منهاج كلية الصيدلة – جامعة بغداد / تحديث 2017-2018				
المرحلة الاولى / عدد الوحدات 35				
الفصل الدراسي	**اسم المادة**	**عدد الساعات النظري**	**عدد الساعات العملي**	**عدد الوحدات**
الفصل الاول	**Human Biology***	**2**	**2**	**3**
الفصل الاول	**Principles of Pharmacy Practice**	**2**		**2**
الفصل الاول	**Analytical Chemistry'**	**3**	**2**	**4**
الفصل الاول	**Medical Terminology**	**1**		**1**
الفصل الاول	**Mathematics and Biostatistics**	**3**		**3**
الفصل الاول	**Computer Sciences****		**2**	**1**
الفصل الاول	**English language****	**2**		**2**
الفصل الثاني	**Human Anatomy ***	**1**	**2**	**2**
الفصل الثاني	**Pharmaceutical Calculations**	**2**	**2**	**3**
الفصل الثاني	**Medical Physics**	**2**	**2**	**3**
الفصل الثاني	**Organic Chemistryl***	**3 **	**2**	**4**
الفصل الثاني	**Histology***	**2**	**2**	**3**
الفصل الثاني	**Human Rights**	**1**		**1**
الفصل الثاني	**Computer Sciences****		**2**	**1**
الفصل الثاني	**English language****	**2**		**2**

المرحلة الثانية / عدد الوحدات 42				
الفصل الدراسي	**اسم المادة**	**عدد الساعات النظري**	**عدد الساعات العملي**	**عدد الوحدات**
الفصل الاول	**Organic Chemistry II***	**3**	**2**	**4**
الفصل الاول	**Medical Microbiology J**	**3**	**2**	**4**
الفصل الاول	**Physical Pharmacy I**	**3**	**2**	**4**
الفصل الاول	**Physiology I**	**3**	**2**	**4**
الفصل الاول	**Democracy****	**1**		**1**
الفصل الاول	**Computer Sciences****		**2**	**1**
الفصل الاول	**English language****	**2**		**2**
الفصل الثاني	**Organic Chemistry IH***	**2**	**2**	**3**
الفصل الثاني	**Medical Virology parasitology and Immunology**	**3**	**2**	**4**
الفصل الثاني	**Physical Pharmacy II**	**3**	**2**	**4**
الفصل الثاني	**Physiology II**	**3**	**2**	**4**
الفصل الثاني	**Pharmacognocy I ***	**3**	**2**	**4**
الفصل الثاني	**Computer Sciences****		**2**	**1**
الفصل الثاني	**English language****	**2**		**2**

المرحلة الثالثة/ عدد الوحدات 41				
الفصل الدراسي	اسم المادة	عدد الساعات النظري	عدد الساعات العملي	عدد الوحدات
الفصل الاول	**Inorganic pharmaceutical Chemistry***	2	**2**	3
الفصل الاول	**Pharmacognocy TT**	**2**	**2**	**3**
الفصل الاول	**Pharmaceutical Technology' I**	**3**	**2**	**4**
الفصل الاول	**Biochemistry I**	**3**	**2**	**4**
الفصل الاول	**Pathophysiology**	**3**	**2**	**4**
الفصل الاول	**English language****	**2**		**2**
الفصل الثاني	Organic Pharmaceutical Chemistry I	**3**	**2**	**4**
الفصل الثاني	**Pharmacology I**	**3**		**3**
الفصل الثاني	**Pharmaceutical Technology II**	**3**	**2**	**4**
الفصل الثاني	**Biochemistry n**	**3**	**2**	**4**
الفصل الثاني	**Pharmacognocy III***	**2**	**2**	**3**
الفصل الثاني	**Pharmacy Ethics****	**1**		**1**
الفصل الثاني	**English language****	**2**		**2**

المرحلة الرابعة / عدد الوحدات 38				
الفصل الدراسي	اسم المادة	عدد الساعات النظرى	عدد الساعات العملى	عدد الوحدات
الفصل الاول	**Pharmacology II**	**3**	**2**	**4**
الفصل الاول	**Organic Pharmaceutical Chemistry II***	**3**	**2**	**4**
الفصل الاول	**Clinical Pharmacy I***	**2**	**2**	**3**
الفصل الاول	**Biopharmaceutics**	**2**	**2**	**3**
الفصل الاول	**Public Health***	**2**		**2**
الفصل الاول	**English language****	**2**		**2**
الفصل الثاني	**Pharmacology III**	**2**		**2**
الفصل الثاني	**Organic Pharmaceutical Chemistry HI**	**3**	**2**	**4**
الفصل الثاني	**Clinical Pharmacy n***	**2**	**2**	**3**
الفصل الثاني	**General Toxicology**	**2**	**2**	**3**
الفصل الثاني	**Industrial Pharmacy I**	**3**	**2**	**4**
الفصل الثاني	**Communication skill***	**2**		**2**
الفصل الثاني	**English language****	**2**		**2**

