

**Department of: Chemistry** 

**College of: Education** 

**University of: Salahaddin** 

**Subject: Biochemistry** 

Course Book – (Year 3 Chemistry)

Lecturer's name: Dr. Zeyan Abdullah Ali

Academic Year: 2023/2024

# **Course Book**

1. Course name	Practical biochemistry				
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2. Lecturer in charge	Dr. Zeyan Abdullah Ali				
3. Department/ College	Chemistry/Education				
4. Contact	e-mail: zeyan.ali@su.edu.krd				
	Tel: (optional):07500464540				
5. Time (in hours) per week	Practical: 4				
6. Office hours	10				
7. Course code					
8. Teacher's academic	Since 1989, I worked as a chemical assistant in chemistry				
profile	department/ Education college. I obtained MSc in 1994 in the				
	field of natural products in Education College/ Saladaddin				
	University at 1994, and published a number of scientific				
	papers in the field of organic chemistry. I completed Ph.D in				
	the field of clinical biochemistry in Ibn Al- Haitham college/				
	Baghdad University at 2006 and I published a number of				
	scientific papers in the field of clinical biochemistry. I				
	obtained Assistant Professor in 2010. The fields of my				
	research interests are oxidative stress and prenatal				
	biochemical screening.				
	The objectives that I had taught: Analytical Chemistry,				
	Organic Chemistry, Biochemistry, Natural Product,				
	Phytochemistry/ undergraduate students.				
	Natural Product, Clinical biochemistry, Metabolism and its				
	regulation, Plant biochemistry, and Advanced biochemistry/				
	j				
	M.Sc. students.				
	Currently I'm working in chemistry department and I'm				
	supervisor for four M.Sc students.				
9. Keywords	Carbohydrate ,Lipid, Protein, Enzyme, and Vitamin				
/ Incy words	Caronyaraco ,Espia, Fromi, Estayino, and Atalini				
	I				

#### 10. Course overview:

Biochemistry can be defined as the science concerned with the chemical basis of life. The cell is the structural unit of living systems. Thus, biochemistry can also be described as the science concerned with studying the various molecules that occur in living cells and organisms and with their chemical reactions.

Biochemical reactions are involved in such areas as breaking down food molecules, generate and store energy, buildup new biomolecules, and eliminate waste. Some biomolecules are small and have only a few functional groups others are big and contain a large number of functional groups. The principal classes of biomolecules are carbohydrates, lipids, Proteins, enzymes, and vitamins. This course provides fundamental concepts in clinical biochemistry. Primary topics include identification, the structures, and properties of carbohydrates, lipids, amino acids, proteins and vitamins. The enzyme kinetics, inhibition, and the purification of enzymes are also addressed. Also provides fundamental concepts in clinical biochemistry which include analysis of blood and evaluation the activity of some enzymes which are present in our body and effect on heart, kidney, and liver.

#### 11. Course objective:

Upon successful completion of this course, the students will be able to:

- 1. Know the principles, theory and calculations of each experiment.
- 2. They should know to prepare all the solutions by themselves. They should standardize their solutions individually.
- 3. Students should know to distinguish and identification of biomolecules like carbohydrates, lipids, and amino acids with proteins.
- 4. Determination of biomolecules like carbohydrates, lipids, and amino acids with proteins in different samples. Also to know the determination of some vitamins like vitamin C in blood and in some vegetables and fruits like green pepper, oranges, and Limon.
- 5. Determination of saponification and Acid value of fats and oils.
- 6. Calculation the concentration of unknown sample by using the calibration curve.
- 7. To give the students experience in biochemical methodology in order to appreciate the clinical biochemistry techniques as diagnostic tools, and to be able to interpret the results for appropriate diagnosis and follow up of patients.

#### 12. Student's obligation

- 1. Student is expected to attend all lecture, laboratory classes, reports, seminars and intermediate assessments on time, be prepared for and participate in discussion during seminars and laboratory classes.
- 2. Students are expected to perform all the practical's mentioned in the syllabus.
- 3. It is beneficial to read and understand the lecture before the seminars and laboratory classes.
- 4. Students must be turn off cell phones, talking and speaking, and drinking or eating are not permitted during laboratory class.

### 13. Forms of teaching

Different forms of teaching will be used to reach the objectives of the course: power point presentations and by using white board for explanation of concepts the principle and the reaction of the experimental.

