In the Name of God

Hamadan University of Medical Sciences and Health Services
Educational Deputy of the University
Center for Studies and Development of Medical Sciences Education

Theory/Practical Lesson Plan Form

Dear Colleagues,

As the teaching-learning process is one that cannot achieve its objectives without planning, it is essential to develop a lesson plan at the beginning of the educational process (as a roadmap and guide for instructors and students). Therefore, it is requested that esteemed instructors exercise utmost care in completing the lesson plan.

Course and Instructor Details (Completion of all items in this section is mandatory)

- **Course Title**: **Medical Biochemistry of the Kidney**
- **Instructor Name**: Dr. Gholamreza Shafiei
- **Course Coordinator**: Dr. Gholamreza Shafiei
- **Department Head**: Dr. Iraj Khodadadi
- **Type and Credit Hours**: Theoretical١,٧ credits■ , Practical ..... credits
- **Field and Level of Student Study**: .....Bachelor's in Laboratory Sciences.....
- **Teaching Location**: .....Classroom 5, Paramedical Department.....

Session	Topic	Behavioral Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Assessment Method
1	Introduction to Biochemistry, Biomolecules, Buffers	1. Define biochemistry. 2. List and categorize biomolecules and their applications. 3. Define buffers and explain their roles and mechanisms.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
2	Structure of Carbohydrates and Their Classification	1. Define carbohydrates. 2. Classify simple carbohydrates. 3. Understand properties of simple carbohydrates.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
3	Types of Polysaccharides, Structure, and Properties	1. Define polysaccharides and classify them. 2. Understand homopolysaccharides and heteropolysaccharides. 3. Know the role of sugars in bacterial membranes.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
4	Structure of Lipids, Types of Fatty Acids	1. Define lipids. 2. Identify types of fatty acids and alcohols. 3. Classify various lipids.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
5	Phospholipids, Types of Steroids, and Prostaglandins	1. Define steroids. 2. Understand and classify prostaglandins. 3. Define and classify lipoproteins.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
6	Structure of Membranes	1. Define membranes. 2. Identify membrane components. 3. Explain the biological effects of	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A

Session	Topic	Behavioral Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Assessment Method
		membranes in the body.					
7	Fat-Soluble Vitamins	1. Identify fat-soluble vitamins. 2. Explain their biological roles. 3. Discuss deficiencies or excesses.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
8	Water-Soluble Vitamins	1. Identify water-soluble vitamins. 2. Explain coenzymes. 3. Discuss their role in metabolic reactions.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
9	Amino Acids and Their Types	1. Identify the structure of 20 amino acids found in proteins. 2. Understand properties of amino acid side chains. 3. Learn how these properties affect protein structure.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
10	Peptides, Proteins, and Their Types	1. Identify the structure of a peptide bond. 2. Understand how this bond affects protein folding. 3. Learn about primary, secondary, tertiary, and quaternary protein structures and study methods.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
11	Definition and Classification of Enzymes	1. Recognize enzymes and their classifications. 2. Understand enzyme mechanisms. 3. Know enzyme structure and	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A

Session	Topic	Behavioral Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Assessment Method
		active and allosteric sites.					
12	Enzyme Kinetics and Inhibitors	1. Understand enzyme reaction rates. 2. Identify inhibitors. 3. Learn about inhibitor kinetics.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
13	Structure of Nucleic Acids and Their Types	1. Identify types of organic bases. 2. Recognize types of nucleotides. 3. Understand types of nucleic acids.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
14	DNA Replication	1. Learn about DNA synthesis. 2. Identify factors affecting prokaryotic and eukaryotic replication. 3. Understand associated disorders.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A
15	RNA Transcription	1. Learn about RNA synthesis. 2. Identify	Knowledge	Lecture, Participatory, Group	2 hours	Slides, Animation,	Q&A

Session	Topic	Behavioral Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Assessment Method
		factors affecting prokaryotic and eukaryotic transcription. 3. Understand processes after synthesis.		Discussion		Whiteboard	
16	Translation and Gene Expression Regulation	1. Explain protein synthesis steps in prokaryotes and eukaryotes. 2. Discuss inhibitors of protein synthesis. 3. Explain gene regulation using the lactose and tryptophan operons.	Knowledge	Lecture, Participatory, Group Discussion	2 hours	Slides, Animation, Whiteboard	Q&A

Notes:

- Each session is designed to last approximately 90-100 minutes.
- The teaching methods primarily include lectures, question and answer sessions, and in some cases, flipped classroom techniques.
- Evaluation is conducted through class assessments and final exams.

Grading Scheme

Type of Evaluation	Evaluation Tool	Score out of Total
Quiz	Oral Exam	1
Project Presentation	Class Seminar	1
Midterm Exam	Written Exam	
Final Exam	Multiple Choice Exam	18
Other	-	-
Total		**20**

Reference

- **General Biochemistry** by Shahbazi Maleknia, University of Tehran Publications, 32nd Edition, published in 2022 (1401 in the Persian calendar).
- **Principles of Biochemistry** by Lehninger, Nelson, and Cox, translated by Dr. Asareh, Dr. Ghavam, and Zahra Mohammadi, Arjomand Publications, 7th Edition (2017), published in 2018 (1397 in the Persian calendar).
- **Harper's Biochemistry** by Victor Rodwell, translated by Parvin Pasalar, Andisheh Rafieh Publications, 3rd Edition, published in 2021 (1400 in the Persian calendar).