المرحلة الخامسة / عدد الوحدات 35				
الفصل الدراسي	اسم المادة	عدد الساعات النظرى	عدد الساعات العملى	عدد الوحدات
الفصل الاول	**Organic pharmaceutical chemistry**	**2**		**2**
الفصل الاول	**Industrial Pharmacy II**	**3**	**2**	**4**
الفصل الاول	**Applied therapeutics I***	**3**		**3**
الفصل الاول	**Clinical chemistry**	**3**	**2**	**4**
الفصل الاول	**Clinical laboratory training**		**2**	**2**
الفصل الاول	**Clinical toxicity**	**2**	**2**	**3**
الفصل الاول	**Project ****	**1**		**1**
الفصل الثاني	**Pharmacoeconomic**	**2**		**2**
الفصل الثاني	**Applied therapeutics II***	**2**		**2**
الفصل الثاني	**Therapeutic drug Monitoring**	**2**	**2**	**3**
الفصل الثاني	**Advance pharmaceutical analysis ***	**3**	**2**	**4**
الفصل الثاني	**Hospital training**		**2**	**2**
الفصل الثاني	**Dosage form design**	**2**		**2**
الفصل الثاني	**Pharmaceutical biotechnology**	**1**		**1**

University of Baghdad- College of Pharmacy		Syllabus
First stage		
1st semester	**Lecture title**	**Hours**
Title of the course: **Human Biology** 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 & the blood , immunity to disease)	3
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;	4
	The evaluation of analytical data: Definition of	1
	An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods;	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; coordinate and graph in plane; inequality; absolute value or magnitude; function and their graphs; displacement function; slope and equation for lines.	6
	Limits and continuity: Limits; theorem of limits; limit involving infinity; continuity; continuity conditions.	4
	Derivatives: Line tangent and derivatives; differentiation rules; derivative of trigonometric function; practice exercises.	6
	Integration: Indefinite integrals; rules for indefinite integrals; integration formulas for basic trigonometric function; definite integrals; properties of definite integrals; practice exercises.	6
	Biostatistics: General concepts of statistics; statistical methods; statistical theory; applied statistics; statistical operations.	2
	Probability concepts: Properties of probability; Set theory and set notation (basic notation); counting techniques- permutations and combinations; calculating the probability of an events; probability distribution of discrete variable; binomial distribution, Poisson distribution; continues probability distribution and normal distribution, review questions and exercises.	6
	The concept of central tendency: Mean of sample and mean of population; median; mode; measure of central tendency; review questions and exercises.	6
	Deviations and variation: Deviation; dispersion and variability; standard deviation and variance; coefficient of variations; standard error; correlation analysis.(regression model and sample regression equation); application of statistic in medical field; review questions 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 and common suffixes	1
	More word roots, suffixes and prefixes related to pharmaceutical sciences (pharmacognosy, clinical pharmacy, pharmaceutics,…etc)	1
	Basic anatomical terms and abnormal conditions	2
	The genitals and urinary tract	1
	The gastrointestinal tract	1
	The heart and cardiovascular system	1
	Symptoms, diagnoses, treatments, communication qualifiers, and statistics	2
	Growth and development, and body orientation	1
	Gynecology, pregnancy, and childbirth	1
	The eye and the respiratory tract	1
	The nervous system and behavioral 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

First stage

2nd semester	**Lecture title**	**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 of vascular system (Heart, Arteries, Veins)	1
	Circulatory system: Location of lymphatic system (Lymphatic capillary).	1
	Lymphoid tissue: location of the (Thymus gland, Spleen & Lymph nodes)	1
	Lymphoid nodule (MALT) & Tonsils	1
	Nervous system: Central & Peripheral nervous system by location	1
	Respiratory system: -Conducting portion (Nose, Nasopharynx, Trachea Bronchus & Bronchioles). -Respiratory portion (Lung)	1
	Digestive system: -location of different parts of digestive tract (GIT) (Oral cavity, Mouth, Esophagus & Stomach) -Small intestine, Large intestine, Rectum & Anus.	2
	Digestive system: Glands associated with the digestive tract by location (Salivary glands, Pancreas, Liver & Gall bladder).	1
	Endocrine system: -location of the pituitary gland -location of the Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands.	1

	Male reproductive system: -location of the testes. -Excretory genital ducts -Excretory genital glands (Seminal vesicles, Prostate & Cowper's glands)	2
	Female reproductive system: -location of ovary, Oviduct, Uterus & Vagina.	2
	Urinary system: -location of the (kidney & nephrone) - location of the (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
	Electrolyte solutions (milliequivalents, millimoles and milliosmoles).	6
	Constituted solutions, I.V admixtures and 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 of physics and standards; thermodynamics system and system properties; conservation of energy principle; application of thermodynamics; the Zeroth law.	3
	Pressure; temperature and temperature scales (Celsius, Fahrenheit, Kelvin); equation of state; ideal gas and real gas; general law of gases; clauses equation and Vander Waales equation; equilibrium and types of equilibrium; compressibility factor, coefficient of volume expansion, elastic coefficient (bulk modulus).	6

	Heat and energy; work and mechanical forms of work; power; the 1st law of thermodynamics; Boyles and Charles law; practice exercises.	3
	The 2nd law of thermodynamics; reversible and irreversible process; entropy and enthalpy; internal energy; heat capacity and adiabatic process; the relation between pressure, volume, and temperature in	6
	Fundamental of physics: Kinetic theory of a gas; electromagnetic waves; Maxwell equations; physical optics.	6
	Radiation: Kirshoffs law; planks law; Stefan-Boltzman law; Wiens law; Black body and Albedo; Heat transfer (radiation, convection, conduction).	6
	Production of X-Ray and X-Ray spectra; absorption of X-Ray; U.V and 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 Chemistry I	Introduction.	3
	Alkanes and methane.	6
	Alkenes I and II	5
	Alkynes and dienes.	5
	Stereochemistry I & 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

