

Second stage		
1st semester	Lecture title	Hours
Title of the course: Organic Chemistry II Course number: 211 Reference text: 1- Organic Chemistry by Robert T. Morrison and Robert N. Boyd. 2- Organic Chemistry by McCurry; 5th ed.; Thomason learning; CA,USA 2000. Objectives: To enable students to understand the chemistry of carbon, and the classification, properties and reactions of organic compounds. It includes understanding the basic structure and properties of organic halides, carboxylic acids, aldehydes, ketones and amines, in addition to the principles and application of stereochemistry on these compounds.		
Organic Chemistry II	Aromatic Hydrocarbons (includes benzene, electrophilic aromatic substitution, arenas and their derivatives).	10
	Carboxylic acids: properties and reactions.	5
	Functional derivatives of carboxylic acids.	7
	Amines I and II.	6
	Aldehydes and ketones (include also aldol and Claisen condensation); Classification, reactions and properties.	12
	Phenols.	5
Title of the course: Medical Microbiology Course number: 212 Credit hours: Theory 3 hours Laboratory 1 hour Reference text: <i>1. Medical Microbiology, seventeenth edition E .Jawetz, J.L. Melnick, E.A. Adel 1987 & 2. Principles of microbiology by Roland M.</i>		
Medical MicrobiologyI	Introduction: Importance of microbiology, History of microbiology	2
	Anatomy of bacteria: Surface appendages, Capsule, Cell wall of G.+ve & G -ve bacteria, Cytoplasmic membrane.	2
	Bacterial physiology: Physical and chemical growth determinate, growth and growth curves, bacterial reproduction.	3
	Genetics: Definition, genetic, element, mutation (spontaneous, Gene transfer, transformation, conjugation, and gene transduction).	2
	Recombinant DNA biotechnology.	1
	Sporulation and germination.	1
	Sterilization (chemical + physical Methods).	2
	Chemotherapy and sensitivity test	3
	Staphylococci species	3
	Streptococcus species	3

Aerobic Spore-forming bacteria Bacillus species (<i>B. anthracis</i> , <i>B. subtilis</i> , <i>B. cereus</i>).	2
<i>Clostridium perfringens</i> ; <i>Clostridium tetani</i> ; <i>Clostridium botulinum</i>	3

	<i>Corynebacterium diphtheriae</i>	2
	<i>Propionibacterium acnes, Listeria</i>	2
	<i>Mycobacterium tuberculosis; M. leprae</i>	2
	Enterobacteriaceae: (<i>E. coli; Klebsiella spp.; Citrobacter, Serratia, Salmonella, Shigella</i>)	6
	, <i>Vibrio, Pseudomonas, Helicobacter pylori, Neisseria spp., Brucella, Proteus,</i>	6
<p>Title of the course: Physiology I Course number: 214 Level: 2nd Class, 1st Semester Credit hours/week : Theory 3 Laboratory 1 Reference text: Review of Medical Physiology; Ganong W.F (Ed.); 2005. and Textbook of Medical Physiology by Guyton AC; latest edition. Objectives: To enable students understanding the basic principles of physiological functions of different tissues and organs of the human being, and how to evaluate these functions and correlate them with the normal and abnormal conditions. It also emphasizes on the role of homeostatic and hemodynamic changes in the integration of physiological status.</p>		
Physiology I	The general and cellular basis of medical physiology.	5
	Physiology of nerves and muscles: Nerve cells; excitation and conduction; Properties of mixed nerves; glia; neurotrophins; Nerve fiber types and functions; Muscles: Skeletal muscle; smooth muscle; cardiac muscle. Synaptic transmission: Reflexes; cutaneous, deep and visceral sensations; alert behavior, sleep and electrical activity of the brain; control of posture and movement; higher function of the nervous system; central regulation of visceral function; the autonomic nervous system.	16

