



Course Specifications

Course Title:	Biochemistry.
Course Code:	4012172-3
Program:	B.Sc. Biology Program.
Department:	Biology Department.
College:	Faculty of Applied Science.
Institution:	Umm Al-Qura University.
Revision Date	November 2019.

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A. Course Identification

1. Credit hours: 3 hours.
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
Level/year at which this course is offered: 2 nd Year / Level 4.
4. Pre-requisites for this course (if any): Organic Chemistry (4022301-4).
5. Co-requisites for this course (if any): NA.

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	37.5
2	Blended	-	-
3	E-learning	-	-
4	Correspondence	-	-
5	Other	50	62.5

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	42
3	Tutorial	-
4	Practical/Field work/Internship	-
5	Others (specify) Two Office Hours per week.	28
	Total	100
Other Learning Hours*		
1	Study	51
2	Assignments	8
3	Library	15
4	Projects/Research Essays/Theses	10
5	Others (specify)	-
	Total	84

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course will cover the principle of biochemistry, particularly on the structure and metabolism of biomolecules, such as water, carbohydrates, proteins, lipids and vitamins. This course will provide a conceptual and experimental background in biochemistry sufficient to enable students to take courses that are more advanced in related fields.

2. Course Main Objective

Upon successful completion of this course, the student should:

1. Understand the molecular and cellular biochemistry.
2. Develop understanding of the biosynthesis and biochemical role of the specialized tissues of the body.
3. Develop the student's awareness of the biochemical bases of tissue associated diseases.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Enumerate the different reaction of carbohydrates, fats and protein metabolism.	
1.2	Remember the different types of amino acids.	
1.3	Distinguish the difference between aerobic and anaerobic oxidation.	
1.4	Recognize the anabolism and catabolism and nitrogen balance.	
1.5	Know the reactions, importance and regulation of carbohydrate, proteins and lipid metabolism.	
2	Skills:	
2.1	Understand the importance of carbohydrates, proteins and lipid function and its role in metabolism.	
2.2	Draw the metabolic pathways of carbohydrates, proteins and lipid.	
2.3	Recognize the difference between energy production from lipid and carbohydrates.	
2.4	Perform all techniques for preparation of chemical solutions.	
2.5	Perform all biochemical test for the identification of biomolecules, carbohydrate; proteins; lipids.	
2.6	Operate selected instruments used in biochemistry laboratory.	
3	Competence:	
3.1	Perform self-directed learning.	
3.2	Use information and communication technology.	
3.3	Develop the ability to exchange ideas and accept the opinions of others and perform group discussions.	
3.4	Write scientific term paper.	
3.5	Calculate and discuss the facts and logical propose methods to solve the difficulties.	

C. Course Content

Topics to be Covered		
Topic	No of Weeks	Contact hours
❖ Introduction: Introduction to Biochemistry (Importance and targets).	1	5
❖ Water -composition. -importance. -properties.	1	5

❖ Carbohydrates I Structure of monosaccharide – formation of polysaccharides – structure of polysaccharides.	1	5
❖ Carbohydrates II Glycoproteins – Ionic polysaccharides.	1	5
❖ Carbohydrate Metabolism Glycolysis – Glycogen – Citric Acid Cycle – Electron Transport Chain – Energy and ATP.	2	10
❖ Proteins I Amino acids – proteins primary structure – protein secondary structure.	1	5
❖ Mid-term Exam	1	5
❖ Proteins II Proteins tertiary structure – proteins quaternary structure – protein dynamics – what do proteins do?	1	5
❖ Proteins Metabolism and Urea formation Deamination of amino acids – Urea cycle – delaminated amino acids as metabolic fuels – Amino acids as biosynthetic precursors.	1	5
❖ Lipids I Classification and structure of lipids – micelles – bilayers and liposomes.	1	5
❖ Lipids II Biological membrane – lipoproteins – transport through membranes.	1	5
❖ Lipids Metabolism Production of Acetyl-coA from lipids – Ketone bodies – fatty acids biosynthesis – glycerol.	1	5
❖ Vitamins and cofactors Definition and function of vitamins and cofactors.	1	5
❖ Revision.	1	5
❖ Final exam.	1	5
Total	16 weeks	80 hrs

