

المركز الوطني لضمان جودة واعتماد  
المؤسسات التعليمية والتدريبية



المتطلبات الأكاديمية للمقرر الدراسي

اسم المؤسسة التعليمية: جامعة بنغازي – كلية الطب.

اسم البرنامج التعليمي: بكالوريوس طب وجراحة

اسم المقرر: Biochemistry II

رمز المقرر: 1203

الفصل/العام الدراسي: 2025-2026

## المتطلبات الأكاديمية للمقرر الدراسي

### 1. معلومات عامة:

Biochemistry II	اسم المقرر الدراسي	1
د. خالد جبريل القذافي	منسق المقرر	2
Biochemistry department	القسم / الشعبة التي تقدم البرنامج	3
	الأقسام العلمية ذات العلاقة بالبرنامج	4
124	الساعات الدراسية للمقرر	5
English	اللغة المستخدمة في العملية التعليمية	6
2 <sup>nd</sup> year	السنة الدراسية/ الفصل الدراسي	7
	تاريخ وجهة اعتماد المقرر	8

### 1.1 عدد الساعات الأسبوعية:

محاضرات 5 معام 2 تدريب  المجموع 7

### 2- أهداف المقرر:

- 1) Acquire comprehensive knowledge on basic concepts of metabolism of proteins, carbohydrate, and lipids, nucleotides and bioenergetics.
- 2) Acquire comprehensive knowledge, on molecular biology, gene-expression, formation of proteins, and bio-signaling along with their clinical significance.
- 3) Acquire basic skills on handling chemicals and performing various biochemical procedures in safe manner
- 4) Acquire comprehensive knowledge, on metabolism of heme and xenobiotic.
- 5) Demonstrate an understanding on biotechnology methods and their clinical implications.
- 6) Acquire critical thinking and problems solving skills for self and lifelong learning
- 7) Acquire communication, and team working skills that are essential for them to become active members in society

### 3- مخرجات التعلم المستهدفة: أ. المعرفة والفهم.

Discusses the metabolic pathways of proteins, carbohydrates, lipids, and nucleotides, including their regulatory mechanisms.	1أ
Describe the fundamental principles of molecular biology, gene expression, and biosignaling, with emphasis on hormonal regulation.	2أ
Describe the metabolism of nucleotides and heme, as well as the biochemical processes involved in xenobiotic metabolism.	3أ

#### ب-المهارات الذهنية:

Analyze and interpret the results of laboratory biochemical tests to diagnose .various metabolic disorders	1ب
Integrate proteins, carbohydrates and lipid's metabolism with their clinical correlation	2ب
Evaluate the clinical significance of bio-signaling, and heme metabolism	3ب

#### ج-المهارات العلمية والمهنية:

Handle chemicals and various body fluids sample in safe manner	1ج
Perform standard biochemistry laboratory procedures	2ج
Estimate different biochemical substance in the blood and Write lab reports	3ج

#### د-المهارات العامة:

Communicate effectively with their colleagues and teachers.	1د
Be an influential part of a teamwork and aware of team dynamics	2د
Manage time appropriately	3د

#### 4-محتوى المقرر:

Topics to be covered in the module: List of Topics	Total teaching hours	Teaching strategy		
		Lecture	Practical	New strategy
Bioenergetics and oxidative phosphorylation	5	5		
Free energy change and ATP		1		
Electron transport chain		2		
Oxidative phosphorylation		2		
Carbohydrate metabolism	21	19	2	
CHO chemistry and introduction to metabolism		3		
Digestion and absorption of CHO		2		
Glycolysis		2		
Tricarboxylic acid cycle (TCA)		2		
Alternative pathways of glucose oxidation		2		
Gluconeogenesis		2		
Glycogen metabolism		2		Flipped classroom
Blood glucose and DM		2		
Fructose and Galactose metabolism		2		
Estimation of blood glucose			2	
Amino acid metabolism	24	20	4	
Digestion and absorption of dietary proteins		2		
Nitrogen metabolism		2		
Transport of amino acids into cells		1		online
Removal of nitrogen from amino acids		2		
Urea cycle		2		
Metabolism of ammonia		2		
Amino acid degradation and synthesis		3		
Biosynthesis of nonessential amino acid		2		
Metabolic defects in amino acid metabolism		2		
Conversion of amino acids to specialized products		2		
Estimation of blood urea nitrogen			2	
Estimation of serum creatinine			2	
Lipid metabolism	26	18	8	
Digestion, absorption, hormonal regulation of dietary lipid		2		
Lipid malabsorption Resynthesize of TAG and CE and their transport from enterocytes		1		
Fatty acid synthesis (saturated & unsaturated)		2		

