

## Course Description

This course description provides a brief summary of the most important characteristics of the course and list the learning outcomes expected from the student to achieve when he\she has made maximum use of the available learning opportunities.

1-Educational Institution/ college	<b>CMUM</b>	
2-Department offering the course	<b>Biochemistry</b>	
3-Name of Academic Program	<b>MSc</b>	
4-Academic Year/level	<b>preparation year</b>	
5-Title of the course	<b>Clinical chemistry</b>	
6-Total Course Hours	<b>First term 30 hours theory 30 hours practice</b>	<b>Total=60 hours theory 30 hours practice</b>
	<b>Second term 30 hours theory</b>	
7-Date of specification approval	<b>10/9/2023</b>	

### **8-General Aims of Course**

In general, the (Clinical Chemistry) course offered to postgraduate students (theoretically and practically) aims to provide information (knowledge) about chemical disturbances and their role and effects in controlling the balanced metabolism of the body at the molecular level under various pathological conditions. At the same time, it develops skills in making clinical thinking when managing various acute and chronic health problems and in particular the ability to determine the cause of metabolic and molecular imbalances.

**9-Intended learning outcomes of the course:**

By the end of the course, students should be able to:

**A-Knowledge and understanding:**

- A1. Recall the basic concepts of major body metabolism and its important biochemical pathways and reactions.
- A2. Repeat the mechanisms of different diseases that develop due to metabolic derangements and/or genetic mutations.
- A3. Recognize the possible treatment of different diseases by analyzing the metabolic (or molecular) etiology.
- A4. Arrange how to make final diagnosis of common chronic diseases that develop due to disturbances of body metabolism by using biochemical and/or molecular laboratory tests.
- A5. Arrange signs and symptoms and expect the clinical findings of a disease that results from disturbances in body metabolism.
- A6. Describe what they learned about metabolic diseases to patients in their families and friends with confidence based on the knowledge they acquired.
- A7. Select the appropriate body specimen to conduct the appropriate lab analysis that aids in confirmation of diagnosis of different diseases and acquire the necessary knowledge to conduct the lab experiments with the ability to interpret results.
  
- A8- Learn how to examine urine normally (including color, appearance, pH, and specific gravity) and chemically (testing for urobilinogen, uric acid, ammonium salt, creatinine, etc.). Use a spectrophotometer and learn how to calculate the concentrations of any substance using Beer-Lambert's law.
- A9- The student will learn to prepare the samples used for this procedure (which are: blank, standard and test solutions)

<p><b>B-Intellectual Skills</b></p>	<p>B1 -Identify the link between the materials produced from raw materials, understand their path, and try to transform them from their natural path to other paths for more benefit.</p> <p>B2- Arrange to transform the paths of harmful produced substances into harmless substances, especially inside the body</p> <p>B3- Predict the means of analysis and selection of the resulting materials and increase their specialization</p>
<p><b>C-Professional Skills</b></p>	<p>C1-Judge the modifications that occur as a result of a few interactions within the body and the unnatural substances resulting from them that lead to various types of diseases</p> <p>C2-Interpret the means of analysis and measurement of models taken from the human body, especially blood and other physiological or pathological models, which help in diagnosing diseases or assessing the health or treatment status</p> <p>C3- Practicing the blood drawing process and acquiring sufficient skills and knowledge to select samples and their timing, choose collection tubes and appropriate anticoagulants, and prepare serum and plasma samples.</p> <p>C4- Acquire sufficient skills to examine urine samples</p> <p>C5- Measure total protein concentrations using a spectrophotometer.</p> <p>C6- Measure the concentration of protein in the cerebrospinal fluid and identify its physical properties as well.</p>

	<p>C7- Measure the amount of urinary protein in a 24-hour urine sample</p> <p>C8- Use the enzymatic method to measure the level of glucose in plasma and know how to interpret the results based on the standards of the World Health Organization and the ADA</p> <p>C9- Measure the level of cholesterol in the blood as well as the percentage of other fats in the blood</p> <p>C10- Measuring the activity of bilirubin, alkaline phosphatase and liver enzymes by the enzymatic method</p> <p>C11- Evaluation of kidney function, blood urea and blood creatinine, and creatine clearance calculations</p> <p>C12- Identify the principle and tools needed to perform the polymerase chain reaction (PCR)</p> <p>C13- Learning about the working principles of more specialized devices such as ELISA and Minividus</p>
<p><b>D-General and Transferable Skills</b></p>	<p>D1- Summarize skills in the use of materials and equipment and the necessities that support them in verification, measurement and evaluation</p> <p>D2- Test and follow up students practically, directing them and alerting them to the possible specialized dangers as a result of their work, especially for the unscheduled and inferred judgments from their activities in personal development and assigning distinctive abilities to be on the right track.</p>

<b>E-Attitude outcomes</b>	The student will be able to recognize any ethical problems in relation to the topics and act accordingly, the student will acknowledge the importance of wearing gloves and mask in chemical lab
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<b>10-Teaching and learning methods</b>	
1. Theoretical lectures	1 lecture \week
2. Practical labs or clinical sessions	Practical laboratories and clinical sessions 1\ week
3. Seminars and presentations	Students are presenting about different topics in biochemistry through seminars and encouraged to make scientific posters. They are subjected to thorough discussion by teaching staff and colleagues.

