University of Babylon- College of Pharmacy		**Syllabus**
First stage		
1st semester	**Lecture title**	**Hours**
Title of the course: **HumanBiology** Course number: 111 **Objectives**: Study the human body composition, types of cell structures, types of tissues, bone, skeleton, joints and muscle as well as the nutrition. Human biology also explains in details the different body systems and human genetics. At the end of the course the student should be able to describe the human body composition, body systems structure and function, and human genetics such as the mendelain inheritance, division of chromosomes, and terms such as allel, locus homo and heterozygous.		
Human Biology	Biology	2
	Cell	2
	Tissues, bone and cartilages	3
	Nervous system (central & peripheral)	4
	Nutrition	2
	Digestive system (Mouth, Esophagus,Stomach)	2
	Digestive system (intestine)	1
	Excretory system & respiration	3
	Human genetics (chromosomes & semi-lethal genes)	3
	Skin	2
	Circulatory system	3
	Immunity (Inflammation, immunity & theblood , immunity to disease)	3
Human Biology		
Title of the course: ***Principles of Pharmacy Practice***Course number: **112** Reference text: Pharmaceutical Calculation by Stoklosa **Objectives**: Involves brief information about old pharmacy. It teaches kinds of numbers, abbreviations that are commonly used in prescriptions and their meanings. In this course the students will understand the components of typical prescription, the different unit systems and the relation between these systems. Students will also be familiar with the methods and tools of measuring weights and volumes, and how to calculate doses on different bases and know how to reduce or enlarge formulas; they will be able to describe values in percentage and ratio strength.		

Principles of Pharmacy Practice	Some fundamentals of measurements and calculations.	4
	Interpretation of prescription or medication orders.	
	The metric system.	4
	Calculation of doses.	4
	Reducing and enlarging formulas.	4
	Density, specific gravity and specific volume.	4
	Percentage and ratio strength calculation.	6
Title of the course: ***Analytical Chemistry***Course number: **113** **Reference text: Fundamentals of Analytical Chemistry by Stook and West.** **Objectives**: To provide students with a sound theoretical back ground in chemical principles that is essential to practice chemical analysis. It enables students to understand the importance of judging the accuracy and precision of experimental data and techniques of quantitative analysis, and also to show that theory frequently serves as a useful guide to the solution of analytical problems.		
Analytical Chemistry	Review of elementary concept important to analytical chemistry: Strong and weak electrolytes; important weight and concentration units.	4
	The evaluation of analytical data: Definition of terms.	1
	An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods; gravimetric factor.	9
	The scope of applications of gravimetric analysis: Inorganic precipitating agents; organic precipitating agents.	4
	An introduction to volumetric methods of analysis: Volumetric calculations; acid-base equilibria and pH calculations.	5
	Buffer solutions: Theory of neutralization titrations of simple system.	3
	Theory of neutralization titrations of complex system; Precipitation titrations.	5

	Calculation of pH in complex system; Volumetric methods based on complex system.	4
	Equilibria in oxidation-reduction system; theory of oxidation-reduction titrations.	6
	Spectrophotometric analysis: An introduction to optical methods of analysis; Methods based on absorption of radiation.	4

Title of the course: Mathematics and Biostatistics Course number: 115

Reference text: 1. Finny RI, Thomas GB (Eds.); Calculus and Analytical Geometry.

Objectives: Gives students the ability to deal with the concept of Mathematics and Statistic, emphasizes the knowledge and skill required to efficiently discharge the duties and responsibilities of the pharmacist. The course deals with the concept of basic Mathematics and application of Biostatistics in the medical field. Upon completion of the course students will be able to understand the applications of statistics in medical field.

Mathematics and Biostatistics	Mathematics: General concepts; coordinateand graph in plane;inequality; absolutevalueor magnitude; function and theirgraphs; displacement function; slope and equation for lines.	6
	Limits and continuity:Limits; theorem of limits; limit involving infinity;continuity; continuityconditions.	4
	Derivatives:Line tangent and derivatives; differentiation rules; derivativeof trigonometric function; practice exercises.	6
	Integration:Indefinite integrals; rules for indefinite integrals; integration formulas forbasic trigonometric function; definite integrals; properties ofdefinite integrals; practice exercises.	6
	Biostatistics: Generalconcepts of statistics; statistical methods;statistical theory; appliedstatistics; statistical operations.	2

	Probabilityconcepts: Properties ofprobability; Set theoryand setnotation (basic notation); countingtechniques- permutations and combinations; calculatingthe probabilityofan events;probabilitydistribution of discretevariable; binomial distribution, Poisson distribution; continues probabilitydistribution and normal distribution, reviewquestions and exercises.	6
	Theconcept of central tendency: Mean of sample and mean ofpopulation; median; mode; measureof central tendency; review questions and exercises.	6
	Deviations and variation: Deviation; dispersion and variability; standarddeviation and variance; coefficient of variations; standard error; correlation analysis.(regression model and sample regression equation); application ofstatisticin medical field; reviewquestions and exercises.	9
Title of the course: **Medical Terminology** Course number: 116 Reference text: Edward CC, (Ed.); A Short Course in Medical Terminology; 1st Ed.; Lippincott Williams and Wilkins; 2008. Objective: In this course, students will learn to pronounce, spell, and define medical and pharmaceutical terms used in health care settings. It will use a word-building strategy that helps them discover connections and relationships among word roots, prefixes, and suffixes. They will learn the meaning of each part of a complex medical and pharmaceutical term and be able to put the parts together and define the term.		
Medical Terminology	Basic word roots andcommon suffixes	1
	Moreword roots, suffixes andprefixes related to pharmaceutical sciences(pharmacognosy, clinical pharmacy, pharmaceutics,…etc)	1
	Basicanatomical terms and abnormal conditions	2
	Thegenitals and urinarytract	1
	Thegastrointestinal tract	1
	Theheart and cardiovascularsystem	1

	Symptoms, diagnoses, treatments, communication qualifiers, and statistics	2
	Growth and development, and bodyorientation	1
	Gynecology, pregnancy,and childbirth	1
	Theeyeand the respiratorytract	1
	Thenervous system andbehavioral disorders	2
	Blood and immunity	1
Reference : John and Liz Soars, New Headway Plus, Oxford: Oxford		
English	Hello	4
	Your world	4
	All about you	5
	Family and friends	4
	The way I live	5
	Every day	4
	My favorites	4

Firststage

2nd semester	**Lecturetitle**	**Hours**

Title of the course: ***Human Anatomy*** Course number: 127
Reference text: 1- Clinical Anatomy by Regions (Richard S. Snell 8th ed. 2010).

Objective

Credit hours/week: Theory 1 lab1

Study the position of different organs in the thoracic and abdominal cavity ncluding: digestive system, circulatory system, lymphatic system, respiratory system, urinary system, reproductive system, endocrine system, nervous system and skin

Human Anatomy	**Circulatory system:** Location ofvascular system (Heart, Arteries, Veins)	1
	Circulatory system: Location oflymphaticsystem (Lymphatic capillary).	1
	Lymphoidtissue: location ofthe (Thymusgland, Spleen& Lymph nodes)	1
	Lymphoid nodule (MALT)&Tonsils	1
	Nervous system: Central &Peripheral nervous system bylocation	1
	Respiratory system: -Conductingportion (Nose, Nasopharynx, Trachea Bronchus&Bronchioles). -Respiratoryportion (Lung)	1
	Digestivesystem: -location ofdifferent partsofdigestivetract (GIT) (Oral cavity, Mouth, Esophagus&Stomach) -Small intestine,Largeintestine, Rectum &Anus.	2
	Digestivesystem: Glands associatedwith thedigestivetract by location (Salivary glands, Pancreas,Liver&Gall bladder).	1
	Endocrinesystem: -location ofthe pituitary gland -location ofthe Adrenal,Thyroid, Parathyroid,Islet ofLangerhans&Pinealglands.	1
	Male reproductivesystem: -location ofthe testes. -Excretory genital ducts -Excretorygenitalglands(Seminal vesicles, Prostate &Cowper'sglands)	2
	Female reproductivesystem: -location ofovary,Oviduct, Uterus&Vagina.	2

	Urinary system: -location ofthe (kidney&nephrone) -location ofthe (Ureter,Bladder &Urethra).	1
Title of the course: ***Pharmaceutical Calculation*** Course number: **128 Reference text: Pharmaceutical Calculations by Stoklosa** **Objectives**: It involves computation of pharmaceutical ingredients, dosage forms, pharmaceutical formulations of extemporaneous compounding, and biological parameters of drug substances. The course teaches calculations for dilution and concentration of different types of liquids and those involved in preparing isotonic solutions, electrolyte solutions and intravenous admixtures.		
Pharmaceutical Calculations by Stoklosa	Dilution and concentration of pharmaceutical preparations.	10
	Isotonic solutions.	6
	Electrolytesolutions (milliequivalents, millimolesand milliosmoles).	6
	Constituted solutions,I.V admixturesand flow rate calculations.	8
Title of the course: ***Medical Physics*** Course number: **129** **Reference text: Physics for Biology and Medical Students, 2nd ed.** **Objectives**: Gives students the ability to deal with the concepts of physics, emphasizes the knowledge and skills required to efficiently discharge the duties and responsibilities of the pharmacist.The course deals with the concept of basic physics and application of physics in the medical field. Upon completion of the course the students will be able to understand the physical terminology and abbreviation used to describe the lecture, and the application in medical field.		
Medical Physics	General concepts: Method ofphysicsand standards; thermodynamicssystem and system properties; conservation of energyprinciple; application ofthermodynamics; theZeroth law.	3
	Pressure; temperature andtemperaturescales (Celsius, Fahrenheit, Kelvin); equation ofstate; ideal gas and realgas; general law of gases; clauses equation and Vander Waalesequation; equilibrium and types of equilibrium; compressibilityfactor, coefficient of volume expansion,elastic coefficient (bulk modulus).	6

