

## Module (Course Syllabus) Catalogue 2022-2023

College/ Institute	Shaqlawa Technical College	
Department	Medical Laboratory Technology- Morning	
Module Name	Biochemistry	
Module Code	BIO202	
Degree	Technical Diploma <input checked="" type="checkbox"/>	Bachelor <input type="checkbox"/>
	High Diploma <input type="checkbox"/>	Master <input type="checkbox"/> PhD <input type="checkbox"/>
Semester	2 <sup>nd</sup>	
Qualification	MSc. Biochemistry	
Scientific Title	Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours	4	
Weekly hours (Theory)	(Two)hr Class	(70)Total hrs Workload
Weekly hours (Practical)	(Two)hr Class	(80)Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Hardi Rafat Baqi	
E-Mail & Mobile NO.	<a href="mailto:hardi.baqi@epu.edu.iq">hardi.baqi@epu.edu.iq</a>	
Lecturer (Practical)	Hardi Rafat Baqi	
E-Mail & Mobile NO.	<a href="mailto:hardi.baqi@epu.edu.iq">hardi.baqi@epu.edu.iq</a>	
Websites		

# Course Book

<b>Course Description</b>	<p>Biochemistry is the application of chemistry to the study of biological processes at the cellular and molecular level. It emerged as a distinct discipline around the beginning of the 20th century when scientists combined chemistry, physiology, and biology to investigate the chemistry of living systems.</p> <p>Biochemistry is both life science and a chemical science - it explores the chemistry of living organisms and the molecular basis for the changes occurring in living cells. It uses the methods of chemistry, physics, molecular biology, and immunology to study the structure and behaviour of the complex molecules found in biological material and the ways these molecules interact to form cells, tissues, and whole organisms.</p>
<b>Course objectives</b>	<p>"Biochemistry has become the foundation for understanding all biological processes. It has provided explanations for the causes of many diseases in humans, animals and plants."</p> <p>Biochemists are interested, for example, in mechanisms of brain function, cellular multiplication and differentiation, communication within and between cells and organs, and the chemical bases of inheritance and disease. The biochemist seeks to determine how specific molecules such as proteins, nucleic acids, lipids, vitamins, and hormones function in such processes. Particular emphasis is placed on the regulation of chemical reactions in living cells.</p> <p>Biochemistry has become the foundation for understanding all biological processes. It has provided explanations for the causes of many diseases in humans, animals, and plants. It can frequently suggest ways by which such diseases may be treated or cured.</p> <p>Because biochemistry seeks to unravel the complex chemical reactions that occur in a wide variety of life forms, it provides the basis for practical advances in medicine, veterinary medicine, agriculture, and biotechnology. It underlies and includes such exciting new fields as molecular genetics and bioengineering.</p> <p>The knowledge and methods developed by biochemists are applied to in all fields of medicine, in agriculture and in many chemical and health-related industries. Biochemistry is also unique in providing teaching and research in both protein structure/function and genetic engineering, the two basic components of the rapidly expanding field of biotechnology.</p> <p>As the broadest of the basic sciences, biochemistry includes many subspecialties such as neurochemistry, bioorganic chemistry, clinical biochemistry, physical biochemistry, molecular genetics, biochemical</p>

	<p>pharmacology, and immunochemistry. Recent advances in these areas have created links among technology, chemical engineering, and biochemistry. The main objective of the course is to make students realize the importance and applications of chemistry for their future study and career in medical laboratory science. Also, teaching them the basics and fundamental concepts of modern chemistry that is both needed and useful in their major. In order of achieving this objective, the current course is split into two (Theoretical and Practical) sections that fulfils the major concepts of theoretical modern chemistry and applies practical concepts and laboratory skills in the lab. through proper use of lab equipment, glassware, techniques, and reagents. This course also is integrated with the student's participation through making assignments and presentations in subject areas.</p>				
<b>Student's obligation</b>	<p>Students attending Biochemistry course need to:</p> <ol style="list-style-type: none"> <li>1- Attend the scheduled classes whether on campus or online.</li> <li>2- Read the course documents (lectures): It is important that students read all course documents (e.g., syllabus, assignments) to become familiar with course expectations. This will allow students the ability to properly plan for all course activities.</li> <li>3- Participate in all activities related to the course including: practical experimentations, presentations, reports, discussions, quizzes, and exams.</li> <li>4- Success in the assigned assessments with a minimum grade of 60%.</li> </ol>				
<b>Required Learning Materials</b>	<ul style="list-style-type: none"> <li>- Printouts of weekly lectures taught at the college campus (Theoretical and Practical).</li> <li>- Reviewing of internet</li> <li>- Proper laboratory (Chemistry, Clinical Chemistry, or Biochemistry).</li> <li>- Proper instruments</li> <li>- Chemicals and reagents</li> <li>- Laboratory glassware, equipment</li> </ul>				
<b>Forms of teaching</b>	<p>Biochemistry subjects are taught through presenting the lecture slides by slideshow in the class or electronically by recorded videos. Students attending the class can share their thoughts and ask the lecturer any questions they want. The practical section of the subject is taught in the lab where students need to do practical experimentations and report their results.</p>				
<b>Evaluation</b>		<b>Task</b>	<b>Weight (Marks)</b>	<b>Due Week</b>	<b>Relevant Learning Outcome</b>
		Paper Review			
	Assignments	Homework	5%		Encourages students to search for more detailed knowledge relevant to the topics taught at campus.
		Class Activity	2%		
	Report	5%		Report their weekly laboratory work	