Histology	**Circulatory system:** Structure of the vascular system (Heart wall, Arteries, Veins & Capillaries)	2
	Circulatory system: Structure of the lymphatic system (Lymphatic capillary).	1
	Lymphoid tissue: Structure & function of the (Thymus gland, Spleen & Lymph nodes)	1
	Lymphoid nodule (MALT) & Tonsils	1
	Nervous system: Central & Peripheral nervous system	3
	Respiratory system: -Conducting portion (Nose, Nasopharynx, Trachea Bronchus & Bronchioles). -Respiratory portion (Lung)	3
	Digestive system: -Digestive steps. -General structure of the digestive tract (GIT) (Oral cavity, Mouth, Esophagus & Stomach) -Small intestine, Large intestine, Rectum & Anus.	3
	Digestive system: Glands associated with the digestive tract (Salivary glands, Pancreas, Liver & Gall bladder0.	1
	Endocrine system: -General structure of the pituitary gland -Histophysiologies of the pituitary gland.	2
	Endocrine system: -General structure of the Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands.	2
	Male reproductive system: -General structure of the testes. -Stages of spermatogenesis.	2

	Male reproductive system: -Excretory genital ducts-Excretory genital glands (Seminal vesicles, Prostate & Cowper'sglands)	1
	Female reproductive system: -General structure of ovary, Oviduct, Uterus & Vagina. -Stages of follicle development.-Ovulation	3
	Urinary system: -Structure & Function of the (kidney & nephrone) -Histology of the nephrone (filtration, absorption & excretion). - Structure of the (Ureter, Bladder & Urethra).	3
	The skin 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 Baghdad- College of Pharmacy		Syllabus
	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.		
1	**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: *1.**Medical Microbiology, seventeenth edition E .Jawetz, J.L. Melnick, E.A. Adel 1987 & 2. Principles of microbiology by Roland M***.		
	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 (*B. anthracis*, *B. subtilis*, *B. cereus*).	2
		Clostridium perfringens; *Clostridium tetani*; *Clostridium botulinun*	3

	Corynebacterium diphtheriae	2
	Propionibacterium acnes, Listeria	2
	Mycobacterium tuberculosis; *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.

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

	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.	8
	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 execration; regulation of Na^+, K^+ and Cl^- excretion; uremia; acidosis; micturition.	8
	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.	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.

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
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.***		
Pharmacognosy I	General Introduction: The Scope of Pharmacognosy, definitions and basic principles.	3
	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

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.

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 complicate reactions that involve heteroatoms.	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
Organic ChemistryIII	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
Title of the course: ***Medical MicrobiologyII*** **(Medical Virology, immunology, and Parasitology)** 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 Chilomastix)	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, Entrobius. 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
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 in improvement of various modes of administration. **Physical PharmacyII**	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 eight averages.	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.

Physiology II	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
	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
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 Baghdad- College of Pharmacy		Syllabus
Third stage		
1st semester	**Lecture title**	**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 molecular structure/ Complexation.	6
	Essential and trace ions: Iron, copper, sulfur, iodine.	3
	Non essential ions: Fluoride, bromide, lithium, gold, silver and mercury.	2
	Gastrointestinal agents: Acidifying agents.	1
	Antacids.	2
	Protective adsorbents.	1
	Topical agents.	2
	Dental agents.	1
	Radiopharmaceutical preparations.	6
	Radio opaque and 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, physical and chemical properties; cardiac glycosides; saponin glycosides; anthraquinone glycosides; flavonoid glycosides; cyanophore lycosides.	5
	Glycosides: Isothiocyanate glycosides; aldehyde glycosides; alcoholic glycosides; phenolic glycosides; lactone glycosides; coumarins and chromones.	5
	Resins and resin combination; tannins.	2
	Lipids: fixed oils and waxes.	2
	Volatile oils: Introduction; chemistry of volatile oils; biosynthesis of volatile oils; hydrocarbons as volatile oils; alcohols as volatile oils; aldehydes as volatile oils.	4
	Ketones as volatile oils; Phenols as volatile oils; Oxides as volatile oils; Ester as volatile oils; Phenolic ethers as volatile oils.	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 By Haward 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: their classification; comparisons between different systems.	2
	Solutions and types of solutions.	2
	Solubility: Factors affecting solubility; expression of dissolution; dissolution rate versus solubility; preparation of solutions containing non-volatile materials.	4
	Official solutions; classification of official solutions; preparation and uses.	4
	Aqueous solutions containing aromatic principles; aromatic waters; methods of preparations; stability.	4
Pharmaceutical Technology I	Syrups: sugar based syrups; artificial and sorbitol based syrups; stability of syrups.	4
	Definition and methods of clarification; filter aids in clarification.	3
	Preparation of solutions using mixed 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
	Coarse dispersion; 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.		
Biochemistry I	Introduction to the macromolecules biochemistry: Definitions and terms; proteins, enzymes, DNA; Clinical value.	2
	Amino acids: Structures of A.A (table of standard A.A abbreviation and side chain); Classification, properties, isomerism.	3
	Amino acids: Chemical reactions, Zwitter ions, titration curve calculating isoelectric point values. Examples and questions. Non standards A.A: Structures, existence and clinical value.	3
	Peptides: Peptide bond, resonance forms, isomers, physical properties and chemical reactions. Essential poly peptides in human body, structures, roles and clinical values.	3
	Proteins: Structure and conformations of proteins, Primary structure, Secondary structure (4 helix, 5 sheet), tertiary structure, quaternary structure. Classification, synthesis, cellular functions (Enzymes, cell signaling, and ligand transport, structural proteins), protein in nutrition.	3
	Denaturation of proteins and 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, structure predication and simulation.	3
	Carbohydrates: Chemistry and classification, biomedical importance, classification of CHO, Stereochemistry of monosaccharides, metabolism of CHO; Physiologically important monosaccharides, glycosides, disaccharides, polysaccharides.	3