	Heat andenergy; work and mechanical forms of work; power; the1st lawof thermodynamics;Boyles andCharles law; practiceexercises.	3
	The2ndlawof thermodynamics; reversibleand irreversible process; entropyand enthalpy; internal energy; heat capacity and adiabaticprocess; the relation between pressure, volume,and temperatureinadiabatic process.	6
	Fundamental of physics: Kinetictheoryofagas; electromagneticwaves; Maxwell equations; physical optics.	6
	Radiation: Kirshoffs law;planks law; Stefan-Boltzman law; Wiens law; Black bodyand Albedo;Heat transfer (radiation, convection, conduction).	6
	Production ofX-RayandX-Rayspectra; absorption of X-Ray; U.Vand IR effects; medical and biological effects of radiation; radiotherapy.	3
Title of the course: ***Organic Chemistry* I** Course number: **1210** 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 alkanes, alkenes and alkynes, in addition to the principles of stereochemistry and features of aromatic compounds.		
Organic ChemistryI	Introduction.	3
	Alkanes and methane.	6
	Alkenes Iand II	5
	Alkynes and dienes.	5
	StereochemistryI&II	8
	Alcohols and ethers.	8
	Alkyl halides.	6
	Cycloalkanes.	4

Title of the course: ***Histology*** Course number: 127 1- Refrances text Basic Histology by Luiz Carlos 11th ed. (2005) **Objectives:**INTRODUCTION Histology is one of the most useful courses that the first class student in college of pharmacy will take in the department of clinical laboratory sciences. It brings together a lot of the information the student have already acquired about cells and organs, and it points him in the fascinating direction of development and differentiation. In fact, histology is the core subject in the study of microscopic anatomy, and cell and together with ultrastrucural study of subcellular histology. What is more, contemporary medical researcher is utterly dependent on histology. OBJECTIVES Briefly, objective in studying histology is to identify mammalian tissues quickly, accurately, with the course is memorizing many details in a short period of time.		
Histology	**Circulatory system:** Structureof thevascular system (Heart wall, Arteries, Veins &Capillaries)	2
	Circulatory system: Structureof thelymphaticsystem(Lymphatic capillary).	1
	Lymphoidtissue: Structure& function ofthe (Thymusgland, Spleen & Lymph nodes)	1
	Lymphoid nodule (MALT)&Tonsils	1
	Nervous system: Central &Peripheral nervous system	3
	Respiratory system: -Conductingportion (Nose, Nasopharynx, Trachea Bronchus&Bronchioles). -Respiratoryportion (Lung)	3
	Digestivesystem: -Digestivesteps. -General structure ofthedigestivetract (GIT) (Oral cavity, Mouth, Esophagus&Stomach) -Small intestine,Largeintestine, Rectum &Anus.	3
	Digestivesystem: Glands associatedwith thedigestivetract (Salivary glands, Pancreas,Liver&Gall bladder0.	1

	Endocrinesystem: -General structureof the pituitary gland -Histophysiologies ofthepituitary gland.	2
	Endocrinesystem: -General structureof the Adrenal, Thyroid, Parathyroid,Islet ofLangerhans&Pinealglands.	2
	Male reproductivesystem: -General structureof the testes. -Stages of spermatogenesis.	2
	Male reproductivesystem: -Excretory genital ducts-Excretorygenital glands (Seminal vesicles, Prostate &Cowper'sglands)	1
	Female reproductivesystem: -General structureof ovary,Oviduct, Uterus& Vagina. -Stages of follicledevelopment.-Ovulation	3
	Urinary system: -Structure & Function ofthe (kidney&nephrone) -Histologyof thenephrone (filtration,absorption&excretion). -Structureof the (Ureter,Bladder &Urethra).	3
	Theskin Thick &Thin skin	2
Reference text : **(John and Liz Soars, New Headway Plus, Oxford: Oxford**		
English	Where I live	4
	Times past	5
	We had a great time	4
	I can do that	4
	Please and thank you	4
	Here and now	4
	It’s time to	5

	University of Babylon- College of Pharmacy		Syllabus
	Second stage		
	1st semester	**Lecturetitle**	**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.		
1	**Organic Chemistry II**	Aromatic Hydrocarbons (includes benzene, electrophilic aromatic substitution,arenasand their derivatives).	10
		Carboxylicacids: properties and reactions.	5
		Functional derivatives ofcarboxylicacids.	7
		AminesIandII.	6
		Aldehydes andketones (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:*1.**Medical Microbiology, seventeenth edition E .Jawetz, J.L. Melnick, E.A. Adel 1987 & 2. Principles of microbiology by Roland M***.		
		Introduction: Importance ofmicrobiology, Historyof microbiology	2
		Anatomyof bacteria:Surface appendages, Capsule, Cellwallof G.+ve&G–ve bacteria, Cytoplasmic membrane.	2
		Bacterialphysiology:Physicaland chemicalgrowthdeterminate, growth and growthcurves,bacterialreproduction.	3
		Genetics:Definition, genetic, element, mutation (spontaneous, Gene transfer,transformation, conjugation, and gene transduction).	2

	Medical MicrobiologyI	RecombinantDNAbiotechnology.	1
		Sporulationand germination.	1
		Sterilization (chemical+ physicalMethods).	2
		Chemotherapy and sensitivity test	3
		Staphylococci species	3
		Streptococcus species	3
		Aerobic Spore-formingbacteria Bacillus species(*B. anthracis, B. subtilis*,*B.cereus*).	2
		Clostridiumperfringens;*Clostridiumtetani*;*Clostridiumbotulinun*	3
		Corynebacteriumdiphtheriae	2
		Propionibacteriumacnes,*Listeria*	2
		Mycobacteriumtuberculosis;*M.leprae*	2
		Enterobacteriaceae: (*E. coli; Klebsiella spp.; Citrobacter , Serratia, Salmonella, Shigella*)	6
		, Vibrio, Pseudomonas, Helicobacter pylori, Neisseria spp., Brucella, Proteus,	6

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.

	Thegeneral and cellular basis of medical physiology.	5

Physiology I	Physiologyof nerves andmuscles: Nerve cells; excitation and conduction; Properties ofmixed nerves; glia; neurotrophins; Nerve fiber types and functions; Muscles: Skeletal muscle; smooth muscle; cardiac muscle. Synaptictransmission: Reflexes; cutaneous, deep and visceral sensations; alert behavior, sleep and electrical activityof the brain; control ofposture and movement; higherfunction ofthe nervous system; central regulation of visceral function; the autonomic nervous system.	16
	Respiration: Respiratoryzones; Mechanics of respiration; air volumes; respiratory muscles; complianceof thelungsand chest wall; surfactants; differences in ventilationand blood flow in deferent parts of the lung; Dead space anduneven ventilation; Pulmonary circulation: Pressure, volume andflow. Gas transport between the lungs andtissue; Regulation ofrespiration: Neural control ofbreathing; Respiratorycenters; Regulation of respiratoryactivity: Chemical factors; nonchemical factors; Respiratory adjustment in health and disease; Effectofexercise; Hypoxia; Emphysema; Asthma.	8
	Renal Physiology:Introduction; innervations of the renal vessels; renal clearance; renal blood flow;glomerularfiltration rate(GFR): Measurements; factoraffectingGFR; Filtration fraction; reabsorption of Na^+, $Cl^-$and glucose. Tubuloglomerular feedback andglomerulotubular balance; water excretion in: proximal tubules; loop ofhenle; distal tubules; collecting ducts; the countercurrentmechanism; roleof urea;water diuresis and osmoticdiuresis; acidification oftheurine: H^+ secretion; reaction with buffers; ammonia secretion; factors affecting acid secretion;bicarbonateexecration; regulation ofNa^+, K^+ andCl^- excretion; uremia; acidosis; micturition.	8

	Cardiovascularsystem: origin and spread of cardiac excitation; theelectrocardiogram; cardiac arrhythmias; electrographic findings in cardiac diseases; mechanical events of the cardiaccycle; cardiac output; cardiovascular regulatorymechanisms:Local regulatorymechanisms; systemic regulation bythe nervous system; systemic regulation byhormones; Coronary circulation; Hypertension; Heart failure; Angina pectoris.	8
Title of the course: ***Physical Pharmacy*** **I**Course number: **213** Level: 2nd Class, 1st Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Physical Pharmacy by Alfred Martin et al.*** **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.		
PhysicalPharmacyI	States of matter, binding forces between molecules, gases, liquids, solidand crystallinematters; phase equilibria and phaserule; thermal analysis.	10
	Thermodynamics, first law, thermochemistry, second law, third law,freeenergyfunction andapplications.	8
	Solutions of non-electrolytes, properties, ideal and real Colligativeproperties, molecular weight determination.	7
	Solution of electrolytes,properties, Arrhenius theoryof dissociation,theoryof strongelectrolytes, ionicstrength, Debye-Huchle theory,coefficients for expressingcolligativeproperties.	5
	Ionicequilibria, modern theories ofacids, basesand salts, acid-baseequilibria, calculation ofpH, acidityconstants, theeffect of ionicstrengthand free energy.	8
	Bufferedand isotonicsolutions: Bufferequation; buffer capacity;methods of adjustingtonicityand pH; buffer and biological system.	7

References text :Liz and John Soar, New Headway Plus – Pre-Intermediate. Oxford: Oxford		
English	Getting to know you.	4
	The way we live	5
	It all went wrong	4
	Let's go shopping	4
	What do you want to do?	4
	Tell me! What's it like?	4
	Famous couples	5

2nd semester	**Lecture Title**	**Hours**
Title of the course: ***Pharmacognosy*I** Course number: **2210** Level: 2nd Class, 2nd Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Trease and Evans Pharmacognosy; 15th ed., 2000.***		
PharmacognosyI	GeneralIntroduction; TheScopeof Pharmacognosy, definitions and basic principles.	3
	Drugs from natural spurces, crud drugs, official and non-official drugs.	1
	Classification ofnaturalproducts.	2
	Plant nomenclatureand taxonomy.	2
	Production of crudedrugs: Cultivation, collection,drying and storage.	3
	Deterioration of crudenatural products.	1
	Chemistryof natural drugproducts.	3
	Qualitycontrol: Evaluation of natural products; macroscopical evaluation; physical evaluation; chemical evaluation; biologicalevaluation; spectroscopical evaluation.	4
	Phytochemical investigation of herbal products: Extraction ofthe plant material; Separation and isolation of constituents; characterization ofthe isolated compounds.	4

Objectives: This course is intended to study the scope of pharmacognosy, Medicinal plant nomenclature, classification of natural products, phytochemistry which include extraction and isolation of active constituents from natural sources.

