



**Department of Anaesthesia**  
**College of Health Sciences**  
**University of Cihan- Sulaymaniyah**

**Subject: Practical Biochemistry**

**2<sup>nd</sup> Stage - 1<sup>st</sup> semester**

**Course Book – Year 2023-2024.**

**Lecturer's name: Darya Shorsh Hamad**

**Academic Year: 2023-2024**

# Course Book

<b>1. Course name</b>	<b>Practical Biochemistry</b>	
<b>2. Lecturer in charge</b>	<b>Darya Shorsh Hamad</b>	
<b>3. Department/ College</b>	<b>Medical Laboratory Analysis/ Health Science</b>	
<b>4. Time (in hours) per week</b>	<b>2 Hrs Practical</b>	
<b>5. Office hours</b>	<b>All days of the week from 9:00 to 14:00 pm</b>	
<b>6. Course code</b>	<b>MLA</b>	
<b>7. Teacher's academic profile</b>	<a href="https://uni.sulicihan.edu.krd/qa/profile.php?id=149">https://uni.sulicihan.edu.krd/qa/profile.php?id=149</a>	
<b>8. Keywords</b>	<b>Carbohydrate, Iodine Test, Seliwanoff's Test, Qualitative Tests for Amino Acid and Proteins, Reactions of Lipids.</b>	
<b>9. Course overview:</b>	<p>Biochemistry is the study of the chemical and physical processes that occur in living organisms. It is a broad discipline that encompasses many different areas of study, including the structure and function of biomolecules, the metabolism of nutrients, and the regulation of gene expression. This course will provide an introduction to the fundamental concepts of biochemistry. We will discuss the structure and function of the major biomolecules, including carbohydrates, lipids, proteins, and nucleic acids. We will also explore the mechanisms of enzyme catalysis, metabolic pathways, and gene regulation.</p> <p>In addition to lectures, the course will include a laboratory component. In the laboratory, you will have the opportunity to apply the concepts you learn in lecture to real-world problems. You will also gain hands-on experience with biochemical techniques, such as protein purification and enzyme assay.</p>	
<b>10. Course objective:</b>	<p>This course serves as a foundational gateway to the core principles of biochemistry and is especially tailored for students aiming to specialize in clinical chemistry.</p> <p>-Utilizing easy-to-follow protocols and readily accessible equipment and materials, the course aims to facilitate a comprehensive understanding of biochemical substances.</p> <p>-A curated set of experiments is included to empower students with the skills needed to function autonomously in any laboratory environment.</p> <p>For today's lab researchers, a solid grasp of biochemical analytical methods and key theoretical concepts is essential. Therefore, students in the Medical Laboratory Science program are expected to acquire a basic set of practical skills for conducting biochemical research. These skills encompass tasks such as precise measurement and dispensing of solutions and biological fluids, effective use of centrifugation, colorimetric analysis of various solutions, pH level determination, and specialized techniques for enzyme studies. This course manual</p>	

provides in-depth explanations of these essential biochemical analytical methods, equipping students with the requisite skills.

### **11. Student's obligation**

A student has an obligation to respect the ethical standards of **Cihan University** in the following points:

#### **A. Class Attendance and responsibilities:**

1. Students are expected to attend each class for the entire semester.
2. If a student arrives more than 15 minutes late or leaves more than 15 minutes early, they will be marked as absent for the whole hour.
3. Students are responsible for material present in lectures.
4. Students will take several quizzes over the course and the quiz marks will be counted toward the final grade. So, try to prepare yourself for quiz every week.

#### **B. Penalty and acceptable excuses for class and exam absence:**

5. Only students with official absence, family crises, and illness are excused from class.
6. Three occasions of lateness count as one absence.
7. The student who misses 10 percent of the classes will be placed on probation.
8. Since all examinations are announced in advance, **ZERO** grade will be given to any missed examination unless a student has an acceptable reason, such as illness, for not being able to take the examination during all those days when the examination was announced.

### **12. Forms of teaching**

The teaching format for this practical biochemistry course integrates both theoretical instruction and practical application. Lectures serve as the foundation for understanding key biochemical concepts, while laboratory exercises offer hands-on experience for skill development. To ensure comprehensive understanding and retention, the course incorporates mandatory quizzes and a final evaluation. Additionally, the learning experience is enhanced through a variety of supplementary materials, including specialized assignments, Lab Report, group-based learning activities, video demonstrations, and online tools.

