AL-Imam Muhammad Ibn Saudi University
Deanship of Preparatory Programs
Medical Sciences Track

SYLLABUS

2nd Semester 2014 / 2015

Course Code	Course Name	Credit Hours	Lec	Lab	Tut.	Pre-requisite
BICH 020	BIOCHEMISTRY II	2	1	1	0	BICH 10
Course Supervisor	Prof. Dr. Salahuddin Khan drsalahuddin2002@yahoo.com					
Class meetings						

Biochemistry plays an important role in the field of medicine. The spectrum of this subject is start from the normal reaction and function of the body to the causation, diagnosis, treatment and complication of diseases. This course will provide a foundation for the understanding of more advanced studies of not only in basic biochemistry but also in clinical biochemistry in the later years. This course in an integrated fashion will focus on the basic principles of biochemical reactions in the normal and disease states. This course is aims to introduce basic structures of major body compounds. The student will review carbohydrates, lipids, protein and nucleic acid structure and the mechanics of protein synthesis. Bioenergetics will be described along with the importance of oxidative phosphorylation. Selected techniques in Biochemistry will be examined in tutorial as necessary to understand experiments and concepts. In the laboratory, students will learn basic techniques used for carbohydrate and lipids determination

COURSE OBJECTIVES

At the end of this course, the student should be able to:

1. Describe the structural and functional characteristics of carbohydrates,
2. Describe clinical importance and clinical correlation of carbohydrates
3. Describe the normal blood sugar levels and relationship of sugar and diabetes
4. Describe the structural and functional characteristics of amino acids: classification based on side chain characteristics and on nutritional requirement
5. Describe clinical importance and clinical correlation of different amino acids
6. Describe the structural and functional characteristics of protein: primary, secondary, tertiary and quaternary structures. Structure of insulin.
7. Describe the denaturation of protein and biochemical analysis
8. Describe the structural and functional characteristics of nucleic acids
9. Describe the interaction between DNA and protein with as an example eukaryotic transcription factors.
10. Describe the structural and functional characteristics and classification of lipids.
11. Describe clinical importance and clinical correlation of lipids
12. Describe lipoprotein and lipid Heart disease relationship
13. Describe vitamins, classify different types of vitamins
14. Describe the role of vitamins in health and diseases
15. Describe the important mineral required in different body functions
16. Describe the and Role of mineral in health and diseases
17. Express an understanding of the general processes of enzymes and enzymes catalyzed reactions: Co-enzymes, active center, kinetics, Michaelis constants.
18. Regulation of enzymatic activity: competitive, noncompetitive inhibition, allosteric inhibition, feedback inhibition and keys enzymes.
19. Describe and evaluate Clinical enzymology
20. Demonstrate knowledge of laboratory techniques used for glucose, protein and lipids determination in biological samples

METHOD OF ASSESSEMENT:

Assessment	
Activity	**Marks**
Class Participation & Attendance	**5**
Home works/Assignment	**10**
Quiz 1	**10**
First Examination(Mid Term)	**15**
Quiz 2	**10**
Laboratory performance	**10**
Final Examination	**40**
TOTAL	**100**

TEXT BOOKS

- Harper's Illustrated Biochemistry a LANGE medical book twenty-sixth edition
- Lippincott's illustrated reviews, Biochemistry. 5th edition. Pamela Champe et al. (LippincottWilliams & Wilkins).
- Textbook of biochemistry for medical students, 5th or 6th edition, DM Vasudevan, Ed (Jaypee). Online access http:sdl.edu.sa user: Imam password: imam321 select ebook: Jaypee and look for the book.
- Human Biochemistry and Disease. Gerald Litwack. 2008, Elsevier

COURSE OUTLINE

1. CARBOHYDRATES

1.1. Introduction of carbohydrates with definition
1.2. Biomedical importance. f carbohydrates
1.3. Structural and functional characteristics of carbohydrates
1.4. Chemistry, Classification, Configurations and Conformations of carbohydrates
1.5. Classification and functions of mono and Di-saccharides and their derivatives
1.6. Chemistry, Classification and functions of Oligosaccharides and polysaccharides and their derivatives.
1.7. Isomerism, structural and optical isomerism
1.8. Calculation of Isomers
1.9. Biochemical reaction of monosaccharide's
1.10. derived Carbohydrates
1.11. Carbohydrates in clinical situations such as hyperglycemia and hypoglycemia

2. AMINO ACIDS

2.1. Structural and functional characteristics of amino acids
2.2. Classification of Amino Acids.
2.3. Chemical Characteristics of Amino Acids.
2.4. Peptide bond, characteristics of Peptide Bonds.
2.5. Amino acid derivates
2.6. Clinical situation related to amino acids.

