

Course Description Form

1. Course Name:	
Biochemistry I (theoretical and practical)	
2. Course Code:	
Phcls25_311	
3. Semester / Year:	
First semester / 2025-2026	
4. Description Preparation Date:	
01/09/2025	
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	
<p>Name: Assist. Prof. Dr. Jehan Abdulwahab Mohammad Email: dr.jehan.biochem@uomosul.edu.iq Name: Lecturer Dr. Zaid Muwafaq Younus Email: z.m.younus@uomosul.edu.iq Name: Lecturer Dr. Sameer Mohammed Mahmood Email: sm.mahmood@uomosul.edu.iq Name: Lecturer. Mayada Husam Email: Mayadaaljammass@uomosul.edu.iq Name: Lecturer Dr. Hiba Radhwan Tawfeeq Email: hiba.radhwan@uomosul.edu.iq</p>	
Practical	
<p>Name: lecturer. Marwa Husam Almawla Email: marwaalmola@uomosul.edu.iq Name: Lecturer Fatimah Haitham Fathi Email: fatma17@uomosul.edu.iq Name: Assist. Lecturer. Atyaf Talal Mahmood Email: .atyaf.alchalabi@uomosul.edu.iq Name : Assis. Lec. Inas Hazim Email:enashazim@uomosul.edu.iq</p>	
8. Course Objectives	
<p>Course Objectives The course teaches the basics of biochemistry and establish the foundations of essential metabolites and macromolecules.</p>	<ul style="list-style-type: none"> - Amino acids, peptides, proteins, fats, nucleic acids, as well as carbohydrates. - Essentials of enzymes, their names, their mechanism of action, kinetics and inhibition - Plasma membrane, the mechanism of action of hormones and their classification - The basics of clinical nutrition
9. Teaching and Learning Strategies	
Strategy	Lecturing Seminars and discussions

		Homework and Quizzes 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	A1: Students will be able to understand the basic concepts of macromolecules (proteins, enzymes, DNA) and explain their clinical value. B2: Students will be able to develop self-learning skills by reviewing biochemical terms and abbreviations. C1: Students will commit to scientific integrity when dealing with biochemical and medical information.	Introduction to the macromolecules in biochemistry, Definitions and terms; proteins, enzymes, DNA; Clinical value	Theoretical lectures. Laboratory experiments	Paper-based exams
2	3+2	A1: Students will understand the structure of amino acids, their properties, and structural isomerism. B1: Students will be able to use scientific tables and standards to identify amino acids in the laboratory.	Amino acids: Structures of amino acids (table of standard amino acids abbreviation and side chain); Classification, properties, isomerism	Theoretical lectures. Laboratory demonstration.	Paper-based exams
3	3+2	A1: Students will be able to explain the chemical reactions of amino acids and the formation of zwitterions. B1: Students will apply calculation skills to determine the isoelectric point. B2: Students will enhance self-learning skills through solving examples and problems.	Amino acids: Chemical reactions, Zwitter ions, titration curve calculating isoelectric point values. Examples and questions. Non standards A.A: Structures, existence and clinical value	Theoretical lectures. Laboratory demonstration.	Paper-based exams

4	3+2	<p>A1: Students will describe the nature of peptide bonds and the physical properties of peptides.</p> <p>A1: Students will explain the importance of essential peptides in the human body and their clinical value.</p> <p>B1: Students will acquire the skill of identifying peptide reactions in the laboratory.</p>	<p>Peptides: Peptide bond, resonance forms, isomers, physical properties and chemical reactions. Essential poly peptides in human body, structures, roles and clinical values</p>	<p>Theoretical lectures.</p> <p>Laboratory demonstration.</p>	Paper-based exam
5	3+2	<p>A1: Students will explain the four levels of protein structure and their relation to cellular functions.</p> <p>A1: Students will interpret the role of proteins in nutrition and in biological processes such as signaling and transport.</p> <p>B2: Students will develop the ability to conduct self-directed research on complex protein topics.</p>	<p>Proteins: 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</p>	<p>Theoretical lectures.</p> <p>Laboratory experiments.</p>	Paper-based exam
6	3+2	<p>A1: Students will understand methods of protein sequencing and their research importance.</p> <p>B1: Students will recognize laboratory techniques related to protein purification and analysis.</p> <p>B2: Students will develop skills in using electronic resources (Proteomics, Bioinformatics).</p>	<p>Denaturation of proteins and protein sequencing: Determining amino acids composition, N- terminal amino acid analysis, C-terminal A.A analysis, Edman degradation, prediction protein sequence from DNA/ RNA sequences. Methods of protein study: Protein purification, cellular localization,</p>	<p>Theoretical lectures.</p> <p>Laboratory demonstration.</p>	Paper-based exam

