

CHEM2003: BIOCHEMISTRY

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Biochemistry

Subject Code

CHEM - Chemistry

Course Number

2003

Academic Unit

Chemistry (CHEM)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

CHEM1200/BCH1200 Discovery in Biology or
CHEM2071/BCH2071 Biological Chemistry or
CHEM2007/BCH2007 Principles of Organic Chemistry

Equivalent Courses

BMS2004 Biochemistry
BCH2003 Biochemistry

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to provide students:

1. an understanding of the chemical structure of biomolecules involved in mammalian metabolism;
2. concepts in biochemical reactions involved in metabolism;
3. principles behind the free energy flow in several major metabolic pathways and their controls and integration;
4. up-to-date knowledge on the biochemical basis of some human diseases and the biochemical techniques used in biotechnology.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Explain the thermodynamic principles behind the metabolic pathways			x	
2	Determine the bioenergetics and chemistry in metabolic reactions		x	x	
3	Identify and explain the regulation of metabolism by hormones and deregulation of metabolism in diseases		x		
4	Design experiments to explore the principles in biochemistry and metabolism		x	x	x
5	Create a concept map relating biochemistry to health and diseases			x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures and tutorials	Through lectures and tutorials, students will learn the thermodynamic principles employed in metabolic pathways	1, 2
2	Lectures and quizzes	Through lectures and quizzes, students will determine the bioenergetics and chemistry of metabolic reactions	2

3	Lectures and tutorials	Through lectures and tutorials, students will learn the importance of regulation of metabolism by hormones and deregulation of metabolism in diseases	3	
4	Tutorials and recent primary research articles	Through tutorials and recent primary research articles, students will learn biochemistry aspects related to health, diseases, and applications in biotechnology	4	
5	Small group activity	Through small group activity, student will create a concept map relating biochemistry to health and disease based on case studies of applications of biochemistry in human and animal health and society	5	

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorial quizzes and assignments	1, 2, 3, 4, 5	30

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

3

Additional Information for ATs

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM: "A minimum of 40% in both coursework and examination components."

Assessment Rubrics (AR)**Assessment Task**

Tutorial quizzes and assignments

Criterion

Ability to explain the chemical and biological principles behind the metabolic pathways and integrate the metabolic pathways in various medical conditions and in cancers

Excellent (A+, A, A-)

Excellent in understanding, explaining, exploring and integrating the knowledge

Good (B+, B, B-)

Good in understanding, explaining, exploring and integrating the knowledge

Fair (C+, C, C-)

Partial in understanding, explaining, exploring and integrating the knowledge

Marginal (D)

Weak in understanding, explaining, exploring and integrating the knowledge

Failure (F)

Poor in understanding, explaining, exploring and integrating the knowledge

Assessment Task

Examination

Criterion

Ability to explain the chemical and biological principles behind the metabolic pathways and integrate the metabolic pathways in various medical conditions and in cancers

Excellent (A+, A, A-)

Excellent in understanding, explaining, and integrating the knowledge in written format

Good (B+, B, B-)

Good in understanding, explaining, and integrating the knowledge in written format

Fair (C+, C, C-)

Partial in understanding, explaining, and integrating the knowledge in written format

Marginal (D)

Weak in understanding, explaining, and integrating the knowledge in written format

Failure (F)

Poor in understanding, explaining, and integrating the knowledge in written format

Part III Other Information**Keyword Syllabus**

Chemistry, biological functions, metabolic pathways

Thermodynamics, bioenergetics

Metabolism of carbohydrates and lipids

Lipid biosynthesis and fatty acid catabolism

Metabolic integration and cancer metabolism

Reading List**Compulsory Readings**

Title	
1	Lehninger Principles of Biochemistry 7th edition. David L. Nelson and Michael M. Cox. W.H. Freeman and Company, 2017.

2	Essentials of medical biochemistry : with clinical cases 2nd edition. N.V. Bhagavan, Chung-Eun Ha. Amsterdam; Oxford : Academic, 2015.
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Additional Readings

Title	
1	Cell Metabolism
2	Science Daily: http://www.sciencedaily.com/news/plants_animals/biochemistry/