	Separation technique:Introduction; Mechanisms of separation andclassification based on the typeof technique; paper chromatography; Thin layer chromatography;Ion-exchange chromatography;Gel filtration chromatography; Column chromatography; Gas chromatography;HPLC; Electrophoresis; Affinitychromatography.	15
	Traditional plant medicines as a sourceof new drugs. Bioassay-guided fractionation	3
	Tissue cultureof medicinal plant:Introduction andhistory; laboratoryof theplant tissue culture; aseptictechniques Application ofthe plant tissue culture; environmental and biological control; plantgrowth regulators.	4
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. Boyed, 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.***		
Objectives: To teach students the principles of heterocyclic chemistry including the fundamental principles and the features, classes and reactions of heterocyclic compounds; it enable students to apply these principles in complicated reactions that involve heteroatoms. Organic ChemistryIII	Heterocyclicsystem: Classes of heterocyclicsystems; general structures; properties; Occurrencein nature and in medicinal products.	5
	Five-membered ringheterocyclic compounds: pyrrole, furan and thiophen.	3
	Sourceof pyrrole, furanand thiophen.	2
	Electrophilic substitutionin pyrrole, furan and thiophen: Reactivityand orientation.	5
	Six-membered ringheterocyclic compounds: Structure & reactions of pyridine.	4
	Saturated five-memberedheterocyclic compounds.	6
	Heterocyclicof five&sixmember rings with two &three heteroatoms.	5

Title of the course: ***Medical MicrobiologyII*(Medical Virology, immunology, andParasitology)**Course number: **212** **Objectives**: provide a basic understanding of the morphology, anatomy, physiology and genetics of bacteria in addition, the methods of handling, visualizing, characterizing		
Microbiology II	Introduction.	1
	Intestinal and tissue protozoa(Amoeba (pathogenic and non pathogenic), Balantidium, Giardia, Trichomonas	4
	Haemoflagellates:Leishmaniaspp.; Trypanosomespp.	4
	Sporozoa: Malarial parasites of human; Toxoplasma.	3
	Helminthes: Classification, Cestodes (Hymenolepis nana, Taenia spp.),Echinococcus (Hydatid cyst). Hepatic flukes, Trematodes (Blood Flukes: Schistosomaspp).Nematods: Ascaris, Entrobius. Trichuris, Ancylostoma, Necatoramericans.	8
	Virology:Introduction, Comparison between viruses and Bacteriaand othermicrobes; origin of viruses, reproduction, one step growth curve, type of mutations and Classification ofviruses; RNA viruses: Orthomyxo viruses; Paramyxo viruses; Retroviruses; 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
Title of the course: ***Physical Pharmacy* II**Course number: **228** Level: 2nd Class, 2nd Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Physical Pharmacy by Alfred Martin et al.***		
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 improvement of various modes of administration.	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,thermodynamictreatment of stabilityconstants.	5

PhysicalPharmacyII	Kinetics, rateand orders ofreactions, influenceof temperature and otherfactors on reactions rate,decomposition of medicinal agents and accelerated stabilityanalysis.	9
	Interfacial phenomena, liquid interfaces, surfacefree energy,measurement ofinterfacial tension, spreadingcoefficient, surface active agents	5
	Colloids, dispersed system and its pharmaceutical application, types ofcolloidal systems, kineticproperties, diffusion, zeta potential, solubilization.	5
	Micrometrics, particlesize, methods of determiningparticlesize, particleshape and surface area, porosity, density.	3
	Rheology, Newtonian systems, thixotropymeasurement, Negative thixotropy, determination ofthixotropy.	5
	Polymer science, definitions pharmaceutical applications, molecular eightaverages.	3

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.***

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.

	Gastrointestinal function: Digestion andabsorption of carbohydrates; proteins; lipids; absorption of water and electrolytes; vitamins and minerals; regulation ofgastrointestinal function:Introduction; gastrointestinal hormones; mouth and esophagus; stomach; exocrineportion of thepancreas; liver and biliarysystem; smallintestine; colon.	10

Physiology II	Circulatorybodyfluid:Introduction; blood; bone marrow; white blood cells; immunity; platelets; red blood cells; anemia; polycythemia; blood groupand Rh factor; hemostasis: The clottingmechanism / blood coagulation tests; anti clottingmechanism; theplasma; thelymph; abnormalities of hemostasis.	15
	Endocrinology:Introduction; energybalance, metabolism and nutrition; the pituitary gland; the thyroidgland; thegonads: development and function ofthe reproductivesystem; the adrenal medullaand adrenal cortex; hormonal control of calcium metabolism andthe physiologyof thebone; endocrine functions of thepancreasand regulationof carbohydrate metabolism.	20
Refinances text :Liz and John Soar, New Headway Plus – Pre-Intermediate. Oxford: Oxford University Press		
English	Do's and Don'ts	5
	Going places	4
	Scared to death	4
	Things that changed the word	4
	Dreams and reality	4
	Earning living	4
	Love you and leave you	5

University of Babylon- College of Pharmacy	**Syllabus**
Third stage	

1st semester	Lecturetitle	Hours
Title of the course: ***Inorganic Pharmaceutical Chemistry*** Course number: **311** Level: 3rd Class, 1st Semester Credit hours: **Theory 2 hours Laboratory 1 hour** Reference text: ***1. Inorganic Medicinal and Pharmaceutical Chemistry by Block, Roche Soine and Wilson, latest edition*** ***2. Wilson and Gisvold; Textbook of Organic medicinal and Pharmaceutical chemistry; Delgado JN, Remers WA, (eds); latest edition*** **Objectives**: To present a review of the principles of inorganic chemistry that applied to medicinal and /or pharmaceutical chemistry. It includes understanding atomic and molecular structures, and explanation of atomic structures and the relationship with binding forces and complexation. It also describes inorganic products used as pharmaceutical preparations or diagnostic tools.		
Inorganic Pharmaceutical Chemistry	Atomic and molecularstructure/ Complexation.	6
	Essential and traceions: Iron, copper, sulfur, iodine.	3
	Non essential ions: Fluoride, bromide, lithium, gold, silver and mercury.	2
	Gastrointestinal agents:Acidifyingagents.	1
	Antacids.	2
	Protective adsorbents.	1
	Topical agents.	2
	Dental agents.	1
	Radiopharmaceutical preparations.	6
	Radio opaqueand contrast media.	6
Title of the course: ***Pharmacognosy*****II**Course number: **312** Level: 3rd Class, 1st Semester Credit hours/week : **Theory 2 Laboratory 1** Reference text:***Robbers JE, Speedie MK, Tyler VE (Eds.); Pharmacognosy and Pharmacobiotechnology; the latest edition.***		
	Introduction: General biosynthesis pathways of secondary metabolites.	2
	Carbohydrates.	2

Pharmacognosy II	Glycosides: Biosynthesis, physicaland chemical properties; cardiac glycosides; saponinglycosides; anthraquinoneglycosides;flavonoid glycosides; cyanophorelycosides.	5
	Glycosides:Isothiocyanateglycosides;aldehydeglycosides; alcoholic glycosides; phenolicglycosides; lactone glycosides; coumarinsand chromones.	5
	Resins and resin combination; tannins.	2
	Lipids: fixed oils andwaxes.	2
	Volatile oils:Introduction;chemistryof volatile oils; biosynthesis of volatileoils; hydrocarbons as volatile oils; alcohols as volatile oils; aldehydes as volatile oils.	4
	Ketones as volatile oils; Phenols as volatileoils;Oxidesas volatile oils; Ester as volatile oils; Phenolic ethers as volatileoils.	3
	Non-medicinal toxic plants.	2
	Vitamins and Amino acids.	2
Title of the course: ***Pharmaceutical Technology*** **I**Course number: **313** Level: 3rd Class, 1st Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Pharmaceutical Dosage forms and Drug Delivery Systems ByHaward A. Ansel; latest edition.*** and ***Sprowel's American Pharmacy***.		
Objectives: To teach theoretical bases for the technology of preparing different dosage forms with respect to their raw materials, compositions, methods of preparation, stability, storage and uses.	Dispersed systems: theirclassification; comparisons between different systems.	2
	Solutions and types of solutions.	2
	Solubility: Factors affectingsolubility; expression ofdissolution; dissolution rate versus solubility; preparation ofsolutions containing non-volatilematerials.	4
	Official solutions; classification ofofficial solutions; preparation and uses.	4
	Aqueous solutions containingaromaticprinciples;aromaticwaters; methods of preparations; stability.	4
Pharmaceutical TechnologyI	Syrups: sugar based syrups; artificial and sorbitol based syrups; stabilityof syrups.	4
	Definition and methods of clarification; filteraidsin clarification.	3

