



## Course Book

<b>Course Description</b>	<p><b><u>Clinical Biochemistry:</u></b> (also known as clinical biochemistry or chemical pathology) is the study of chemical and biochemical mechanisms of the body in relation to disease, mostly through the analysis of body fluids such as blood or urine.</p> <p>Clinical chemists use a wide range of analytical techniques for example, molecular diagnostics, measurement of enzyme activities, spectrophotometry, electrophoresis, the separation of molecules based on physical characteristics and immunoassays The work involves manual techniques for which the biomedical scientist develops complex practical and interpretive skills.</p>			
<b>Course objectives</b>	<p><b><u>The goal of the course :</u></b></p> <p>a) Provide appropriate and effective consultation          (b) Render decisions based on data          (c) Render diagnostic interpretational considering clinical implications          (d) Provide advice about diagnostic interpretations          (e) Explain diagnostic tests or procedures          (f) Provide advice about influence of preanalytic variables          (g) Provide information about disease-screening methods          (h) Use information systems to improve clinical interpretations and transmit information</p>			
<b>Student's obligation</b>	<p style="text-align: right;">Attendance in the all lectures.</p> <p style="text-align: right;">· Several quizzes and assignment.</p> <p style="text-align: right;">· Attendance at midterm and final Exams in end of the course.</p> <p style="text-align: right;">Attendance on electronic application (zoom , module)</p>			
<b>Required Learning Materials</b>	<p>· Lecture halls Using data show, white board and PowerPoint, computer ,zoom and module application          laboratory. · data show , clinical tests kit ,chemical instruments ,safety materials</p>			
<b>Evaluation</b>	<b>Task</b>	<b>Weight (Marks)</b>	<b>Due Week</b>	<b>Relevant Learning Outcome</b>

	Paper Review				
	A s s i g n m e n t s	Homework	5%		
		Class Activity	2%		
		Report	5%		
		Seminar	5%		
	Quiz		8%		
	Lab.		10%		
	Midterm Exam		25%		
	Final Exam		40%		
	Total		100%		
<b>Specific learning outcome:</b>	<p>Upon graduation from the program, students will be able to demonstrate:</p> <ol style="list-style-type: none"> <li>1. competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services, including hematology, chemistry, microbiology, urinalysis, body fluids, molecular diagnostics, phlebotomy, and immunohematology</li> <li>2. proficiency to problem-solve, troubleshoot, and interpret results, and use statistical approaches when evaluating data</li> <li>3. professional conduct, respecting the feelings and needs of others, protecting the confidence of patient information, and not allowing personal concerns and biases to interfere with the welfare of patients</li> <li>4. administrative skills consistent with philosophies of quality assurance, continuous quality improvement, laboratory education, fiscal resource management, and appropriate composure under stressful conditions</li> <li>5. application of safety and governmental regulations and standards as applied to medical laboratory practice</li> <li>6. effective communication skill to ensure accurate and appropriate information transfer.</li> </ol>				
<b>Course References:</b>	<p><b>Key references: clinical chemistry (principles, procedures, correlation)</b> by Michael L. Bishop and Larry Schoef 5<sup>th</sup> edition 2005.</p> <p><b>Organic chemistry 6<sup>th</sup> edition , by Morrison and Boyd-</b> ▪</p>				

- **Useful references:** practical general chemistry for medical technology students. معاهد الطبي الفني / قسم التحليلات المرضية.

Course topics (Theory)	Week	Learning Outcome
-Define and history about clinical chemistry, components of blood and functions in the body , collection of blood ,anticoagulants .	1	
- <b>Carbohydrates</b> .classification , stereoisomer, monosaccharide , di and polysaccharide -Chemical properties of carbohydrates, metabolism of glucose, regulation of carbohydrates.	2	
- <b>Lipids</b> , types of lipid ,distribution in humans body . -Cholesterol, HDL, LDL ,functions -General lipoproteins structure, disease of lipids(lipemia). Increasing lipid in the body and effect of fatty acid in the stomach	3	
- <b>Proteins</b> , general character, synthesis, classification. -Protein metabolisms in healthy human and patient . -Total protein abnormalities -Protein in the urine(protein urea) method of analysis, determination protein of blood .	4	
<b>Enzymes</b> , general properties, definition, Classification and nomenclature Enzyme of clinical significant, functions, enzymes effective change.	5	
Non protein nitrogen's ( <b>Blood urea nitrogen</b> ) synthesis, metabolism and excretion . <b>Creatinine</b> waste product .	6	
<b>Uric acid</b>	7	
<b>Electrolytes</b> (Sodium)	8	
<b>Calcium and other electrolytes</b>	9	
<b>Bilirubin</b>	10	
<b>Vitamins</b>	11	
	12	
Practical Topics	Week	Learning Outcome
practicing of blood drawing ,and find with select suitable vein . Equipment identification , Lab Safety	1	
Glucose determination in blood sample (RBS)	2	

Determination of total cholesterol and lipid profiles (LDL, HDL, TG)	3	
Determination of Albumin and Globulins	4	
Determination of blood urea nitrogen in the blood	5	
Determination Creatinine as kidney function test in the blood	6	
Determination of Uric Acid in thhe blood	7	
Liver function tests enzymes:spesification of active amylase in blood . Determination ALP and ALT in the blood.	8 9	
Determination of sodium and potassium in the blood	10	
Determination Calcium in the blood		
Determination vit D in the Hospital laboratories	11	
General Urine Examination	12	

## Questions Example Design

### -Compositiona

Q/What are electrolyte?

SOL:

Chemically, electrolytes are substances that become ions in solution and acquire the capacity to conduct electricity.

Q/How can treatment of hypo and hypernatremia ?explain

Sol:

Treatment

Treatment is directed

At correction of the underlying condition that caused the water depletion or sodium retention .The maximum rate should be 0.5mmol/L per hour.

### 2- True or false type of exams:

Q/write the letter **T** and **F** in front of sentences ,if false correct without changing underling words.

A- **Insulin** and **glucagon** are **hormones** secreted by islet cells within the pancreas.

B- The female sex hormone estrogen tends to decrease **HDL** .

Sol:

A-T

B-F The female sex hormone estrogen tends to **arise HDL** .

### 3-Multiple Choices:

Q/A 3 year old is admitted with gastroenteritis and dehydration. His serum sodium is 167 mEq/L. Once he is hemodynamically stable, fluid management should be focused on providing:

- 1-Glucose
- Free water-2
- 3-Sodium
- 4-Potassium

**2- is the correct answer. Hypernatremia is a total body free water deficit rather than an excess of sodium**

**Extra notes:**

**External Evaluator**