Course Specifications

General Information

Course name	Biochemistry I
Course number	DENT2305
Faculty	
Department	
Course type	Major Needs
Course level	2
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - To realize the importance of studying biochemistry and its interdisciplinary significance

2 - To let students understand the basic concepts of biochemistry and realize the physical and chemical properties of the major biomolecules, and their important functions for the biological system

3 - To give students a concrete foundation in biochemical processes of the biological system

4 - To provide students with fundamental understanding of the central principles and themes of Biochemistry and their experimental basis

Intended Learning Outcomes

Knowledge and Understanding	* Students will explain the structure of the biological macromolecules (proteins, carbohydrates, nucleic acids and lipids) and their important role in biological system both at the molecular and cellular levels
Intellectual Skills	* Students will use biochemical techniques and methodologies to design and carry out experiments
Professional Skills	* Students will search, explore and review scientific literature for state-of-the art biochemical researches and experimental techniques. Also writing and presenting scientific data

Course Contents

1 - • Part I: Water and Buffers (Water structure, Hydrogen Bonds, unusual properties, Water as a solvent and its interaction with other molecules, Colligative Properties of Aqueous Solutions, Ionization of Water, Weak and strong Acids and Bases, Buffers and pH Changes in Biological Systems)

2 - Part II Macromolecules: Carbohydrates, amino acids and proteins, nucleic acids, lipids

3 - Part II-1: Carbohydrates (Monosaccharides, Stereochemistry: optical activity, stereoisomers, epimers, anomers, Glycosidic Bond, Disaccharides and Oligosaccharides, Polysaccharides: Homopolysaccharides and Heteropolysaccharides, Glycoconjugates: Proteoglycans, Glycoproteins, and Glycolipids

4 - Part II.2: Amino Acids, Peptides, and Proteins (Classification of amino acid side chains, Amino Acids as Acids and Bases, Amino Acids Titration Curve, Peptide bond: formation and characteristics, Isoelectric point (isoelectric pH) pI of amino acid and peptides, The three-dimensional Structure of proteins Levels of Protein Structure: primary, secondary, tertiary, and quaternary, Fibrous Proteins and their structural Functions Keratin, collagen, and silk fibroin, Globular proteins: Structural and Functional Diversity, Hemoglobin Structure, Function and molecular basis, Protein Denaturation and Folding

5 - PartII.3" Nucleotides and Nucleic Acids, Nucleic Acids Structure and functions: DNA and RNA, Watson and Crick Model of DNA, Introduction to pcr and sanger sequencing

6 - PartII.4 Lipids(Fatty Acids structure and nomenclature,Storage Lipids: Triacylglycerols, fats and oils, Waxes, Structural Lipids in Membranes: Phospholipids and Glycolipids, Sterols)

7 - Part III: Enzymes (Structural and Chemical natures of Enzymes , Holoenzyme, apoenzyme or apoprotein, cofactors, coenzymes, Prosthetic group, International classification of enzymes, How Enzymes Work, Enzyme Kinetics: substrate concentration, initial velocity and max velocity, Michaelis-Menten equation, for one-substrate enzyme-catalyzed reaction, Enzymes Inhibition: Reversible and Irreversible).

8 - Part IV: Vitamins (Water-soluble vitamins and Lipid-soluble vitamins: function, clinical importance and deficiencies)

Teaching and Learning Methods

1 - Class lectures

2 - online assignments and homeworks

Teaching and Learning Methods for the Disabled Students

1 - this will be determined individually according to the type of disability

Students Assessment

Assessment Method	TIME	MARKS
online quizzes and assignments via Moodle	10-60 mins	30
midterm exam	60 mins	30
final exam	120 mins	40

Books and References

Essential books	•Lehninger Principles of Biochemistry 7th edition. Authors: David L. Nelson, Michael M. Cox. 2017.