	Preparation ofsolutions usingmixed solvent systems; spirits, and elixirs.	3
	Extraction; maceration and percolation.	3
	Tinctures; fluid extracts; extracts of resins and oleoresins.	4
	Colloidal dispersions; lyophilic; lyophobic.	6
	Coarsedispersion; suspensions.	6
Title of the course: ***Biochemistry*** **I**Course number: **314** Level: 3rd Class, 1st Semester Credit hours/week : **Theory 3** **Laboratory 1** Reference text: ***Harper's Illustrated Biochemistry, Twenty-Sixth Edition*** **Objectives**: To integrate key concepts describing the traditional core topics of Biochemistry: structure and metabolism. At the end of the semester the students should be able to understand the chemical structure, and function of all biomolecules present in the living organisms.		
BiochemistryI	Introduction to themacromolecules biochemistry:Definitions and terms; proteins, enzymes,DNA; Clinical value.	2
	Amino acids: StructuresofA.A (tableof standardA.A abbreviation and side chain); Classification, properties, isomerism.	3
	Amino acids: Chemical reactions,Zwitter ions, titration curve calculatingisoelectricpoint values. Examples andquestions. Non standards A.A: Structures, existence and clinicalvalue.	3
	Peptides: Peptidebond, resonanceforms, isomers,physical properties and chemical reactions. Essential polypeptides in human body, structures, rolesand clinical values.	3
	Proteins: Structureand conformations of proteins,Primarystructure, Secondarystructure(4 helix, 5sheet), tertiarystructure, quaternary structure. Classification, synthesis, cellularfunctions (Enzymes, cell signaling, and ligand transport, structural proteins), protein in nutrition.	3

	Denaturation ofproteinsand protein sequencing: Determining A.A composition, N-terminal A.A analysis, C-terminal A.A analysis, Edman degradation, prediction protein sequence from DNA/ RNA sequences. Methods of protein study: Protein purification, cellular localization, proteomics and bioinformatics, structurepredication and simulation.	3
	Carbohydrates: Chemistryandclassification, biomedical importance, classification ofCHO, Stereochemistryof monosaccharides, metabolism of CHO; Physiologicallyimportant monosaccharides, glycosides, disaccharides, polysaccharides.	3
	Lipids:Introduction, classification oflipids, fattyacids (F.A), nomenclatureof F.A, saturated F.A, unsaturated F.A, physical and physiological propertiesofF.A, metabolism of lipids. Phospholipids, lipid peroxidation and antioxidants, separation and identification of lipids, amphipathiclipids.	3
	Enzymes: Structures andmechanism, nomenclature, classification, mechanisms of catalysis,thermodynamics, specificity, lockand key model, induced fit model, transition state stabilization, dynamics and function, allosteric modulation. Biological function, cofactors, coenzymes, involvementin disease.	3
	Kinetics: General principles, factorseffectingenzymerates (substrate conc., pH, temperature, etc), single-substrate reaction (Michaelis-Menten kinetics), kineticconstants. Examples of kineticquestions and solutions.	2
	Enzymeinhibition: Reversible inhibitors, competitive and non competitive inhibition, mixed-typeinhibition,Irreversible inhibition. Inhibition kinetics and bindingaffinities (*k*i), questions and solutions.	1
	Control of activityand uses of inactivators; multi-substrate reactions, ternary-complexmechanisms, ping-pongmechanisms, non- Michaelis-Menten kinetics, pre-steady-statekinetics, chemical mechanisms.	1
	NucleicAcid: Chemical structure, nucleic acidcomponents, nucleic acid bases, nucleotides and deoxynucleotides(Properties, base pairing, sense andantisense, super-coiling, alternativestructures, quadruple structures.	3
	Biological functions of DNA: Genesandgenomes,transcription and translation, replication.	2

	Biochemistryofextracellularand intracellularcommunication: Plasma membranestructureandfunction; Biomedical importance, membrane proteins associated with lipid bilayer, membranesprotein composition, dynamicstructures of membranes, asymmetric structures of membranes.	3
	Artificial membranes model, the fluid mosaic model, membrane selectivity, physiologicalfunctions of plasma membranes.	1
	Biochemistryof the endocrinesystem: Classification ofhormones, biomedical importance, thetarget cell concept andhormone receptors, biochemistryof hormone action and signal transduction.	3
	Special topics: Nutrition, digestion, and absorption. Biomedical importance, digestion and absorption of carbohydrates, lipids, proteins, vitamins and minerals; energybalance.Biochemistryof hemostasis and clot formation.	3
Title of the course: ***Pathophysiology*** Course number: **315** Level: 3rd Class, 1st Semester Credit hours/week : **Theory 3 Laboratory 1** tutors : DrAjwadAwad Muhammad and Dr. Nathera Mohammad Ali Reference text:***Essentials in Pathophysiology by: Carol Mattson Porth 2nd Ed.andpathophysiologly of disease : an introduction to clinical medicine 7ed.Cary D. Hammer, editor*** Stephen J. Mc Phee editor **Objectives**: Describe the basic concepts of pathophysiology at the cellular level related to injury, the self-defense mechanism, mutation, and cellular proliferation. Outline basic pathological factors that influence the disease process. Describe the impact and abnormal functions upon the organ (s) associated with the disease process of targeted body systems. Describe clinical manifestations associated with the diseased organ(s).		
	Introduction.	1
	Cell injuryand tissue response; Degeneration; Necrosis; Atrophy; Hypertrophy; Metaplasiaand Calcification;Inflammation and Repair.	6
	Disorders of electrolytesand water and acid–basebalances: Hyper AndHyponatremia; Hyper and Hypokalemia; Syndrome ofinappropriate secretion ofADH; Diabetes insipidus; Metabolic acidosis and alkalosis; Respiratoryacidosisand alkalosis.	4

Pathophysiology	Disorders of cardiovascularsystem: Hyperemia;Congestion and edema;Thrombosis; embolism and infarction; Shock; Coronaryheart disease and MI; Rheumatic heartdisease; Heart failure; Acute pulmonary edema; Essential hypertension; Secondaryhypertension; Malignant hypertension; Hypotension; Aneurysm versus varicoseveins;	5
	Disorders ofrespiratorysystem: Pneumonias; Tuberculosis; Respiratorydistress syndrome;Bronchial asthma; Emphysemaand bronchiectasis; Cysticfibrosis; Pulmonaryembolism; Pulmonary hypertension.	3
	Disorders oftherenal system: Nephrotic syndrome; Glomerulonephritis;Diabeticglomerulosclerosis; Hypertensiveglomerulardisease; Pyelonephritis; Drugrelated nephropathies; Acuterenal failure; Chronic renal failure.	4

	Disorders ofGIand hepatobiliarysystems: Pepticulcer andZollinger –Ellison syndrome;Irritable bowel syndrome; Crohn's disease; Diarrhea; Celiacdisease;Viral hepatitis; Primarybiliarycirrhosis; Liver failure; Cholelithiasis.	4
	Disorders ofthyroid function: Hypothyroidism. Hyperthyroidism. Graves's disease. Thyrotoxicosis.	2
	Disorders of adrenal function: Cushingsyndrome.Adrenal cortical Insufficiency(primaryand secondary). Congenitaladrenal hyperplasia. Pheochromocytoma.	2
	Diabetes mellitus and metabolic syndrome; Dyslipoproteinemia. Neoplasia Metabolic &rheumatic disorders of skeletal system: -Osteoporosis, osteomalacia& rickets, rheumatoidarthritis, systemic lupus erythromatosus, ankylosing spondylitis, gout, osteoarthritis syndrome. Alterations in the immune response (pathophysiology of immunopathology): - Hypersensitivity disorders. - Transpalantation immunopathology. - Immunodeficiency disorders.	3 2 4 2 3

English		

2nd semester	**Lecturetitle**	**Hours**
Title of the course: ***Organic Pharmaceutical Chemistry*** **I**Course number: **326** Level: 3rd Class, 2nd Semester Credit hours: **Theory 3 hours** **Laboratory 1 hour** Reference text: ***Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 10th ed, 2004.*** To enable understanding mechanisms of drug action atmolecularlevel, :**Objectives** andthe role of medicinal chemistry in the discovery and development of syntheticstherapeutic agents. It also enables students to understand the concept ofstructure-activity relationship and its application in design and synthesisof new compounds or derivatives.		
	Drugdistribution.	4
	Acid-baseproperties.	3
	Statistical prediction of pharmacological activity.	3

OrganicPharmaceuticalChemistryI	QSAR models.	2
	Molecularmodeling(Computeraided drugdesign).	1
	Drugreceptor interaction: forceinvolved.	1
	Steric features of drugs.	2
	Optical isomerism and biologicalactivity.	1
	Calculated conformation.	1
	Three-dimensional quantitative structureactivityrelationships and databases.	1
	Isosterism.	1
	Drug-receptor interactionand subsequent events.	1
	General pathways of drugmetabolism: Sites of drug biotransformation; Role ofcytochrome P450 mono-oxygenases in oxidative biotransformation; Oxidative reactions; Reductive reactions; Hydrolyticreactions; PhaseIIreactions.	22
	Factorsaffectingdrugmetabolism.	2
Title of the course: ***Pharmacology*** **I**Course number: **327** Level: 3rd Class, 2nd Semester Credit hours/week : **Theory 3** Reference text: ***Lipincott Pharmacology 3rd Edition, 2006*** **Objectives**: To introduce the pharmacy students to the basis of general pharmacology. The student will learn about various body systems and drugs used to affect them in health and disease. Moreover the course will cover the drugs used to treat microbial infections.		
pharmacology**I**	General introduction to Pharmacology. Pharmacokinetics.	2 4
	DrugReceptor interaction and Pharmacodynamics. Theautonomic nervous system (ANS).	4 2
	Cholinergic system.	6
	Adrenergic system.	6
	Principal of antimicrobial therapy.	2
	β-lactam and other cellwall synthesis inhibitor antibiotics	4

