



UNIVERSITI TEKNOLOGI MARA

BCM311: BIOCHEMISTRY II

Course Name (English)	BIOCHEMISTRY II APPROVED
Course Code	BCM311
MQF Credit	2
Course Description	This course introduces students to the law of thermodynamics, enzyme kinetics and metabolic pathways of carbohydrates, fats and amino acids. Topics related to the ATP also included where students are taught to show the consumption and production of ATP from all metabolic pathways such as carbohydrates and lipids. The course is supplemented by lectures and presentations. This will ensure that students have the necessary skills and understand the metabolism in general. The application of protein purification technique will be introduced in this course.
Transferable Skills	Demonstrate ability to identify and articulate self skills, knowledge and understanding confidently and in a variety of contexts.
Teaching Methodologies	Lectures, Discussion
CLO	CLO1 Explain the Law of Thermodynamics, basic terms of enzymes kinetics, metabolism and electron transport system CLO2 Describe the functions, reactions and control of selected metabolic pathways of carbohydrates, amino acids and lipid metabolism CLO3 Show the production and consumption of "high energy" compounds like ATP, production and consumption of reducing power in the pathways studied and the assays of protein and enzymes
Pre-Requisite Courses	No course recommendations
Topics	
1. Bioenergetics 1.1) The flow of energy in the cell 1.2) Laws of thermodynamics, entropy (disorder), endergonic, exergonic, "high energy" bonds of ATP and coupled reactions 1.3) The interrelationship between degradative and biosynthetic pathways. The central role of ATP 1.4) Oxidation-reduction reactions, electron acceptor (NAD and FAD) 1.5) The electron-transport system and oxidative phosphorylation, the role of oxygen in aerobic respiration	
2. Enzyme kinetics 2.1) Michaelis-Menten and Lineweaver-Burke equations 2.2) Factors affecting rate of reaction 2.3) Enzyme inhibition and regulation	
3. Carbohydrate metabolism 3.1) Glycolysis – anaerobic, anaerobic reactions and its significance 3.2) Gluconeogenesis and Cori cycle – reactions and significance 3.3) Krebs cycle – the steps functional significance (3.3.1 Comparison between aerobic and anaerobic respiration in terms of initial substrates, final products, cellular locations, and the total number of ATP molecules produced per glucose respired) 3.4) Glycogen metabolism – reactions and control of blood glucose	
4. Lipid metabolism 4.1) Lipolysis and β -oxidation, the reactions and hormone control 4.2) Ketone bodies formation	
5. Amino acids catabolism 5.1) Oxidative deamination and transamination of amino acids and its contribution to energy production 5.2) Fate of carbon skeletons and nitrogen 5.3) The urea cycle	

6. Metabolic interrelationship

- 6.1) Interconversion between carbohydrates or protein to fat and the metabolic pathways involved
- 6.2) Energy sources of different organs during fasting and
- 6.3) exercise

7. Protein and Enzyme Assays

- 7.1) The introduction and methods to purify protein

Assessment Breakdown	%
Continuous Assessment	40.00%
Final Assessment	60.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment 1	10%	CLO3
	Test	Test 1	10%	CLO1 , CLO2
	Test	Test 2	10%	CLO1 , CLO2
	Test	Test 3	10%	CLO1 , CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> Campbell, M.K., and Farrell, S.O. 2012, <i>Biochemistry (7th Ed.)</i>, Thomson Brooks/Cole Boyer, R. 2006, <i>Concept in Biochemistry (3rd Ed.)</i>, Wiley
	Reference Book Resources	<ul style="list-style-type: none"> Voet, D.J., Voet, G.V., and Pratt, C.W. 2008, <i>Principles of Biochemistry (3rd Ed.)</i>, Wiley McKee, T. And McKee, J.R. 2003, <i>Biochemistry The Molecular Basis of Life</i> , McGraw-Hill
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	