Every week before the lecture day, I will be given Digital copy of each lecture to students to obtain hard copy and to read the lecture before laboratory classes.

#### 14. Assessment scheme

The students are required to do two examinations at the mid of the semester (75 degree) in addition to the final examination. Also the student must be do the following activity: Ouiz every week (5 degree)

Seminars (10 degree)

Report (10 degree)

15. Student learning outcome:

Upon successful completion of this course, the students will be able to:

- 1. Know structures, and chemical properties of macromolecules such as carbohydrates, lipids, amino acids, proteins
- 2. Introduce the students to the techniques of protein purification and protein characterization
- 3. Provide practical experience in the determination of enzyme kinetic parameters;

- 4. Provide an introduction to the chemical and biochemical literature and the Library.
- 5. Provide an introduction to preparing scientific reports and documents.
- 6. Also Student's independent work
- 7. Student's preparation for a seminar

## 16. Course Reading List and References:

- 1. Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer, Biochemistry, 5 th edition, W.H. Freeman and Company, New York, 2004.
- 2. Devlin T.M., Textbook of Biochemistry with clinical correlations, 6 th edition, Wiley-Liss AJohn Wiley & Sons, Inc., Publication, 2006.
- 3. Champe P.C., Harvey R.A., and Ferrier D.R., Lippincotts illustrated reviews Biochemistry, 3 rd edition, Lippincott Williams &Wilkins, 2011.
- 4. Murray R.K., Granner D.K., Mayyes P.A., and Rodwell V.W., Harpers illustrated biochemistry, 26 th edition, The McGraw-Hill Companies, 2003.
- 5. Shivananda Nayak B., Manipal Manual of clinical biochemistry, 3 rd edition, Jaypee brothers Medical publishers, New Delhi, 2007
- 6. Shivaraja Shankara, Laboratory manual for practical biochemistry, Jaypee brothers Medical publishers, New Delhi, 2008.

17. The Topics:	Lecturer's
	name
18. Practical Topics (If there is any)	
First semester	Dr. Zeyan
	Le. Hemin
Week 1: An Introduction to the biochemistry.	
Week 2: Identification Tests of carbohydrates: (Molisch test for	
Carbohydrates, Benedict's Test for Reducing Sugars, Barfoed's Test for	
Monosaccharides, Seliwanoffs Test for Ketoses, Bial's Test for Pentoses.	
Week 3: Iodine Test for polysaccharides.	
Week 4: Hydrolysis of polysaccharides.	
Week 5: Identification Tests of lipids.	
Week 6: Acrolein Test for free and esterified glycerol, Dunsten's test for	
free glycerol, Cupric acetate test for free fatty acids.	
Week 7: Test for Cholesterol (Salkowski test, Liebermann- Burchard test.	
Week 8: Kreis test for rancid fats or oils.	
Week 9: Determination of saponification number	
Week 10: Determination of Iodine number	
Week 11: Identification Tests of amino acids and proteins. Ninhydrin test	
for amino acids and proteins, Biuret test for peptides and proteins,	
Xanthoproteic test for aromatic amino acids containing phenyl groups,	
Glyoxylic acid test for amino acids which have the indole groups, Pauly's	
test for the imidazole group, Sakaguchi test for guanidino group.	
Week 12: Lead acetate Test test for S-S and SH, Nitroprusside test for SH	
group.	
Week 13: Precipitation of proteins. Precipitation by heavy metals,	
Precipitation by acidic reagent, Precipitation by concentrated metal,	

21. Peer review					
20. Extra notes:					
2- Ribose gives positive with bene 3- Tyrosine give negative with sak Q3/ Choice the correct answer: 1- Hydrolysis of polysaccharides of a- Iodine test b- Bene Q4/ Define: 1- Non reducing sugar 2- Polysacc	agushe test obtained by: dict test		ranof test		l- Bial test
19. Examinations: Q1/ Explain how you can distingual- 1- Monosaccharide and disaccharial- 2- Pentose and hexose sugar 3- Starch and glucose 4- Galactose and mannose 5- Glucose ad fructose Q2/ put true or false: 1- Reducing sugar is a sugar which	de n has free carbor	nyl grouj	o.		
Precipitation by ethanol, Precip saturation, Denaturation of protein	itation by salts	, Half	saturation,	Full	