	Lipids: Introduction, classification of lipids, fatty acids (F.A), nomenclature of F.A, saturated F.A, unsaturated F.A, physical and physiological properties of F.A, metabolism of lipids. Phospholipids, lipid peroxidation and antioxidants, separation and identification of lipids, amphipathic lipids.	3
	Enzymes: Structures and mechanism, nomenclature, classification, mechanisms of catalysis, thermodynamics, specificity, lock and key model, induced fit model, transition state stabilization, dynamics and function, allosteric modulation. Biological function, cofactors, coenzymes, involvement in disease.	3
	Kinetics: General principles, factors effecting enzyme rates (substrate conc., pH, temperature, etc), single-substrate reaction (Michaelis-Menten kinetics), kinetic constants. Examples of kinetic questions and solutions.	2
	Enzyme inhibition: Reversible inhibitors, competitive and non competitive inhibition, mixed-type inhibition, Irreversible inhibition. Inhibition kinetics and binding affinities (*k*i), questions and solutions.	1
	Control of activity and uses of inactivators; multi-substrate reactions, ternary-complex mechanisms, ping-pong mechanisms, non-Michaelis- Menten kinetics, pre-steady-state kinetics, chemical mechanisms.	1
	Nucleic Acid: Chemical structure, nucleic acid components, nucleic acid bases, nucleotides and deoxynucleotides (Properties, base pairing, sense and antisense, super-coiling, alternative structures, quadruple structures.	3
	Biological functions of DNA: Genes and genomes, transcription and translation, replication.	2
	Biochemistry of extracellular and intracellular communication: Plasma membrane structure and function; Biomedical importance, membrane proteins associated with lipid bilayer, membranes protein composition, dynamic structures of membranes, a symmetric structures of membranes.	3
	Artificial membranes model, the fluid mosaic model, membrane selectivity, physiological functions of plasma membranes.	1
	Biochemistry of the endocrine system: Classification of hormones, biomedical importance, the target cell concept and hormone receptors, biochemistry of hormone action and signal transduction.	3

	Special topics: Nutrition, digestion, and absorption. Biomedical importance, digestion and absorption of carbohydrates, lipids, proteins, vitamins and minerals; energy balance. Biochemistry of 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 : Dr Ajwad Awad Muhammad and Dr. Nathera Mohammad Ali Reference text: ***Essentials in Pathophysiology by: Carol Mattson Porth 2nd Ed.and pathophysiologly 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).		
Pathophysiology	Introduction.	1
	Cell injury and tissue response; Degeneration; Necrosis; Atrophy; Hypertrophy; Metaplasia and Calcification; Inflammation and Repair.	6
	Disorders of electrolytes and water and acid–base balances: Hyper And Hyponatremia; Hyper and Hypokalemia; Syndrome of inappropriate secretion of ADH; Diabetes insipidus; Metabolic acidosis and alkalosis; Respiratory acidosis and alkalosis.	4
	Disorders of cardiovascular system: Hyperemia; Congestion and edema; Thrombosis; embolism and infarction; Shock; Coronary heart disease and MI; Rheumatic heart disease; Heart failure; Acute pulmonary edema; Essential hypertension; Secondary hypertension; Malignant hypertension; Hypotension; Aneurysm versus varicose veins;	5
	Disorders of respiratory system: Pneumonias; Tuberculosis; Respiratory distress syndrome; Bronchial asthma; Emphysema and bronchiectasis; Cystic fibrosis; Pulmonary embolism; Pulmonary hypertension.	3
	Disorders of the renal system: Nephrotic syndrome; Glomerulonephritis; Diabetic glomerulosclerosis; Hypertensive glomerular disease; Pyelonephritis; Drug related nephropathies; Acute renal failure; Chronic renal failure.	4

