هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Biochemistry**
Course Code:	**204CHEM-3**
Program:	**Bachelor in Biology**
Department:	**Biology**
College:	**Science**
Institution:	**Jazan University (JU)**

Table of Contents

A. Course Identification

1. Credit hours: 3hrs
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 4 / year 2
4. Pre-requisites for this course (if any)**:** CHEM 203
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	22	100 %
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other (Lab)**		

7. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	22
3	**Tutorial**	
4	**Others** (specify)	
	Total	44

B. Course Objectives and Learning Outcomes

1. Course Description

Course Title	*Course Number*	*Contact Hours*		*Credit unit (CU)*	*Year*	*Level*	*Prerequisite*
		Lect.	*Prac.*				
Biochemistry	204CHEM-3	2	2	3	2	4	203CHEM - 3

Course objectives: They are to identify the following.

1- Biological compounds, their functional groups and bioactivity

2- Biosynthesis methods of different biological compounds

3- Chemical reactions and its composition and their metabolism

Syllabus: A-Theoretical contents

1- Definition and classification of carbohydrates, lipids, amino acids, proteins, nitrogenous bases and nucleic acids.

2- The composition and functions of carbohydrates, lipids, amino acids, proteins, nitrogenous bases and nucleic acids in living cells

3- Translation and transcription of nucleic acids

4- Enzymes and their role in stimulating cellular reactions - enzymatic accompaniments - power generation and transmission in the cell and factors affecting enzymatic reactions

5- The biosynthesis of some biological molecules.

Syllabus: B-Practical contents

-Qualitative determination and quantitative estimation of some biological compounds belonging to carbohydrates (mono, di and polysaccharides), proteins and amino acids.

- some chemical properties of lipids and fatty acids

*See attachment

2. Course Main Objective

This course aims to provide students with the basic knowledge about the main classes of biomolecules, their composition, properties, functions and their transformations in cells

3. Course Learning Outcomes

CLOs		Aligned PLOs*
1	**Knowledge and Understanding** *Upon completion of this course student will be able to*	
1.1	Demonstrate knowledge and understanding in biochemistry related to biology students including the identification, classification and properties of biological compounds. (I)	
1.2	Describe the essential facts, principles and theories related to biochemistry and evaluate the level of different biological metabolites in biological fluids. (I)	
2	**Skills:** *Upon completion of this course student will be able to*	
2.1	Demonstrate critical thinking ability to differentiate and compare between biological compounds and different factors affecting biological and enzymatic reactions (I)	
2.2	Apply their experimental basics and skills to use laboratory equipment, modern instructions, and classical techniques to perform experiments of biochemistry (I)	
2.3	Examine and follow proper procedures and regulations for safe handling, use, and disposal of chemicals (P)	

* To be determined by Biology Program

C. Course Content

No	List of Topics	Contact Hours
1.	An introduction to bio chemistry and water structure, hydrogen bonds, ionization, pH and buffer solutions.	2
2.	Carbohydrates, classification, Nomenclature of monosaccharides and their derivatives, isomerism and mutarotation.	2
3.	Reactions of monosaccharides, disaccharides and poly saccharides.	2
4.	Amino acids chemistry, classification and reactions.	2
5.	Peptide formation, protein functions, classification and separation.	2
6.	Enzymes nomenclature, classification, mechanism, inhibitions and their types.	2
7.	Lipids identification and classification. Triglycerides functions. Compound lipids (Conjugated and derived). Classification and fatty acids	2
8.	Chemical properties of fatty acids, rancidity, nucleic acid classification and structure.	2
9.	Types of nucleic acids, DNA Transcription, RNA translation and protein synthesis.	2
10.	Metabolism, Glycolysis and Kreb's cycle.	2
11.	Gluconeogenesis, phosphate pentose shunt and glycogenolysis.	1
12.	Beta Oxidation and digestion of proteins.	1
13.	Lab Experiments	22
Total		44

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 and Understanding** *Upon completion of this course student will be able to*		
1.1	Demonstrate knowledge and understanding in biochemistry related to biology students including the identification, classification and properties of biological compounds. (I)	***lecture***	***Imbedded Q*** ***Final exam***
1.2	Describe the essential facts, principles and theories related to biochemistry and evaluate the level of different biological metabolites in biological fluids. (I)	***lecture***	***Imbedded Q*** ***Final exam***
2.0	**Skills** *Upon completion of this course student will be able to*		
2.1	Demonstrate critical thinking ability to differentiate and compare between biological compounds and different factors affecting biological and enzymatic reactions (I)	***Lecture***	***Imbedded Q*** ***Final exam***
2.2	Apply their experimental basics and skills to use laboratory equipment, modern instructions, and classical techniques to perform experiments of biochemistry (I)	***Lab. work***	***Lab report***
2.3	Examine and follow proper procedures and regulations for safe handling, use, and disposal of chemicals (P)	***Lab. work***	***Quiz in safety***

2. Assessment Tasks for Students

#	Assessment task*		Week Due	Percentage of Total Assessment Score	
1	***Homework assignment***		**3 - 8**	**4**	**(4%)**
2	**Mid-term exam**		**~7**	**15**	**(15%)**
3	***Lecture Quizzes***		***4 - 10***	**1**	**(1 %)**
4	**Practical**	***Safety EXAM***	**9**	**3**	
		Sheet	**11**	**7**	**(30%)**
		Final practical exam		*20*	
5	**Final Exam**		**12**	**50**	**(50%)**
Total				***100 %***	