Synthesis of TAG and mobilization of stored fat		1		online
Oxidation of fatty acids and ATP production		2		
Ketone bodies metabolism and their clinical correlation		2		
Compound lipids metabolism and their clinical correlation		2		
Cholesterol, bile acids and bile salts and their clinical correlation		2		
Lipoproteins metabolism and their clinical correlation		2		
Role of liver in lipid metabolism		1		
Eicosanoids metabolism		1		
Estimation of total cholesterol			2	
Estimation of HDL- cholesterol			2	
Estimation of LDL- cholesterol			2	
Estimation of serum triglyceride			2	
<b>Integration of metabolism</b>	<b>6</b>	<b>6</b>		
Introduction		1		online
Hormonal influences on metabolism		1		
Metabolic changes during well-fed		1		
Metabolic changes during Fasting state		1		
Metabolic changes during starvation state		1		
Metabolic changes in untreated insulin-dependent diabetes mellitus and in ethanol ingestion		1		
<b>Hormonal biosignaling</b>	<b>6</b>	<b>6</b>		
Definition and classification.		1		
Plasma membrane and intracellular receptors		1		
Hormonal signals transduction and second messengers		2		
Examples of some signal transduction pathways		1		online
Effect of cell signaling on the regulation of transcription and cytoplasmic activities		1		
<b>Nucleotide metabolism</b>	<b>8</b>	<b>6</b>	<b>2</b>	
Structure, Nomenclature and biomedical importance of nucleotides		1		
Biosynthesis of purine bases and their clinical correlation		1		online
Biosynthesis of pyrimidine bases and their clinical correlation and defects		1		
Salvage pathways of purine and pyrimidine, degradation of nucleotide		1		
Clinical defects in nucleotide metabolism		1		
Clinical applications of synthetic nucleoside analogs		1		
Estimation of uric acid			2	
<b>Gene expression and molecular biology</b>	<b>16</b>	<b>14</b>	<b>2</b>	
DNA structure, function and organization within the cell		1		
DNA replication		2		

Polymerase chain reaction and sequencing		1		
Types, structure and function of all RNAs involved in gene expression		1		online
Transcription and post transcriptional modification		1		
Translation and post translation modification.		2		
Consequences of mutation		1		
Regulation of gene expression in prokaryotes: The Lac operon		1		
Gene expression in eukaryotes		2		
Biotechnology and human disease		2		
PCR			2	
Heme metabolism	8	6	2	
Introduction		1		
Biosynthesis of Heme		1		online
Porphyria		1		
Degradation of Heme		1		
Jaundice		1		
Diagnosis and evaluation of hyperbilirubinemia		1		
Estimation of serum bilirubin			2	
Xenobiotic metabolism	4	4		
Definition of xenobiotic and phases of xenobiotic metabolism		2		online
Five types of phase 2 reactions		2		
<b>Total</b>	<b>124</b>	<b>104</b>	<b>20</b>	<b>-</b>

