

King Saud University
College of Science
Biochemistry Department

Course title and code: General Biochemistry-II (BCH 302)

Credit hours: 4(3 + 1)

Pre-requisite: BCH 201

Lecture time: Sunday, Tuesday, and Thursday (from 9:00 am to 9:50 am).

Lecture location: 1 B 23 Bld. # 5

Objectives:

Main objective of this course is to familiarize students the basic biochemical knowledge necessary to meet the institutional goals for general biochemistry, like:

- Characteristic features of living organisms.
- Structure and function of the cell parts.
- Structures, names, properties and biological function of monosaccharides, disaccharides and polysaccharides.
- Structure, properties and biological roles of lipids
- Introduction to general metabolic pathways of different macromolecules (Carbohydrates and lipids).
- Structures and biological function of nucleotides and nucleic acids
- Introduction to different micro molecules like hormones, vitamins, coenzymes and minerals

Reference Books:

- **Fundamentals of Biochemistry** by D. Voet, J. Voet and C. W. Pratt (latest edition).
- **Principles of Biochemistry (Lehninger)** by DL. Nelson and MI. Cox (latest edition).
- **Biochemistry (Stryer)** By Jeremy M Berg, John L Tymoczko, and Lubert Stryer. (Latest edition).

Topics	Contact hours
<ul style="list-style-type: none"> • The composition of living matter. • Biomolecules. The elements of biomolecules (shape, dimensions and functional groups). Building blocks of biomolecules (amino acids , nitrogenous bases , simple sugars and fatty acid) 	3
<ul style="list-style-type: none"> • Carbohydrates: <ul style="list-style-type: none"> - Function and classification: Monosaccharides structure, epimers, optical activity, solubility, cyclic structure, anomers, reducing sugars, monosaccharide derivatives. - Functions of glucose, fructose and galactose - Reactions of simple sugars 	4
<ul style="list-style-type: none"> • Glycosidic bonds (Types and structure) <ul style="list-style-type: none"> - Oligosaccharides: structure of disaccharides (e.g. maltose, lactose, sucrose). Structure of trisaccharides - Polysaccharides: classification, structure and Function. Storage polysaccharides: starch and glycogen Structural Polysaccharides: cellulose and chitin 	4
<ul style="list-style-type: none"> • Functional polysaccharides: glycosaminoglycans and heparin. • Glycoproteins and there functions : adhesion immunology, and recognition • Introduction to sugar metabolism 	4
<ul style="list-style-type: none"> • Lipids: <ul style="list-style-type: none"> • Definition, function, fatty acids, and classification: <ul style="list-style-type: none"> - Simple lipids: structure and function (TAG and waxes) - Compound lipids: structure and function (phospholipids, and sphingolipids) - Derived lipids: structure and function (cholesterol, bile acids(- Lipoproteins, micelle, membrane structure. 	4
<ul style="list-style-type: none"> • Glycerophospholipids (classifications, types& function(Sphingolipids(classifications, types and function) Triglycerides Steroids (structure, properties, and functions; cholesterol, terpenes, vitamins and steroid hormones) 	4
<ul style="list-style-type: none"> • Lipoproteins 	2
<ul style="list-style-type: none"> • Introduction to bio membranes and adipocytes <ul style="list-style-type: none"> Assembly of lipid molecules (membrane and adipose tissue) Fluid mosaic model and types of membrane proteins Fat storage & mobilization in adipose tissue 	3
<ul style="list-style-type: none"> • Introduction to lipid metabolism 	1
<ul style="list-style-type: none"> • Nucleic acids: <ul style="list-style-type: none"> Structure of a nucleotide. - Types of nitrogen bases. - Structure of nucleosides. - Nomenclature of nucleosides and nucleotides. - Phosphodiester bonds. - Properties of nitrogen bases. - Roles of functional nucleotides. 	2

• Nucleotides derivatives (NAD, NADP, FAD, FMN, c AMP, c GMP)	2
<ul style="list-style-type: none"> • Overview of DNA and RNA. - DNA primary structure: Description and orientation of bonds. - RNA: Types, role and structure. - Secondary structure of DNA (double helix) - Double helix properties, base pairing, reading, stabilizing forces. - DNA denaturation: significance and factors - Tertiary structure of DNA (relaxed, coiled and associated proteins; histones, protamines). • Genetic code, exon and introns: Gene, genome and chromosome • Introduction to replication, transcription and translation and important enzymes 	5
• Introduction to: Vitamins, Co-enzymes, Heme, minerals and Hormones	4

Assessment Tasks for Students during the Semester

Assessment task	Assessment date	Marks
1st continuous assessment	5/2/1440, 14/10/2018	15
2nd continuous assessment	10/3/1440, 18/11/2018	15
Assignment and quizzes	Along the semester	10
Practical	Along the semester	20
Final exam	At end of the semester	40

The Practical part of BCH 302

Topics	Contact hours
Safety in the laboratory	2
Tutorial on writing experiment reports and introduction to the most commonly used instruments in biochemistry	2
Buffer: titration of a weak acid, pH, pKa and buffer capacity	2
Amino acids: Detection and estimation	2
Proteins: Detection and estimation	2
Determination of total of carbohydrates	2
Hydrolysis of amylose and quantitative estimation of glucose	2
General characterization and qualitative tests for lipids	2
Determination of the iodine number of fat	2
DNA characterization, absorption spectrum, 260/280 ratio, reaction with diphenylamine (Quantitative), and measuring DNA melting	4
RNA characterization, absorption spectrum, 260/280 ratio, reaction with Orcinol (Quantitative)	4