of searching on the internet and using the scientific sources

Modern language association (MLA)

- Style 7th quick guide
- Library search guides
- Killam library MLA

- The reasons of using MLA handbook effective April 2009

Articles

- Types of articles
- Referencing
- How to cite

Some consideration and limitation facing post-gradation students

Presenting a research paper and writing a critical review

- Introduction
- Body
- Conclusion
- Purpose of research paper

Oral presentation

- How to make good presentation
  - Good starting
  - Clear voice
  - Eye contact
  - Good timing
  - Confidence

11.	**ML302**	**Endocrinology**	**علم الغدد الصماء**	**3**	**2**	**2**	

Course aims:

1. This course aims to provide students with a broad understanding of the major human endocrine glands and their hormones.
2. In addition to understanding hormones, action and their effect on target cell.
3. Provide students with understanding of the medical conditions resulted from abnormal hormone secretion and the laboratory tests that are used to diagnose these conditions.

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Define endocrine gland and hormones and explain how endocrine system is important for homeostasis

a.2 Describe the synthesis of different endocrine gland hormones

a.3 Know the development of the endocrine glands

a.4 Know the histological features of the endocrine glands

a.5 Define and categorize the hormones secreted according to their biochemical structure

a.6 Understand the regulation and physiological effect of different hormones

a.6 Describe clinical manifestations of conditions resulting from hyper-and- hypo secretion of each endocrine gland

a.7 Explain recent laboratory methods in diagnosis hormone disorders

a.8 Describe the integration of different endocrine glands to perform function and control homeostasis

b- Intellectual skills:

b.1 Use a wide range of idea based on knowledge in this course to solve unexpected problems in the lab and apply this way of thinking in different life situations

b.2 Interpret hormone test results to diagnose the cause of medical condition

b.3 Integrate the knowledge from this course to describe the correlation between different endocrine glands

b.4 Ability to analyze how an endocrine gland can affect the function of other endocrine glands and homeostasis

c- Professional and practical skills:

c.1 Apply the knowledge from this course while working in medical laboratory to diagnose different hormone disorders

c.2 Apply quality control procedures in the lab

c.3 Ability to analyze and solve problems related to hormone tests

c.4 Follow scientific procedure for solving problems in the lab and make sure to apply quality control procedures in the lab

c.5 Understand different methods used in measuring hormones and apply them in future while working in medical laboratory or research labs

c.6 Practice and apply some of these techniques in the practical part of the course

c.7 Understand the scientific research that have been used to understand endocrine and hormone function

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics:

Introduction: definitions, a brief history of endocrinology, important people and research

Methods in endocrinology, classes of hormones, cascades and feedback loops

Hormone sources, Synthesis, receptors and target tissues

The steroid hormones: sources, structure, synthesis, regulation, receptors and effects on target tissues

Steroids, the releasing hormones, structure of the Hypothalamus

Posterior and anterior pituitary hormones: morphology of the pituitary, structure and function.

The anterior pituitary as the central regulatory center.

Thyroid hormones: structure, control, release and function.
Hypo- and hyperthyroidism.
Pancreatic hormones: Insulin and glucagon, and Diabetes.
Parathyroid glands and its disorders.
The adrenal glands: glucocorticoids, Structure and function.
GI hormones.
Androgens, gonadal differentiation and free-martins.
Estrogens and the endocrinology of Pregnancy.
Prostaglandins, pineal gland, cell growth factors.
Practical part:
Techniques for Studying Endocrinology Extirpation/replacement, RIA, etc.

Fourth year:

NO	Code	Subject		units	Theoretical	Practical	Tutorial
		English	Arabic				
1.	NT401	Therapeutic Nutrition	التغذية العلاجية	3	2	2	

Course aims:

1. The main objective of this course is to learn common types of therapeutic diet, meals and making dietary approaches stopping hypertension .
2. Plat method proteins and also explaining food types related to specific treatment and diseases

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 To acquire basic knowledge of nutrient requirements, recommended dietary allowances, and dietary modification under different physiological conditions.
a.2 To acquire basic knowledge of food groups, food exchange system and their nutritional significance, and application of knowledge acquired for healthy eating.
a.3 To gain knowledge on the nature and scope of therapeutic nutrition; and understand the principles of dietary modification and apply in planning.
a.4 To understand nutrition-related diseases of the: gut, liver, gallbladder, pancreas, and heart.
a.5 To know the etiology, incidence, nature, clinical symptoms, diagnosis, and medical and dietary management of disease.
a.6 To modify the diet plans to suit the disease condition

b- Intellectual skills

b.1 Use wide range of idea based on knowledge in this course to define the nutrition in health care system
b.2 Knowing completion of nutrition and diet therapy

b.3 Students will be able to demonstrate critical thinking skills and analytical abilities to identify and solve problems in the nutritional sciences.
b.4 Students will be able to critique and effectively communicate nutrition information.

c- Professional and practical skills

c.1 To develop practical skills in planning and management of diets for the different age groups under normal/ physiological conditions keeping in mind the dietary guidelines.
c.2 Be able to prepare different type of therapeutic diet
c.3 Explaining food types related to specific treatment and disease
c.4 Students will be able to assess nutritional status of individuals in various life-cycle stages and determine nutrition-related conditions and diseases by applying knowledge of metabolism and nutrient functions, food sources, and physiologic systems.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development
d.3 Interact effectively in team working.