<p>Respiration: Respiratory zones; Mechanics of respiration; air volumes; respiratory muscles; compliance of the lungs and chest wall; surfactants; differences in ventilation and blood flow in deferent parts of the lung; Dead space and uneven ventilation; Pulmonary circulation: Pressure, volume and flow. Gas transport between the lungs and tissue; Regulation of respiration: Neural control of breathing; Respiratory centers; Regulation of respiratory activity: Chemical factors; non chemical factors; Respiratory adjustment in health and disease; Effect of exercise; Hypoxia; Emphysema; Asthma.</p>	8
<p>Renal Physiology: Introduction; innervations of the renal vessels; renal clearance; renal blood flow; glomerular filtration rate (GFR): Measurements; factor affecting GFR; Filtration fraction; reabsorption of Na⁺, Cl⁻ and glucose. Tubuloglomerular feedback and glomerulotubular balance; water excretion in: proximal tubules; loop of henle; distal tubules; collecting ducts; the counter current mechanism; role of urea; water diuresis and osmotic diuresis; acidification of the urine: H⁺ secretion; reaction with buffers; ammonia secretion; factors affecting acid secretion; bicarbonate excretion; regulation of Na⁺, K⁺ and Cl⁻ excretion; uremia; acidosis; micturition.</p>	8
<p>Cardiovascular system: origin and spread of cardiac excitation; the electrocardiogram; cardiac arrhythmias; electrographic findings in cardiac diseases; mechanical events of the cardiac cycle; cardiac output; cardiovascular regulatory mechanisms: Local regulatory mechanisms; systemic regulation by the nervous system; systemic regulation by hormones; Coronary circulation; Hypertension; Heart failure; Angina pectoris.</p>	8

Title of the course: Physical Pharmacy I Course number: 213 Level: 2 nd Class, 1 st Semester Credit hours/week : Theory 3 Laboratory 1 Reference text: Physical Pharmacy by Alfred Martin et al.		
<p>Objectives: To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy. It aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products. As a result of this knowledge it will help in the development of new drugs and dosage forms as well as in improvement of various modes of administration.</p>		
Physical Pharmacy I	States of matter, binding forces between molecules, gases, liquids, solid and crystalline matters; phase equilibria and phase rule; thermal analysis.	10
	Thermodynamics, first law, thermochemistry, second law, third law, free energy function and applications.	8
	Solutions of non-electrolytes, properties, ideal and real Colligative properties, molecular weight determination.	7
	Solution of electrolytes, properties, Arrhenius theory of dissociation, theory of strong electrolytes, ionic strength, Debye-Huchle theory, coefficients for expressing colligative properties.	5
	Ionic equilibria, modern theories of acids, bases and salts, acid-base equilibria, calculation of pH, acidity constants, the effect of ionic strength and free energy.	8
	Buffered and isotonic solutions: Buffer equation; buffer capacity; methods of adjusting tonicity and pH; buffer and biological system.	7
2nd semester	Lecture Title	Hours
Title of the course: Pharmacognosy I Course number: 2210 Level: 2 nd Class, 2 nd Semester Credit hours/week : Theory 3 Laboratory 1 Reference text: Trease and Evans Pharmacognosy; 15th ed., 2000.		
	General Introduction: The Scope of Pharmacognosy, definitions and basic principles.	3

