



## Course Specifications

<b>Course Title:</b>	<b>Enzymes and Metabolism</b>
<b>Course Code:</b>	<b>2054109-3</b>
<b>Program:</b>	<b>Bachelor of Biotechnology</b>
<b>Department:</b>	<b>Department of Biotechnology</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Taif University</b>

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## A. Course Identification

<b>1. Credit hours:3 (2 lecture, 1 Lab)</b>
<b>2. Course type</b> a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 5 <sup>th</sup> levels, 2 <sup>nd</sup> year
<b>4. Pre-requisites for this course (if any): Biochemistry, 2053101-3</b>
<b>5. Co-requisites for this course (if any): NONE</b>

### 6. Mode of Instruction (mark all that apply)

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

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	60

## B. Course Objectives and Learning Outcomes

### 1. Course Description

This course covers the enzymatic nature, classification, kinetics, factors affecting enzymatic action and enzymatic mechanisms. Students will be providing with an appreciation and an understanding of key metabolic biochemistry and molecular biology concepts in carbohydrates, lipids, amino acids as well as Nucleic acids synthesis and degradation. Mechanisms of hormone action and extensions of the signal transduction pathways will be covered. We will also discuss how metabolic pathways are regulated by effector molecules and by hormones in living systems

### 2. Course Main Objective

Account for basic concept within kinetics of enzyme-catalyzed reactions. Recognize for simpler structure/function relationships for the most common cofactors. Distinguish between (digestion – anabolism -catabolism). Outline the different pathways for metabolism of carbohydrates, protein and lipid. Explain the role of Energy Rich Molecules in Metabolism

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Recognize the nature, mechanism of action and types of enzymes	<b>K.1</b>
1.2	Describe the metabolic pathways of carbohydrates, lipids, proteins and nucleotides	<b>K.1</b>
1.3	Outline the steps and regulatory mechanisms of metabolic pathways	<b>K.4</b>
1.4	Explain the normal and abnormal body functions in healthy and diseased states.	<b>K.4</b>
2	<b>Skills :</b>	
2.1	Practice the different approaches of metabolic disorders and their relations to biochemical and molecular basis	<b>S.2</b>
3	<b>Values:</b>	
3.1	Accept the morals of communications using recent different communication technologies	<b>V.3</b>

### C. Course Content

No	List of Topics	Contact Hours
1	Enzymes, definition, nomenclature, classification, kinetics and factors affecting enzymatic activities	3
2	Coenzymes ,Electron Transport System : Electron Transport and Oxidative Phosphorylation and bioenergetics	3
3	Carbohydrate Metabolism : Glycolytic Pathway and its Regulation, Alcoholic Fermentation; Citric Acid Cycle and its Regulation;	3
4	Gluconeogenesis; Pentose Phosphate Pathway; Glycogenolysis and glycogenesis	3
5	Lipid Metabolism : Mobilization, Transport of Fatty Acids. Beta, Alpha and Omega Oxidation of Saturated Fatty Acids, Oxidation of Unsaturated Fatty Acids, Oxidation of Odd Chain Fatty Acids.	3
6	Energy Yield, Ketone Body Breakdown to Yield Energy. Fatty acid synthesis	3
7	Protein metabolism, Amino Acid Breakdown : Deamination, Transamination, Urea Cycle, Breakdown of Glucogenic and Ketogenic Amino Acids.	3
8	Amino Acids as Biosynthetic Precursors : Biosynthesis of Epinephrine, and Dopamine.	3
9	Biosynthesis of Serotonin, GABA, Histamine, and Glutathione	3
10	Nucleotide Metabolism : synthesis and Degradation of Purines and Pyrimidines	3
<b>Total</b>		<b>30</b>

## D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and Understanding</b>		
1.1	Recognize the nature, mechanism of action and types of enzymes	Lecture	Written Exam
1.2	Describe the metabolic pathways of carbohydrates, lipids, proteins and nucleotides	Lecture	Written Exam
1.3	Outline the steps and regulatory mechanisms of metabolic pathways	Discussion	Written Exam
1.4	Explain the normal and abnormal body functions in healthy and diseased states.	Project	Report
<b>2.0</b>	<b>Skills</b>		
2.1	Practice the different approaches of metabolic disorders and their relations to biochemical and molecular basis	Project	Written Exam (Practical)
<b>3.0</b>	<b>Values</b>		
3.1	Accept the morals of communications using recent different communication technologies	Discussion	Report

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Written Exam (Midterm exam)	Week 5	20%
2	Written Exam (Periodical exam)	Week 8	10%
3	Project	Week 9	10%
4	Practical Exam	Week 10	20%
5	Written Exam (Final Exam)	Week 11	40%

\*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 :**

**6 hours per week of office hours are available for each faculty members for consultations and academic advice**

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Clinical Biochemis</b> Glew, Robert H. Clinical studies in medical biochemistry. 4th ed. Oxford University Press, 2007
<b>Essential Reference Materials</b>	<b>Harpers Illustrated Biochemistry</b> 30th Edition Author: Victor Rodwell, David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil ISBN-13: 9780071825344

	Lehninger's Principles Of Biochemistry 5e 2. Modern Genetic analysis book
<b>Electronic Materials</b>	<a href="http://medstudent.net/biochemistry.html">http://medstudent.net/biochemistry.html</a> (biochemistry for medical students)
<b>Other Learning Materials</b>	<a href="https://www.wiley.com/college/boyer/0470003790/animations/animations.htm">https://www.wiley.com/college/boyer/0470003790/animations/animations.htm</a> Interactive Biochemistry.

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>One classroom with internet connection for 2 hours a week and one laboratory for 3 hours a week with internet facility.</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Data show</b>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<b>1. Spectrophotometer Kits for Liver enzymes and kidney function tests</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course management and planning	Students	Indirect
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Students	Indirect
Effectiveness of Evaluation and exams	Students, Peer Reviewer	Indirect, Direct

**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

<b>Council / Committee</b>	Department Council
<b>Reference No.</b>	7
<b>Date</b>	16-6-1443