Topics

introduction, types of therapeutic diet.
Therapy of anemia, supplementation and for IDA,
Meals made easy with the diabetes plate, Diabetes, food groups, physical activity.
Plate methods protein& tips for estimating food proteins.
Fruits exchanges
Meal patterns
Mind meal snacks
Making D.A. S.H to good health, what did DASH include, chocolate(possibly effective for hypertension) chocolate Myth cause ache.
Renal Diet(chronic kidney disease).
Potassium fruits
Obesity(Diet and physical activity)
Healthy diet(dietry guidelines).
Nutrition & asthma
Some dietary risks factors for asthma& overweight.
Fats: sources, chosing quality fats.
Possible benefits of Omega 3 fats.
Nature of celiac disease(glutin free diet)

2.	**NT402**	**Nutritional Diseases**	**الامراض التغذوية**	**3**	**2**	**2**	

Course aims:

1. The course focuses on the causal factors for malnutrition, malnutrition definition& types/ forms...

2. Also focuses on micronutrients and macronutrients deficiencies
3. Diseases include, Protein Energy Malnutrition, Scurvy, Rickets, Beri Beri, hypocalcaemia, Osteomalacia, Vitamin K Deficiency, Pellagra, Xerophthalmia
4. The course will provides students with sufficient knowledge and skills on assessment, diagnosis and admission of malnourished cases.
5. The course also describing the entire case identification, management and handling of complicated medical cases.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know the macronutrients and micronutrients
a.2 Describe the symptom of every disease caused by vitamin deficiency
a.3 Independently identify and explain key concepts relating to the understanding of the role of nutrition in aetiology, prevention and treatment of disease.
a.4 Knowing of each disease and their relationship with vitamins deficiency

b- Intellectual skills

b.1 Demonstrate professionalism and ethical behavior in all areas of practice
b.2 Integrate scientific information, research, and critical thinking into evidence- based practice
b.3 Evaluate evidence for the relationship between diet, nutrition and disease
b.4 Interpret and explain the role of genetics in diet-related diseases and disease susceptibility;

c- Professional and practical skills

c.1 Apply dietary, energy and physical assessment methodologies;
c.2 Incorporate their knowledge and understanding of the principles of nutrition to the prevention and treatment of specific diseases;
c.3 Synthesise and communicate the relationship of diet and nutrition to specific diseases;
c.4 Be able to explain food types to specific treatment and disease.

d- General and transferable skills

d.1 Read and critically evaluate papers in the field of human nutrition
d.2 Present research and practice information clearly and concisely in written format
d.3 Evaluate and develop own communication and professionalism skills

Topics

Introduction to Nutrition.
Introduction to malnutrition
Definition , classifications , causes, epidemiology, treatments, prevention.
Protein- energy malnutrition(PEM).
Marasmus and kwashiorkor
Micronutrients deficiencies
Definition, types

Anaemia.
Vitamin A deficiency.
Iodine deficiency
Beriberi.
A riboflavinosis
Pellagra
Scurvy1
Vitamin D Deficiency(Rickets).
Folic acid.
Magnesium.
Nutritional diseases and diabetes.
Nutritional disease and infectious diseases.
Environmental and nutrition disease.

3.	**NT403**	**Nutritional Epidemiology**	**علم الأوبئة التغذوي**	**3**	**2**	**2**	

Course aims:

1. This course is designed to cover: the fundamental principles and practices of epidemiology in public health
2. To increase students to examine basic epidemiological concepts and methods , explore their application, perform elementary epidemiological reviews and critiques, and reflect in the role of epidemiology in public health
3. The course is designed for students who want to understand the relationships between diet and health or disease
4. To introduces basic methods of dietary assessment, reviews various topics in nutrition epidemiology and teaches the skills needed for critical evaluation of the nutritional epidemiologic literature

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Recognize the fundamental principles and practices of epidemiology in public health
a.2 Recognize the basic epidemiological concepts and methods
a.3 Describe the principles of epidemiological study design
a.4 Understand how to control malnutrition in societies
a.5 Reflect in the role of epidemiology in public health

b- Intellectual skills

b.1 Critically evaluate, summarize, present, and debate new research findings in the light of prior knowledge
b.2 Integrate the knowledge from this course to describe the correlation between healthy diet and disease
b.3 Interpret nutritional epidemiological research
b.4 Demonstrate critical appraisal of the published literature in nutritional epidemiology

c- Professional and practical skills

c.1 Able the suitable methods of nutritional assessment

c.2 Be able to use the tools needed to solve nutritional and health problem

c.3 Be able to present research summaries accurately and concisely to their peers

c.4 Be able to provide examples of food policy in practice in vulnerable population groups

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development

d.3 Interact effectively in team working.

