Course Description Form

1. Course Name:
Biochemistry I (theoretical and practical)
2. Course Code:
Phcls24-311-
3. Semester / Year:
1st Semester / 3rd year
4. Description Preparation Date:
01/09/2024
5. Available Attendance Forms:
Students' signature on attendance sheet
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours Theoretical + 2 hours Practical (75) /4 units
7. Course administrator's name
Theoretical
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8. Course Objectives

Course Objectives The course teaches the basics of biochemistry a establish the foundations of essential metabolites a macromolecules.	- Amino acids, peptides, proteins, f nucleic acids, as well as carbohydrate - Essentials of enzymes, their names, th mechanism of action, kinetics a inhibition - Plasma membrane, the mechanism action of hormones and th classification - The basics of clinical nutrition

9. Teaching and Learning Strategies

Strategy	Lecturing Seminars Homework Quiz Practical laboratory demonstrations, microscopic slides and Lab book catalogue

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3+2	Definitions and terms; proteins, enzymes, DNA; Clinical value	Introduction to the macromolecules in biochemistry	Theoretical lectures Laboratory experiments	Paper-based exa
2	3+2	Structures of amino acids (table of standard amino acids abbreviation and side chain); Classification, properties, isomerism	Amino acids	Theoretical lectures Laboratory demonstration	Paper-based exa
3	3+2	Chemical reactions, Zwitter ions, titration curve calculating isoelectric point values. Examples and questions. Non standards A.A: Structures, existence and clinical value	Amino acids	Theoretical lectures Laboratory demonstration	Paper-based exa
4	3+2	Peptide bond, resonance forms, isomers, physical properties and chemical reactions. Essential poly peptides in human body, structures, roles and clinical values	Peptides	Theoretical lectures Laboratory demonstration	Paper-based exa
5	3+2	Structure and conformations of proteins, Primary structure, Secondary structure (α helix, β sheet), tertiary structure, quaternary structure. Classification, synthesis, cellular functions (Enzymes, cell signaling, and ligand transport, structural proteins), protein in nutrition	Proteins	Theoretical lectures Laboratory experiments	Paper-based exa
6	3+2	Determining amino acids composition, N-terminal amino acid analysis, C- terminal	Denaturation of proteins and protei sequencing	Theoretical lectures	Paper-based exa

		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		Laboratory demonstration	
7	3+2	Chemistry and classification, biomedical importance, classification of CHO, Stereochemistry of monosaccharides, metabolism of CHO; Physiologically important monosaccharides, glycosides, disaccharides, polysaccharides	Carbohydrates	Theoretical lectures Laboratory demonstration	Paper-based exa
8	**Mid-term exam**				
9	3+2	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	Lipids	Theoretical lectures Laboratory demonstration	Paper-based exa
10	3+2	Structures and mechanism, nomenclature, classification, mechanisms of catalysis,	Enzymes	Theoretical lectures Laboratory demonstration	Paper-based exa

		thermodynamics, specificity, lock and key model, induced fit model, transition state stabilization, dynamics and function, allosteric modulation. Biological function, cofactors, coenzymes, involvement in disease			
11	3+2	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.	Kinetics	Theoretical lectures Laboratory demonstration	Paper-based exa
12	3+2	Reversible inhibitors, competitive and non-competitive inhibition, mixed-type inhibition, Irreversible inhibition. Inhibition kinetics and binding affinities (*k*i), questions and solutions	Enzyme inhibition	Theoretical lectures Laboratory demonstration	Paper-based exa
13	3+2	multi-substrate reactions, ternary-complex mechanisms, ping-pong mechanisms, non-Michaelis-Menten kinetics, pre-steady-state kinetics, chemical mechanisms	Enzymes: Control activity and uses o inactivators	Theoretical lectures Laboratory demonstration	Paper-based exa
14	3+2	Chemical structure, nucleic acid components, nucleic acid bases, nucleotides and deoxynucleotides (Properties, base pairing, sense and	Nucleic Acid: Biological functio of DNA	Theoretical lectures Laboratory demonstration	Paper-based exa

		antisense, super-coiling, alternative structures, quadruple structures, Genes and genomes, transcription and translation, replication			
15		Plasma membrane structure and function; Biomedical importance, membrane proteins associated with lipid bilayer, membranes protein composition, dynamic structures of membranes, asymmetric structures of membranes, Artificial membranes model, the fluid mosaic model, membrane selectivity, physiological functions of plasma membranes	Biochemistry of extracellular and intracellular communication	Theoretical lectures Laboratory demonstration	Paper-based exa
16		Classification of hormones, biomedical importance, the target cell concept and hormone receptors, biochemistry of hormone signal transduction	Biochemistry of th endocrine system	Theoretical lectures Laboratory demonstration	
17		Biomedical importance, digestion and absorption of carbohydrates, lipids, proteins, vitamins and minerals; energy balance. Biochemistry of hemostasis and clot formation	Nutrition, digestio and absorption	Theoretical lectures Laboratory demonstration	Paper-based exa
18	**Students' seminars**				

11. Course Evaluation

- 20 M Theoretical assessment;
  (paper-based mid-term exam + quiz + attendance + seminar)
- 20 M practical assessment (attendance + quiz + practice)
- 60 M paper-based theoretical final exam

100 M total	
12. Learning and Teaching Resources	
Required textbooks	Harper's Illustrated Biochemistry 29th edition
Main references (sources)	lippincotts-biochemistry-6th-edition 2014
Electronic References, Websites	https://pbthru.com/biochemistry-basics https://www.lecturio.com/medical-courses/biochemistry-basics.course#/