

Bachelor Degree of Biochemistry

Curricular Plan

1 st Semester (Common First Year)				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
ENG 100	English Language	-	-	6
MATH 101	Differential Calculus	-	-	3
ENT 101	Entrepreneurship	-	-	1
CHEM 101	General Chemistry	-	-	4
ARAB 100	Written skills	-	-	2
Total of Credit Hours				16

2 nd Semester (Common First Year)				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
ENG 110	English Language	-	-	6
CI 101	University skills	-	-	3
CT 101	Computer Skills	-	-	3
STAT 101	Introduction to Statistics	-	-	3
CHS 101	Fitness and healthy culture	-	-	1
Total of Credit Hours				16

3 rd Semester				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
BCH 103	Biochemical fundamentals of Life	-	-	2 (2+0+0)
ZOO 103	Principles in General Zoology	-	-	3 (2+0+2)
CHEM 108	Introduction in Organic Chemistry	-	-	4 (3+0+2)
MBIO 140	Microbiology	-	-	3 (2+0+2)
BCH 202	General Biochemistry	-	-	4 (3+0+2)
Elective Course group (A)			-	2 (2+0+0)
Total of Credit Hours				18

4 th Semester				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
PHYS 102	General Physics	-	-	4 (3+0+2)
CHEM 233	Chemical Thermodynamics	-	-	3 (2+0+2)
CHEM 251	Analytical Chemistry	-	-	3 (2+0+2)
BCH 303	Protein Biochemistry	BCH 202	-	3 (2+0+2)
BCH 312	Biochemical calculations	BCH 202	-	3 (2+0+2)
Elective Course group (A)			-	2 (2+0+0)
Total of Credit Hours				18

5 th Semester				
Course Code		Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
BCH 320	General Enzymology	BCH 303	-	3 (3+0+0)
BCH 322	Experiments in Enzymology		BCH 320	2 (0+0+4)
BCH 361	Molecular Biology		-	4 (3+0+2)
BCH 452	Biomembrane and Cell signaling	BCH 202	-	2 (2+0+0)
Elective course (Biochem. dept. or other)				2 (2+0+0)
Elective course (Biochem. dept. or other)				3 (2+0+2)
Elective Course group (A)			-	2 (2+0+0)
Total of Credit Hours				18

6 th Semester				
Course Code	Course Title	Requisite		Credits (Lect.-Exer.- Pract.)
		Pre.	Syn.	
BCH 332	Physical Biochemistry	BCH 303	-	3 (3+0+0)
BCH 340	Metabolism-1	BCH 320	-	3 (3+0+0)
BCH 333	Experiments in Biophysical Biochemistry	BCH 312	BCH 332	2 (2+0+4)
BCH 462	Biotechnology and Genetic engineering	BCH 361	-	4(2+0+4)
BCH 471	Blood Biochemistry	BCH 320	-	3 (2+0+2)
Elective course from Biochemistry Dept.			-	3 (2+0+2) Elective Course Group (A)
Total of Credit Hours				18

7 th Semester				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
BCH 440	Metabolism- II	BCH 340	-	3 (3+0+0)
BCH 447	Practical Metabolism		-	2(0+0+4)
BCH 463	Bioinformatics	BCH 361	-	3 (1+0+4)
BCH 477	Immunochemistry	BCH 471	-	2(2+0+0)
BCH 453	Hormones	BCH 340 BCH 452		2(2+0+0)
BCH 484	Introduction in Scientific Research skills	BCH 333 BCH 361		2(1+2+0)
Elective course (Biochem. dept. or other)			-	2 (2+0+0)
Elective Course group (A)			-	2(2+0+0)
Total of Credit Hours				18

8 th Semester				
Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)
		Pre.	Syn.	
BCH 445	Biochemistry of Nutrition	BCH 303	-	3(2+0+2)
BCH 496	Field Training in Biochemistry	BCH 361 BCH 484 BCH 340	-	5(0+0+10)
BCH 493	Research Project	BCH 484 Finishing 115 h	-	2(0+0+4)
Elective course from Biochemistry Dept.				2 (2+0+0)
Elective course from Biochemistry Dept.				2 (2+0+0)
Total of Credit Hours				14