			proteomics and bioinformatics, structure predication and simulation		
7	3+2	A1: Students will explain the chemical structure of carbohydrates and their stereoisomerism. A1: Students will connect carbohydrate types to their physiological importance. B1: Students will be able to distinguish between carbohydrates using laboratory techniques.	Carbohydrates: Chemistry and classification, biomedical importance, classification of CHO, Stereochemistry of monosaccharides, metabolism of CHO; Physiologically important monosaccharides, glycosides, disaccharides, polysaccharides	Theoretical lectures. Laboratory demonstration.	Paper-based exam
8	Mid-term exam				
9	3+2	A1: Students will describe the structure of lipids and fatty acids and their physiological properties. A1: Students will explain the role of lipids in metabolism and oxidative processes. B1: Students will apply methods for separation and detection of lipids in the laboratory.	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	Theoretical lectures. Laboratory demonstration.	Paper-based exam
10	3+2	A1: Students will explain the general structure of enzymes and mechanisms of catalysis. A1: Students will relate enzyme functions to diseases. B1: Students will practice enzyme	Enzymes: Structures and mechanism, nomenclature, classification, mechanisms of catalysis, thermodynamics, specificity, lock and key model, induced fit model, transition	Theoretical lectures. Laboratory demonstration.	Paper-based exam

		classification in laboratory examples.	state stabilization, dynamics and function, allosteric modulation. Biological function, cofactors, coenzymes, involvement in disease		
11	3+2	A1: Students will explain the general principles of enzyme kinetics. B1: Students will apply calculation skills to determine kinetic constants. B2: Students will strengthen self-learning skills by solving kinetic problems.	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.	Theoretical lectures. Laboratory demonstration.	Paper-based exam
12	3+2	A1: Students will understand the types of enzyme inhibition (competitive and non-competitive). B1: Students will use mathematical approaches to plot and interpret inhibition curves. B3: Students will apply knowledge of inhibition in understanding drug mechanisms.	Enzyme inhibition: Reversible inhibitors, competitive and non competitive inhibition, mixed-type inhibition, Irreversible inhibition. Inhibition kinetics and binding affinities (k_i), questions and solutions	Theoretical lectures. Laboratory demonstration.	Paper-based exam
13	3+2	A1: Students will explain mechanisms of enzyme activity regulation and advanced inhibition. B1: Students will apply multi-substrate kinetic models in laboratory settings. B2: Students will develop the ability to follow modern research on non-classical kinetics.	Enzymes: Control of activity and us multi-substrate reactions, ternary-complex mechanisms, ping-pong mechanisms, non-Michaelis-Menten kinetics, pre-steady-state kinetics, chemical mechanisms es of inactivators,	Theoretical lectures. Laboratory demonstration.	Paper-based exam

14	3+2	<p>A1: Students will describe the chemical structure of nucleic acids and their secondary structures.</p> <p>A1: Students will explain base pairing and the importance of supercoiling.</p> <p>A1: Students will understand the relationship between genes and proteins through transcription and translation.</p> <p>B2: Students will enhance self-learning by following modern genetic applications.</p> <p>B3: Students will apply this knowledge in interpreting genetic disorders.</p>	<p>Nucleic Acid: Biological functions of DNA: Chemical structure, nucleic acid components, nucleic acid bases, nucleotides and deoxynucleotides (Properties, base pairing, sense and antisense, supercoiling, alternative structures, quadruple structures, Genes and genomes, transcription and translation, replication</p>	<p>Theoretical lectures.</p> <p>Laboratory demonstration.</p>	Paper-based exam
15	3+2	<p>A1: Students will describe the structure of the plasma membrane and its medical importance.</p> <p>A1: Students will explain the role of membrane proteins in physiological functions.</p> <p>B1: Students will recognize laboratory methods for studying membranes.</p>	<p>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, asymmetric structures of membranes,</p>	<p>Theoretical lectures.</p> <p>Laboratory demonstration</p>	Paper-based exams

16	3+2	<p>A1: Students will explain the fluid mosaic model and its applications.</p> <p>B1: Students will apply the concept of membrane selectivity in experiments.</p> <p>C1: Students will adhere to professional ethics when discussing artificial membrane applications in medicine.</p>	Artificial membranes model, the fluid mosaic model, membrane selectivity, physiological functions of plasma membranes	Theoretical lectures.	Paper-based exams
17	3+2	<p>A1: Students will explain the classification of hormones and their mechanisms of action on target cells.</p> <p>A1: Students will relate hormone signaling pathways to diseases.</p> <p>B3: Students will use this knowledge to improve pharmaceutical care for patients.</p>	Biochemistry of the endocrine system: Classification of hormones, biomedical importance, the target cell concept and hormone receptors, biochemistry of hormone signal transduction	<p>Theoretical lectures.</p> <p>Laboratory demonstration</p>	Paper-based exams
18	3+2	<p>A1: Students will describe the pathways of digestion and absorption of nutrients and their medical importance.</p> <p>A1: Students will explain energy balance and its relation to health.</p> <p>A1: Students will explain the biochemical basis of hemostasis and blood clotting.</p> <p>B3: Students will use this knowledge to promote community health awareness.</p> <p>C1: Students will commit to ethical</p>	<p>Nutrition, digestion, and absorption: Biomedical importance, digestion and absorption of carbohydrates, lipids, proteins, vitamins and minerals; energy balance.</p> <p>Biochemistry of hemostasis and clot formation</p>	<p>Theoretical lectures.</p> <p>Laboratory demonstration</p>	Paper-based exams

		principles when providing nutritional and medical consultations.			
18	Students' seminars				
11. Course Evaluation					
<ul style="list-style-type: none"> • 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 <hr style="width: 20%; margin-left: 0;"/> <p style="margin-left: 20px;">Total 100 M</p>					
12. Learning and Teaching Resources					
Required textbooks		Harper's Illustrated Biochemistry 29 th 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#/			