	Disorders of GI and hepatobiliary systems: Peptic ulcer and Zollinger –Ellison syndrome; Irritable bowel syndrome; Crohn's disease; Diarrhea; Celiac disease; Viral hepatitis; Primary biliary cirrhosis; Liver failure; Cholelithiasis.	4
	Disorders of thyroid function: Hypothyroidism. Hyperthyroidism. Graves's disease. Thyrotoxicosis.	2
	Disorders of adrenal function: Cushing syndrome. Adrenal cortical Insufficiency (primary and secondary). Congenital adrenal 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	Lecture title	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.*** level, molecular To enable understanding mechanisms of drug action at :**Objectives** the role of medicinal chemistry in the discovery and development of synthetic and structure- therapeutic agents. It also enables students to understand the concept of of new compounds activity relationship and its application in design and synthesis or derivatives.		
Organic Pharmaceutical Chemistry I	Drug distribution.	4
	Acid- base properties.	3
	Statistical prediction of pharmacological activity.	3
	QSAR models.	2
	Molecular modeling (Computer aided drug design).	1
	Drug receptor interaction: force involved.	1
	Steric features of drugs.	2
	Optical isomerism and biological activity.	1
	Calculated conformation.	1
	Three- dimensional quantitative structure activity relationships and databases.	1
	Isosterism.	1
	Drug-receptor interaction and subsequent events.	1
	General pathways of drug metabolism: Sites of drug biotransformation; Role of cytochrome P450 mono-oxygenases in oxidative biotransformation; Oxidative reactions; Reductive reactions; Hydrolytic reactions; Phase II reactions.	22
	Factors affecting drug metabolism.	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
	Drug Receptor interaction and Pharmacodynamics. The autonomic nervous system (ANS).	4 2
	Cholinergic system.	6
	Adrenergic system.	6
	Principal of antimicrobial therapy.	2
	β- lactam and other cell wall synthesis inhibitor antibiotics	4
	Protien synthesis inhibitors	4
	Quinolones, Folate antagonists, and urinary tract antiseptics.	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 By Haward 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 Technology II	Emulsions; purpose of emulsification; methods of emulsification; emulsifying agents; HLB system; stability of emulsions.	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.		
Biochemistry II	Bioenergetics.	2
	Biologic oxidation.	2
	The respiratory chain and oxidative phosphorylation.	2
	Over view of metabolism.	2
	Citric acid Cycle.	2
	Glycolysis.	2
	Metabolism of glycogen.	4
	Gluconeogenesis.	3
	Pentose phosphate pathway and other pathways of hexose metabolism.	3
	Biosynthesis of fatty acids.	3
	Oxidation of fatty acids.	2
	Metabolism of acylglycerol and sphingolipids.	2
	Lipid transport and storage.	2
	Cholesterol synthesis, transport, and excretion.	2
	Biosynthesis of the Nutritionally Nonessential Amino Acids.	3
	Catabolism of Proteins & of Amino Acid Nitrogen	3

	Catabolism of the Carbon Skeletons of Amino Acids.	2
	Conversion of Amino Acids to Specialized Products.	2
	Porphyrins & Bile Pigments	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.		
Pharmacognosy III	Alkaloids: Introduction; Physical and chemical properties; pyridine, piperidine alkaloids; tropane alkaloids.	5
	Alkaloids: Quinoline tropan alkaloids; iso-quinoline alkaloids; imidazole alkaloids; indole alkaloids.	5
	Alkaloids: Steroidal alkaloids; lupinane alkaloids; alkaloidal amines; purine alkaloids.	4
	Antibiotics: Natural sources; biosynthetic pathways, isolation and purification.	6
	.phytotherapy :Introduction , principles,medicinal plants in selected health care systems.Important natural products & phytomecines used in pharmacy & medicine	10

<table>
<tr><td colspan="2">Title of the course: Medical ethics Course 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.
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<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="9">Pharmacy Ethics</td><td>Introduction to Pharmacy Ethics (Theoretical considerations).</td><td>2</td></tr>
<tr><td>Code of Ethics for Pharmacists.</td><td>1</td></tr>
<tr><td>Common Ethical Considerations in Pharmaceutical Care Practice (Beneficence, Autonomy, Honesty, Informed Consent, Confidentiality, Fidelity ……).</td><td>3</td></tr>
<tr><td>Interprofessional Relations.</td><td>2</td></tr>
<tr><td>Making ethical decisions.</td><td>1</td></tr>
<tr><td>Ethical issues related to clinical pharmacy research.</td><td>1</td></tr>
<tr><td>Ethical problems in the pharmacist’s clinical practice.</td><td>1</td></tr>
<tr><td>Preventing misuse of medicines.</td><td>1</td></tr>
<tr><td>Case studies in pharmacy ethics.</td><td>3</td></tr>
<tr><td>English language</td><td></td><td></td></tr>
</table>

University of Baghdad- College of Pharmacy		Syllabus
Fourth stage		
1st semester	**Lecture title**	**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.		
Pharmacology II	Introduction to CNS pharmacology**.**	2
	CNS stimulants.	2
	Anxiolytic and Hypnotic drugs.	3
	General and Local Anesthetics.	3
	Antidepressant drugs.	3
	Antipsychotic (neuroleptic) drugs.	3
	Opioid analgesics and antagonists.	3
	Treatment of neurodegenerative diseases.	3
	Antiepileptic Drugs.	2
	Diuretics.	2
	The treatment of heart failure (HF).	2
	Antiarrhythmic drugs.	2
	Antianginal Drugs.	2
	Antihypertensive drugs.	3
	Drugs affecting the blood.	3
	Antihyperlipidemic drugs.	2
	Gastrointestinal and antiemetic drugs.	2
	Drugs acting on the respiratory system.	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.*** **discovery and development of new agents for The course is devoted to the** :**Objectives translating the drug structural formula into therapeutic treating diseases, and enables pharmaceutical Additionally, it focuses on the methods of preparation for some effect. agents.**		
organic pharmaceutical chemistry II	Cholinergic agents, cholinergic receptors and their subtypes.	3
	Cholinergic agonists; stereochemistry and structure-activity relationships (SAR); products; cholinesterase inhibitors.	5
	Cholinergic blocking agent; structure-activity relationships (SAR); Solanaceous alkaloid and analogues; synthetic cholinergic blocking agents and products; ganglionic blocking agents (neuromuscular blocking agents).	5
	Analgesic agents (SAR of morphine, SAR of meperidine type molecules; SAR of methadone type compounds; N-methylbezomorphans, antagonist type analgesics in benzomorphans).	5
	Analgesic receptors, endogenous opioids; Products; Antitusive agents; Anti-inflammatory analgesics.	5
	Adrenergic agents (Adrenergic neurotransmitters); Adrenergic receptors; Drugs affecting Adrenergic neurotransmission; Sympathomimetic agents; Adrenergic receptor antagonists.	8
	CNS depressant; Benzodiazepines and related compounds; Barbiturates; CNS depressant with skeletal muscle relaxant properties; Antipsycotics; Anticonvulsants.	7
	CNS Stimulants	3
	Steroidal & nonsteroidal hormones	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. Lor waterfield, Community Pharmacy Hand Book, 5th edition		
	Introduction to community pharmacy.	1
	Respiratory problems: Cough, Common cold, allergic rhinitis, Otitis media, Laryngitis & Pharyngitis	3