Topics

Nutritional Epidemiology
Dietary assessment methods:records ,recalls and FFQ
Energy intake validation and dietary under and over reporting
Energy adjustment
Measurement error: Effects and Remedies
Practical: Bird flu
Nutrition Biomarkers.
Practical: Mad cow presentation
Dietary patterns
Practical: Fat food sample
The role of meta analysis in nutritional epidemiology weaning.
Practical: Fresh food sample
Methodological considerations in study design
Practical: Stale food sample
Controversies in epidemiology: observation studies vs RCT
Practical: Refrigerated food sample
Comparative effectiveness analysis on diet and health
Practical: Cancer food presentation
Physical activity and health
Nutrition and musculoskeletal health
Gene nutrition interactions
Nutrition and vision
Nutrition and infectious disease
Nutrition and Global Burden of disease
Nutrition and diabetes
International nutrition
Nutrition and cancer
Translation of nutritional epi finding into dietary guidelines and health

4.	**NT404**	**Food Microbiology II**	**علم الكائنات الدقيقة الغذائي II**	**3**	**2**	**2**	

Course aims:

1. This course aims to provide instruction in the general principles of food microbiology.,
2. lt is assumed that students will have received adequate introduction to microbiology
3. The course covers the biology and epidemiology of foodborne microorganisms of public health significance, including bacteria, yeasts, fungi, protozoa and viruses
4. food spoilage microorganisms; the microbiology of food preservation and food commodities; fermented and microbial foods;
5. The principles and methods for the microbiological examination of foods; micro biological quality control, and quality scheme

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Understand the causes of food spoilage and predict the microorganisms that can spoil a given food, when prepared, processed, and stored under given conditions.

a.2 Understand the causes of foodborne microbial diseases and predict the pathogens that can grow in a food, when prepared, processed, and stored under given conditions.

a.3 Understand the role of beneficial microorganisms in food processing, preservation and safety, and the possible health benefits resulting from the consumption of these microorganisms.

a.4 Describe the characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification.

b- Intellectual skills

b.1 Able to predict the microorganisms that can spoil a given food during prepared, processed or stored .

b.2 Be able to predict the necessary measures to control the spoilage and pathogenic microorganisms in food.

b.3 Predict the interactions between microorganisms and the food environment, and factors influencing their growth and survival.

b.4 The ability to locate, analyse, evaluate and synthesise information from a wide variety of sources in a planned and timely manner.

c- Professional and practical skills

c.1 Discuss the rationale for the use of standard methods and procedures for the microbiological analysis of food.

c.2 Able different methods of Enumeration of Microorganisms-

c.3 Able various methods of Qualitative and Quantitative of microorganism.

d- General and transferable skills

d.1 A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.

d.2 An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems.
d.3 Effective team worker.

Topics

Introduction to advanced food microbiology:
Definition and Scope of food microbiology, Inter-relationship with other sciences.
Microbial food spoilage:
Definition , common groups of food spoilers, lactic Acid Bacteria, Acetic acid bacteria, filamentous fungi, Yeasts
Infection Incidence during Food Preservation:
Principles and Methods of Preservation
Infection Incidence during Food Preservation:
Infection Incidence during Food Pasturization, Dehydration
Infection Incidence during Food Preservation:
Infection Incidence during Food Freezing, Blanching
Infection Incidence during Food Preservation:
Infection Incidence during Food Canning and Irradiation.
Cultivation of Micro-organisms: Pure Culture Technique
Cultivation of Micro-organisms: Methods of Isolation and Cultivation
Cultivation of Micro-organisms: Methods of Enumeration of Microorganisms- Qualitative and Quantitative Methods.
Food Fermentations:
Definition, Type of Starter Microorganisms
Food Fermentations:
Common Food Fermentation Methods
Trends in Food Microbiology: Introduction to Hurdle Concept
Trends in Food Microbiology: Introduction to Predictive Microbiology
Trends in Food Microbiology: Introduction to Minimal Processing, Genetically Modified Foods
Trends in Food Microbiology: Introduction to Probiotics, Rapid Methods of Detection of Food Borne Pathogens.
Practical part
Aerobic Mesophilic plate Count
Aciduric Flate Sour Spore-former
Bacillus cereus
Detection and Determination of (Clostridium perfringens)
Detection and Determination of Coliforms, faecal coliforms and E.coli in foods.
Direct Microscopic Count for Sauces, Tomato and Pastes.
Fermentation test (incubation test)
Detection and Confirmation of Salmonella species in food.

Detection and Confirmation of Shegella species in food.
Detection and Determination of Staphyllococcus aureus in food.
Detection and Confirmation of sulfide spoilage sporeformers in processed foods.
Detection and confirmation of pathogenic Vibrios in foods .
Estimation of yeasts and Moulds in foods.
Detection and Confirmation of listeria monocytogenes in foods.
Bacteriological Examination of water for Coliforms. E.coli, Salmonella, Clostridium perfringens, Bacillus cereus, and Pseudomonase

5.	**NT405**	**Food Quality Control**	**مراقبة جودة الغذاء**	**3**	**2**	**2**	

Course aims:

1. Introduce students to the concept of food quality control and quality assurance
2. To acquire knowledge of food quality, safety, and legislation
3. To understand the importance of statistics in food quality control.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know quality assurance and quality control.
a.2 Explain the importance of Quality Assurance
a.3 Define principles of standardization in food production
a.4 Explain the international systems of standards
a.5 Describe national standard
a.6 Discuss the practical applications of Laboratory Information Management Systems in the food industry

b- Intellectual skills

b.1 The Students be able to differentiate between quality assurance and quality control.
b.2 Critically evaluate the factors that are constraining the quality of food and use the concept of Process Quality Management to achieve and maintain high quality and safe outputs throughout food
b.3 Have critical insight into the development and enforcement of legislation and related standards.

c- Professional and practical skills

c.1 Examine the chemical and microbiological quality of food samples
c.2 Be able to detect the adulteration in food samples
c.3 Be able to review of legislative approaches for the management of food safety
c.4 Determine the quality of food by scientific methods such as: instrumentation, microbiological, chemical, and sensory evaluation.
c.5 be able to acquire the theoretical knowledge and practical skills necessary for the implementation of an effective quality management strategy in the company

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the

learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Introduction of food quality control
Essential of Food Quality, value natrution
health ensured to food
Raw material of food
- The cooperation between the producer of raw materials and the processors.
- Water

Water activity
Raw Materials of Plant Origin
- Physical properties
- Cereals and energy

Protein in cereals.
Storage of cereals
Dietary fiber
Introduction to Fruits and Vegetables
- Quality Indices of Fruits
- Appearance and Color of Fruit

Carbohydrates in Fruit
Chemical composition of fruit.
Contaminants in Fruit.
Selected Varieties of Fruit
- Apples
- Apricots
- Cherries
- Peaches

Quality Indices of Vegetables
Chemical Composition of Vegetables Sensory Attributes of Veg.
Chemical composition of fruit, Carbohydrates in Vegetables
Contaminants in Fruit
Selected Varieties of Fruit
- Apples
- Apricots
- Cherries
- Peache

Quality indices of vegetable
- Sensory Attributes of Vegetable
- N-Containing Compounds in Vegetables.

Nutritive Value and Overall Evaluation of Vegetables.
Selected Varieties of Vegetables

- Potatoes
- Carrots
- Peas
- Tomatoes

Raw Materials of animals origin
Milk:

- Introduction
- Quality of Raw Milk
- Microbial Aspects of Raw Milk

Chemical Composition and Chemical Standards for Raw Milk

- Cream
- Butter
- Cheese

Quality of Raw Meat

- Physical Properties of Raw Meat
- Sensory Attributes of meat
- Chemical Composition of meat
- Contaminants in meat

Finished Products

- Introduction
- General Aspects of Quality Control of Finished Products
- Flour, Baked Goods, Pasta
- Oils and Fats Meat and Meat Products
- Dairy Product

FOOD QUALITY INDICES
Quality control of food additives

- Sulphur dioxide
- Nitrates and nitrites
- Benzoic Acid

Practical Part

- Methods of determining humidity in food
- Drying methods

Cereal weight of 1000 kernels, test weight (kg per hectoliter), color, hardness, presence of other grains and other foreign kernels.
Characteristics Rheology of cereals farinograph .
Sensory Attributes of fruit
Color-texture, size, shape and composition.
Fiber determination of the cereals and fruits.

Synthetic pigments determination
standard curve
carotene determination of plans
Nitrogen and crude protein
Determination of acids and organics
Measurement of PH
ASH DETERMINATION
Dry ASHING
WET ASHING
Spectroscopy
Examination of An Absorption Spectrum
Spectrophotometric Assay of color Development a chemical reaction.
Estimation of free sulphur dioxide
Food additives Determination
Deter. Sodium benzoate.
Determination sulpher dioxide by colorimetric methods

6.	**NT406**	**Food Preservation**	**حفظ الأغذية**	**3**	**2**	**2**	

Course aims:

1. The goal of this course is to provide students with a fundamental understanding of food preservation and food packaging.
2. Food preservation: Preservation by chilling, freezing, canning, fermentation, concentration, dehydration, smoking, by chemical agents and novel non thermal techniques. Production of a range of foods using these manufacturing techniques and processes
3. Student will develop an understanding of shelf life and nutritional consequences of preservation.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Explain the basic principles of food preservation processes: heating, chilling, freezing, control of water activity, acidification, chemical preservatives, packaging, etc.
a.2 Explain the range of processing operations used for food preservation including thermal processing, chilling and freezing, dehydration, irradiation, nonthermal methods, etc
a.3 Explain the properties and uses of various packaging materials for preserving foods
a.4 Explain effects of processing and storage conditions on shelf life of foods
a.5 Explain the sources and variability of raw food material and the impact on food processing operations
a.6 Explain the effects of processing steps on nutritional quality, including bioactive components, of foods
a.7 Relate food quality (texture, sensory, structure/appearance, etc.) to the chemical

composition, processing and storage conditions

b- Intellectual skills

b.1 Distinguish between preservation methods appropriate for “natural” foods.

b.2 Analyze, interpret and explain complex phenomena (e.g., literature data) in context of preservation principles

b.3 Compile a literature review on a new topic related to preservation principles and analyze results of specific literature work in that area

b.4 Compare and contrast preservation methods for foods

c- Professional and practical skills

c.1 The student able to determine suitable methods of processing techniques for a chosen food.

