Course Specifications

Course Title:	**Biochemistry**
Course Code:	**23052231-3**
Program:	**BSc Biology**
Department:	**Biology**
College:	**Aljumum University College**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours:	**3 hours (2 theoretical + 1 practical)**
2. Course type	
a.	University ☐ College ■ Department ☐ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	**Level 4 / 2nd year**
4. Pre-requisites for this course (if any)**:**	**Organic Chemistry (23052230-4)**
5. Co-requisites for this course (if any)**:**	**Non**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3 hours in 15 weeks	90%
2	Blended		0%
3	E-learning	1 hours in 15 weeks	10%
4	Correspondence		0%
5	Other		0%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	16 hours
2	Laboratory/Studio	2 hours
3	Tutorial	1 hour
4	Others (specify)	Nothing
	Total	19 hours
Other Learning Hours*		
1	Study	16 hours
2	Assignments	2 hours
3	Library	1 hour
4	Projects/Research Essays/Theses	Nothing
5	Others (specify)	Nothing
	Total	19 hours

* 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

Study the structure, properties and functions of biomolecules in cells.

2. Course Main Objective

The course aims to introduce the student to molecular and cellular biochemistry, develop bio-understanding and biochemical role of specialized tissues of the body. It also develops the student's awareness of the biochemical rules of tissue-related diseases.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	The student should know the general bases of biochemistry.	
1.2	Multiplication of the primary biomolecular compounds in the organism.	
1.3	The student's application of the chemical reactions of biochemical compounds related to biology and biochemistry.	
2	**Skills :**	
2.1	The student should be aware of the biochemical reactions that occur in the organism.	
2.2	The student should explain the results by giving a suitable way to complete the chemical reactions.	
2.3	The student should practice creative thinking skills and analytical thinking skills to provide innovative solutions to solve the chemical reactions that occur in living cells	
3	**Competence:**	
3.1	The student exercises leadership of the group in different situations and participates in finding solutions to the proposed chemical reactions.	
3.2	The student should be responsible for her self-education and academic development	
3.3	That the student communicate effectively orally and in writing to find solutions and interpretation of the products of the chemical reactions in the organism.	
3.4	Students should use more information technology to collect, analyze and deliver information and ideas	
3.5	The student should choose a method for detecting and measuring the biochemical compounds	
3.6	The student should determine the appropriate method for detecting the biochemical compounds	

C. Course Content

#	List of Topics	No. of Weeks	Contact Hours
1	General Introduction to Biochemistry • What is the biochemistry and what study. • Uses of biochemistry. • Changes in energy and electron transfer. • Oxidation and reduction reactions. • Metabolism: definition and its mechanism.	**2**	**6**
2	i. Carbohydrates metabolism: • Digestion and absorption of carbohydrates. • Utilization of carbohydrates: 1. Glycogen metabolism (glycogenesis and glycolysis). 2. Oxidation of glucose: A. Glycolysis; Steps of reactions- calculate the energy yield- control of glycolysis.	**2**	**6**
3	B. Conversion of pyruvate to acetyl-CoA C. Citric acid cycle CAC : - Steps of reactions. - Energy calculation from krebs cycle.	**1**	**3**

	- Control of Krebs cycle.		
4	- The importance of Krebs cycle. - The role of oxygen in the Krebs cycle. - Pasteur effect. - Cori cycle.	**1**	**3**
5	• Definition and importance of gluconeogenesis. • Definition and importance of pentose phosphate pathway. • Definition and importance of secondary metabolic pathway of glucose.	**1**	**3**
6	ii. Lipid metabolism: • Digestion and absorption of fat. • Use of triglyceride in the blood and tissues, fat storage. • Oxidation of fatty acids: - Steps of B-Oxidation and its energy product.	**1**	**3**
7	• Fatty acid biosynthesis: microsomal, mitochondrial synthesis and extra-mitochondroal De Novo synthesis of fatty acids.	**1**	**3**
8	• Cholesterol: structure, importance and source Synthesis and metabolic fate of cholesterol.	**1**	**3**
9	iii. Protein metabolism: Digestion and absorption Metabolic utilization of amino acids Source of ammonia, Transamination, Oxidative deamination, Transdeamination, Decarboxylation.	**1**	**3**
10	iv. Nucleic acids metabolism: structure of DNA and RNA and their differences Cellular component for protein synthesis	**1**	**3**

