Postgraduate Course Book

Department: Chemistry

College: Education College

University: Salahaddin University

Subject: Advanced biochemistry

Course Book Level: Ph.D ; First semester

Lecturer's name: Dr.Zeyan Abdullah Ali

Academic Year: 2023/2024

Course Book

1. Course name	Advance biochemisry
2. Lecturer in charge	
3. Department/ College	Education ?chemistry
4. Contact	
5. Time (in hours) per week	Theory: 3 Practical:
6. Office hours	
7. Course code	
8. Teacher's academic profile	Since 1989, I worked as a chemical assistant in chemistry 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/M.Sc. students. I was a supervisor for four Masters students.
9. Keywords	
10. Course overview:	

11. Course objective:

12. Student's obligation

13. Forms of teaching

14. Assessment scheme

15. Student learning outcome:

16. Course Reading List and References:

Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer, Biochemistry, 5th edition, W.H. Freeman and Company, New York, 2004.
Nelson D.L., and Cox M.M., Lehninger's Principles of Biochemistry, CBS Publishers and distributors, 5th edition, 2015.
Mathews, Van Holde, and Ahern, Biochemistry, 3rd edition, 2003.
Murray R.K., Granner D.K., Mayyes P.A., and Rodwell V.W., Harpers illustrated biochemistry, 29th edition, The McGraw-Hill Companies, 2018.
Danniston, Topping, and Caret, General, Organic, and Biochemistry, 4th edition, The McGraw-Hill Companies, 2003.
Jain J.L., Fundamentals of Biochemistry, S.Chand & Company LTD., 2005.
Champe P.C., Harvey R.A., and Ferrier D.R., Lippincotts illustrated reviews Biochemistry, 8th edition, Lippincott Williams &Wilkins, 2021.
Chatterjea M,M., and Shinde R., Textbook of Medical Biochemistry, 7th edition, Jaypee brothers Medical Publishers(P) Ltd, New Delhi, 2013
Garrett R.H., and Grisham C.M., Biochemistry, 3rd edition, Thomson Brooks/Cole, 2016.
Devlin T.M., Textbook of Biochemistry with clinical correlations, 6th edition, Wiley-Liss AJohn Wiley & Sons, Inc., Publication, 2011.

. Vasudeven D.M., and Sreekumari S., Textbook of Biochemistry, 6th edition, Jaypee brothers, New Delhi, 2013.
. Voet J.G., and Voet D., Biochemistry, 4th edition, John Wiley & Sons, Inc., 2011.
. McKee and McKee, Biochemistry, an Introduction Wm. C. Brown Publishers, 2019.
. Naik P., Biochemistry, Jaypee brothers Medical Publishers (P) Ltd, New Delhi, 2007.
. Sheety B.V., Nandini M., and PaiV.R., Biochemistry for physiotherapy and allied Health Sciences Students, Jaypee brothers Medical Publishers (P) Ltd, New Delhi, 2008.

17. Topics Program	Lecture's Name
Week 1: Bioenergetics, Free energy, High energy compounds, ATP- ADP Cycle, Shuttle system for Oxidation of extra-mitochondrial NADH.	Dr. Zeyan A.A
Week 2: Metabolism of Carbohydrates, Digestion of carbohydrates, Absorption of monosaccharides by intestinal mucosal cells, Metabolic Fate of Glucose, Glycolysis, Regulation of glycolysis, Fate of other monosaccharides, Metabolic fate of pyruvate, Regulation of Pyruvate dehydrogenase, The Citric Acid Cycle, Regulation of the TCA Cycle,	
Week 3: Glycogen metabolism, Glycogenesis, Glycogenolysis, Effects of hormones on glycogen metabolism, Gluconeogenesis, Advantages of Gluconeogenesis, The Pentose Phosphate Pathway	
Week 4: Lipid metabolism, Digestion and Absorption of Dietary Triacylglycerol, Regulation of hormone-sensitive TG-lipase, Fate of glycerol, Fate of fatty acids, Activation of fatty acids, Transport of Fatty Acids to the Mitochondria, β –oxidation pathway, Regulation of Beta Oxidation, Oxidation of Odd-Number Fatty Acids, Alpha-Oxidation of fatty acids, ω-Oxidation of fatty acids, Oxidation of Unsaturated Fatty Acids.	
Week 5: Ketone Bodies, ketogenesis, Utilization of ketone bodies, The Biosynthesis of Fatty Acids, Synthesis of glycerol phosphate, Synthesis of triglycerides, Biosynthesis of Cholesterol, Fate of cholesterol and Degradation of cholesterol, Synthesis of vitamin D.	
Week 6: Protein metabolism, Digestion and Absorption of proteins, The Degradation of Amino Acids, Transamination, Mechanism of Transamination, Oxidative Deamination, Non-Oxidative Deamination, metabolism of amino acids, The Urea Cycle, Biosynthesis of amino acids and protein.	
Week 7: Overall reactions and energetics of amino acids, Regulation of amino acids, integration between amino acids and TCA cycle, Non.protein nitrogen (NpN), metabolism of individual amino acids :Glycine, phenylalanine and tyrosine, synthesis of melanin	
Week 8: Metabolism of nucleic acids, biosynthesis of purine and ribonucleotides, inhibitors of purine synthesis, formation of purine nucleoside, salvage pathway for purine, regulation of purine nucleotide biosynthesis	
Week 9: Degradation of purine nucleotides, biosynthesis of pyrimidine, regulation of pyrimidine, degradation of pyrimidine	
Week 10: Minerals metabolism, calcium, factors regulating plasma Ca level, phosphorus, magnesium, sodium, potassium	

Week 11: Chlorine, sulfur, iron, copper, iodine, manganese, zinc, molybdenum, cobalt, fluorine, selenium, chromium	
Week 12: Metabolism of xenobiotics, mechanism of detoxification, oxidation, role of cytochrome P450, reduction, conjugation, detoxification of drugs	
Week 13: Integration of metabolism of carbohydrates, lipids and proteins, organ specialization and metabolic integration, liver, adipose tissue, skeletal muscle, brain	
Week 14: Metabolism in starvation, Liver in starvation, adipose tissue in starvation, skeletal muscle in starvation, brain in starvation	
18. Grading procedure	
19. Examinations:	

20. Extra notes:
21. Peer review *

* Must have permission of the Scientific and Higher Education Committee