3. PROTEINS

3.1. Definition of Proteins
3.2. Structural and functional characteristics of amino acids
3.3. Classification of Proteins (based on shape, physiochemical properties and functions).
3.4. Structure of Proteins (Primary to Secondary).
3.5. Structure of Proteins (Tertiary to Quaternary).
3.6. Structure of Proteins with special reference to Hemoglobin.
3.7. Plasma proteins chemistry and functions.
3.8. Clinical importance of proteins anemia and hypoalbuminemia.

4. LIPIDS

4.1. Definition of lipids
4.2. Structural and functional characteristics of lipids
4.3. Classification of Lipids. Triglycerols.
4.4. Chemistry, Classification and Function of Phosphoglycerides, Spingolipids, Steroids.
4.5. Chemistry, Classification and Function of Fatty acids.
4.6. Chemistry, Classification and Functions of Membrane lipids and Membrane Proteins.
4.7. Chemistry, Classification and Functions of Compound Lipids.
4.8. Chemistry, Classification and Functions of Derived Lipids:
4.9. Chemistry, Classification and Functions of Ecosanoids.
4.10. Clinical importance of lipids with example of hyperlipdemia

5. NUCLEIC ACIDS

5.1. Definition of Nucleic acid
5.2. Biomedical importance of Nucleic acid
5.3. Structural and functional characteristics of Nucleic acid
5.4. Chemistry, classification and characteristics of Purine and Pyrimidine Bases.
5.5. Chemistry, classification and characteristics of Nucleosides and Nucleotides.
5.6. Classification, Function and occurrence of nucleotides in human tissue.
5.7. Role of Nucleotides in the Human Body.
5.8. Role of Cyclic AMP and Cyclic GMP in the body.

6. PROTEIN SYNTHESIS

6.1. Definition of protein synthesis
6.2. Genetic Code.
6.3. Transcription.
6.4. Translation of m-RNA. Protein Synthesis.
6.5. Gene Expression and Regulation.
6.6. Mutation.
6.7. Recombinant DNA Technology.

7. ENZYMES

7.1. Definition of enzymes
7.2. Basic Concepts and Classification of Enzymes,
7.3. Cofactors, Coenzymes and isozymes
7.4. Enzyme-Substrate Complex, Active Sites.
7.5. Enzymes Specificity,
7.6. Chemical Kinetics, Free and Activation Energy.
7.7. Factors Affecting Enzyme Activity (pH, Temperature and Substrate Concentration).
7.8. Enzyme inhibition.
7.9. Enzymes and Isozymes of Clinical Importance.

8. VITAMINS

8.1. Definition of vitamins
8.2. Basic Concepts and biomedical importance of vitamins
8.3. Classification of vitamins on the basis of solubility
8.4. Classification of fat soluble vitamins with examples
8.5. Classification of water soluble vitamins with examples
8.6. Sources of vitamins
8.7. Daily requirements of vitamins
8.8. Deficiency condition of vitamins

Attendance:

Attendance will be taken in the first 5 minutes of the lecture (lectures). If you came late, you should remind me at the end of the class to consider your attendance for the second lecture, otherwise, you will be marked absent. Accepted excuses for absence should be submitted within two weeks after the absent lectures.

Classroom Participation:

It is expected that you participate in the discussion at lectures by asking and answering questions, raising issues, and making observations and constructive comments.

Cheating and Dishonesty:

Each student should write and submit his own work either on exams or on exercises and other course material. Any kind of cheating or dishonesty throughout the course is considered a serious violation and will be dealt with strictness and no mercy. All students must have ID cards readily available during examination.

Failure to follow these rules can result in a grade of F on the exam or possibly harsher penalties, according to the University Policies.

Attention:

Using mobile phone is prohibited during the lecture time. Please make sure that your phone is turned off. Violating this may result in lowering your grad or expelling from the classroom.

Problems and Questions:

At the end of each chapter in the text are numerous questions and problems. Specific problems relating to the material covered in lecture will be assigned from each chapter. Although the problem assignments will not be collected and graded, they should help you understand the various concepts in lecture and thereby prepare you for the examinations. Answers to all of these problems can be found in the solutions manual of the text book

General Classroom Policies:

Any kind of disturbance will not be tolerated. If you talk, you are disturbing the instructor and at least four students; one on your left, one on your right, one in front, and one at the back. If you have questions, please direct them to the instructor. Therefore, chatter, whispering, or any other form of two or more personal communication will not be tolerated during lectures.

NOTE: ***This syllabus is tentative and should not be considered definitive. The instructor reserves the right to modify it (including the dates of the tests) to meet the needs of the class. It is the student responsibility to attend class regularly and to make note of any change.***