	Protiensynthesis inhibitors	4
	Quinolones, Folate antagonists, and urinarytractantiseptics.	3
	Antimycobacterium drugs	2
	Antifungal drugs.	2
	Antiprotozoal drugs.	1
	Anthelmintic drugs.	2
	Antiviral drugs.	1
Title of the course: ***Pharmaceutical Technology*** **II**Course number: **328** Level: 3rd Class, 2nd Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Pharmaceutical Dosage forms and Drug Delivery Systems ByHaward A. Ansel; latest edition.*** and ***Sprowel's American Pharmacy***. **Objectives**: To teach theoretical bases for the technology of preparing different dosage forms with respect to their raw materials, compositions, methods of preparation, stability, storage and uses; in addition to define and characterize the possible incompatibilities that may occur in dosage forms.		
Pharmaceutical TechnologyII	Emulsions; purposeof emulsification; methods of emulsification; emulsifyingagents; HLB system; stabilityofemulsions.	10
	Lotions; liniments and collodions.	5
	Suppositories.	6
	Powdered dosage forms.	10
	Semisolid dosage forms.	10
	Incompatibilities in pharmaceutical dosage forms.	4
Title of the course: ***Biochemistry*** **II**Course number: **329** Level: 3rd Class, 2nd Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Harper's Illustrated Biochemistry, Twenty-Sixth Edition*** **Objectives**: To provide a condensed curriculum of strong basic biochemistry and molecular biology. At the end of the semester the students should be able to understand all metabolic processes occurring in the living cell.		
	Bioenergetics.	2

BiochemistryII	Biologic oxidation.	2
	Therespiratorychainand oxidative phosphorylation.	2
	Over view of metabolism.	2
	Citricacid Cycle.	2
	Glycolysis.	2
	Metabolism of glycogen.	4
	Gluconeogenesis.	3
	Pentose phosphate pathwayand otherpathways ofhexose metabolism.	3
	Biosynthesis of fattyacids.	3
	Oxidation of fattyacids.	2
	Metabolism of acylglyceroland sphingolipids.	2
	Lipid transportand storage.	2
	Cholesterol synthesis, transport, and excretion.	2
	Biosynthesis of theNutritionallyNonessential Amino Acids.	3
	Catabolism of Proteins &of Amino Acid Nitrogen	3
	Catabolism of the CarbonSkeletons of Amino Acids.	2
	Conversion ofAmino Acids to Specialized Products.	2
	Porphyrins& BilePigments	2

Title of the course: ***Pharmacognosy*III**Course number: **3210** Level: 3rd Class, 2nd Semester Credit hours/week : **Theory 2** **Laboratory 1** Reference text: ***Robbers JE, Speedie MK, Tyler VE (Eds.); Pharmacognosy and Pharmacobiotechnology; the latest edition.*** ***Michael Heinrich, Joanne Barnes; Fundamentals of Pharmacognosy&Phytotherapy.*** **<u>Objectives</u>**: This course is intended to study chemistry of other natural products namely alkaloids and antibiotics. Also this course includes studying phytotherapy& tissue culture techniques utilized for production of natural products.		
PharmacognosyIII	Alkaloids:Introduction;Physical andchemical properties; pyridine, piperidine alkaloids; tropane alkaloids.	5
	Alkaloids: Quinolinetropanalkaloids; iso-quinolinealkaloids; imidazole alkaloids; indole alkaloids.	5
	Alkaloids: Steroidal alkaloids; lupinanealkaloids; alkaloidal amines; purinealkaloids.	4
	Antibiotics: Natural sources; biosynthetic pathways, isolation and purification.	6
	.phytotherapy:Introduction , principles,medicinalplants in selected health caresystems.Important natural products &phytomecines used in pharmacy&medicine	10

<table>
<tr><td colspan="2">Title of the course: Medical ethicsCourse number: (3211)
Level: 3rd Class, 2nd Semester
Credit hour/weeks: Theory 1
Reference text:
1- Ruth Rodgers, (ed.); fast track: Law and Ethics in Pharmacy Practice. Pharmaceutical Press 2010.
2-Joy Wingfield and David Badcott . Pharmacy Ethics and Decision Making. Pharmaceutical Press2007
3-Robert J. Cipolle, Linda M. Strand, Peter C. Morley.Pharmaceutical Care Practice: The Clinician's Guide, 2nd Edition.
4- Robert m. Veatch and Amy Haddad. Case Studies in Pharmacy Ethics. second edition. Copyright © 2008 by Oxford University Press, Inc.

<u>Objectives</u>:
The course will provides an overview of ethical issues facing practicing pharmacists in order to enable the student to understand the basic concepts of ethics which formulate the relationship of pharmacist with the patient, colleges, and other health personnel in order to deliver his pharmaceutical services in good way.

The course will begin with an introduction to ethics in pharmaceutical practice and then proceed to examine in depth specific topics (Beneficence, Autonomy, Confidentiality, Consent…).

The course will include lectures, case analysis, and classroom discussion.</td><td></td></tr>
<tr><td rowspan="10">PharmacyEthics</td><td>IntroductiontoPharmacyEthics(Theoreticalconsiderations).</td><td>2</td></tr>
<tr><td>Codeof Ethics forPharmacists.</td><td>1</td></tr>
<tr><td>Common Ethical Considerations in Pharmaceutical CarePractice (Beneficence,Autonomy, Honesty,Informed Consent, Confidentiality, Fidelity ……).</td><td>3</td></tr>
<tr><td>Interprofessional Relations.</td><td>2</td></tr>
<tr><td>Makingethical decisions.</td><td>1</td></tr>
<tr><td>Ethical issues related to clinical pharmacyresearch.</td><td>1</td></tr>
<tr><td>Ethical problems in thepharmacist’s clinical practice.</td><td>1</td></tr>
<tr><td>Preventingmisuse ofmedicines.</td><td>1</td></tr>
<tr><td>Casestudies in pharmacyethics.</td><td>3</td></tr>
<tr><td>English language</td><td></td><td></td></tr>
</table>

University of Babylon- College of Pharmacy		Syllabus
Fourth stage		
1st semester	**Lecturetitle**	**hours**
Title of the course: ***Pharmacology* II** Course number: **411** Level: 4th Class, 1st Semester Credit hours/week: **Theory 3** **Laboratory 1** Reference text: ***Lipincott Pharmacology 3rd Edition, 2006*** **Objectives**: To introduce the pharmacy students to the general pharmacology of the central nervous system and to the various drug groups used in the treatment of CNS diseases or drugs altering its function. The student will be introduced to the various drugs used in the management of cardiovascular diseases. Moreover the course will cover the drugs affecting the gastrointestinal and respiratory systems.		
PharmacologyII	Introduction to CNS pharmacology**.**	2
	CNS stimulants.	2
	Anxiolytic and Hypnoticdrugs.	3
	General andLocal Anesthetics.	3
	Antidepressant drugs.	3
	Antipsychotic (neuroleptic)drugs.	3
	Opioid analgesics andantagonists.	3
	Treatment of neurodegenerativediseases.	3
	Antiepileptic Drugs.	2
	Diuretics.	2
	Thetreatment of heartfailure(HF).	2
	Antiarrhythmic drugs.	2
	Antianginal Drugs.	2
	Antihypertensive drugs.	3
	Drugs affectingtheblood.	3

	Antihyperlipidemicdrugs.	2
	Gastrointestinal and antiemetic drugs.	2
	Drugs actingon the respiratorysystem.	3
Title of the course: ***Organic Pharmaceutical Chemistry*** **II**Course number: **412** Level: 4th Class, 1st Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.); 10th ed., 2004.*** **Objectives** :**The course is devoted to thediscovery and development of new agents for treating diseases, and enablestranslating the drug structural formula into therapeutic effect.Additionally, it focuses on the methods of preparation for somepharmaceutical agents.**		
organic pharmaceutical chemistryII	Cholinergic agents, cholinergic receptorsand theirsubtypes.	3
	Cholinergic agonists; stereochemistryand structure-activity relationships (SAR); products; cholinesteraseinhibitors.	5
	Cholinergic blockingagent; structure-activityrelationships (SAR); Solanaceousalkaloid andanalogues; synthetic cholinergic blockingagents and products; ganglionic blocking agents (neuromuscular blocking agents).	5
	Analgesicagents (SAR of morphine, SAR of meperidinetype molecules; SAR of methadonetype compounds;N-methylbezomorphans, antagonist type analgesics in benzomorphans).	5
	Analgesicreceptors,endogenous opioids; Products; Antitusive agents; Anti-inflammatoryanalgesics.	5
	Adrenergic agents (Adrenergic neurotransmitters); Adrenergic receptors; Drugs affectingAdrenergic neurotransmission; Sympathomimeticagents; Adrenergic receptorantagonists.	8
	CNS depressant; Benzodiazepines and relatedcompounds; Barbiturates; CNS depressant with skeletal muscle relaxant properties; Antipsycotics; Anticonvulsants.	7
	CNS Stimulants	3
	Steroidal &nonsteroidalhormones	4