Clinical Pharmacy1	G.I.T problemse: Diarrhea, Constipation, Heart burn and indigestion, IBS and Hemorrhoids	4
	Pediatric care practice : Oral thrush, pinworms and head lice	2
	Skin conditions: Acne, Scabies, Psoriasis, Hair loss, Fungal infection, Eczema and Dermatitis , Dandruff, Cold sore, Corns and Callus.	5
	Women's health care: Cystitis and vaginal thrush, primary dysmenorrhea and Premenstrual syndrome.	2
	CNS related problems: Headache, Insomnia, Motion sickness, Nausea and vomiting	3
	- Eye problems	1
	ENT problems	1
	Oral hygiene, mouth ulcer	1
	Obesity and body weight control.	1
	- Pain and musculoskeletal disorders	1
	Nicotine replacement therapy (NRT).	1
	Dietary supplements	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
	Biopharmaceutic aspects of products; drug absorption; mechanisms of absorption; physicochemical factors; dissolution rate; effects of excipients; type of dosage forms.	6
	One compartment open model.	2
	Multicompartment models.	2

	Pharmacokinetics of drug absorption.	2
	Bioavailability and bioequivalence.	2
	Clearance of drugs from the biological systems.	2
	Hepatic elimination of drugs.	2
	Protein binding of drugs.	2
	Intravenous infusion	2
	Multiple dosage regimens.	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	**Lecture title**	**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 and Elements of Interpersonal Communication	2
	Nonverbal type of communication.	2
	Barriers to communication.	2
	Listening and empathic responding during communication.	2
	Assertiveness.	2
	Interviewing and assessment.	2
	Helping patients to manage therapeutic regimens.	2
	Patient counseling; counseling check list; point-by-point discussion; counseling scenario.	2
	Medication safety and communication skills.	2
	Strategies to meet specific needs.	2
	Communicating with children and elderly about medications.	2
	Communication skills and inter-professional collaboration.	2
	Electronic communication in healthcare.	2
	Ethical behavior when communicating with patients.	2
	Travel health	1
	Health insurance	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.

Pharmacology III	Hormones of the pituitary and thyroid glands.	3
	Insulin and oral hypoglycemic drugs.	4
	Adreno-corticosteroids.	3
	The gonadal hormones and inhibitors.	3
	Autacoids and autacoid antagonists	3
	Non-steroidal anti-inflammatory drugs (NSAIDs) and other anti-inflammatory agents.	3
	Drugs used in erectile dysfunction.	2
	Drugs used in osteoporosis.	2
	Drugs used in the management of obesity.	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.***

Organic Pharmaceutical Chemistry III	β-Lactam antibiotics (Penicillins); β-Lactamase inhibitors; Cephalosporins and Monobactams	9
	Aminoglycosides and Chloramphenicol; Tetracyclines; Macrolides; Lincomycins and Polypeptides; Antiviral agents (properties of viruses, viral classification, products).	9
	Sulfonamides (chemistry, nomenclature, mechanism of action, resistance, toxicity, side effects, metabolism, protein binding, distribution and SAR); products; Sulfones.	4
	Anti-neoplastic agents: Alkylating agents; Antimetabolites; Antibiotics; Plant products; Miscellaneous compounds.	17
	Hormones and related compounds; Future anti-neoplastic agents; Monoclonal antibodies; Gene therapy of cancer.	6

Objectives: To enable understanding mechanisms of drug action, including antibacterial, antifungal and antiviral agents, at molecular level, 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.

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 professional responsibilities.(including current state of clinical pharmacy in Iraq) .	**1**
	overview of pharmaceutical care practice (the patient care process).	**1**
	Hematologic disorders: Anemia and sickle cell disease.	**2**
	Hypertension.	**2**
	Ischemic heart diseases	**2**
	Heart failure.	**2**
	Peripheral vascular diseases.	**1**
	- Asthma.	**2**
	Chronic obstructive pulmonary disease (COPD).	**1**
	Diabetes mellitus & Diabetic ketoacidosis (DKA) .	**2**
	Peptic ulcer disease.	**2**
	Tuberculosis	**1**
	Infective meningitis	**1**
	Respiratory tract infections	**2**

