Course Specification
(Bachelor)

Course Title:	Biochemistry
Course Code:	204CHEM-3
Program:	Bachelor of Science in Biology
Department:	Biology
College:	Science
Institution:	Jazan University (JU)
Version:	TP-153-2024
Last Revision Date:	05/05/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3h)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: *Level 4 / Year 2*					
4. Course general Description:					

1. Course Description

Course Title	*Course Number*	*Contact Hours (CH)*		*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*

5. Pre-requirements for this course (if any)**:**

203 CHEM3

6. Co-requisites for this course (if any)**:**

NON

7. Course Main Objective(s):

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

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100 %
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**; (Upon completion of the 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***	Objective Q Short answer Q
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***	Objective Q Short answer Q
2.0	**Skills**; (Upon completion of the course, student will be able to)			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Demonstrate critical thinking ability to differentiate and compare between biological compounds and different factors affecting biological and enzymatic reactions (I)		*Lecture*	Objective Q Short answer Q
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*

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.	3
3.	Reactions of monosaccharides, disaccharides and poly saccharides.	2
4.	Amino acids chemistry, classification and reactions.	3
5.	Peptide formation, protein functions, classification and separation.	2
6.	Enzymes nomenclature, classification, mechanism, inhibitions and their types.	3
7.	Lipids identification and classification. Triglycerides functions. Compound lipids (Conjugated and derived). Classification and fatty acids	3
8.	Chemical properties of fatty acids, rancidity, nucleic acid classification and structure.	3
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.	3
12	Beta Oxidation and digestion of proteins.	2
13	Lab Experiments	30
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *		Assessment timing (in week no)	Percentage of Total Assessment Score	
1.	*Lecture Quizzes*		5-6	5 (5%)	
2.	Mid-term exam		~9-12	15 (15%)	
4.	Practical	*Safety EXAM*	15	3	30%
		Sheet	15	7	
		Final practical exam		20	
5.	Final Exam		16-17	50	
	Total			100%	

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Textbook-of-Biochemistry-For-Medical-Students-6th-Edition.pdf
Supportive References	• 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
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. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students
Technology equipment (projector, smart board, software)	Smart board, Data show, Black board, internet
Other equipment (depending on the nature of the specialty)	none

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of Students assessment	Instructor & Course coordinator	Classroom evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Psci2415
DATE	28/03/1446 Corresponding to 1 / 10 /2024

H. Attachments

1- Practical Work

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
5-6	Estimation of glucose in serum by phenol-sulphuric acid method	Spectrophotometer, ethanol Phenol, Sulfuric acid, Water bath, Tubes with covers, filter paper, Cones	4
7	General tests for proteins	Ninhydrin reagent, copper sulfate in a strong base, sodium hydroxide solution, water bath	2
8	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)	2
9	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	2
10-11	Estimation of amino acid	-Using Ninhydrin -titration with potassium hydroxide in the presence of formaldehyde	4
12	Properties of fats and oils	Melting point, Crystallization, Viscosity, Density, Solubility, Refractive index, The Saponification number, iodine number, Rancidity	2
13	Estimation of triglyceride	4-chlorophenol, Magnesium aspartate, Sodium Azide	2
14	Revision on the theoretical part of the experiments	General revision	2
15	FINAL EXAM	Labe chemicals	2

2- Blue Print

Course Name	Biochemistry
Course Code	204CHEM-3

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)	Quiz	Objective Q Short answer Q	2	2	2%
			Midterm	Objective Q	2	7	7%
			Final Exam	Objective Q Short answer Q	2	21	21%
	K2	1.2 (25 M)	Quiz	Objective Q Short answer Q	2	2	2%
			Midterm	Objective Q Short answer Q	2	5	5%
			Final Exam	Objective Q	2	18	18%
Skills	S1	2.1 (15 M)	Quiz	Objective Q	3	1	1%
			Midterm	Objective Q Short answer Q	2	3	3%
			Final Exam	Short answer Q	3	11	11%
	S2	2.2 (27 M)	Practical Sheet	Objective Q Short answer Q	7	7	7%
			Final Practical Exam	1 task experiment	---	20	20%
	S3	2.3 (3 M)	*Safety EXAM*	Objective Q	6	3	3%
TOTAL		100				100	100%