### 13. Assessment scheme

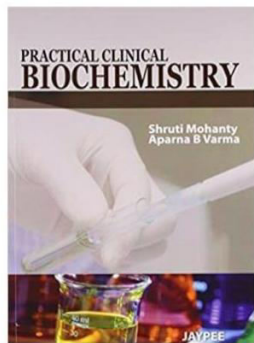
<b>Practical Session</b>			
<b>No.</b>	<b>Activities</b>	<b>Number or Quantity</b>	<b>Mark %</b>
1	Quiz	4-5	4
2	Lab. Report	-	8
3	Lab. Presentation	-	4
4	Lab. Attitude	-	2
5	Attendance	-	2
<b>Total</b>			<b>20</b>
<b>Final Exam</b>			
1	<b>Practical Examination</b>	1	20
<b>Total</b>			<b>40</b>

### 14. Student learning outcome:

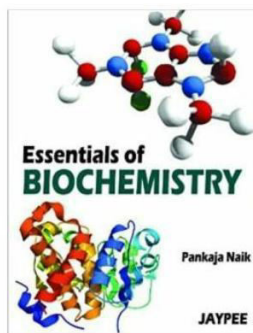
The students will learn:

1. Laboratory Techniques: Master essential lab skills such as pipetting, centrifugation, titration, and pH measurement.
2. Experimental Execution: Be able to independently conduct basic biochemistry experiments, following protocols accurately and safely.
3. Safety Protocols: Learn and adhere to laboratory safety guidelines, including the proper use of personal protective equipment (PPE) and waste disposal.
4. Instrumentation: Gain hands-on experience with laboratory instruments commonly used in biochemical research, such as spectrophotometers, centrifuges, and PCR machines.

## 15. Course Reading List and References:



[Practical Clinical Biochemistry](#)



[Essentials Of Biochemistry](#)

## 16. Lessons plan

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No. of week	Subject- Practical
1	Lab Safety- Introduction
2	Qualitative Tests of Carbohydrates (Molisch, Iodine) tests.
3	Identification of Carbohydrates (benedicts and Barfoed) tests.
4	Carbohydrate Qualitative tests (Seliwanoff, Osazone, Fehling's, and Bial) Tests.
5	Qualitative Tests of Amino acids (Ninhydrin test).
6	Qualitative Tests of Proteins (Biuret test).
7	Precipitation of proteins/solubility.
8	Reaction of Lipids (Saponification).
9	Reaction of Lipids Part II (Acrolein Test).
10	Introduction to protein/ colour reaction of proteins (Salkowaki, Liberman – Burchards) test.
11	Thin layer chromatography.
12	Measurement of glucose by Digital Glucometer.
13	Final Exam

## 17. Sample of Question:

### Multiple choice questions (MCQs):

1) Which of the following is a carbohydrate?

- A. Glucose      B. Protein      C. Lipid      D. DNA

5. Which of the following fatty acids is an example of a saturated fat?

- A. Linoleic Acid      B. Palmitic Acid      C. Oleic Acid      D. Arachidonic Acid

Q2/ Determine if the following statements are true or false. If false, replace the underlined word(s) or expression to produce a true statement.

- 1) In a Bradford assay, the colour change from brown to blue indicates the presence of proteins.
- 2) The iodine test is used to determine the presence of saturated fats in a sample.

Q3/ Fills the blanks with the correct answer:

- 1) The basic building blocks of proteins are called \_\_\_\_\_.
- 2) In saponification, lipids react with \_\_\_\_\_ to produce glycerol and fatty acid salts.

Q4/ Answer the following:

- 1) Write the principle of Barford's test? Clarify with chemical equation?
- 2) we did the following tests for each of Solution **Glucose** and **ribose** give the results and explanation for each solution.

Tests	Benedict	Barford	Bail	Selliwanoff
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Q5/

- 1) **Given the following lipid profile, calculate the total cholesterol level:**
  - HDL (High-Density Lipoprotein): 50 mg/dL
  - LDL (Low-Density Lipoprotein): 100 mg/dL
  - VLDL (Very Low-Density Lipoprotein): 30 mg/dL
- 2) You perform a glucose assay with a standard solution of known concentration (5 mg/mL) and measure its absorbance as 0.200. You then measure the absorbance of your unknown sample as 0.150. What is the concentration of glucose in your unknown sample?

**18. Peer review:** I certify that:

- 1 - I read and verify all requirements of teaching quality assurance are respected in this course book.
- 2- The scientific contents are new, convenient and well organized for this stage.
- 3- The order of chapters is well done.
- 4- References are new and available for students.

That's why I signed on this course book. And I take all responsibilities.

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Date: 9/ 09/ 2023

Signature:

**Main Lecturer in charged**  
**Darya Shorsh Hamad**

**Head of The Department**  
**Dr. Hastyar Hamarashid**