



# Paramedical Program

Specialization	Medical Laboratories
Course Number	020807121
Course Title	Medical Biochemistry
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



### Brief Course Description:

This course deals with structure and properties of biomolecules, such as amino acids, proteins, carbohydrates, lipids, and nucleic acids. The focus of this course will be on the relationship between protein structure and its biological function, generation and storage of metabolic energy, main metabolic pathways and their key steps.

Also to focus on enzymes , glycolysis and Citric Acid Cycle.

### Course Objectives:

Upon the completion of the course, the student should be able to:

- 1) Review general information about different biomolecules in the human body.
- 2) Acquire knowledge and understanding of current concepts in the subject of the course and develop critical thinking skills.
- 3) Learn the basic concepts governing protein structure, reactivity and regulation.
- 4) Understand how energy and essential nutrients are derived from foods, how these are stored and how these processes are regulated.
- 5) Know how biomolecules are synthesized and catabolised.





## Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction	<p>-Introduction: review of biomolecules, proteins, lipids, carbohydrates, nucleic acids.</p> <p>- Water balance &amp; pH .</p> <ul style="list-style-type: none"> <li>▪ Water balance and recommended intake</li> <li>▪ Blood volume and blood gases</li> <li>▪ Electrolytes (Na, K, Cl, P, Ca, Fe)</li> </ul>	
2	Enzymes, Mechanisms, and Control	<p>- The Michaelis-Menten model and the behavior of allosteric enzymes?</p> <p>- The models for the behavior of allosteric enzymes? (Concerted Model)</p> <p>- Zymogens, and control of enzyme activity</p> <p>- Active-site events of an enzyme that affect the reaction mechanism? (The Mechanism of Chymotrypsin Action)</p> <p>-Types of chemical reactions involved in enzyme mechanisms</p> <p>- Coenzymes</p>	



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3	Glycolysis	<ul style="list-style-type: none"> <li>-Introduction</li> <li>- The overall pathway in glycolysis?</li> <li>- Energy produced by glycolysis</li> <li>- Glycogen production and degradation</li> <li>-Gluconeogenesis</li> <li>- Carbohydrate metabolism control</li> <li>- Pentose phosphate pathway Cycle?</li> <li>-Glyoxylate cycle</li> </ul>	
4	The Citric Acid Cycle	<ul style="list-style-type: none"> <li>-Role of the citric acid cycle in metabolism?</li> <li>-Overall pathway of the citric acid cycle?</li> <li>- Electron Transport chain and Oxidative Phosphorylation.</li> </ul>	
5	Lipid Metabolism	<ul style="list-style-type: none"> <li>- Lipids catabolism</li> <li>- The energy yield from the oxidation of fatty acids- unsaturated fatty acids and odd-carbon fatty acids catabolism</li> <li>-Ketone bodies</li> <li>-Fatty acids production? (Brief pathway)</li> <li>-Cholesterol synthesis and degradation</li> </ul>	



6	Metabolism of Nitrogen & Nucleic Acids	<p>Metabolism of amino acids</p> <ul style="list-style-type: none"> <li>- amino acids synthesis</li> <li>- amino acid catabolism</li> <li>- The levels of structure in nucleic acids?</li> <li>- Covalent structure of polynucleotides?</li> <li>-Purines Metabolism</li> <li>-Pyrimidine metabolism</li> </ul>	
7	Practical part	<ul style="list-style-type: none"> <li>- Urine analysis</li> <li>-Clinically Significant Isoenzymes:             <ul style="list-style-type: none"> <li>A. Lactate dehydrogenase (LD)</li> <li>B. Creatinine kinase (CK)</li> <li>C. Alkaline phosphatase (ALP)</li> <li>D. Alanine aminotransferase (ALT)</li> <li>E. Aspartate aminotransferase (AST)</li> <li>F. Amylase (AMS)</li> <li>G. Gamma glutamyl transferase (GGT)</li> <li>H. Lipase (LPS)</li> <li>I. Pseudocholinesterase(pCHE)</li> <li>J. Prostatic acid phosphatase (PAS)</li> <li>K. Glucose-6-phosphate dehydrogenase</li> </ul> </li> </ul>	



**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Practical Exam	10%	--/--/----
	Final Exam	35%Theory 15%Practical	--/--/----

**Teaching Methodology:**

- ❖ Lectures
- ❖ Slides and posters
- ❖ Practice inside labs

**Text Books & References:****Reference**

- 1- Medical biochemistry. Alaa Abu Samhadaneh, Dr. Fatima Nashash & Walid Shquirat, 1st ed. 2014, Altatbeekeya; Pubtication & Distribution, Jordan.
- 2- Biochemistry . Mary K. campell, shawn O. Farrell & Owen m. Mcdougal . 9th ed, 2018. USA.
- 3- Medical biochemistry . Gustavo Blanco & AntonioBlanco. 1st ed. 2017 . Academic press.
- 4- Mark's Basic Medical biochemistry. Michael Lieberman & Alisa Peet. 5th ed. 2017. Wolters Kluwer.



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