c.2 The student able to determine suitable methods of food preservative

c.3 Able various techniques for food preservation

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

Introduction to food preservation.
Preservation using chemicals and microbes;
Fermentation as a method for food preservation.
Preservation using chemicals and microbes; pH in food preservation
Preservation by controlling water, structure and atmosphere; Modified-Atmosphere packaging of produce.
Packaging and preservation.
Food preservation and processing using membranes.
Stickiness and caking in food preservation.
Drying and food preservation, osmotic dehydration of foods
Water activity and food preservation.
Preservation using heat and energy; pasteurization and food preservation
Canning and sterilization of foods.
Cooking and Frying of Foods.
Food preservation by freezing.
Freezing–melting process in liquid food concentration.
Microwave pasteurization and sterilization of foods.
Ultrasound in food processing and preservation.
Food preservation aspects of ohmic heating.
Light energy in food preservation. Irradiation preservation of foods.
High-pressure treatment in food preservation.

7.	NT407	Food Additives	المضافات الغذائية	3	2	2	

Course aims:

1. Gaining knowledge on the division and labeling of additional substances and the regulations governing their use.
2. Acquiring the ability to identify additives in the product and to determine the risk of excessive daily intake

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Define food additives and differentiate between direct and indirect food additives
a.2 Discuss the purpose of food additives and the regulations that govern food additives.
a.3 identify the functions of the basic groups of food additives and their influence on changes in food
a.4 knows the current legal regulations regarding the use of food additives, including those obtained by genetic modification
a.5 Assign functions to most, if not all, of the ingredients at the ingredient label of a food product

b- Intellectual skills

b.1 Distinguished between the positive and negative aspects of food additives.
b.2 Distinguished between food additives in Food Codex and their usage.
b.3 To encourage student critical thinking on quality issues.

c- Professional and practical skills

c.1 able to apply statistical methods to verify data on the toxicology of food additives
c.2 Determine the regulatory status of food ingredients and discuss the methods used for evaluating the safety of food additives.
c.3 Discuss the likely changes in ingredients if a product were processed in a different manner.
c.4 Discuss the contributions and the limitations of food additives in our food supply.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Introduction to food additives
Functions and usage of food additives and risk assessments.
Nutritional additives; vitamins
Nutritional additives; amino acids, fatty acids and minerals
Antioxidants; types and application in foods.
Preservatives; Popular preservatives and their uses in foods.
Anti-browning agents; common agents and their applications on food.

Food colorants; natural and synthetic colorants and their application in food.
Flavorings agents; natural, artificial flavorings as food additives.
Flavor enhancers; types and function.
Sweeteners; nutritional and non-nutritional sweeteners and their effect on food.
Sweeteners; nutritional and non-nutritional sweeteners and their effect on food.
Emulsifiers; definition, mechanism of action and their application in food.
Thickening agents and stabilizers; common types and their use in food processing.
Glazing agents and other food texturizing.
Acidulants and pH control agents; popular types and their applications in food.
Food phosphates; uses and applications of food grade phosphates.
Food additives; hypersensitivity and intolerance.
Practical part
E number system.
International numbering system.
Analytical equipment to analyze additives and impurities in food.
Food additives in dairy products and milk products.
Food additives incanned Food
Food additives inbakery products.
Food additives in confectionery products
Food additives in soft drinks, juices and chips

8.	**NT408**	**Food and Drugs**	**الغذاء والدواء**	**2**	**2**	**-**	

Course aims:
1. Describe the routes of drug administration
2. Describe factors that might alter the absorption and bioavailability of drugs.
3. Describe the effects of various drugs on action, metabolism and elimination of nutrients
4. Identify the risk factors for drug-nutrient interaction;
5. Demonstrate an appropriate nutrition counseling ability to aid client/patient with dietary side effects caused by nutrient-drug interactions.
6. Identify and explain adverse herb-drug interactions.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know general introduction to pharmacology: Definition, sources of drugs, route of administration, and mechanisms action of drugs.
a.2 Understand the general concepts of drug interactions.
a.3 Define drug-drug and drug-food interactions
a.4 Explain the importance of drug interactions related to the therapy and illustrate desirable (beneficial), undesirable (harmful) and dangerous drug interactions
a.5 Summarize ways of drug interactions and explain pharmaceutical, pharmacokinetic and pharmacodynamics drug interactions.

a.6 Know and understand the most common and important Examples of drug interactions

b- Intellectual skills

b.1 The student be able to discuss pharmaceutical drug interactions and illustrate pharmaceutical drug interactions.

b.2 question clinical importance of pharmaceutical, pharmacokinetic interactions

b.3 Discuss pharmacokinetic drug interactions and interpret drug interactions during absorption, distribution, metabolism and elimination.

b.4 Be able to predict the risk of drug interaction

c- Professional and practical skills

c.1 Make specific recommendations

c.2 Be able to monitor nutritional status of people on medication schedules and reviews how diseases and aging affect drug-nutrient metabolism

c.3 Be able to explain the drug interaction for people taken medication

c.4 Be able to do awareness lecture about risk of drug interaction.

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

Topics

Introduction to pharmacology: Definition, sources of drugs, route of administration, mechanisms action of drugs.