## 5- طرق التعليم والتعلم:

1. Illustrated lectures

2. Practical

3. Flipped classroom

## 6- طرق التقييم:

ت	طرق التقييم	تاريخ التقييم	النسبة المئوية	ملاحظات
الدور الأول				
1	امتحان نصفي نظري	نوفمبر 2025	20%	
2	امتحان نهائي نظري	مايو 2026	50%	
3	امتحان نهائي عملي	مايو 2026	20%	5degree activity 20 lab exam
4	امتحان نهائي شفهي	مايو 2026	10%	
	المجموع		100%	
الدور الثاني				
	امتحان نظري	يوليو 2026	70%	
	امتحان عملي	يوليو 2026	20%	
	امتحان شفهي	يوليو 2026	10%	
	المجموع		100%	

## 7- المراجع والدوريات:

العنوان	الناشر	النسخة	المؤلف	مكان تواجدها
مذكرات المقرر	Lecture notes			Biochemistry department
الكتب الدراسية المقررة	Lippincott illustrated reviews: Biochemistry	7th edition	Ferrier, D. R. Philadelphia, PA: Wolters .Kluwer.2017	library
كتب مساعدة	Harper's Illustrated Biochemistry	31 <sup>st</sup> edition	Rodwell V.W. Bender D.A., Botham K.M., Kennelly P.J., Weil: New York. McGraw Hill. 2018	library

library	Devlin, M Thomas. Hoboken, N.J.: John Wiley & Sons; 2011.	7th edition	Textbook of • biochemistry with clinical correlations	
---------	--	-------------	--	--

### 8-الإمكانات المطلوبة لتنفيذ المقرر:

ملاحظات	الإمكانات المطلوب توفرها	ت
	Equipped Classes with educational facilities (Smart Board, Data show, Audio System, Computer, white board).	1
	Biochemistry lab	2

منسق المقرر: دكتور خالد جبريل القذافي. التوقيع .....

منسق البرنامج: دكتورة سارة علي شعيب ..... التوقيع .....

التاريخ...../...../.....م

رقم النموذج م. ا. م (011)	تاريخ الاصدار : 01 / 01 / 2009 م	تعديل رقم ( 2 )	تاريخ التحديث 08 / 08 / 2023 م
---------------------------	----------------------------------	-----------------	--------------------------------

مصفوفة المقرر الدراسي (1203)

المهارات									المعرفة والفهم			الأسبوع الدراسي
المهارات العامة			(ب)المهارات العلمية والمهنية			(أ)المهارات الذهنية			3.أ	2.أ	1.أ	1.أ
3.د	2.د	1.د	3.ج	2.ج	1.ج	3.ب	2ب	1.ب				
✓	✓	✓		✓	✓					✓	✓	
✓	✓	✓		✓	✓					✓	✓	1
✓	✓	✓		✓	✓						✓	2
✓	✓	✓		✓	✓			✓			✓	3
✓	✓	✓	✓	✓	✓			✓			✓	4
✓	✓	✓	✓	✓	✓			✓			✓	5
✓	✓	✓		✓	✓			✓			✓	6
✓	✓	✓		✓	✓			✓			✓	7
✓	✓	✓		✓	✓			✓			✓	8
✓	✓	✓		✓	✓		✓	✓			✓	9
✓	✓	✓		✓	✓		✓	✓			✓	10
✓	✓	✓		✓	✓		✓	✓			✓	11
✓	✓	✓	✓	✓	✓		✓	✓			✓	12
✓	✓	✓	✓	✓	✓		✓	✓			✓	13
✓	✓	✓	✓	✓	✓		✓	✓			✓	14
✓	✓	✓		✓	✓		✓	✓			✓	15
✓	✓	✓		✓	✓		✓	✓			✓	16
✓	✓	✓		✓	✓	✓	✓			✓		17
✓	✓	✓		✓	✓	✓	✓			✓		18
✓	✓	✓	✓	✓	✓	✓	✓			✓		19

✓	✓	✓	✓	✓	✓	✓	✓			✓		20
✓	✓	✓		✓	✓	✓			✓			21
✓	✓	✓	✓	✓	✓	✓			✓			22
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	23
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	24