3rd stage ; 1st Semster المرحلة الثالثة: الفصل الدراسي الاول

Title of the course: Inorganic Pharmaceutical Chemistry

Level: 3rd Class, 1st Semester
Credit hours: **Theory 2 hours Practical 2 hours/week (3 credit units)**
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 discuss the principles of inorganic chemistry that are applied to medicinal and /or pharmaceutical chemistry. It includes understanding of atomic and molecular structures, and the relationship with binding forces and complexation. It also describes inorganic products used as pharmaceutical preparations or diagnostic tools.

Inorganic Pharmaceutical Chemistry syllabus

- 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

Level: 3rd Class, 1st Semester
Credit hours/week: **Theory 2 Practical 2 (3 credit units)**
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 glycosides. 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.3
- 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

Level: 3rd Class, 1st Semester
Credit hours/week: **Theory 3 Practical 2 (4 credit units)**
Reference text: *Pharmaceutical Dosage forms and Drug Delivery Systems By Haward A. Ansel; latest edition.* and *Sprowel's American Pharmacy.*
Objectives: To explain the theoretical bases for the technology of preparing different dosage forms with respect to their raw materials, compositions, methods of preparation, stability, storage and uses.

Pharmaceutical Technology I: syllabus

- 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
- 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

Level: 3rd Class, 1st Semester
Credit hours/week: **Theory 3 Practical 2 (4 credit units)**
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: syllabus

- Introduction to the macromolecules biochemistry: Definitions and terms; proteins, enzymes, DNA; Clinical value. 2
- Amino acids: Structures of amino acids (table of standard amino acid 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 amino acids: structures, existence and clinical value. 3
- Peptides: Peptide bond, resonance forms, isomers, physical properties and chemical reactions.Essential polypeptides 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 amino acid 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 noncompetitive 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

Level: 3rd Class, 1st Semester
Credit hours/week: **Theory 3 Practical 2 (4 credit units)**
Reference text:
Essentials in Pathophysiology by: Carol Mattson Porth 2nd Ed.
Pathophysiology of disease: an introduction to clinical medicine 7ed. Cary D. Hammer, Stephen J. McPhee (editors*)*
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 HBP; 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. 3
- Neoplasia 2
- Metabolic & rheumatic disorders of skeletal system: Osteoporosis, osteomalacia & rickets, rheumatoid arthritis, systemic lupus erythromatosus, ankylosing spondylitis, gout, osteoarthritis syndrome. 4
- Alterations in the immune response (pathophysiology of immunopathology): Hypersensitivity disorders, Transplantation immunopathology, Immunodeficiency disorders. 3