List of the Elective Courses

Course Code	Course Title	Requisite		Credits (Lect.- Exer.- Pract.)	Level
		Pre.	Syn.		
BCH 350	Plant Biochemistry	BCH 303	-	2(2+0+0)	5 th
BCH 476	Chemistry of Antibiotics	BCH 202	-	2(2+0+0)	5 th
ZOO 352	Principles of Genetics	-	-	2(1+0+2)	5 th
MBIO 250	General Virology	-	-	3(2+0+2)	5 th
MBIO 260	General Bacteriology	-	-	3(2+0+2)	5 th
CHEM 341	Heterocyclic Organic Chemistry	CHEM 108	-	2(2+0+0)	5 th
FED 420	Biotechnology for food	-	-	2(2+0+0)	5 th
BCH 472	Biochemistry of Biological fluids	BCH 320	-	3(2+0+2)	6 th
BCH 473	Biomarkers in Health and Diseases	BCH 320	-	3(2+0+2)	6 th
BCH 450	Biochemistry of Specialized Tissues	BCH 340	-	2(2+0+0)	7 th
BCH 434	Biophysics	BCH 340	-	2(2+0+0)	7 th
BCH 441	Bioenergetics	BCH 320	-	2(2+0+0)	8 th
BCH 464	Gene Expression	BCH 361	-	2(2+0+0)	8 th
BCH 465	Molecular Genetics	BCH 303	-	2(2+0+0)	8 th
BCH 436	Nanotechnology	BCH 332	-	2(2+0+0)	8 th
BCH 454	Toxicology & Carcinogens	BCH 440	-	2(2+0+0)	8 th
BCH 466	Molecular Biology of Cancer	BCH 361 BCH 452	-	2(2+0+0)	8 th

List of Courses [Group A] (Student elects 8 credit hours)

Course Code	Course Title	Pre-requisite	Credits (Lect. – Exer. - Pract.)
IC 100	Studies in the Biography of the Prophet	-	2 (2+0+0)
IC 101	Introduction of Islamic Culture	-	2 (2+0+0)
IC 102	Islam and Building up the Society	-	2 (2+0+0)
IC 103	Economic System in Islam	-	2 (2+0+0)
IC 104	Political system in Islam	-	3 (2+0+1)
IC 105	Human Rights	-	3 (2+0+1)
IC 106	Islamic Jurisprudence	-	2 (2+0+0)
IC 107	Ethics of Occupation	-	2 (2+0+0)
IC 108	Contemporary Issues	-	2 (2+0+0)
IC 109	Woman and Her Developmental Role	-	2 (2+0+0)

List of Service courses offered to other departments

Course code	Course Name	Credits	Prereq.	Benefitting Departments
BCH 101	General Biochemistry	4 (3+0+2)	--	College of Science/Computer Science
BCH 102	Cellular Biochemistry	2 (1+2+0)	--	Chemistry Department
BCH 220	Fundamentals of Blood Biochemistry	2(1+0+2)	--	Microbiology Department

BCH Courses' Description

<p>Course No. and abbrev: BCH 103 Credit hours: 2 (2+0+0) Contact hours: 2</p>	<p>Course title: Biochemical fundamentals of Life Level: 3^{ed} level Course prerequisites: None</p>
<p>Course Description: This course covers general introduction to biochemistry. It describes the living cell, its organelles and the general foundations determining cell structure and functions. It also covers relevant chemical concepts, properties of water as main constituent of life, chemicals elements and their distribution in earth and cell, different chemical bonds, functional groups chemical equilibrium and homeostasis, acids, bases and buffer solution, the formation of macro-molecules from small building blocks.</p>	
<p>Course No. and abbrev: BCH 202 Credit hours: 4(3+0+2) Contact hours: 5</p>	<p>Course title: General Biochemistry Level: 3^{ed} level Course prerequisites: None</p>
<p>Course Description: This is an introductory course in biochemistry. It covers carbohydrates; their stereo-isomers, and configuration; function and structure, monosaccharides, reducing and non-reducing, sugar derivatives, oligosaccharides, and polysaccharides, storage, functional and structural polysaccharides. Lipids; fatty acids, triglycerides, phospholipids, sphingolipids, derived lipids, lipoproteins and steroids. Introduction about nucleic acids, nitrogenous bases. Introduction to hormones and vitamins, etc. with special emphasis on macromolecules structures and functions.</p>	
<p>Course No. and abbrev: BCH 303 Credit hours: 3 (2+0+2) Contact hours: 4</p>	<p>Course title: Protein Biochemistry Level: 4th Level Course prerequisites: BCH 202</p>
<p>Course Description: This course covers the structural features of natural amino acids, stereo-isomerism, and configuration; their classification, functional groups and their effect on protein conformation, zwitterion and pI, titration curve; chemical reactions specifying each amino acid, spectroscopic properties, and their biological importance. Peptide bond formation, it is rigid and planar and biologically active peptides. Protein classification, levels of protein structure (primary to quaternary), alpha helix, beta sheet; protein architecture. Physical and chemical properties. Fibrous vs globular proteins; domains and motifs; Different functions of proteins, biosynthesis, folding and the role of molecular chaperons. Protein denaturation and renaturation. Effect of protein structure on ligand binding, ex. Hemoglobin/O₂, immunoglobulins/antigens. Techniques used in amino acid analysis, peptide synthesis, protein purification, quantification, protein sequencing and its role in elucidating the evolutionary relationships; mass spectrometry.</p>	

