UNIVERSITI TEKNOLOGI MARA

BIO462: BIOCHEMISTRY

Course Name (English)	BIOCHEMISTRY APPROVED
Course Code	BIO462
MQF Credit	4
Course Description	This is an introductory course of biochemistry with the emphasis given to various structures and functions of biological molecules and the biochemical reactions involved. This course covers topics on the structures and functions of biomolecules such as nucleic acids, carbohydrates, lipids, proteins and enzymes. The course will also provide an introduction to metabolic pathways including glycolysis, glycogenesis, gluconeogenesis, fermentation and respiration, lipid metabolism, amino acid metabolism as well as the process of DNA transcription and translation.
Transferable Skills	- Knowledge in specific area-content - practical skills - Social skills, teamwork and responsibilities
Teaching Methodologies	Lectures, Practical Classes
CLO	CLO1 Explain biomolecules with respect to their structure, function, biochemical reactions and characterization techniques in biochemistry CLO2 Display practical skills in biochemical experiments CLO3 Demonstrate communication skills in oral and written related to biochemistry
Pre-Requisite Courses	No course recommendations

Topics
1. Introduction 1.1) Definition of biochemistry 1.2) Properties of water 1.3) Thermodynamics
2. Amino acids, proteins and enzymes 2.1) Twenty standard amino acids - properties 2.2) Amino acids – ionic properties and buffers 2.3) Methods of amino acids analysis 2.4) Proteins structure, function and metabolism 2.5) Levels of protein structures (disulphide and peptide bonds) - Determination of protein structure 2.6) Protein purification procedures with reference to purification of a soluble enzyme 2.7) Metabolism of amino acids (anabolic and catabolic pathways) 2.8) Enzymes: Nomenclature, active sites, cofactors, isozymes, enzyme kinetics, factors affecting rate of reaction and enzyme inhibition and allosteric regulation
3. Carbohydrate structure, function and metabolism 3.1) Monosaccharides and polysaccharides, structural configurations and isomerism. Chemical properties of carbohydrates 3.2) The central role of ATP 3.3) Glycolytic pathways, TCA cycle 3.4) Bioenergetics, ETC, oxidative phosphorylation and sources of energy 3.5) Gluconeogenesis and Glycogen metabolism 3.6) Pentose phosphate pathway - The interrelationship between degradative and biosynthetic pathways
4. Lipids structure, functions and metabolism 4.1) The different classes of lipids. Structure and chemical properties 4.2) Biological membrane 4.3) Breakdown (-oxidation) and biosynthesis of lipids 4.4) Ketone bodies - breakdown and synthesis

5. Nucleic acids structure and functions
5.1) Structures of nucleotides (in DNA and RNA)
5.2) Polynucleotides
5.3) Types of RNA molecules
5.4) Genetic code
5.5) Overview of DNA replication, transcription and translation

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	one group assignment	10%	CLO1
Practical	average of four experiments	5%	CLO2
Test	one test	30%	CLO1
Written Report	one report for all practical	5%	CLO3

Reading List

Recommended Text

- **Mary K. Campbell,Shawn O. Farrell & Owen M. McDougal, *Biochemistry*, 9th Ed., Cengage Learning Inc. USA [ISBN: 9789814792264]**

Article/Paper List

This Course does not have any article/paper resources

Other References

- **Reference Book David L. Nelson & Michael M. Cox 2017, *Principles of Biochemistry*, Freeman & Co. Ltd., USA**
- **Reference Book Reginald H. Garrett & Charles M. Grisham. 2017, *Biochemistry*, Cengage Learning Inc., USA**
- **Reference Book Christopher K. Mathews, Kensal E. van Holde, Dean R. Appling & Spencer J. Anthony-Cahill 2015, *Biochemistry*, Prentice Hall, USA**
- **Reference Book Trudy McKee & James McKee 2013, *Biochemistry: The Molecular Basis of Life* , Oxford University Press Inc., UK**