	Seminar	5%		Enhances the preparation and presenting skills of the students
	Essay			To make students engage more with their favorite topics
	Project			
	Quiz	8%		To encourage students, study every week.
	Lab.	10%		To make students practice obeying the laboratory rules including scientific, safety, attitude, and ethics.
	Midterm Exam	25%		To evaluate students and their achievements at the middle of the term.
	Final Exam	40%		Final evaluation and assessment.
	Total	100%		
<b>Specific learning outcome:</b>	<p>At the end of the course, students should be familiar with the basic concepts in biochemistry including the importance and applications of biochemistry in life and its contributions in forming all other life sciences. Also, the reasons make biochemistry subject a mandatory course to be taught in all departments related to life sciences especially the Medical Laboratory Technology department. Students should have a clear view and understandings about cell components, biomolecules, carbohydrates, lipids, proteins, metabolism, etc. Besides, Students should learn the basic laboratory skills needed for conducting experiments in biochemistry and other laboratories. Another learning outcome of the course is understanding and performing of qualitative analysis for biomolecules such as carbohydrates (mono, di, and polysaccharides), proteins (amino acids, dipeptides, oligopeptides, polypeptides) in laboratory.</p>			
<b>Course References:</b>	<ul style="list-style-type: none"> <li>• Books:               <ol style="list-style-type: none"> <li>1. Lehninger principles of biochemistry, fourth Edition by David L. Nelson and Michael M. Cox</li> <li>2. Harper's illustrated biochemistry 26<sup>th</sup> edition by Robert K. Murray, Daryl K. Granner, Peter A. Mayes and Victor W. Rodwell</li> <li>3. Biochemistry, fourth edition by Donald Voet and Judith G. Voet</li> <li>4. Biochemistry, fifth edition by Jermy M. Berg, John L. Tymoczko and Lubert Styrer</li> <li>5. Lippincott's illustrated reviews, fifth edition by Richard Harvey and Denise Ferrier</li> </ol> </li> </ul>			

	6. Medical biochemistry at a glance, third edition by J. G. Salway 7. Biochemistry, third edition by U. Satyanarayana and U. Chakrapani • Magazines and internet review	
<b>Course topics (Theory)</b>	<b>Week</b>	<b>Learning Outcome</b>
Introduction to biochemistry	<b>1</b>	An introduction to biochemistry, why do we study biochemistry?
Biomolecules and the cells	<b>2</b>	Understanding, importance, and objective of analytical chemistry
Carbohydrates, monosaccharides, disaccharides, polysaccharides	<b>3,4,5</b>	Definition, types, classifications, structures, functions
Amino acids, peptides, proteins, protein structures	<b>6,7,8</b>	Definition, types, classifications, structures, functions
Lipids, classifications, simple, complex lipids	<b>9,10,11</b>	Definition, types, classifications, structures, functions
Metabolism, catabolism, anabolism	<b>12</b>	Definition, types, classifications, functions, metabolic pathways
Carbohydrate metabolism, glycolysis	<b>13</b>	Definition, types, classifications, metabolic pathways, functions
Protein metabolism, synthesize	<b>14</b>	Definition, types, classifications, metabolic pathways, functions
Lipid metabolism	<b>15</b>	Definition, types, classifications, metabolic pathways, functions
<b>Practical Topics</b>	<b>Week</b>	<b>Learning Outcome</b>
Introduction to the lab., biochemistry lab safety rules	<b>1</b>	
Qualitative tests for carbohydrates	<b>2, 3, 4</b>	Molisch's test, Barfoed's test, Benedict's test, iodine test, hydrolysis of starch
Qualitative tests for proteins	<b>5,6,7</b>	Biuret's test, Ninhydrin test, Xanthoproteic test, Millon's, etc.
Qualitative tests for lipids	<b>8,9,10</b>	Solubility test, emulsification test, Liebermann – Burchard test

Quantitative determination of carbohydrates	<b>11</b>	
Quantitative determination of proteins	<b>12</b>	
Quantitative determinations of lipids	<b>13</b>	

### Questions Example Design (theoretical and practical exam):

All of the activities provided in the workload section are considered when awarding you a grade for this course. In order to pass this course, you will need to earn a 60% or higher on the final exam. Your score on the exam will be calculated as soon as you complete it. If you do not pass the exam on your first try, you may take it again in the second trial.

- Type of the exam (composition and multiple choice)
- Exam's duration (for example one hour)
- The number of the questions: at least four questions. The marks distributed evenly throughout.

The answer should contain preface, main contents and conclusion.

- I- *Compositional:* In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....?

Example:

- 1- What are the major causes of diseases that influence biochemical processes in cell or body? Write them down with one example for each.
- 2- What are the elements of life? Why carbon is considered as a unique element of life?
- 3- Draw the following table on your answer sheet, then complete the numbered cells with correct answers:

NAME OF TEST	SAMPLE	OBSERVATION	RESULT	REASON
Biuret test	1	2	Positive	3
4	Starch	5	6	polysaccharide
7	8	Red ppt.	Positive	9
Emulsification	10	11	Negative	12
13	Alanine	14	15	Amino acid

- II- *Multiple choices:*

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase.

**Extra notes:**

**External Evaluator**