<p>Course No. and abbrev: BCH 312 Credit hours: 3 (2+0 +2) Contact hours: 4</p>	<p>Course title: Biochemical Calculations Level: 4th level Course prerequisites: BCH 202</p>
<p>Course Description: An introductory course that deals with the most common calculation problems in biochemistry including calculation of concentration, pH value, ionization of weak acids, buffer composition, and reaction constants as well as the subjects of spectrophotometric measurements and statistical analysis of data. The course also offers tutorials on the same subjects supported by hands-on experiments whenever possible.</p>	
<p>Course No. and abbrev: BCH 320 Credit hours: 3 (3+0+0) Contact hours: 3</p>	<p>Course title: General Enzymology Level: 5th level Course prerequisites: BCH 303</p>
<p>Course Description: General aspects: nature of enzymes, localization, units of enzyme activity, specificity and specific Nonenzyme catalysts: ribozymes and apoenzymes. Enzymes kinetics. Michaelis-Menten equation. Enzyme inhibition. Irreversible inhibition and suicide inhibition. Bisubstrate reaction. Cooperativity and allosteric enzyme. The transition state theory and its analogs. Types of enzymatic catalysis. Definition, classification of coenzymes. Multi-molecular form of enzymes. Isolation, purification, characterization of enzymes and criteria of purity of enzymes. Applications of free and immobilized enzymes in the food, and pharmaceutical industries. Enzyme applications in cheese manufacture. Utilization of enzymes baking. Analytical and therapeutic applications of enzymes.</p>	
<p>Course No. and abbrev: BCH 322 Credit hours: 2 (0+0+4) Contact hours: 4</p>	<p>Course title: Experiments in Enzymology Level: 5th level Course prerequisites: BCH 303</p>
<p>Course Description: A set of special experiments designed to study parameters of enzyme activity, activation & inhibition, and isolation & characterization of enzymes.</p>	
<p>Course No. and abbrev: BCH 361 Credit hours: 4 (3+0+2) Contact hours: 5</p>	<p>Course title: Molecular Biology Level: 5th level Course prerequisites: BCH 303</p>
<p>Course Description: This course covers fundamental aspects of molecular biology with emphasis on human genome: composition, chemical and physical properties, genes, and gene products. The course covers most DNA-associated processes such as replication, transcription, translation, as well as DNA transposition, recombination and rearrangements, gene expression, and recent advances in molecular biology. The course aims at providing basic knowledge necessary to understand the importance of the central dogma in molecular biology and the more advanced concepts such as genetic engineering or recombinant DNA technology.</p>	

Course No. and abbrev: BCH 452 Credit hours: 2 (2+0+0) Contact hours: 2	Course title: Biomembranes and Cell Signaling Level: 5 th level Course prerequisites: BCH 202
<p>Course Description: General structural and functional properties of natural and synthetic membranes. Functions and properties of proteins, lipids and carbohydrates of biomembranes. Solubilization and fractionation of biomembranes. Fluids mosaic model. Types of transport across biomembranes. Calculation of energy change in each case. Composition and function of the different types of cellular membranes: Membranes of erythrocyte, intestinal mucosa, renal tubules, muscle cells, mitochondria, nerve cells, retinal cells and bacterial cells. Types and properties of signals and signal transduction. Biosynthesis and assembly of membranes.</p>	

B. List of the Elective Courses

Course No. and abbrev: BCH 350 Credit hours: 2 (2+0+0) Contact hours: 2	Course title: Plant Biochemistry Level: 5 th level Course prerequisites: None
<p>Course Description: Plant Biochemistry is a course designed to introduce the students to biochemical processes that take place in plant such as photosynthetic reactions, nitrogen fixation, plant secondary metabolites, the metabolic pathways, plant hormones, the use of plant in medicine and industry and plant molecular biology. The goal of this course is to study the plants biochemistry based on the latest knowledge and the biochemical differences between plants and other organisms. This course can target students from different disciplines such as biochemistry, botany and anyone using plant products -in food and medicines.</p>	
Course No. and abbrev: BCH 476 Credit hours: 2(2+0+0) Contact hours: 2	Course title: Chemistry of antibiotics Level: 5 th level Course prerequisites: BCH 202
<p>Course Description: This course covers an introduction to secondary metabolites and their chemical structure, properties and function. It also covers the classification of antibiotics, usage, isolation and purification, characterization, structural and functional properties, mode of action and resistance from the chemical and biochemical point of view.</p>	