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

E. Student Academic Counseling and Support

Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice:

- The instructor will be available for academic counseling on daily basis for 4h/day during office hours.
- The office hours are listed in the instructor time table and delivered to the students in the first lecture each semester.
- The instructor is available in the WhatsApp group and BB with the students.
- E-mail and Telephone number are delivered to the students for any help throughout the semester.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Lehninger, principales of biochemistry (sixth edition) by David L. Nelson Michafi M. Cox. W. H. FREEMAN AND COMPANY. New York. 2013 • Concise Text of Biochemistry. T.N Pattabiraman, 3rd Ed, 2001. • اسس الكيمياء الحيوية. الدكتور عبد المنعم الاعسر , المجلد الاول, المكتبة الاكاديمية 2011
Essential References Materials	Textbook-of-Biochemistry-For-Medical-Students-6th-Edition.pdf
Electronic Materials	• https://www.khanacademy.org/science/biochemistry • https://www.biochemistry.org/ • https://en.wikipedia.org/wiki/biochemistry • https://www.masterorganicchemistry.com/
Other Learning Materials	• https://www.youtube.com/watch?v=cAxJw_W05ZY • https://www.chemguide.co.uk/orgmenu.html • https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/intro1.htm

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1 Lecture room(s) for groups of 50 students
Technology Resources (AV, data show, Smart Board, software, etc.)	Smartboard, Data show, Blackboard, Zoom, and internet
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements, or attach a list)	***Colorimetric devices, Bunsen burner, microscopes, reagent bottles, beakers, Buchner funnel, Test tube and many more. Scientific videos***

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	***Instructor & Course coordinator***	***Class room evaluation (direct & indirect)***
Quality of learning resources	***Program coordinator***	***Indirect***
Exam Quality assessment	***Assessment committee***	***Indirect***
Effectiveness of Teaching and Assessment	***Student***	***Likert-type Survey (CES) Indirect***

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	Chemistry Department Council CHEMS 2216
Reference No.	CHEMS 221602
Date	27/09/2022 G -- 01/03/1444 H

Laboratory Experiments

While specific laboratory experiments vary depending on the instructor and the semester, the following list is representative of the experiments that are used:

Week	EXP, titles	Chemicals and tools	hours
1	Course Introduction include: -Safety during handling with Chemicals and biological samples. Introduction to the devices used in the laboratory.	Safety tools, and Devices	2
2-3	Carbohydrate detection	Molisch's, Barfoed. Reducing tests, Fehling's, Benedict's, Ammoniacal silver nitrate, Rapid furfural, furfural, Osazone formation and Iodine test	4
4	Estimation of the content of reducing sugars using Fehling's and Benedict's test	Fehling's and Benedict's reagent; copper(II) sulfate, potassium sodium tartrate, Potassium hydroxide	2
5	Estimation of glucose in serum by phenol-sulphuric acid method	Spectrophotometer, ethanol Phenol, Sulfuric acid, Water bath, Tubes with covers, filter paper, Cones	2
6	General tests for proteins ,	Ninhydrin reagent, copper sulfate in a strong base, sodium hydroxide solution, water bath	2
7	Solubility and Precipitation of protein	heavy metals (e.g., Hg2+, Pb2+, Cu2+), Alkaloidal reagents (e.g., tannate & trichloro acetate), by denaturation (heat coagulation test, strong acids, strong base)	1
7	Color reactions of proteins, Biuret test, Millon's test and Reduced sulfur test, Hopkins-Colé test	copper sulfate, sodium hydroxide, Millon's reagent, Hopkins-Colé reagent, H2SO4	1
8	Estimation of amino acid	-Using Ninhydrin - titration with potassium hydroxide in the presence of formaldehyde	2
9	Properties of fats and oils	Melting point, Crystallization, Viscosity, Density, Solubility, Refractive index, The Saponification number, iodine number, Rancidity	2
10	Estimation of triglyceride	4-chlorophenol, Magnesium aspartate, Sodium Azide	2
11	Revision on the theoretical part of the experiments		2
12	FINAL EXAM		2

Blue Print

Course Name	Biochemistry
Course Code	CHEM-204

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	2.2	2.3			
Marks	30	25	15	27	3			

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	**K1**	**1.1 (30 M)**	Homework	MCQ Q&A	2	**2**	**2%**
			Midterm	MCQ T&F	2	**7**	**7%**
			Final Exam	MCQ Q&A	2	**21**	**21%**
	K2	**1.2 (25 M)**	Homework	MCQ Q&A	2	**2**	**2%**
			Midterm	MCQ Q&A	2	**5**	**5%**
			Final Exam	MCQ Q&A	2	**18**	**18%**
Skills	**S1**	**2.1 (15 M)**	Quiz	MCQ T&F	3	**1**	**1%**
			Midterm	MCQ Q&A	2	**3**	**3%**
			Final Exam	Q&A	3	**11**	**11%**
	S2	**2.2 (27 M)**	Practical Sheet	MCQ and Q& A	7	**7**	**7%**
			Final Practical Exam	1 task experiment	---	**20**	**20%**
	S3	**2.3 (3 M)**	***Safety EXAM***	MCQ	6	**3**	**3%**
TOTAL		**100**				**100**	**100%**