<b>11-Assessment methods</b>
Through theoretical and practical exams, daily follow-up (especially in the laboratory), and graduate students presenting weekly seminars, in addition to exam procedures for the first semester, 30% (semi-semester) and 70% final, and the second semester, 30% semi-semester and 70% final.

<p>1. Formative assessments</p>	<ol style="list-style-type: none"> <li>1. Fast quizzes at the end of lecture</li> <li>2. Asking students to answer two or three questions (may be an MCQ), explain a mechanism or a finding and react with slides and discussion within the lecture minutes.</li> <li>3. Electronic assignments to the class (using Google forms)</li> <li>4. Case interpretations in the lab (students will discuss some lab results to settle differential diagnosis)</li> <li>5. Seminar discussion (the teacher and/or student select a topic and present it with thorough discussion).</li> </ol>
<p>2. Summative assessments</p>	<ol style="list-style-type: none"> <li>1-Mid-semester exam (first) in clinical chemistry 30%.</li> <li>2. The exam at the end of the first semester in clinical chemistry is 70% of the total grade.</li> <li>3. Mid-semester (second) exam in clinical chemistry 30%</li> <li>4. The exam at the end of the second semester in clinical chemistry is 70% of the total grade.</li> </ol>
<p>3. Pass mark</p>	<p>60%</p>

## 12- Course structure

<b>Title</b>	<b>hours</b>	<b>Lecturer</b>	
<b>Carbohydrate metabolism and gestational diabetes</b>	<b>4hours</b>	<b>Ehsan Hassan Lecturer</b>	<b>theory</b>
<b>Iron metabolism</b>	<b>2hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>theory</b>
<b>hemoglobin synthesis</b>	<b>2hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>theory</b>
<b>Ketosis</b>	<b>2hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>theory</b>
<b>Liver function</b>	<b>4hours</b>	<b>Amjad Hazim Lecturer</b>	<b>theory</b>
<b>Renal function</b>	<b>4hours</b>	<b>Amjad Hazim Lecturer</b>	<b>theory</b>
<b>Vitamins</b>	<b>2hour</b>	<b>Sura Khaialdin) Lecturer</b>	<b>theory</b>
<b>Uric acid metabolism and gout</b>	<b>4hours</b>	<b>Amjad Hazim Lecturer</b>	<b>theory</b>
<b>Acid base balance</b>	<b>6hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Vitamin D metabolism Calcium ,phosphate and magnesium</b>	<b>2hours</b>	<b>Amjad Hazim Lecturer</b>	<b>theory</b>

<b>Tumor markers</b>	<b>4hours</b>	<b>Amjad Hazim Lecturer</b>	<b>theory</b>
<b>Genetic diseases (inborn error of metabolism)</b>	<b>4hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Cardiac enzymes and clinical enzymology</b>	<b>4hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>theory</b>
<b>Lipid disorder</b>	<b>2hour</b>	<b>Sura Khaialdin Lecturer</b>	<b>theory</b>
<b>Endocrine (pituitary gland)</b>	<b>2hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Endocrine( adrenal gland and genital gland)</b>	<b>2hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Endocrine( thyroid gland)</b>	<b>2hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Water and electrolytes</b>	<b>4hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>theory</b>
<b>Research methodology</b>	<b>4hour</b>	<b>Ehsan Hassan Lecturer</b>	
<b>Practice</b>			<b>Practice</b>
<b>Laboratory safety</b>	<b>1hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>Practice</b>



<b>Atomic absorption</b>	<b>1hour</b>	<b>Saba Khairy Lecturer</b>	<b>Practice</b>
<b>Flame photometry</b>	<b>1hour</b>	<b>Saba Khairy Lecturer</b>	<b>Practice</b>
<b>Quality control</b>	<b>1hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>Practice</b>
<b>Spectrophotometry</b>	<b>1hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>Practice</b>
<b>Principles of preparation of chemical solution ,dilution, molality and molarity, part per million SI units</b>	<b>1hour</b>	<b>Omar Mohammed Yahya Lecturer</b>	<b>Practice</b>
<b>Principles of immunoassay EIA(Elisa) FIA(minividas) Chemiluminesce</b>	<b>2hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>Practice</b>
<b>Enzyme linked immune sorbent assay(ELISA)</b>	<b>1hour</b>	<b>Sura Khaialdin Lecturer</b>	<b>Practice</b>
<b>Radioimmunoassay and IRMA</b>	<b>2 hours</b>	<b>Hazim Allawi Ass.prof</b>	<b>Practice</b>
<b>Chromatography and HPLC</b>	<b>1 hour</b>	<b>Ehsan Hassan Lecturer</b>	<b>Practice</b>
<b>Renal stone</b>	<b>1hour</b>	<b>عمر محمد يحيى Lecturer</b>	<b>Practice</b>
<b>Optimizing a</b>	<b>2hours</b>	<b>Amjad Hazim</b>	<b>Practice</b>

<b>Conventional Polymerase Chain Reaction (PCR) and Primer Design/ Part II</b>		<b>Lecturer</b>	
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<b>13-Resources and requirements</b>	
Essential text books	1. Lippincott's illustrated reviews of Biochemistry  2. Review of physiological chemistry by H A Harper
Recommended text books	Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, by Nader Rifai, 6th Edition.
Other resources	Theoretical and practical lectures in all the mentioned specializations

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