C. List of Service courses offered to other departments

Course No. and abbrev: BCH 101 Credit hours: (2+0+3)4 Contact hours: 5	Course title: General Biochemistry Level: 3ed level Course prerequisites: None
Course Description: Cell structure and organelle function. Biological buffers. Amino acids. Peptides. Proteins. Enzymes. Carbohydrates. Lipids. Metabolism of carbohydrates. Metabolism of lipids. Metabolism of proteins. Nucleic acid. Hormones. Vitamins. Biochemistry of blood.	
Course No. and abbrev: BCH 102 Credit hours: 2(1+2+0) Contact hours: 3	Course title: Cellular Biochemistry Level: None Course prerequisites: None
Course Description: The aim of this course is to give knowledge about the cellular organelles and their structures and functions. Eukaryotic and prokaryotic cells, life cycle of virus, cellular molecules, fractionation and separation of organelles, plasma membrane and cytoskeleton, cell division and cell culture. Nucleus , DNA , RNA and Central dogma of molecular biology Mitochondria , Endoplasmic Reticulum, Cytosol, Lysosomes, Peroxisomes, Golgi Apparatus ...etc	
Course No. and abbrev: BCH 220 Credit hours: 2 (1+0+2) Contact hours: 3	Course title: Fundamentals of Blood Biochemistry Level: 3 ^{ed} level Course prerequisites: None
Course Description: This course is oriented for Microbiology student's in the preparatory year as an introductory course in biochemistry of blood. This course covers the physical properties, basic compositions and functions of blood. Blood formation. Erythrocytes structure, metabolism and its abnormalities. Some types of anemia. Leucocytes types and functions. Platelets and blood clotting mechanism. Blood grouping and some components of plasma proteins and fats.	

Course No. and abbrev: BCH 332 Credit hours: 3(3+0+0) Contact hours: 3	Course title: Physical Biochemistry Level: 6 Course prerequisites: BCH 303
<p>Course Description:</p> <p>A course designed to study the methods for purification and characterization of biomolecules. The topics of this course include biochemical applications of Spectroscopy (absorption, fluorescence, and Mass spectroscopy), basic & common methods (tissue homogenization, dialysis, filtration, and salting out), Hydrodynamic methods (various forms and applications of centrifugation), Electrophoresis (paper, PAGE, and agarose), various forms and applications of Chromatography (gel filtration, ion-exchange, adsorption, affinity, and HPLC), and Radioisotope applications in Biochemistry.</p>	
Course No. and abbrev: BCH 333 Credit hours: 2(2+0+4) Contact hours: 6	Course title: Experiments in Biophysical Biochemistry Level: 6 Course prerequisites: BCH 312
<p>Course Description:</p> <p>A set of experiments to introduce the students to the most common methods and equipments used in biochemistry.</p>	
Course No. and abbrev: BCH 340 Credit hours: 3(3+0+0) Contact hours: 3	Course title: Metabolism -1 Level: 6 Course prerequisites: BCH 320
<p>Course Description:</p> <p>Introduction to metabolism and bioenergetics. Saccharides metabolism. Glycogen metabolism. Glycolysis and its regulation. Citric acid cycle, glyoxylate cycle. Oxidative phosphorylation. Gluconeogenesis. Diabetes. Pentos phosphate shunt. Photosynthesis. Defects in carbohydrate metabolism. Classification of lipid, lipolysis, lipogenesis. Biosynthesis of fatty acids. Oxidation of fatty acids. Ketogenesis. Defect in lipid metabolism.</p>	
Course No. and abbrev: BCH 462 Credit hours: 4 (2+0+4) Contact hours: 6	Course title: Biotechnology and Genetic engineering Level: 6 Course prerequisites: BCH 361
<p>Course Description:</p> <p>The main objective of this course is to introduce the modern and emerging approaches in Molecular Biotechnology and its applications in Biochemistry. The course is divided into four rotations, each with its own theoretical and practical sessions with emphasis on the theoretical basis of each technique, the actual working method, hands-on experience, pitfall and strengths of each technique.</p>	
Course No. and abbrev: BCH 471 Credit hours: 3(2+0+2) Contact hours: 4	Course title: Blood Biochemistry Level: 6 Course prerequisites: BCH 320
<p>Course Description:</p> <p>Physical properties and functions of blood. Cellular and non-cellular components of blood. Structure and function of hemoglobin. Metabolism of erythrocytes and its abnormalities (e.g. jaundice). Types of anemia, biochemical basis of each. Types and functions of leucocytes. Coagulation and its interrelationship to platelets. Blood formation and its disorders. Types of plasma proteins and their variation in different diseases.</p>	