Title of the course: **Clinical Pharmacy I** Level: 4th Class, 1st Semester Credit hours/week : Theory 2 lab:- 1 Reference Text: ALISON BLENKINSOPP, PAUL PAXTON(eds), Symptoms in the Pharmacy. A Guide to the Management of Common Illness, 6th edition. Lorwaterfield, Community Pharmacy Hand Book, 5th edition		
Clinical Pharmacy1	Introduction to communitypharmacy.	1
	Respiratoryproblems: Cough, Common cold, allergicrhinitis, Otitis media, Laryngitis &Pharyngitis	3
	G.I.T problemse: Diarrhea, Constipation, Heart burn and indigestion,IBS and Hemorrhoids	4
	Pediatriccarepractice:Oral thrush, pinworms and head lice	2
	Skin conditions: Acne, Scabies, Psoriasis, Hair loss, Fungal infection, Eczema andDermatitis , Dandruff, Cold sore, Corns and Callus.	5
	Women's health care: Cystitis andvaginal thrush,primary dysmenorrheaand Premenstrual syndrome.	2
	CNS related problems: Headache,Insomnia, Motion sickness, Nausea and vomiting	3
	-Eyeproblems	1
	ENTproblems	1
	Oral hygiene, mouth ulcer	1
	Obesityand bodyweightcontrol.	1
	-Pain and musculoskeletal disorders	1
	Nicotine replacement therapy(NRT).	1
	Dietarysupplements	1
	An update in reclassification of OTC drugs(simvastatin, Tamusotisin&azithromycin).	2
	Medication adherence and errors.	1

Title of the course: ***Biopharmaceutics*** Course number: **414**
Level: 4th Class, 1st Semester
Credit hours/week : **Theory 2** **Laboratory 1**
Reference text: ***Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics.***

Objectives: The coarse deals with the physical and chemical properties of drug substance, dosage form and the biological effectiveness of the drug or drug product upon administration, including drug availability in the human or animal body from a given dosage form. The pharmacokinetic part of the coarse deals with the time-coarse of the drug in the biological system, and quantification of drug concentration pattern in normal subjects and in certain disease states.

Biopharmaceutics	Introduction to biopharmaceutics.	2
	Biopharmaceuticaspectsofproducts; drugabsorption; mechanisms ofabsorption; physicochemical factors; dissolution rate; effects of excipients; typeof dosage forms.	6
	Onecompartment openmodel.	2
	Multicompartment models.	2
	Pharmacokinetics ofdrugabsorption.	2
	Bioavailabilityand bioequivalence.	2
	Clearanceof drugsfromthe biological systems.	2
	Hepatic elimination ofdrugs.	2
	Protein bindingofdrugs.	2
	Intravenous infusion	2
	Multiple dosageregimens.	2
	Non-linear pharmacokinetics.	2
	Dosage adjustment in renal diseases.	2

Title of the course:**Public Health**Course number: **415** Level: 4th Class, 1st Semester Credit hours/week : **Theory 2** Reference text:***Lucas AO, Gilles HM, (Eds), Short Textbook of Public Health Medicine for the Tropic, (4th Ed), 2003.*** **Objectives**: This course enables the students to understand the principles of public health and the art of preventing disease, promoting health and prolonging life, through organized effort of society.		
Public Health	Introduction: The scope and concerns of public health, health care system in Iraq	1
	Measuring, Monitoring, and Evaluating the Health of a Population	1
	Population screening and public health	1
	Prevention and control of non-communicable diseases	1
	Principles of infectious disease control	1
	National immunization plan of Iraq.	1
	Communicable diseases (infections through the gastro-intestinal tract, Infections through skin and mucous membranes, Infections through the respiratory tract)	1
	Prevention and control of public health hazards (Tobacco, alcohol, Public health aspects of illicit psychoactive drug use)	1
	Major health problems (Obesity, Physical activity and health, Public mental health and suicide, Dental public health, Sexually transmitted infections, Chronic hepatitis and other liver disease, Tuberculosis	2
	Nutritional disorders	1
	Family health	1
	Environmental health	1
	Occupational health	1
	Travel health	1
	Introduction: a historic background of pharmacy practice.	1
	Pharmacy Practice and the health care system	2
	Health promotion in community pharmacy	1
	Introduction to Pharmaceutical care	1

	Pharmaceutical care planning	2
	Community pharmacy management	1
	Hospital pharmacy service.	1
	Biosafety in pharmacy practice	2
	Formulary management and Regulatory affairs	2
	Rational Use of Drugs	2
English language		

2nd semester	**Lecturetitle**	**hours**
Title of the course: Communication Skills Course number: 215 Level: 4th Class, 2st Semester Credit hours: Theory 2 Reference text: 1-Robert S. Beardsley, (ed.); Communication Skills in Pharmacy Practice. **Objectives:** Communication skill is one of the missions of pharmacy care practice, aims to develop a conventional relationship between pharmacist and patients, in which information is exchanged, hold in confidence and used to optimize patient care through appropriate drug therapy. This course is intended to pharmacist provide better care to patients, and focus on communication skills necessary to		
Communication Skills	Principles andElementsofInterpersonal Communication	2
	Nonverbal typeof communication.	2
	Barriers to communication.	2
	Listeningandempathic respondingduring communication.	2
	Assertiveness.	2
	Interviewingandassessment.	2
	Helpingpatients to managetherapeutic regimens.	2
	Patient counseling; counselingcheck list; point-by-point discussion; counselingscenario.	2
	Medication safetyand communication skills.	2
	Strategies to meet specificneeds.	2
	Communicatingwith children and elderlyabout medications.	2
	Communication skills and inter-professional collaboration.	2
	Electronic communication in healthcare.	2

	Ethical behaviorwhen communicatingwith patients.	2
	Travel health	1
	Healthinsurance	1

Department of Pharmacology and Toxicology
Title of the course: ***Pharmacology*** **III**Course number: **426**

Level: 4rd Class, 2nd Semester

Credit hours/week: **Theory 2 hours**

Reference text: ***Lipincott Pharmacology 3rd Edition, 2006***

Objectives: To introduce the pharmacy students to various drug groups affecting endocrine systems and their use in correcting abnormalities in the endocrine functions. Moreover the course will cover the drugs used in the management of neoplastic diseases, bone disorders, obesity and erectile dysfunction. Inflammatory agents and the anti-inflammatory drugs will also be covered during this course.

PharmacologyIII	Hormones ofthe pituitaryand thyroid glands.	3
	Insulin and oral hypoglycemicdrugs.	4
	Adreno-corticosteroids.	3
	Thegonadal hormones and inhibitors.	3
	Autacoids and autacoid antagonists	3
	Non-steroidal anti-inflammatorydrugs (NSAIDs)and otheranti-inflammatoryagents.	3
	Drugs used in erectile dysfunction.	2
	Drugs used in osteoporosis.	2

	Drugs used in the management ofobesity.	2
	Cancer Chemotherapy: Anticancer drugs and immunosuppressants.	5

Title of the course: ***Organic Pharmaceutical Chemistry*** **III**Course number: **427**
Level: 4th Class, 2nd Semester

Credit hours/week : **Theory 3** **Laboratory 1**
Reference text: ***Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.); 10th ed., 2004.***

Objectives: To enable understanding mechanisms of drug action, including antibacterial, antifungal and antiviral agents, at molecularlevel, and the role of medicinal chemistry in the discovery and development of synthetic therapeutic agents. It also enables students to understand the concept of structure-activity relationship and its application in design and synthesis of new chemotherapeutic agents and hormone derivatives with potential biological activity.

OrganicPharmaceutical ChemistryIII	β-Lactam antibiotics (Penicillins); β-Lactamaseinhibitors; Cephalosporinsand Monobactams.	9
	Aminoglycosides and Chloramphenicol; Tetracylines; Macrolides; Lincomycinsand Polypeptides; Antiviral agents (properties of viruses, viral classification, products).	9
	Sulfonamides (chemistry, nomenclature, mechanism of action, resistance, toxicity, sideeffects, metabolism, protein binding, distribution and SAR); products; Sulfones.	4
	Anti-neoplasticagents: Alkylatingagents; Antimetabolites; Antibiotics;Plant products; Miscellaneous compounds.	17
	Hormones and related compounds; Futureanti-neoplastic agents; Monoclonal antibodies; Genetherapyofcancer.	6

Title of the course**: Clinical Pharmacy II**
Level: 4th Class, 2nd Semester
hours/week : Theory 2 hours Lab 1

Reference Text: Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics

Clinical Pharmacy II	Introduction to the concept of clinical pharmacy-its activities and professionalresponsibilities.(includingcurrent state of clinical pharmacyinIraq) .	**1**

	overview ofpharmaceutical carepractice(thepatient care process).	**1**
	Hematologicdisorders:Anemia and sicklecell disease.	**2**
	Hypertension.	**2**
	Ischemicheart diseases	**2**
	Heart failure.	**2**
	Peripheral vasculardiseases.	**1**
	-Asthma.	**2**
	Chronic obstructivepulmonarydisease(COPD).	**1**
	Diabetes mellitus &Diabeticketoacidosis (DKA).	**2**
	Pepticulcer disease.	**2**
	Tuberculosis	**1**
	Infectivemeningitis	**1**
	Respiratorytract infections	**2**
	GIT infections	**1**
	Gout and hyperuricemia	**1**
	Rheumatoid arthritis (RA)and osteoarthritis (OA)	**2**
	Osteoporosis and other metabolicbonedisease.	**1**
	Infectious Endocarditis	**1**
	Surgicalantibiotic prophylaxis	**1**
	Urinarytract infection (UTI)	**1**
Title of the course: ***General Toxicology*** Course number: **429** Level: 4th Class, 2nd Semester Credit hours/week : **Theory 2 Laboratory 1** Reference text: ***Casarett and Doull, Toxicology, the Basic Science of Poisons; latest edition.*** **Objectives**: To study the principle of exposure to different chemicals and environmental factors, their sources, mechanisms of toxicity and their risk to human being; it enables students to understand the required measures to protect living organisms against the suspected toxic hazards.		
	Introduction: general consideration; host factor, environmental factors oftoxic effects.	3
	Carcinogenesis.	3