Pharmacognosy I	Drugs from natural sources, crud drugs, official and non-official drugs.	1
	Classification of natural products.	2
	Plant nomenclature and taxonomy.	2
	Production of crude drugs: Cultivation, collection, drying and storage.	3
	Deterioration of crude natural products.	1
	Chemistry of natural drug products.	3
	Quality control: Evaluation of natural products; macroscopical evaluation; physical evaluation; chemical evaluation; biological evaluation; spectroscopical evaluation.	4
	Phytochemical investigation of herbal products: Extraction of the plant material; Separation and isolation of constituents; characterization of the isolated compounds.	4
	Separation technique: Introduction; Mechanisms of separation and classification based on the type of technique; paper chromatography; Thin layer chromatography; Ion- exchange chromatography; Gel filtration chromatography; Column chromatography; Gas chromatography; HPLC; Electrophoresis; Affinity chromatography.	15
	Traditional plant medicines as a source of new drugs. Bioassay-guided fractionation	3
Tissue culture of medicinal plant: Introduction and history; laboratory of the plant tissue culture; aseptic techniques Application of the plant tissue culture; environmental and biological control; plant growth regulators.	4	
<p>Title of the course: Organic Chemistry III Course number: 226 Level: 2nd Class, 2nd Semester Credit hours/week : Theory 2 Laboratory 1 Reference text: 1- Organic Chemistry by Robert T. Morrison and Robert N. Boyd, latest edition. 2- Organic Chemistry by J. McMurry, latest ed., Thomason learning, CA, USA. 3_ An introduction to the chemistry of heterocyclic compound by Acheson, R. M. latest ed.</p>		
Organic Chemistry III	Heterocyclic system: Classes of heterocyclic systems; general structures; properties; Occurrence in nature and in medicinal products.	5
	Five-membered ring heterocyclic compounds: pyrrole; furan and thiophen.	3
	Source of pyrrole, furan and thiophen.	2

	Electrophilic substitution in pyrrole, furan and thiophen: Reactivity and orientation.	5
	Six-membered ring heterocyclic compounds: Structure & reactions of pyridine.	4
	Saturated five-membered heterocyclic compounds.	6
	Heterocyclic of five & six member rings with two & three heteroatoms.	5
<p>Title of the course: Medical MicrobiologyII (Medical Virology, immunology, and Parasitology) Course number: 212</p> <p>Objectives: provide a basic understanding of the morphology, anatomy, physiology and genetics of bacteria in addition, the methods of handling, visualizing, characterizing</p>		
Microbiology II	Introduction.	1
	Intestinal and tissue protozoa (Amoeba (pathogenic and non pathogenic), Balantidium, Giardia, Trichomonas)	4
	Haemoflagellates: Leishmania spp.; Trypanosome spp.	4
	Sporozoa: Malarial parasites of human; Toxoplasma.	3
	Helminthes: Classification, Cestodes (Hymenolepis nana, Taenia spp.), Echinococcus (Hydatid cyst). Hepatic flukes, Trematodes (Blood Flukes: Schistosoma spp). Nematods: Ascaris, Entrobilus. Trichuris, Ancylostoma, Necator americans.	8
	Virology: Introduction, Comparison between viruses and Bacteria and other microbes; origin of viruses, reproduction, one step growth curve, type of mutations and Classification of viruses; RNA viruses: Orthomyxo viruses; Paramyxo viruses; Retro viruses; Hepato viruses; Oncogenic viruses. DNA viruses: Herpes viridae; poxviradeae, adenoviredeae, parvoviruses	10
	Immunology: introduction, innate and adaptive immunity, complement, MHC molecule and autoimmune diseases, hypersensitivity, tumor immunity, immunodeficiency, immunological methods.	15
<p>Title of the course: Physical Pharmacy II Course number: 228</p> <p>Level: 2nd Class, 2nd Semester</p> <p>Credit hours/week : Theory 3 Laboratory 1</p> <p>Reference text: Physical Pharmacy by Alfred Martin et al.</p>		