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	The student should know the general bases of biochemistry.	• Lectures • Interactive presentations • Scientific discussion • Video Shows (Educational Videos)	• Exams (Oral test - Periodic tests) • Group discussions
1.2	Multiplication of the primary biomolecular compounds in the organism.		
1.3	The student's application of the chemical reactions of biochemical compounds related to biology and biochemistry.		
2.0	**Skills**		
2.1	The student should be aware of the biochemical reactions that occur in the organism.	• Lectures • Scientific discussion. Create schemas for basic concepts and link chemical reactions that occur in different cells.	• Exams • Group discussions • Unannounced testing (Complete interaction)
2.2	The student should explain the results by giving a suitable way to complete the chemical reactions.		
2.3	The student should practice creative thinking skills and analytical thinking skills to provide innovative solutions to solve the chemical reactions that occur in living cells		
3.0	**Competence**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	The student exercises leadership of the group in different situations and participates in finding solutions to the proposed chemical reactions.	• Active Education • Self-Education	-Group discussions -Unannounced testing
3.2	The student should be responsible for her self-education and academic development		
3.3	That the student communicate effectively orally and in writing to find solutions and interpretation of the products of the chemical reactions in the organism.	• Lectures • Scientific discussion	-Follow-up to the learning portal of the course. -individual and group presentations
3.4	Students should use more information technology to collect, analyze and deliver information and ideas		
3.5	The student should choose a method for detecting and measuring the biochemical compounds	-Lectures -Video Captions -Charts and explanatory tables -Scout tests.	-Was applied in theory (practical paper test)
3.6	The student should determine the appropriate method for detecting the biochemical compounds		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First periodic test	6	%15
2	Second periodic test	13	%15
3	Practical final exam	14	%20
4	Theoretical final exam	15	%40
5	year works	Continuous evaluation	10%

***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 :

I have 6 hours of office hours and guides per week, with Monday available for any queries

-Monday (all day with administrative work), Tuesday (1-2-5-6) and Wednesday (3-4)

-Accompany the dial up throughout the week throughout the semester

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	No textbook is designated. Course materials will be based on a combination of lecture notes, handouts, journal articles and various references. Following is a list of suggested (yet not required) references that you would further read as class topic(s) evolves.

Recommended Books	Principles of Biochemistry (Part 2): Prof. Dr. Mohammed Abdullah al-Habashi - Al Dar Al Arabia Publishing and Distribution 2002. (Arabic Version). Foundations of Biochemistry (Part 1): Dr. .Abd El-Moneim Mohammed Al-AAser 1996. (Arabic Version) Biochemistry, Jeremy M. Berg, John L. Tymoczko and Lubert Stryer, 6th Edition, 2006.
Essential References Materials	- Principles of Biochemistry (Second Edition) A. L. Lehninger; D. L. Nelson and M. M. Cox (1993). (English Version) - Biochemistry, Donald Voet and Judith G. Voet, 3th Edition, 2004. - Lehninger, Principles of Biocheistry, David L. Nelson and Michael M. Cox, 5th Edition, 2008. - Harper's Illustrated Biochemistry, Robert K. Murray, Daryl K. Granner and Victor W. Rodwell, 27th Edition, 2003. - Elements of organic chemistry, Henry Zimmerman and Isaak Zimmerman, 2nd Edition.
Electronic Materials	http://www.coursera.org http://www.edx.org
Other learning material	- Microsoft office package. - Multi- media associated with the text book and the relevant websites

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom + Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	Data display device
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Nothing

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching effectiveness	Students	Direct
Effective methods of student assessment	Faculty members + students	Direct
The extent of learning outcomes for the course	Students	not directly

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	

Head of Department

Dr. Wessam M. Filfilan

Stamp