GeneralToxicology	Mutagenesis:	1
	Target organs and systemictoxicology; Respiratorysystem,Liver, Kidney, Skin, Nervous system, cardiovascular system, Blood.	16
	Toxic substances: Food additive and contaminants, Pesticides, Metals,Radiation and radio activematerials, plants, Solvents,	15
	Environmental toxicology:Air pollution, water and soil pollutants, Gases(Teargas, Pepperspray), CO, Cyanide(H_2S).	7
Title of the course: ***Industrial Pharmacy*** **I**Course number: **4210** Level: 4th Class, 2nd Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text: ***The Theory and Practice of Industrial Pharmacy by Leon Lachman et al.*** **Objectives**: The subject aim to teach pharmacy students the steps and lines upon which the preformulation processing of pharmaceutical dosage forms. This fundamental coarse provide the required principles to integrate knowledge of Pharmaceutical Technology in preformulation of perfect dosage form. It includes milling, mixing, drying and filtration, besides sterilization to achieve a proper processing of dosage forms.		
IndustrialPharmacyI	Principles of pharmaceutical processing; mixing; fluid mixing; flow characteristics; mechanisms of mixing; mixingequipments; batch and continuous mixing;mixer selection; solid mixingtheoryand particulate solid variables; forces andmechanisms.	7
	Milling; pharmaceuticalapplication; sizemeasurement methods; Theoryand energyof commenution; types of mills; factors influencing milling;selection ofmill techniques; specialized dryingmethods.	7
	Drying: definition; purpose; humiditymeasurement; theoryof drying;dryingof solids, andclassification ofdryer; specialized drying methods.	7

	Clarification and filtration: Theory;filtermedia; filter aids; selection ofdryingmethod; non-sterile and sterile operations; integritytesting; equipments and systems(commercial and laboratory).	7
	Sterilization; validation of methods; microbial death kinetics; Methodsofsterilization (thermal and non-thermal); mechanisms; evaluation.	7
	Pharmaceutical dosageform design; pre-formulation; preliminary evaluation; bulk characterization; solubilityand stabilityanalysis.	3
	Pharmaceutical dosageforms; sterileproducts; development; formulation; production; processing; qualitycontrol.	7
English language		

University of Babylon- College of Pharmacy		**Syllabus**
Fifth stage		
1st semester	**Lecturetitle**	**hours**
Title of the course: ***Organic Pharmaceutical Chemistry*** **IV**Course number: **511** Level: 5th Class, 1st Semester Credit hours/week : **Theory 2** Reference text: ***Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.); 10th ed., 2004.*** **Objectives**: To give the students knowledge and experience in pro-drug and hormones as part of their medicinal and pharmaceutical field. It includes classification, synthesis, biotransformation and/or formulation of certain drugs to improve their action as well as to avoid some side effect.		
	Basicconcept of prodrugs; Covalent bonds (cleavable); Prodrugs of functional groups; Typesof prodrugs.	6
	Chemical deliverysystems; Polymericprodrugs;Typesand structure ofpolymers; Cross-linkingreagents.	6

Organic Pharmaceutical ChemistryIV	Drugtargeting.	4
	Project.	4
	Combinatorial chemistry; Peptides andotherlinear structures; Drug likemolecules; Support and linker; Solution-phase combinatorial chemistry.	5
	Detection, purification and analgesics; Encoding combinatorial libraries; High-throughput screening; Virtual screening; Chemical diversityand librarydesign.	5

Title of the course: ***Industrial Pharmacy*** **II**Course number: **512**

Level: 5th Class, 1st Semester

Credit hours/week: **Theory 3** **Laboratory 1**

Reference text: ***The Theory and Practice of Industrial Pharmacy by Leon Lachman et al.***

Objectives: The coarse enable technical setup for coordination of standards for formulation of typical dosage forms and the principles needed to learn mass production of different pharmaceutical dosage forms. The syllabus includes different dosage forms like tablets, capsules, aerosols, emulsion, etc, besides the advanced techniques like enteric coating and micro-encapsulation.

Industrial PharmacyII	Pharmaceutical dosageforms: Tablets; role in therapy;advantages Anddisadvantages; formulation; properties; evaluation; machines used in tableting; qualitycontrol;problems; granulation, and methods of production; excipients, and types of tablets.	10
	Tablet coating; principles; properties; equipments; processing; types Ofcoating(sugarand film); qualitycontrol, and problems.	4
	Capsules: Hardgelatin capsules; materials; production; filling equipments; formulation; special techniques.	3
	Soft gelatin capsules: Manufacturingmethods; natureof capsuleshell and content; processingand control; stability.	2

	Micro-encapsulation; core and coatingmaterials; stability; equipments and methodology.	2
	Modified (sustained release) dosageforms; theoryand concepts; evaluation and testing; formulation.	3
	Liquids: Formulation; stabilityand equipments.	3
	Suspensions: Theory; formulation and evaluation.	3
	Emulsions: Theoryandapplication; types; formulation; equipments Andqualitycontrol.	3
	Semisolids:Percutaneouse absorption; formulation; types of bases (vehicles) preservation; processingandevaluation.	3
	Suppositories: Rectal absorption; uses ofsuppositories; types of bases;manufacturingprocesses;problems and evaluation.	3
	Pharmaceutical aerosols:Propellants; containers; formulation; types Andselection of components;stability; manufacturing;qualitycontrol and testing.	6

Title of the course: Therapeutic Drug Monitoring (TDM)
Course number: 529
Level: 5th Class: 2nd Semester
Credit hours/week: Theory 2 , Laboratory 1
Reference Texts:
AppliedClinicalPharmacokinetics, Second Edition, 2008 by Larry A. Bauer.

Additional references include but not limited to the following:
Clinical Pharmacokinetics Concepts and Applications, Third Edition, 1995 by Malcolm Rowland and Thomas Tozer;

	Interpretation ofLab. data.	2
	Acute coronarysyndrome.	2
	Arrhythmias	2
	Thrombosis	2

Therapeutic I	Dyslipidemia	1
	Stroke	2
	Shock	2
	Liver cirrhosis	2
	Viral hepatitis	1
	Inflammatorybowel diseases	2
	Acute renal failure (ARF)	1
	Chronic renal failure (CRF)	2
	Hemodialysis and peritoneal dialysis	1
	Systemiclupus erythematosis (SLE)	1
	Benign prostatic hyperplasia (BPH)	1
	Acid – basedisorders	2
	Disorders offluid andelectrolytes	2
	Urinaryincontinence and pediatricenuresis	1
	Epilepsyand statusepilepticus	2
	multiple sclerosis	1
	Parkinson's disease	2
	Pain management	2
	Headachedisorders	1
	glucoma	2
	Parenteral nutrition	2
	Enteral nutrition	2
	Pharmacovigilance	2
Title of the course: ***Clinical Chemistry*** Course number: **514** Level: 5th Class, 1st Semester Credit hours/week : **Theory 3 Laboratory 1** Reference text:***1- Clinical Chemistry & Metabolic Medicine, Crook, 2006. 2- Clinical Chemistry, Kaplan, 2003.*** **Objectives**: To exhibit knowledge of human body chemistry levels under healthy and abnormal conditions. At the end of the semester the students should be familiar with the basic and advanced information in clinical laboratory chemistry and how it relates to patient health and care		
	Disorders ofCarbohydrates metabolism, Hyperglycemia&Diabetes mellitus, Hypoglycemia.	3

ClinicalChemistry	Disorders oflipid metabolism.	2
	Liver Function Tests.	4
	KidneyFunction Tests.	4
	Diagnosticenzymology.	4
	Hypothalamus &pituitaryendocrinology, disorders ofanterior pituitaryhormones, disorders ofadrenalgland, hypopituitrism.	8
	Reproductivesystem, disorders of gonadal function inmales & females, biochemical assessment duringpregnancy.	5
	Tumor markers.	4
	Druginteraction with laboratoryTests.	2
	Disorders of calcium metabolism	3
	Acid-BaseDisorders.	4
Title of the course: ***Clinical Toxicology***Course number: **516** Level: 5th Class, 1st Semester Credit hours/week : **Theory 2 Laboratory 1** Reference text: ***1- Gossel TA, Bricker TD, (Eds.); Principles of Clinical Toxicology; latest edition. 2-Viccellio P, (Ed.); Handbook of Medicinal Toxicology; latest edition.*** **Objectives**: The course aims to provide students with the principles and skills required to deal with the toxicity of chemicals and drugs in clinical settings; it enables students to correlate signs and symptoms of toxicity with the analytical data, and to know how to establish preventive and therapeutic measures for poisoning cases.		
	InitialEvaluation and Managementofthe Poisoned Patient. Includingpediatric poisoningand specialconsideration inthe geriatric patient	3