Physical Pharmacy I	Solubility and distribution phenomena, solvent-solute interactions, solubility of gases in liquids, solubility of liquids in liquids, solubility of non-ionic solids in liquids, distribution of solutes between immiscible solvents.	10
	Complexation, classification of complexes, methods of analysis, thermodynamic treatment of stability constants.	5
	Kinetics, rate and orders of reactions, influence of temperature and other factors on reactions rate, decomposition of medicinal agents and accelerated stability analysis.	9
	Interfacial phenomena, liquid interfaces, surface free energy, measurement of interfacial tension, spreading coefficient, surface active agents and wetting phenomena.	5
	Colloids, dispersed system and its pharmaceutical application, types of colloidal systems, kinetic properties, diffusion, zeta potential, solubilization.	5
	Micrometrics, particle size, methods of determining particle size, particle shape and surface area, porosity, density.	3
	Rheology, Newtonian systems, thixotropy measurement, Negative thixotropy, determination of thixotropy.	5
	Polymer science, definitions pharmaceutical applications, molecular weight averages.	3
<p>Title of the course: Physiology II Course number: 229 Level: 2nd Class, 2nd Semester Credit hours/week : Theory 3 Laboratory 1 Reference text: Review of Medical Physiology; Ganong W.F (Ed.); 2005. and Textbook of Medical Physiology by Guyton AC; latest edition.</p> <p>Objectives: To enable students understanding the basic principles of physiological functions of different tissues and organs of the human being, and how to evaluate these functions and correlate them with the normal and abnormal conditions. It also emphasizes on the role of homeostatic and hemodynamic changes in the integration of physiological status.</p>		
	Gastrointestinal function: Digestion and absorption of carbohydrates; proteins; lipids; absorption of water and electrolytes; vitamins and minerals; regulation of gastrointestinal function: Introduction; gastrointestinal hormones; mouth and esophagus; stomach; exocrine portion of the pancreas; liver and biliary system; small intestine; colon.	10

Physiology II	Circulatory body fluid: Introduction; blood; bone marrow; white blood cells; immunity; platelets; red blood cells; anemia; polycythemia; blood group and Rh factor; hemostasis: The clotting mechanism / blood coagulation tests; anti clotting mechanism; the plasma; the lymph; abnormalities of hemostasis.	15
	Endocrinology: Introduction; energy balance, metabolism and nutrition; the pituitary gland; the thyroid gland; the gonads: development and function of the reproductive system; the adrenal medulla and adrenal cortex; hormonal control of calcium metabolism and the physiology of the bone; endocrine functions of the pancreas and regulation of carbohydrate metabolism.	20

	Department of Pharmacology and Toxicology	
	Title of the course: <i>Physiology I</i>	
	Level: 2nd Class, 1st Semester	
	Credit hours/week : 1	
	Reference text: <i>Lab Manual for Practical Physiology Adopted by the Department</i>	
No	Lecture title	hours
1	Experiments on respiratory system (respiratory rate and volumes).	4
2	Introduction to blood physiology.	2
3	Blood typing and blood transfusion.	2
4	Tutorial.	2
5	Packed cell volume.	2
6	Determination of hemoglobin concentration.	2
7	Blood indices.	2
8	Determination of bleeding time and clotting time.	2
9	Tutorial.	2
10	Blood pressure.	2
11	Effect of exercise on blood pressure.	4
12	Electrocardiogram (ECG).	2
13	Tutorial and review.	2

	Department of Clinical Laboratory Sciences	
	Title of the course: <i>Medical Microbiology</i>	
	Level: 2 nd Class, 1 st Semester	
	Credit hours/week: 1	
	Reference text: <i>Lab Manual for Practical Medical Microbiology Adopted by the Department.</i>	
	<u>Objectives:</u> Provides a basic understanding of the morphology, anatomy, physiology and genetics of bacteria in addition, the methods of handling, visualizing, characterizing identifying of bacterial disease.	
hours	Lecture title	No.
1	Orientation to the laboratory. Rules of conduct and general safety. Microscopic techniques. Bright-field light microscope.	2
2	Examination of stained microorganisms; Smear preparation and simple staining; Gram staining.	2
3	The hanging drop slide and bacterial motility; Acid-fast staining procedure.	2
4	Bacterial spores and endospores staining; Microbiological culture media and sterilization; Methods of inoculation and isolation of pure culture.	2
5	Action of dyes and antibiotics; Enzymes assays for some specific microbial enzymes.	2
6	Assays for specific metabolic activities; Acid and gas production from: Carbohydrate fermentation; Triple sugar iron agar test; IMVIC tests.	2
7	Systemic bacteriology: Staphylococci spp.	2
8	Streptococci species.	2
9	Salmonella species.	2
10	Shigella species.	2
11	Pseudomonas species.	2
12	Proteus species.	2
13	<i>Escherichia coli</i>	2
14	Klebsiella species.	2
15	<i>Candida albicans</i> .	2

Title of the course: **Organic Chemistry II**

Level: 2nd Class, 1st Semester

Credit hours: 1

Reference text: **Lab Manual for Organic Chemistry Adopted by the Department.**

Objectives: To enable students to understand the chemistry of carbon, and the classification, properties and reactions of organic compounds. It includes understanding the basic structure and properties of organic halides, carboxylic acids, aldehydes, ketones and amines, in addition to the principles and application of stereochemistry on these compounds.