	GIT infections	**1**
	Gout and hyperuricemia	**1**
	Rheumatoid arthritis (RA) and osteoarthritis (OA)	**2**
	Osteoporosis and other metabolic bone disease.	**1**
	Infectious Endocarditis	**1**
	Surgical antibiotic prophylaxis	**1**
	Urinary tract 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.		
General Toxicology	Introduction: general consideration; host factor, environmental factors of toxic effects.	3
	Carcinogenesis.	3
	Mutagenesis:	1
	Target organs and systemic toxicology; Respiratory system, Liver, Kidney, Skin, Nervous system, cardiovascular system, Blood.	16
	Toxic substances: Food additive and contaminants, Pesticides, Metals, Radiation and radio active materials, plants, Solvents,	15
	Environmental toxicology: Air pollution, water and soil pollutants, Gases (Tear gas, Pepper spray), 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.		
Industrial Pharmacy I	Principles of pharmaceutical processing; mixing; fluid mixing; flow characteristics; mechanisms of mixing; mixing equipments; batch and continuous mixing; mixer selection; solid mixing theory and particulate solid variables; forces and mechanisms.	7
	Milling; pharmaceutical application; size measurement methods; Theory and energy of commenution; types of mills; factors influencing milling; selection of mill techniques; specialized drying methods.	7
	Drying: definition; purpose; humidity measurement; theory of drying; drying of solids, and classification of dryer; specialized drying methods.	7
	Clarification and filtration: Theory; filter media; filter aids; selection of drying method; non-sterile and sterile operations; integrity testing; equipments and systems (commercial and laboratory).	7
	Sterilization; validation of methods; microbial death kinetics; Methods of sterilization (thermal and non-thermal); mechanisms; evaluation.	7
	Pharmaceutical dosage form design; pre-formulation; preliminary evaluation; bulk characterization; solubility and stability analysis.	3
	Pharmaceutical dosage forms; sterile products; development; formulation; production; processing; quality control.	7
English language		

University of Baghdad- College of Pharmacy **Syllabus**

Fifth stage

1st semester	Lecture title	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.		
Organic Pharmaceutical Chemistry IV	Basic concept of prodrugs; Covalent bonds (cleavable); Prodrugs of functional groups; Types of prodrugs.	6
	Chemical delivery systems; Polymeric prodrugs; Types and structure of polymers; Cross-linking reagents.	6
	Drug targeting.	4
	Project.	4
	Combinatorial chemistry; Peptides and other linear structures; Drug like molecules; Support and linker; Solution-phase combinatorial chemistry.	5
	Detection, purification and analgesics; Encoding combinatorial libraries; High-throughput screening; Virtual screening; Chemical diversity and library design.	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 Pharmacy II	Pharmaceutical dosage forms: Tablets; role in therapy; advantages And disadvantages; formulation; properties; evaluation; machines used in tableting; quality control; problems; granulation, and methods of production; excipients, and types of tablets.	10
	Tablet coating; principles; properties; equipments; processing; types Of coating (sugar and film); quality control, and problems.	4
	Capsules: Hard gelatin capsules; materials; production; filling equipments; formulation; special techniques.	3
	Soft gelatin capsules: Manufacturing methods; nature of capsule shell and content; processing and control; stability.	2
	Micro-encapsulation; core and coating materials; stability; equipments and methodology.	2
	Modified (sustained release) dosage forms; theory and concepts; evaluation and testing; formulation.	3
	Liquids: Formulation; stability and equipments.	3
	Suspensions: Theory; formulation and evaluation.	3
	Emulsions: Theory and application; types; formulation; equipments And quality control.	3
	Semisolids: Percutaneouse absorption; formulation; types of bases (vehicles) preservation; processing and evaluation.	3
	Suppositories: Rectal absorption; uses of suppositories; types of bases; manufacturing processes; problems and evaluation.	3
	Pharmaceutical aerosols: Propellants; containers; formulation; types And selection of components; stability; manufacturing; quality control 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:
Applied Clinical Pharmacokinetics, 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;

Therapeutic I	Interpretation of Lab. data.	2
	Acute coronary syndrome.	2
	Arrhythmias	2
	Thrombosis	2
	Dyslipidemia	1
	Stroke	2
	Shock	2
	Liver cirrhosis	2
	Viral hepatitis	1
	Inflammatory bowel diseases	2
	Acute renal failure (ARF)	1
	Chronic renal failure (CRF)	2
	Hemodialysis and peritoneal dialysis	1
	Systemic lupus erythematosis (SLE)	1
	Benign prostatic hyperplasia (BPH)	1
	Acid – base disorders	2
	Disorders of fluid and electrolytes	2
	Urinary incontinence and pediatric enuresis	1
	Epilepsy and status epilepticus	2
	multiple sclerosis	1
	Parkinson's disease	2
	Pain management	2
	Headache disorders	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		
Clinical Chemistry	Disorders of Carbohydrates metabolism, Hyperglycemia & Diabetes mellitus, Hypoglycemia.	3
	Disorders of lipid metabolism.	2
	Liver Function Tests.	4
	Kidney Function Tests.	4
	Diagnostic enzymology.	4
	Hypothalamus & pituitary endocrinology, disorders of anterior pituitary hormones, disorders of adrenal gland, hypopituitrism.	8
	Reproductive system, disorders of gonadal function in males & females, biochemical assessment during pregnancy.	5
	Tumor markers.	4
	Drug interaction with laboratory Tests.	2
	Disorders of calcium metabolism	3
	Acid- Base Disorders.	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.

Clinical Toxicology	Initial Evaluation and Management of the Poisoned Patient. Including pediatric poisoning and special consideration in the geriatric patient	3
	Drug Toxicity: Over the counter drugs; caffeine; theophylline; antihistamine and decongestant; non-steroidal anti-inflammatory drugs; vitamins.	3
	Prescription Medications: Cardiovascular drugs; beta blockers; ACE inhibitors; Digoxin; Calcium channel blocker; Antiarrhythmic agents; hypoglycemic drugs; Opiods; CNS depressants; tricyclic antidepressants; anti-cholinergic phenothiazines; CNS stimulant.	13
	Drug of Abuse: Opioids; Cocaine; phencyclidine; marijuana; Lysergic acid.	4
	Chemical and Environmental Toxins: Hydrocarbones; Household toxins; Antiseptic; Disinfectants; Camphor; moth repellents.	3
	Botanicals and 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.