ClinicalToxicology	DrugToxicity: Over the counterdrugs; caffeine; theophylline; antihistamine and decongestant; non-steroidal anti-inflammatory drugs; vitamins.	3
	Prescription Medications: Cardiovasculardrugs; beta blockers; ACE inhibitors; Digoxin;Calcium channel blocker; Antiarrhythmic agents; hypoglycemicdrugs; Opiods; CNS depressants; tricyclic antidepressants; anti-cholinergicphenothiazines; CNS stimulant.	13
	Drugof Abuse:Opioids;Cocaine;phencyclidine;marijuana;Lysergicacid.	4
	Chemical and Environmental Toxins: Hydrocarbones; Household toxins; Antiseptic; Disinfectants; Camphor; moth repellents.	3
	Botanicalsand plants-derived toxins: Herbal preparation; Toxic plants; Poisonous mushrooms.	4
College of Pharmacy **Department of Clinical Laboratory Sciences** **Title of the course: Clinical Laboratory Training Course number: 515** Level: 5th Class, 1st Semester Credit hours/week: 2 Objectives: It provides general information about the biochemical basis of disease and about the principles of laboratory diagnosis; it supplies specific guidance on the **clinical value of chemical investigations, indicating their range of application and** **limitations as well as relating results of laboratory tests to the process of clinical** **diagnosis and management as these might applied to individual patients.**		
	Diagnostic test basics, collecting&transportingspecimens, venipuncture, urinespecimen, stool specimen.	4
	Biochemical tests: Fastingbloodglucose, Post-prandial glucose,Oral glucosetolerancetest.	4
	Blood urea, Blood creatinine, Creatinine clearance, Uric acid.	4

ClinicalLaboratory Training	Cholesterol,Lipoproteins, triglycerides.	4
	Blood proteins, Bilirubin.	4
	Calcium,Inorganic phosphate, Serum chloride	4
	Alkalinephosphatase, Acid phosphatase, Alanineamiotransferase, Aspartateaminotransferase,Lactatedehydrogenase, Creatine phosphokinase.	4
	Serological tests: VDRL,ASO-Titer, Hepatitistests.	4
	C-reactiveprotein test, Rheumatic factor test, Rosebengal test, Typhoid fever test(Widal test), PregnancyTest.	4
	General urine examination, urine specimencollection.	4
	Hematological tests: RBC count, Hb, PCV, RBC indices, WBC count, Platelets count.	4
	Blood typing, Coombs test, Bleedingtime, ESR.	4
	Microbiological tests: cultureand sensitivitytests,Stainingmethods	4
	Culturemedia, Enrichedculturemedia forgeneraluse	4
	Tests foridentification ofbacteria,Disk diffusion tests of sensitivity to antibiotics, Choiceof drugs for disk test, bacterial disease and their laboratorydiagnosis.	4

Semester 2	**Lecturetitle**	**hours**
Title of the course: ***Pharmacoeconomy***Course number: **527** Level: 5th Class, 2nd Semester Credit hours/week: **Theory 2** Reference text: ***Bootman JL, Townsend RJ, McGhan WF, (Eds.), Principles of Pharmacoeconomics, 2nd ed., Harvey Whitney Books Company, Cincinnati, Oh, latest edition*** **Objectives**: The present course will give students the basic understanding of the tools needed to asses the costs and outcomes of medications and pharmaceutical care services. It will enable participants to evaluate the pharmacoeconomic and quality of life literature for the purpose of rational decision-making. Students will be exposed to the drug-focused approaches to pharmacoeconomic research and the fundamentals of quality of life research.		
Pharmacoeconomy	Course overview & basic principle of pharmacoeconomics	2
	Cost analysis	6
	Cost effectiveness analyses (CEA).	2
	1st mid-term examination.	2
	Cost utility analyses (CUA).	2
	Cost-benefit analysis (CBA)	2
	Critical assessment of economic evaluation	4
	2nd mid-term examination.	2
	Drug-focused versus disease-focused frame work for Conductingpharmacoeconomic analyses.	2
	Introduction to epidemiology.	2
	Project presentation.	2
	Projectpresentation.	2

Title of the course: Therapeutic Drug Monitoring (TDM) **Course number: 529** **Level: 5th Class: 2nd Semester** **Credit hours/week: Theory 2 , Laboratory 1** **Reference Texts:** **AppliedClinicalPharmacokinetics**, Second Edition, 2008 by Larry A. Bauer. Additional references include but not limited to the following: **Clinical Pharmacokinetics Concepts and Applications**, Third Edition, 1995 by Malcolm Rowland and Thomas Tozer;		
TherapeuticDrug Monitoring	Reviewofbasic pharmacokinetic(PK) and pharmacodynamic (PD)	2
	Clinical PK equations and calculations	3
	Clinical PKinspecial population and cases	3
	Clinical PK/PD forAminoglycosides	2
	Clinical PK/PD forVancomycin	2
	Clinical PK/PD forDigoxin	2
	Clinical PK/PD forPhenytoin	3
	Clinical PK/PD forotherAnticonvulsants (e.g., Carbamazepine, ValproicAcid, Phenobarbitone/Primidone, Ethosuxsimide	3
	Clinical PK/PD forTheophylline	2
	Clinical PK/PD forImmunossprasants(e.g., Cyclosporine, Tacrolimus	2
	Clinical PK/PD forotherCardiovascular agents (e.g., Lidocaine, Procainamide/N-AcetylProcainamide	2
	Clinical PK/PD of otherdrugs (e.g., Lithium),Anticanceragents, and Anticoagulats	4
Title of the course**: Applied Therapeutic II** Level: 5th Class, 2nd Semester Credit hours/week : Theory 2 Reference Text: Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics. Barbara G.Wells& Joseph T. Diriro, Pharmacotherapy hand book 7th Edittion		
	Thyroidand parathyroiddisorders	2
	Contraception	1

Therapeutic II	Endometriosis	1
	Menstruation related disorders	1
	Hormonal replacement therapy(HRT)	2
	Cancer treatment andchemotherapy	2
	Leukemias	2
	Lymphomas andMultiple myeloma	2
	Breast and prostatecancers	2
	Adverse effects of chemotherapy	1
	Human immunodeficiencyviruse	2
	Adrenalgland disorders	1
	Pituitarygland disorders	1
	Alzheimer's disease	1
	Schizophrenia	2
	Depressivedisorders	2
	Anxietydisorders	1
	Sleep disorders	1
	Bipolar disorders	2
	colorectalcancer	1
Department of pharmaceutics **Title of the course : pharmaceutical biotechnology** **Level 5th. Year , 2nd semester** **credit (1 hours) ,Course number 5213** **Reference : *pharmaceutical biotechnology*** ***J .A .Crommelin , Robert D. Syinder***		
pharmaceutical biotechnology	Biotechnology -introduction	1
	Formulation ofbiotechnologyproduct (biopharmaceutical consideration) Microbial consideration-sterility-pyrogen viral decontamination Excipients of parentral products -solubility enhancer-anti adsorption agents buffer components-preservatives – osmotic agents	4
	Route ofadministration Parentral route Oral routeAlternative routes (nasal-pulmonary-rectal-buccal transdermal)	5

	Pharmacokinetic ofpeptides and proteins Introduction,Elimination ofproteins (proteolysis-excretion-metabolism)	5
Title of the course: ***Dosage form Design*** **Course** number: **5212** Level: 5th Class, 2nd Semester Credit hours/week : **Theory 2** Reference text: ***Pharmaceutical Dosage Forms and Drug Delivery Systems by Haward A. Ansel.*** **Objectives**: This course enables students to understand the principles and factors that influence design dosage forms; and the applications of these principles in the practice of pharmaceutical industry.		
Dosage form Design	Pharmaceutical consideration: Theneed for thedosageform.	1
	General consideration for thedosageform.	3
	Pre-formulation; physical description, microscopic examination.	2
	Meltingpoint; phaserule; particle size; polymorphism; solubility.	2
	Permeability; pH; partition coefficient; pka; stability; kinetics; shelf	2
	Rate reaction; enhancing stability.	2
	Formulation consideration: Excipients; definitionand types; appearance; palatability;flavoring.	2
	Sweetening; coloringpharmaceuticals; preservatives; sterilization; preservatives selection.	2
	Biopharmaceuticalconsiderations: Principleof drugabsorption**;** dissolution of thedrugs**.**	4
	Bioavailabilityand bioequivalancy;FDA requirements.	3
	Assessment of bioavailability;	3
	Pharmacokinetic principles: Half life; clearance;dosage regimen considerations.	4

Title of the course: ***Advanced Pharmaceutical Analyses*** **Course** number: **5210**

Level: 5th Class, 2nd Semester

Credit hours/week : **Theory 3** **Laboratory 1**

Reference text: ***1. Spectrometric Identification of Organic Compounds by Silverstein, Bassler and Morrill; 2. Applications of absorption spectroscopy of organic compounds by Dyer JR. 3. Organic Chemistry by McMurry; 5thed; Thomason learning CA, USA 2000.***

Objectives: To study spectrometric methods used for identification and characterization of organic compounds, including UV, IR, MASS and NMR spectroscopy; it enables students to understand the applications of these techniques for qualitative and quantitative analysis of organic compounds.

Advanced pharmaceutical Analyses	UV/ visiblespectroscopy;Samplehandlingand instrumentation; Characteristic absorptionof organiccompounds; Rules for calculation oflambdamaxand application; Application of UV/visible; spectroscopy; Problems and solutions.	6
	InfraRed spectroscopy(theoryand H-bonding effect; Sampling techniques and interpretation ofspectra; Characteristic group frequencies oforganic compounds;Application ofIRspectroscopy; Problems and solutions.	14
	H^1 –NucleomagneticResonance(NMR) and C^{13}-NMRspectroscopy; Introduction, the natureof NMR absorption, chemical shifts and factors affectingthem, information obtained fromNMR spectra, more complexspin-spin splittingpatterns, application of H_1-NMR spectroscopy; C_{13}-NMR spectroscopy: introduction and characteristics, DEPT C^{13}- NMR spectroscopy.	12
	Mass spectroscopy:Introduction and interpretingMass spectra; interpretingMass spectrafragmentation patterns,Mass behavior of some common functionalgroups.	11
	elemental microanalysisCHNSO	2