Course No. and abbrev: BCH 440 Credit hours: 3(3+0+0) Contact hours: 6	Course title: Metabolism -2 Level: 7 Course prerequisites: BCH 340
<p>Course Description: Lipoproteins properties and their metabolism. Metabolism of prostaglandins. Sterol metabolism. Digestion and absorption of amino acids. Catabolism of amino acids. Biosynthesis of amino acids. Conversion of amino acids to specialized products. Biochemistry of prophyryns. Integration of metabolism.</p>	
Course No. and abbrev: BCH 447 Credit hours: 2(0+0+4) Contact hours: 4	Course title: Practical Metabolism Level: 7 Course prerequisites: BCH 340
<p>Course Description: A selection of metabolic experiments that include carbohydrates, lipids, and proteins.</p>	
Course No. and abbrev: BCH 453 Credit hours: 2 (2+0+0) Contact hours: 2	Course title: Hormones Level: 7 Course prerequisites: BCH 340, BCH 352
<p>Course Description: Mechanism of action of hormones. Definition and classification of hormones. Hypothalamus and pituitary hormones. Hormones of adrenal cortex. Hormones of the adrenal medulla. Thyroid gland hormones. Parathyroid hormones. Pancreatic hormones. Gonadal hormones.</p>	
Course No. and abbrev: BCH 463 Credit hours: 3(1+0+4) Contact hours: 3	Course title: Bioinformatics Level: 7 Course prerequisites: BCH 361
<p>Course Description: This is a practical course designed to train students in the use of public data banks & software to retrieve, analyze, and assemble biological data with special emphasis on concepts relating to gene and protein structures.</p>	
Course No. and abbrev: BCH 477 Credit hours: 2(2+0+0) Contact hours: 2	Course title: Immunochemistry Level: 7 Course prerequisites: BCH 471
<p>Course Description: The fundamental aspect of innate and adaptive immunity. Humoral immunity: antibodies: classes and subclasses, structure and function, biosynthesis, reaction with antigen. Complement system. T-lymphocytes and cell mediate immunity. Human HLA antigens and transplation immunity; immunosuppression; hypersensitivity; autoimmunity; vaccination. Disorders; of the immuno deficiency. Immunochemistry techniques.</p>	

Course No. and abbrev: BCH 484 Credit hours: 2(1+2+0) Contact hours: 3	Course title: Introduction in Scientific skills Level: 7 Course prerequisites: BCH 333, BCH361
<p>Course Description: This course trains students with concepts and mechanisms of scientific research including the various stages of preparation, implementation and observing the ethics of scientific research. The course also trains students with important techniques in Biochemistry.</p>	
Course No. and abbrev: BCH 445 Credit hours: 3(2+0+2) Contact hours: 4	Course title: Biochemistry of Nutrition Level: 8 Course prerequisites: BCH 303
<p>Course Description: This course is designed to study nutrition via biochemical concepts with emphasis on biochemical and physiological fundamentals of nutrition. The course presents an integrated approach to the roles of protein, fat, carbohydrate, energy, minerals and vitamins in metabolism, and their relationships to nutritional concepts.</p>	
Course No. and abbrev: BCH 493 Credit hours: 2(0+0+4) Contact hours: 4	Course title: Research Project Level: 8 Course prerequisites: BCH 484, Finishing 115 h
<p>Course Description: Senior student engages in an independent research project in one of the applied field of biochemistry at the department research laboratories under the supervision of a staff's member. By the end of the semester, he should present a seminar and full report about his project.</p>	
Course No. and abbrev: BCH 496 Credit hours: 5(0+0+10) Contact hours: 10	Course title: Field Training in Biochemistry Level: 8 Course prerequisites: BCH 484-BCH 361-BCH 340
<p>Course Description: This course is field training practical course given in the 8th semester in collaboration with Biomedical Laboratories in hospitals, pharmaceutical and food companies. The course aims to practice students on various biochemical techniques and their applications in clinical and diagnostic laboratories, chemical and pharmaceutical companies and food industries, and the foundations in methodologies. This training course is designed to complement what was studied in our curriculum e.g., blood biochemistry, body fluids, biomarkers, immunology, metabolism, endocrinology and molecular biology. At the end of the course, students will prepare and present their finding as a report. The students' progress will be evaluated by both internal and external supervisor.</p>	