No	Lecture title	hours
1	Determination of melting point (Known sample).	2
2	Determination of melting point (quiz and unknown).	2
3	Determination of boiling point (known sample).	2
4	Determination of boiling point (quiz and unknown).	2
5	Elemental analysis (explanation of basic concepts).	2
6	Elemental analysis (known quantity and quality sample).	2
7	Solution and filtration techniques (explanation of basic concepts).	2
8	Re-crystallization (known sample).	2
9	Re-crystallization (quiz and unknown sample).	2
10	Extraction technique (known sample).	2
11	Extraction technique (quiz and unknown).	2
12	Distillation techniques (known samples).	2
13	Distillation techniques (quiz and unknown).	2
14	Sublimation technique (known sample).	2
15	Sublimation technique (quiz and unknown).	2

Department of PharmaceuticsTitle of the course: ***Physical Pharmacy I***Level: 2nd Class, 1st Semester

Credit hours/week: 1

Reference text: ***Lab manual for Practical Physical Pharmacy Adopted by the Department.***

Objectives: To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy. It aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products. As a result of this knowledge it will help in the development of new drugs and dosage forms as well as in improvement of various modes of administration.

No	Lecture title	hours
1	Introduction to physical pharmacy	2
2	Expression of concentrations in pharmaceutical preparations.	6
2	Two component systems containing liquid phases.	6
3	Three component systems.	4
4	Tie linear for three component systems.	6
5	Buffer solutions	6

	Department of Pharmacognosy	
	Title of the course: <i>Pharmacognosy I</i>	
	Level: 2 nd Class, 2 nd Semester	
	Credit hours/week: 1	
	Reference text: Special curriculum prepared for this purpose.	
	<u>Objectives: To enable students practicing the techniques of extraction, separation, and identification of constituents isolated from natural sources, using microscopes and chromatographic methods.</u>	
No	Lecture title	hours
1	Micro measurement and magnification.	2
2	Microscopical identification of crude drugs and cell contents.	4
3	Extraction and separation techniques.	4
4	Chromatography.	4
5	Paper chromatography (circular and horizontal paper chromatography).	4
6	Introduction to thin-layer chromatography.	2
7	TLC on microscope slides.	4
8	Partition chromatography for the separation of volatile oils.	4
9	Effect of activity of adsorbents on R _f values.	2

	Department of Pharmacology and Toxicology	
	Title of the course: <i>Physiology II</i>	
	Level: 2nd Class, 2nd Semester	
	Credit hours/week : 1	
	Reference text: <i>Manual for Practical Physiology Adopted by the Department</i>	
	<u>Objectives:</u> <u>To enable students understanding the basic principles of physiological functions of different tissues and organs of the human being, and how to evaluate these functions and correlate them with the normal and abnormal conditions. It also emphasizes on the role of homeostatic and hemodynamic changes in the integration of physiological status.</u>	
No	Lecture title	hours
1	Differential W.B.C count	4
2	Total W.B.C. count	2
3	Tutorial	4
4	Red blood cell counting	2
5	Platelets counting	2
6	Erythrocyte sedimentation rate (ESR)	2
7	Tutorial	4
8	Insulin regulation of blood glucose	2
9	Renal physiology	2
10	Some experiments on vision	2
11	Tutorial and review	4