Pharmacodynamics action.

Pharmacokinetics action.

The different groups of medicine.

Food drug interaction introduction

Effect drugs on nutrition state.

Side effects of drugs and other medications.

Juices intake and drugs.

Common drug nutrient interactions anticoagulants, Theophylline, Digoxin.

Common drug nutrient interactions Penicillin's, Cephalosporin's, Quinolones.

Common Drug nutrient interactions Monoamine Oxidase Inhibitors(MAOIS), Levodopa, Diuretics.

Effects of Alcohol, Caffeine, and Tea.

Common Food- Drug interactions associated with cardio vascular Medications.

Common Food- Drug interactions associated with Hypertension medication.

Common Food- Drug interactions associated with Diabetes Mellitus Medications.

Herbs and drugs interaction, Definition, mechanisms of the action.

Common herbs- drugs interaction Garlic, ginger, black paper permanent, green tea.

Food and Drug action							
9.	**NT409**	**Clinical Training II**	**التدريب السريري II**	**6**	**-**	**12**	

Course aims:

The aim of this course is to train students who will be capable of understanding concepts and fundamental principles of the Foods and Nutrition Services in nutrition management of patients/clients.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Demonstrating nutritional interviewing and counseling skills

a.2 Assessing and monitoring the nutritional status and needs that hospitalized patients have using appropriate tools and pertinent medical terminology.

a.3 Using the principles involved in planning and implementing nutrition care, including those necessary for the interpretation of nutrition data, the recommendation of appropriate diet orders and the implementation of physicians' orders.

b- Intellectual skills

b.1 The ability to engage in thinking characterized by the rational, informed, independent, and open-minded exploration of issues, ideas, and events before accepting or formulating a conclusion.

b.2 The ability to ask questions, examine issues, and reach informed conclusions by breaking down complex issues, exploring evidence, and describing relationships among persons, things, or events

b.3 Interpret and translate scientific knowledge and principles related to nutrition into practical information

c- Professional and practical skills

c.1 Be able to do nutrition principles and their application to disease prevention and treatment in adults.

c.2 Be able to use medical and nutritional terminology associated with a variety of nutrition related disease states.

c.3 Be able to apply principles of nutrition assessment associated with nutrition related diseases and conditions.

c.4 Collect, organise and assess data relating to the health and nutritional status of individuals.

d- General and transferable skills

d.1 The ability to exchange information and meaning across cultures, space, and time appropriately and correctly.

d.2 This competency includes oral, written, and interpersonal communication, and the ability to use current or innovative media

d.3 Be able to continues reading and do research related to health nutrient

Topics

1. Nutrition for weight management: Disorders of energy balance, Obesity Assessment of obesity, Management of obesity
2. Underweight/Excessive Leanness/Undernutrition
3. Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders
4. Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders
5. MNT for Diseases of the Hepato - Biliary Tract
a) Nutritional care in liver disease in context with results of specific liver function tests
- Dietary care and management in viral hepatitis(different types) , cirrhosis of liver, hepatic encephalopathy, Wilson's disease
6. A. Assessment of Nutritional Status- reliability, validity accuracy, precision
Measurement of weight and height – assessment of nutritional status for adults, young and older children
Calculation of BMI, interpretation
7. Nutrition for Endocrine Disorders
Nutrition for Diabetes Mellitus and hypoglycemia
8. Nutrition in Cardiovascular Diseases and Pulmonary Disorders

10.	**NT410**	**Food Management and Regulations**	**إدارة ولوائح الغذاء**	**2**	**2**	**-**	

Course aims:
1. Definition of food management and regulations
2. Basic principle with special reference to food proccess industries
3. Desirable safety features of some food processing equipment s
4. Principles for food import and export
5. Establishment and application of Microbiological criteria for food

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Know the hazards which may effect on consumer
a.2 Identify the physical chemical and microbiological risk
a.3 Determine critical control points
a.4 Describe critical limits for every critical points
a.5 Explains the requirements for plant hygiene and safety.

a.6 Explain guidelines for the exchange of information in food control and principles for food import and export inspection and certification
a.7 Determine maximum levels of heavy metals.

b- Intellectual skills

b.1 Know the specifications for every food group and if it is suitable with our specifications and our lifestyle
b.2 Interpret the causes of products acceptance and causes of food recall b.2 Know what means of codex alimentarious commission. Which is members from WHO and b.3 FAO

c- Professional and practical skills

c.1 Use the important machines in Laboratories of foods as stomachers or blender and sensitive balance and seive to .finding weight of every constitute.
c.2 Write adequate description of products including labeling net weight packages manufacturing and expiry date.
c.3 Full description of importing products
c.4 Learn proper handling of and processing food specimens sent for microbiological chemical and physical
examination

d- General and transferable skills

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.
d.2 Practice independent learning needed for continuous professional development.
d.3 Interact effectively in team working.

Topics

Introduction to plant layout.
Basic principle with special reference to food process industry .
HaACCP. Concept applications
Factors act on safety.
Haccp. Desirable safety features of some food processing equipment

- Factors act on safety.
- Haccp protective equipments .

