



Urmia University of Medical Sciences
Medical school
(Course plan)

Course Title and Code: Cell and Molecular Biochemistry Code: 120		Program / Academic Term: Basic Sciences – Semester 1
Number of Students: Approximately 50–100	Target Group: Medical Students	Prerequisite: None
Class Location: School of Medicine	Total Sessions: 16 sessions	Course Credits: 1.88
Instructors Email: ainazmihanfar2013@gmail.com shahin.alizadeh60@yahoo.com	Course Instructors and Coordinators: Dr. Aynaz Mihanfar Dr. Shahin Alizadeh	Class Time: Saturdays, 8:30 AM

Lesson Description

By the end of this course, students should be familiar with the structure, classification, properties, functions, and clinical significance of major biomolecules, including amino acids, proteins, enzymes, and vitamins. In addition, students will understand the biochemical importance of water and buffer systems

Goal

By the end of this course, students should be familiar with the clinical importance, structure, classification, properties, and functions of biomolecules

Objectives

Expected Learning Outcomes

By the end of this course, students are expected to be able to:

1. Describe the structure and chemical properties of water, the mechanisms of buffer action, their role in maintaining acid–base balance, and their clinical applications.
2. Demonstrate comprehensive understanding of the structure, classification, and functions of amino acids.
3. Demonstrate comprehensive understanding of the structure, functions, and clinical importance of proteins.
4. Demonstrate comprehensive understanding of the structure, functions, and clinical importance of carbohydrates.
5. Describe the structure and classification of lipids and lipoproteins.
6. Describe the structure, classification, and clinical significance of enzymes.

7. Demonstrate comprehensive understanding of the structure, classification, functions, and clinical importance of vitamins.
8. Explain the molecular structure and key features of nucleic acids (DNA and RNA).
9. Explain the mechanism of DNA replication.

Educational Resources

Whiteboard and markers, video projector and PowerPoint slides, educational animations, molecular models, and other instructional aids

Educational Methods / Techniques

Lectures accompanied by question-and-answer sessions, in-class quizzes administered every three sessions, and clinical case-based supplementary questions designed for reference book and literature searching

Educational Strategy

Quizzes and in-class assignments, with emphasis on promoting educational creativity

Rules / Assignments / Learning experiences

punctual and regular attendance in class, with active attention to the presented material.

Prohibition of mobile phone use during class sessions.

Positive participation points awarded for correct answers and active engagement in class discussions.

Deductions applied for disruptive behavior that interferes with the classroom environment.

Student Assessment

The assessment for this course will consist of a combination of a pre-test, in-class oral assessments, formative assessments, and summative assessments

Item	score
<i>summative assessment</i>	10
In-class oral assessment on current session topics	1
Presentation of assignments related to the current session / voluntary student participation	2
<i>formative assessments</i>	3
	16

References / Educational Resources

Harper's Illustrated Biochemistry, latest edition.

Course Schedule Saturdays, 8:30 AM – 10:30 AM

Week / Session	Topic / Content
1.	Water and Buffers: Structure and properties of water, Henderson–Hasselbalch equation, major body buffers, acidosis and alkalosis
2.	Amino Acids: Structure, classification, titration, and physicochemical properties of amino acids
3.	Proteins: Protein structural levels (primary, secondary, tertiary, and quaternary), protein folding and denaturation
4.	Proteins: Structure and function of myoglobin, hemoglobin, collagen, and their clinical significance
5.	Enzymes: Definition, classification, and structure of enzymes, mechanisms of enzyme action, factors affecting enzyme activity, types of enzyme-catalyzed reactions
6.	Enzymes: Enzyme kinetics, Michaelis–Menten and Lineweaver–Burk equations, classification of enzyme inhibitors, isoenzymes, regulation of enzyme activity, and clinical significance
7.	Carbohydrates: Classification, structure, and functions of monosaccharides and disaccharides
8.	Carbohydrates: Classification, structure, and functions of polysaccharides
9.	Lipids: Structure and properties of fatty acids and lipids
10.	Lipoproteins: Overview of lipoproteins and their clinical significance

11.	Vitamins: Definition, classification, structure, coenzyme roles of vitamins, water-soluble vitamins, deficiency disorders, and clinical significance
12.	Vitamins: Water-soluble vitamins, deficiency disorders, and clinical significance
13.	Nucleic Acids: Structure and chemical properties of nucleotides and nucleic acids
14.	Nucleic Acids: DNA replication