	Department of Clinical Laboratory Sciences	
	Title of the course: <i>Medical Virology and Parasitology</i>	
	Level: 2 nd Class, 2 nd Semester	
	Credit hours/week : 1	
	Reference text: <i>Lab Manual for Practical Virology and Parasitology Adopted by the Department.</i>	
	<u>Objectives:</u> To provide the student with knowledge of the pathogenesis, morphology, laboratory diagnosis, identification, pathology, and clinical features of medically important parasitic and viral diseases and the basic concepts of immunizing procedure against these diseases.	
No	Lecture title	hours
1	Introduction and classification of the human parasites.	2
2	Intestinal protozoa: <i>Entamoeba histolytica</i> .	2
3	Commensal amoeba; <i>Entamoeba coli</i> ; <i>Endolimax nana</i> ; <i>Iodamoeba buetschillii</i> .	2
4	Flagellate of digestive tract: <i>Giardia lamblia</i> ; <i>Chilomastix mesenili</i> .	2
5	Flagellate of genital organs: <i>Trichomonas vaginalis</i> ; Ciliate protozoa; <i>Balantidium coli</i> .	2
6	Flagellate of blood and tissues: <i>Leishmania donovani</i> ; <i>Leishmania tropica</i> .	2
7	<i>Trypanosoma gambiense</i> ; <i>Trypanosome rhodesiense</i> ; <i>Trypanosoma cruzi</i> .	2
8	Malarial parasite: Life cycle of Plasmodium species; <i>Plasmodium vivax</i> ; <i>Plasmodium falciparum</i> .	2
9	<i>Plasmodium malariae</i> ; <i>Plasmodium ovali</i> .	2
10	<i>Toxoplasma gondii</i> ; Cestoidea; <i>Taenia saginata</i> ; <i>Taenia solium</i> .	2
11	<i>Hymenolepis nana</i> ; <i>Echinococcus granulosus</i> ; <i>Echinococcus multilocularis</i> .	2
12	Trematoda: Life cycle of <i>Schistoma</i> species; <i>Schistoma japonicum</i> ; <i>Schistoma mansoni</i> ; <i>Schistoma haematobium</i> .	2
13	Nematoda: <i>Trichuris trichuira</i> ; <i>Entrobium vermicularis</i> .	2
14	<i>Ascaris lumbricoides</i> ; <i>Ancylostoma duodenale</i> .	2
15	Methods of diagnosis of parasites.	2

Department of Pharmaceutical Chemistry		
Title of the course: <i>Organic Chemistry III</i>		
Level: 2 nd Class, 2 nd Semester		
Credit hours/week : 1		
Reference text: <i>Lab Hand book for practical Org Chem adopted by the department</i>		
<u>Objectives:</u>		
No	Lecture title	hours
1	Determination of solubility class (known sample).	2
2	Determination of solubility class (quiz and unknown).	2
3	Identification of alcohols (known sample, quiz and unknown).	2
4	Identification of phenols (known samples).	2
5	Identification of phenols (quiz and unknown).	2
6	Identification of aldehydes and ketons (explanation of concepts and quiz).	2
7	Identification of aldehydes and ketons (known sample).	2
8	Identification of aldehydes and ketons (quiz and unknown).	2
9	Identification of carboxylic acid (explanation of concepts).	2
10	Identification of carboxylic acid (known sample).	2
11	Identification of carboxylic acid (quiz and unknown).	2
12	Salts of carboxylic acids (known sample).	2
13	Salts of carboxylic acids (quiz and unknown).	2
14	Classification of reactions of amines (known sample).	2
15	Classification of reactions of amines (quiz and unknown).	2

	Department of Pharmaceutics	
	Title of the course: <i>Physical Pharmacy II</i>	
	Level: 2 nd Class, 2 nd Semester	
	Credit hours/week : 1	
	Reference text: <i>Lab Manual for Practical Physical Pharmacy Adopted by the Department.</i>	
	<u>Objectives:</u> To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy. It aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products. As a result of this knowledge it will help in the development of new drugs and dosage forms as well as in improvement of various modes of administration.	
No	Lecture title	hours
1	Solubility	2
2	Solubilization by complexation.	2
3	Solubilization by surface active agents	4
4	Determination of solubility product constant	2
5	determination of partition coefficient	4
6	Kinetics	8
7	Measurement of surface tension	2
8	Viscosity	6