HACCP safety from adultration of food,
Guidelines for the exchange information food control Emergency situations.
Principles for food import and export.
Inspection and certification
Principles for the establishment and application of Microbiological criteria for food
Guidelines for use of nutrition claims
General guidelines for use of term HALAL
Guidelines on Regections of imported food
Guidelines for the design operation assessment and accreditation of.

Food import and export inspection and certification systems
General requirements for natural flavouring
Principles and guidelines for the conduct of microbiological risk assessment
Packing media
composition and labeling
Codex
Maximum level of cadmium in cereals pulses and legumes.
Maximum level of Lead in foods as meat products
General principles of meat hygiene
Hygiene and sanitation in food processing and fermentations industries
Cleaning. Sanitizing. Pest control in food processing
Sanitizing pest control in food processing continuation
Storage and service area

11.	**AN408**	**Psychology**	**علم النفس**	**2**	**2**	**-**	

Course aims:

1. The objective of this course is to introduce students to the principle domains of psychology that are most relevant to Physiotherapy.
2. Its aim is to teach students the key areas of psychology that would provide the basis for viewing people not only as biological but also as psychological beings.
3. Furthermore the course also aims to introduce students to the application of psychology in the wider practice of Physiotherapy
4. In this course, students are introduced to the interaction between psychological and medical principles in the development, assessment and diagnosis and in the treatment of medical illnesses.

Intended learning outcomes (ILOS):

a- Knowledge and understanding

a.1 Knowledge and understanding of psychological theories, concepts, research paradigms and research findings, and the ability to make links to the relevant historical background

a.2 Identify and reflect on personal strengths, weaknesses and professional development in relation to placement provider/employers' needs

a.3 Recognize and help with the psychological factors involved in disability, pain, disfigurement, unconscious patients, chronic illness, death, bereavement and medical surgical patients/conditions.

a.4 Understand the concept of stress and its relationship to health, sickness and one's profession.

a.5 An awareness of applications and implications of psychological theories and research

a.6 Understand Ego defense mechanisms and learn counselling techniques to help those in need

b- Intellectual skills

b.1 Use critical thinking effectively in evaluating information quality, recognizing thinking fallacies, and making connections between observations, facts, and theories of psychology.

b.2 Be able to critically evaluate and analyze theoretical perspectives, historical trends and empirical findings that address psychology.

b.3 Be able to do psychosocial assessment of patients in various developmental stages.

c- Professional and practical skills

c.1 Apply psychological skills to professional work, exhibit self-regulation, refine project management skills, enhance teamwork ability, and develop life direction in the area of psychology.

c.2 Practice ethical behavior in all aspects of the science and practice of psychology.

c.3 Apply psychological theories and principles to professional employment and recruitment processes

c.4 Research skills, including statistical and other data analysis skills, which will equip you to contribute to psychological knowledge

d- General and transferable skills

d.1 Practice independent learning needed for continuous professional development.

d.2 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.3 Interact effectively in team working

Topics

What's psychology ?
Fast facts on psychology
Subject of psychology
Branches of psychology
What's behaviour
Classification of behaviour
Psychology goals
Intelligence
Emotion
Perception
Communication
Conflict
Autism
Abnormality
Parent-child relationship
The role of genetics
Mental disorders
Anxiety disorders

Specific phobias
Obsessive- compulsive disorder
Somatoform disorders
Dissociative disorders
Personality disorders

12.	**MT401**	**Research Project**	**بحث التخرج**	**3**	**2**	**2**	

Course aims:

1. During this course, the students should know how to handle and develop specific research problem and then put forward the idea of research.
2. Preparing for scientific research methodology and research planning.
3. Data collection and analysis
4. Solve problems that hinder the method adopted in the search.
5. Results tab and develop scientific solutions to the problem of finding.
6. Writing a final report and then present and discuss the results in the form of scientific research reached by the student through research and throw him in the form of a seminar.
7. Develop the skills necessary to undertake a research project
8. Assist the student in identifying appropriate research topics and methodologies

Intended learning outcomes (ILOS):

a- Knowledge and understanding:

a.1 Identify the essential steps the usage of library and electronic search
a.2 Know types of scientific papers, thesis and journals
a.3 Learn the classification of collected information in priority order
a.4 Design a complete and basic research proposal.
a.5 know how to collect and analyze data
a.6 Know how to write a final research format and present it
a.7 Know how to use relevant scientific literature.
a.8 Identify the suitable experimental methods that used to solve a given scientific task

b- Intellectual skills

b.1 Be able to Analyze data and synthesize research findings
b.2 Be able to show independence, critical and creative thinking
b.3 formulate new scientific questions that came up during project performance
b.4 Independently gain the necessary knowledge to undertake meaningful research
b.5 To acquire and critically assess original source references from databases and libraries [published scientific papers, books, etc.]
b.6 Articulate the contributions of qualitative and quantitative methods to a specific discipline such as environmental health research
b.7 Be able to draft an academic paper appropriately structured for publication
b.8 To assess the significance of project outcomes against what is already known in the area of your project topic via a critical assessment of the literature

c- Professional and practical skills

c.1 Conduct practical research

c.2 Be able to perform a research project according to an individual study plan

c.3 Be able to present and discuss the research results with colleagues and senior researchers

