Course Title: Medical Biochemistry

Course Description: This course is designed to the **1th year** undergraduate Thi-Qar medical college students the goal of the Chemistry department is study the basic science of medical chemistry **,** In addition to learning about the chemical reactions that occur inside the human body and how to detect chemical compounds that have a benefit inside the human body, such as carbohydrates, Lipids and proteins**.**

Course Duration: 90 hours of theory and 30 hours of practice

Course learning Units: 8 units .

Course General Objectives:

Goal of clinical biochemistry: The goal of the Clinical Chemistry is study the metabolic processes occurring in the human body in order to understand the biochemical basis, correlated symptoms, signs and complication of disease to biochemical events.

Teaching methods: Each lecture is accompanied with power point presentation , examines (quiz), and major individual project that takes the form of seminars , Case Studies Presentations , group & class discussion and active Participation by clinical biochemistry research .

Objectives:

The student will be capable of

1-The detailed relationships between basic science, organ physiology and function, pathophysiology, patient outcomes and selected topics of evidence-informed care and management.

2-Investigations for metabolic disorders.

3-Provide additional information regarding the current diagnosis.

Specific objectives :

Explained with in topics description in the attached table.

Teaching strategy (overview):

- Objective – based learning
- Student-centered learning
- Active student interaction

Teaching and Learning Methods:

The course will use the following teaching and learning methods:

- **Theory sessions :**
  - **Lectures:** Knowledge acquisition
  - **Visual aids** (e.g., films , videos, , and illustrations): Knowledge acquisition and skill development.
  - **Group discussion** - critical thickening

Practical part of clinical chemistry

Goals:. The objective of the medical chemistry laboratory is to detect the presence of vital compounds such as carbohydrates, fats, proteins, by conducting chemical tests and identifying how chemical reactions occur in the laboratory.

Blueprint for 2th year medical student in Thi-Qar college of medicine include:

- The course will be divided into the following topics:

Week NO	Lecture Name	Specific Objective	ILO	hours	Assessment Method						Total Weight (impact X frequency
					Summative			Formative			
					Written	practical	Log book	Quizzes	Group discussion	Project homework	
1.	Amino acids	Classify each of the 20 common amino acids found in proteins according to side chain type (aliphatic, aromatic, sulfur containing, aliphatic hydroxyl, basic, acidic, amide, hydrophilic (polar), hydrophobic (nonpolar). (These categories overlap extensively, e.g., glutamate is acidic and it's very polar.)	K:1,6,3, 4,8.1,19 S:4,,15	10	X		X	X	X	X	25
2.	proteins	Explain the 4 levels of protein structure: primary,secondary, tertiary, and quaternary	K:1,6,19 S:4,6	6	X		X	X	X	X	22
3.	Enzyme	To introduce some of the most relevant and commonly used chemical concepts, processes and naming systems. Define the following terms: a. Enzymes b. Isoenzyme c. Catalyst d. Substrate e. Product f. Activator i. Active site j. Cofactor g. Inhibitor k. Coenzyme	K:1,2,4, 5,8,13 S:5,12,1 5	8	X		X	X	X	X	21
4.	Nuclic acids	After complete the lecture, student should be able to : 1.Explain the basic units of	K:1 S:4,5	5	X						22

		nucleic acids 2.Differ between nucleotide and nucleoside; 3.Determine types and biological functions of purine and pyrimidine nucleotides; 4.Explain the acidity, stability and organization of nucleic acids in the human cells. 5.Explain central dogma. 6.Distinguish between the following genome, gene, chromosome codon, and anticodon.									
5.	**Carbohydrates**	1.Chemistry, properties, structures, biological significance and classification of carbohydrates; stereo-chemical and reducing properties; isomers, anomers and epimers, the common monosaccharide derivatives and their occurrence. 2.Nature and type of glyosidic linkage that occur in common disaccharides and homopolysaccharides; and occurrence and role of these compounds. 3.Structure and role of glycosaminoglycans and various types of mucopolysaccharidoses.,	K:1,2,3, 7,10,19 S:4,6, 11,12,14 ,15	8	X	X	X	X	X	X	25
6.	**Lipids**	1-outline the structure of a triglyceride and phospholipids, 2-describe the synthesis and breakdown of triglycerides, compare the structure of saturated and unsaturated fatty acids, 3-describe the properties of triglyceride, phospholipid, and cholesterol molecules and relate them to their functions in organisms, 4-recall that lipids can be classified into simple, complex,	K:2,3,10 S:12	8	X	X	X	X	X	X	21

		and derived lipids.									
7.	**Cell membrane**	After complete the lecture, student should be understand the following: 1. Cell membrane (plasma membrane , intracellular membrane and nucleus membrane); 2. Relation between chemical composition and functions of cell membrane; 3. Fluid mosaic model of cell membrane; 4. Types of Transporting across membrane and cell-cell Junctions and communication; 5. Disease associated with the defect in cell membrane composition. Minerals Metabolism and Abnormalities	K:1,3,19 S:12	2	X		X	X	X	X	21
8.	**Minerals**	After complete the lecture, student should be understand the following: 1.Minerals classification. 2.Dietary minerals source. 3.Recommended dietary allowance per day (RDA). 4.Biochemical roles of minerals in body 5.Minerals forms and distribution in body. 6.Normal metabolism , absorption and circulating regulation of minerals 7.Minerals deficiency: causes , clinical features and related disease. 8.Minerals toxicity : causes, clinical features and related disease.	K:1,7, 10,12, 19, S:,4,5,12 ,15	4	X		X	X	X	X	14
9.	**Chemistry of muscle**	After complete the lecture, student should be understand the	K:1	4	X		X	X	X	X	16

