Vice Chancellor for Education, Ahvaz University of Medical Sciences
Center for Studies and Development of Medical Sciences Education

Course Title: Molecular-Cell Biochemistry
Field and Level of Study: Medicine - Professional Doctorate
Faculty: Medicine
Course Code: 1121868
Academic Year: 1404-1405
Prerequisite: None
Number of Credits: 1.5
Semester: First, First and Second Half
Credit Breakdown: 1.5 Theory Credits
Teaching Group:

Class Day and Time: Monday and Tuesday, 10:00 - 12:00
Responsible Instructor: Dr. Rashidi
Email:
Office Hours: Daily, 8:00 - 14:00

Overall Course Objectives:
By the end of this course, the student should be familiar with the clinical importance, structure, classification, properties, and function of biological molecules. These molecules include water and buffers, amino acids, carbohydrates, lipids, proteins, enzymes, vitamins, and nucleotides. Students should also understand the gene replication process using nucleic acids.

Specific Objectives:

1. Definition of acid, base, their dissociation, the concepts of pH and pK, and the importance of buffers in regulating blood pH, and understanding the importance of the Henderson-Hasselbalch equation.
2. Identifying the structure and biochemical role of amino acids, their physicochemical properties, and how to determine the isoelectric point (pI) of amino acids.
3. Understanding the structure, biological roles, and separation methods of proteins; the structure and role of hemoglobin and the mechanism of oxygen binding to hemoglobin.
4. Understanding the structure and biological roles of simple carbohydrates, their specific reactions, and understanding the structure and roles of various polysaccharides, glycosaminoglycans, and glycoproteins.
5. Identifying the structure and biological roles of lipids, the structure of fatty acids, classification of lipids, and the structure and classification of various lipoproteins.
6. Identifying the structure and roles of nucleic acids, the main differences between DNA and RNA, understanding the types of DNA structures, the stages of nucleosome formation, chromatin and chromosome, and understanding the types and roles of RNA.
7. Understanding the structure and roles of vitamins, recognizing the coenzyme forms of vitamins, the role of various B-group vitamins and diseases caused by their deficiency, and the role of fat-soluble vitamins and diseases caused by their deficiency.
8. Definition of enzymes, differences between enzymatic and chemical catalysis, the mechanism of enzymatic catalysis and factors affecting it, classification and nomenclature of enzymes, the importance of the Michaelis-Menten equation in enzymatic catalysis, mechanisms of regulating enzyme activity, and types of enzyme inhibitors.

Vice Chancellor for Education, Ahvaz University of Medical Sciences
Center for Studies and Development of Medical Sciences Education

Course Description:
In this course, the student becomes familiar with vital molecules in order to learn the metabolism of these substances in the biochemistry discipline. This set of structural and functional information is presented in a way that can play a role in investigating health and disease.

Session	Main Topics (Concepts to be Taught)	Learner Activities	Teaching Method	Instructor Name
First	Introduction to Biochemistry of Water, Acids and Bases, Buffers	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Rashidi
Second	Structure and Roles of Amino Acids	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Rashidi
Third	Structure, Classification, and Separation Methods of Proteins	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Rashidi
Fourth	Structure and Function of Hemoglobin	Punctual and full-time attendance and active participation in class (attention and participation	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Rashidi

		in discussions, Q&A, etc.)		
Fifth	Structure and Role of Simple Carbohydrates	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Igder
Sixth	Structure and Role of Complex Carbohydrates	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Igder
Seventh	Structure and Role of Simple Lipids	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Faridi
Eighth	Structure and Role of Complex Lipids	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Faridi
Ninth	Structure of Nucleotides and Nucleic Acids	Punctual and full-time attendance and active participation in class (attention and participation	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Ghasemian

		in discussions, Q&A, etc.)		
Tenth	Structure and Kinetics of Enzymes	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Hashemnia
Eleventh	Regulation of Activity and Classification of Enzymes	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Hashemnia
Twelfth	Structure and Role of Water-Soluble Vitamins and Their Coenzymes	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Mohammadzadeh
Thirteenth	Structure and Roles of Fat-Soluble Vitamins	Punctual and full-time attendance and active participation in class (attention and participation in discussions, Q&A, etc.)	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Mohammadzadeh
Fourteenth	DNA Replication	Punctual and full-time attendance and active participation in class (attention and participation	Interactive Lecture (Q&A during teaching), Encouraging students for more participation	Dr. Ghasemian

		in discussions, Q&A, etc.)		

Student Assignments:

Answering questions in each teaching session.

Course Evaluation Method:
Assignment Score: 20%
Midterm Exam Score: 40%
Final Exam Score: 40%

Main Course Resources Approved by the Ministry:

Harper's Biochemistry, 2023
Medical Biochemistry, Volume One, authored by the Authors' Committee of Tehran University of Medical Sciences