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1	Knowledge:		
1.1	Enumerate the different reaction of carbohydrates, fats and protein metabolism.	1.Lectures and student research papers.	- Homework and Quizzes.
1.2	Remember the different types of amino acids.	2.The using of visual display such as PowerPoint.	- Midterm and final written exams.
1.3	Distinguish the difference between aerobic and anaerobic oxidation.	3.Homework assignments.	- Evaluation of reports.
1.4	Recognize the anabolism and catabolism and nitrogen balance.	4.Discussions	- Group discussions and participation in the lecture.
1.5	Know the reactions, importance and regulation of carbohydrate, proteins and lipid metabolism.	(connecting what they learn in the class and applying	

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		this information in laboratory).	- Course work reports.
2	Skills:		
2.1	Understand the importance of carbohydrates, proteins and lipid function and its role in metabolism.	1. Interactive lectures. 2. Seminars. 3. Participation of students in discussions during the lecture. 4. Trying to explain the issues in regular and motivated manner. 5. Follow up the students in lab and during carryout all analytical techniques.	- Exam must contain questions that can measure these skills. - Quiz and exams. - Discussions after the lecture. - Practical exam.
2.2	Draw the metabolic pathways of carbohydrates, proteins and lipid.		
2.3	Recognize the difference between energy production from lipid and carbohydrates.		
2.4	Perform all techniques for preparation of chemical solutions.		
2.5	Perform all biochemical test for the identification of biomolecules, carbohydrate; proteins; lipids.		
2.6	Operate selected instruments used in biochemistry laboratory.		
3	Competence:		
3.1	Perform self-directed learning.	1. Oral presentations. 2. Internet search assignments and essays. 3. Incorporating the use and utilization of computer in the course requirements.	- Evaluation of student essays and assignments. - Marks given to for good reports and presentations - Evaluating during the discussion in lecture and reports. Part of the grad is put for student's written participation.
3.2	Use information and communication technology.		
3.3	Develop the ability to exchange ideas and accept the opinions of others and perform group discussions.		
3.4	Write scientific term paper.		
3.5	Calculate and discuss the facts and logical propose methods to solve the difficulties.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam(s)	4	10 %
2	Mid Term Exam (Theoretic)	8	20 %
3	Mid Term Exam (practical)	9	10 %
4	Reports and essay	11	5 %
5	Final Practical Exam	15	15 %
6	Final Exam	16	40 %
Total			100%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice: **Two hours per week as office hours and can be arranged according to the student needs.**

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Principles of Biochemistry (Second Edition) A. L. Lehninger; D. L. Nelson and M. M. Cox (1993).
Essential References Materials	<ol style="list-style-type: none"> 1. Charlotte W. Pratt and Kathleen Cornely (2010). Biochemistry 2nd. Published by John Wiley & Sons. 2. Robert, H. Horton, Laurence A. Moran, K. Gray Scrimgeour, Marc D. Perry, and J. David Rawn (2006). Principles of Biochemistry fourth edition by Pearson Education, Inc. Pearson Prentice Hall Pearson Education, Inc.
Electronic Materials	
Other Learning Materials	PPT prepared by the course professor.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class room is already provided with data show. The area of class room is suitable concerning the number of enrolled students and air conditioned.
Technology Resources (AV, data show, Smart Board, software, etc.)	Digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	The students.	Questionnaires. Open discussion in the class room at the end of the lectures.
Evaluation of Teaching	The Instructor or by the Department	Revision of student answer paper by another staff member. Analysis the grades of students.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	20.11.2019