		following: 1.Chemical structure of muscles 2.The basic chemical structure of sarcomeres 3.Mechanism of Actin – Myosin interaction during contraction and relaxation of muscles 4.Roles of sodium ,calcium and troponin in muscles contraction 5.Important metabolism and energy sources for muscle contracting	S:4,5								
10	**Vitamins**	. Know the classifications and properties of the vitamins group. . Understand the structure of each vitamin. . Understand the role of each vitamin in metabolism . Know the symptoms of vitamin deficiency.	K:1,2,4, 6,9 S:2,11	4	X		X	X	X	X	20
11	Organic chemistry	To introduce some of the most relevant and commonly used chemical concepts, processes and naming systems,to provide students the Imprtance of Organic chemistry of life.to learn student .that Organic compounds contain the same founctional group undergo similar chemical reactions.	K:19 S:6	4	X	X	X	X	X	X	20
12	chemistry of cell-cell junction	1- understand the molecular interactions and signaling processes that occur at these junctions. 2- This knowledge helps in comprehending various essential cellular functions, including tissue development, cell adhesion, communication, and barrier formation. 3- It also provides insights into disease mechanisms and potential targets for therapeutic	K:1,19 S:3	1							

		interventions.									
13.	introduction in central dogma steps	- Explain the central dogma - Importance of central dogma - how the central dogma is relevant to various biological processes -discussing the fundamental processes involved in the flow of genetic information.	K:1,6,19 S:4	1							
14.	Hydrocarbons.a liphatic and aromatic	Hydrocarbones supplies much of the energy and many of the simple organic compounds used in our society.Study some its reactions .Study most aromatic compounds to synthesis drugs	K:1,19 S:3	4	X		X	X	X	X	14
15.	Alcohols , Phenols , Ethers	-To learn the Nameclature of alcohols, phenols, and ethers according to the IUPAC system. -DRAW the structure corresponding to a given name. -CLASSIFY alcohols as primary, secondary, or tertiary based on their structure. -EXPLAIN the role of dipoles and hydrogen bonding in determining the physical properties of alcohols, Phenols and ethers.	K:1,6 S:5	4	X	X	X	X	X	X	17
16.	**Aldehydes and ketones**	-To study the general chemistry of Aldehydes and ketones with particular attention -To study their two majer reactions : addition to the carbonyl group and condensation reactions . -Many examples of these reactions are found in both of the labrotary and living systems	K:1,19 S:5	4	X	X	X	X	X	X	16
17.	**Stereochemistry**	The importance of stereochemistry in drug action is gaining greater attention in medical practice, and a basic knowledge of the subject will be necessary for clinicians to make	K:1,2,4,7,8,18,19 S:3,5,15	4	X		X	X	X	X	12

		informed decisions regarding the use of single-enantiomer drugs. For some therapeutics, single-enantiomer formulations can provide greater selectivities for their biological targets,									
18.	**Carboxylic acids**	teaching students how to identify and name carboxylic acids and describe their physical properties. Students will be able to 1-identify the functional group and general structure of a carboxylic acid, 2-identify and name different types of carboxylic acids using classic and IUPAC nomenclature, 3-describe and explain the general properties of carboxylic acids	K:1,19 S:5	4	X		X	X	X	X	14
19.	**Analytic and Inorganic chemistry**	The objective of an analytical chemist is to identify the chemical makeup of various substances. You perform specific procedures to identify and isolate ...	K:1,19 S:5	5	X		X	X	X	X	12

Assessment Methods:

The course will use the following assessment methods:

1.Written exams (short essay questions ,long essay) to assess the students' knowledge and understanding of the theory.

2.Practical exams (Conduct clinical chemical analyzes (manually) to diagnose associated diseases and determine their concentrations inside the body.

3.Logbook (documentation of the performance of the practical procedure)

4.Formative assessment :

- Examination of the first and second semesters, theoretical and practical

- Daily or quick theoretical and practical exams

- Theoretical and practical mid-year exams

- Theoretical and practical final exam year.

- Research evaluation

Grading and Evaluation:

The grading system for the course will be as follows:

-Pass mark = 50%

Type exam	1st course	2st course	mid-year exams	final exam	Total
Theoretical exam	5%	5 %	20%	50%	100%
Practical exam	2.5 %	2.5 %	5 %	10%	

Textbooks approved

1.chemical bases of life.

2. Organic chemistry j. lury

3.Biochemistry harper

4.Lippincott's Illustrated Reviews :Biochemistry

5.Biochemistry lenninger

Lecturers:

1- Dr. Lamees Majid - Head of Clinical Biochemistry Department.
2- Dr.Idrise Muhson Abeed - Establisher of Clinical Biochemistry Department
3- Lecturer Dr .Hassan Tuhmaz Hammed Clinical Biochemistry Department
4- Lecturer Dr. Ula Abbas Zeki- Clinical Biochemistry Department
5- Lecturer Dr.Zainab Ali Kadhim - Clinical Biochemistry Department
6- Lecturer Dr .Hiba abdulatheem Clinical Biochemistry Department