Clinical Laboratory Training	Diagnostic test basics, collecting &transporting specimens, venipuncture, urine specimen, stool specimen.	4
	Biochemical tests: Fasting blood glucose, Post-prandial glucose, Oral glucose tolerance test.	4
	Blood urea, Blood creatinine, Creatinine clearance, Uric acid.	4
	Cholesterol, Lipoproteins, triglycerides.	4
	Blood proteins, Bilirubin.	4
	Calcium, Inorganic phosphate, Serum chloride	4
	Alkaline phosphatase, Acid phosphatase, Alanine amiotransferase, Aspartate aminotransferase, Lactate dehydrogenase, Creatine phosphokinase.	4
	Serological tests: VDRL, ASO- Titer, Hepatitis tests.	4
	C-reactive protein test, Rheumatic factor test, Rosebengal test, Typhoid fever test(Widal test), Pregnancy Test.	4
	General urine examination, urine specimen collection.	4
	Hematological tests: RBC count, Hb, PCV, RBC indices, WBC count, Platelets count.	4
	Blood typing, Coombs test, Bleeding time, ESR.	4
	Microbiological tests: culture and sensitivity tests, Staining methods	4
	Culture media, Enriched culture media for general use	4
	Tests for identification of bacteria, Disk diffusion tests of sensitivity to antibiotics, Choice of drugs for disk test, bacterial disease and their laboratory diagnosis.	4

Semester 2	Lecture title	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 Conducting pharmacoeconomic analyses.	2
	Introduction to epidemiology.	2
	Project presentation.	2
	Project presentation.	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:** **Applied Clinical Pharmacokinetics**, 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;		
	Review of basic pharmacokinetic (PK) and pharmacodynamic (PD)	2

Therapeutic Drug Monitoring	Clinical PK equations and calculations	3
	Clinical PK in special population and cases	3
	Clinical PK/PD for Aminoglycosides	2
	Clinical PK/PD for Vancomycin	2
	Clinical PK/PD for Digoxin	2
	Clinical PK/PD for Phenytoin	3
	Clinical PK/PD for other Anticonvulsants (e.g., Carbamazepine, Valproic Acid, Phenobarbitone/Primidone, Ethosuxsimide	3
	Clinical PK/PD for Theophylline	2
	Clinical PK/PD for Immunossprasants (e.g., Cyclosporine, Tacrolimus	2
	Clinical PK/PD for other Cardiovascular agents (e.g., Lidocaine, Procainamide/N-Acetyl Procainamide	2
	Clinical PK/PD of other drugs (e.g., Lithium), Anticancer agents, 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		
Therapeutic II	Thyroid and parathyroid disorders	2
	Contraception	1
	Endometriosis	1
	Menstruation related disorders	1
	Hormonal replacement therapy (HRT)	2
	Cancer treatment and chemotherapy	2
	Leukemias	2
	Lymphomas and Multiple myeloma	2
	Breast and prostate cancers	2
	Adverse effects of chemotherapy	1
	Human immunodeficiency viruse	2
	Adrenal gland disorders	1
	Pituitary gland disorders	1
	Alzheimer's disease	1
	Schizophrenia	2
	Depressive disorders	2
	Anxiety disorders	1
	Sleep disorders	1
	Bipolar disorders	2
	colorectal cancer	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 of biotechnology product (biopharmaceutical consideration) Microbial consideration- sterility-pyrogen viral decontamination Excipients of parentral products - solubility enhancer-anti adsorption agents buffer components-preservatives – osmotic agents	4
	Route of administration Parentral route Oral route Alternative	5
	Pharmacokinetic of peptides and proteins Introduction,Elimination of proteins (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: The need for the dosage form.	1
	General consideration for the dosage form.	3
	Pre-formulation; physical description, microscopic examination.	2
	Melting point; phase rule; particle size; polymorphism;	2
	Permeability; pH; partition coefficient; pka; stability; kinetics; shelf	2
	Rate reaction; enhancing stability.	2
	Formulation consideration: Excipients; definition and types; appearance; palatability; flavoring.	2
	Sweetening; coloring pharmaceuticals; preservatives; sterilization;	2
	Biopharmaceutical considerations: Principle of drug absorption**;** dissolution of the drugs**.**	4
	Bioavailability and bioequivalancy; FDA requirements.	3
	Assessment of bioavailability; bioequivalence among drug	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 / visible spectroscopy; Sample handling and instrumentation; Characteristic absorption of organic compounds; Rules for calculation of lambda max and application; Application of UV/visible; spectroscopy; Problems and solutions.	6
	Infra Red spectroscopy (theory and H-bonding effect; Sampling techniques and interpretation of spectra; Characteristic group frequencies of organic compounds; Application of IR spectroscopy; Problems and solutions.	14
	H^1 –Nucleomagnetic Resonance (NMR) and C^{13}-NMR spectroscopy; Introduction, the nature of NMR absorption, chemical shifts and factors affecting them, information obtained from NMR spectra, more complex spin-spin splitting patterns, application of H_1-NMR spectroscopy; C_{13}-NMR spectroscopy: introduction and characteristics, DEPT C^{13}- NMR spectroscopy.	12
	Mass spectroscopy: Introduction and interpreting Mass spectra; interpreting Mass spectra fragmentation patterns, Mass behavior of some common functional groups.	11
	elemental microanalysis CHNSO	2