c.4 Be able to show a professional attitude regarding time planning, collaboration, and the link between theoretical and practical knowledge

c.5 The student shall be able to perform the project work in an ethical correct manner

c.6 The student shall be able to reflect upon and discuss the relevance of the work in written and oral form

c.7 The student shall be able to work independently and plan and organize effectively to achieve the project goals

c.8 Apply tools of research preparation including problem formulation, undertaking a literature review, research designs, developing a hypothesis, ethical implications, time management, and assessing resourcing implications

c.9 Be able to communicate the project outcomes in a final written report

c.10 be able to collaborate with project partners (internal and external) and with other research group members

c.11 To systematically and contemporaneously record the project work carried out in a paper (hard-bound) or electronic notebook

c.13 To use research and write background material and use advanced research methods and techniques to conduct a scientific investigation

d- General and transferable skills:

d.1 Communicate clearly by verbal and written means with teaching staff during the learning process.

d.2 Practice independent learning needed for continuous professional development.

d.3 Interact effectively in team working.

d.4 Draft an academic paper appropriately structured for publication.

d.5 Perform basic data management tasks and analyses using a computer

Topics:

Conduct practical research

Collect data

Analyze data

Trouble shooting

Write research progress reports

Write a final “paper” format with presentation in form of seminar

5) متطلبات التسجيل:

قبول الطلبة الليبيين:

يشترط لقبول من يتقدم للدراسة بكلية التقنية الطبية بالإضافة إلى الشروط المنصوص عليها في لائحة الدراسة والامتحانات والتأديب ومؤسسات التعليم العالي ذات الرقم (501) لسنة 2010 م ما يلي:

1. يقتصر قبول الطلبة المتقدمين للدراسة بالكلية على حملة الشهادة الثانوية التخصصية أو العامة.
2. أن يكون الطالب حاصلا على النسبة المئوية المعتمدة للقبول بالكلية وفق النظم التي يحددها مجلس الجامعة.
3. أن يجتاز الطالب الكشف الطبي الخاص بالقبول بالكلية وفق القواعد التي يضعها مجلس الجامعة أو الكلية.
4. أن يجتاز الطالب امتحان القبول إذا راء المجلس العلمي للكلية ذلك.
5. أن يكون الطالب حسن السيرة والسلوك.
6. ألا يكون مفصولا من جامعة أخرى لأسباب تأديبية أو علمية.
7. أن يستوفي أي شروط أخرى يحددها مجلس الكلية وتُعلن وقت التقديم.

قبول الطلبة غير الليبيين:

يحق للكلية قبول طلاب من جنسيات غير ليبية وفقا لماده رقم (61) من اللائحة العامة للتعليم العالي رقم (501) لعام 2010 والتي تنص على الاتي:

1. أن يكون الطالب مقيما في ليبيا إقامة اعتيادية طوال فترة دراسته.
2. دفع الرسوم ونفقات الدراسة وفق اللوائح المعمول بها في الكلية.
3. أن يكون مستوفي لكل شروط القبول حسب المادة (6) من اللائحة الداخلية لكلية

الوثائق المطلوبة

2. عدد ثمان صور شخصية
1. الاستمارة ثانوية الاصلية

5. الإقامة
6. ملف معلق
3. افادة بالرقم الوطني
4. شهادة الميلاد

الرسوم الدراسية

يقوم الطالب الليبي بدفع مبلغ 20.5 دينار عند التسجيل و15.5 دينار عند تجديد القيد، أما الطالب الموفد يقوم بدفع مبلغ 1005
لكل سنة دراسية.

8) طريقة التقييم بالأقسام العلمية :

المادة النظرية + العملي

الفصل الدراسي / السنة	**طريقة التقييم**	**النسبة المئوية**
الامتحان الجزئي	تحريري وشفوي واوراق بحثية	**% 30**
الأعمال	الحضور والغياب وواجبات منزلية	**% 10**
الامتحان العملي	عملي	**% 10**

الامتحان النهائي	تحريري	**% 50**
المجمـــــــــــوع		**% 100**

المادة النظرية فقط

الفصل الدراسي / السنة	**طريقة التقييم**	**النسبة المئوية**
الامتحان الجزئي	تحريري وشفوي واوراق بحثية	**% 30**
الأعمال	الحضور والغياب وواجبات منزلية	**% 10**
الامتحان النهائي	تحريري	**% 60**
المجمـــــــــــوع		**% 100**

المادة العملية فقط

الفصل الدراسي / السنة	**طريقة التقييم**	**النسبة المئوية**
الامتحان	شفوي	**%40**
	تحريري	**% 25**
الأعمال	الحضور والغياب وواجبات منزلية	**% 10**
	تقرير	**% 25**
المجمـــــــــــوع		**% 100**

- المساعدات المالية :

لاتوجد أى منح ولكن هذا العام خلال شهر مايو 2024 تم إنشاء صندوق **Sharing for c aring**
بحيث يتم تجميع مبلغ من كل العاملين بالكلية كل شهر حسب المستطاع ليتم مساعدة الطلبة ومساندة من يحتاج للعون وأيضاً مساعدة الطلبة الذين يتوفى له والديه.