

1.	Name of Course/Module	Biochemistry II
2.	Course Code	HBC1029
3.	Status of Subject	Core for B. Sc Bioinformatics
4.	MQF Level/Stage	Bachelor Degree – MQF Level 6
5.	Version (state the date of the last Senate approval)	June 2012
6.	Requirement for Registration	HBC1019 Biochemistry I
7.	Name(s) of academic/teaching staff	Tan Chai Hong Amelia Kassim Leila Hilout
8.	Semester and Year offered	Trimester 2 (Beta level)
9.	Objective of the course/module in the programme :	
	<ol style="list-style-type: none"> 1. To introduce and provide the basic principles of biochemistry. 2. To provide basic theoretical knowledge and application of the various components of biochemistry such as bioenergetics, enzymology, metabolism and synthesis of molecules. 3. To provide an appreciation of the necessity of biochemical knowledge in various biomedical field. 	
10.	Learning Outcomes :	
	At the completion of the subject, students should be able to:	
	LO1: Explain the basic components and core principles of various biochemical pathways (Cognitive, Level 2) LO2: Comprehend how and why biochemical pathways are integrated (Cognitive, Level 2) LO3: Relate various metabolic disorders to specific biochemical pathway (Cognitive, Level 3) LO4: Acquire basic skills in mining the online biological data (Psychomotor, Level 1)	
11.	Synopsis:	
	The course covers Glycolysis, Citric Acid Cycle, Glycogen Metabolism, Gluconeogenesis, Electron Transport and Oxidative Phosphorylation, Photosynthesis, Lipid Metabolism, Protein Turnover and Amino acid Metabolism, Nucleotide Metabolism and various responses to Environmental Changes. The disorders associated with defect in various metabolic pathways will also be covered.	
	Kursus ini merangkumi glikolisis, kitar asid sitrik, metabolisme glikogen, glukogenesis, pengangkutan elektron dan fosforilasi oksidatif, fotosintesis, metabolisme lipid, pengitaran protein dan metabolisme amino asid, metabolisme nucleotida dan pelbagai tindak balas terhadap pertukaran sekitar.	
12.	Mapping of Subject to Programme Outcomes :	
	Programme Outcomes	% of Contribution
	PO1: Apply soft skills in work and career related activities	20.00
	PO2: Demonstrate knowledge and understanding of fundamental concepts, principles and best practices	80.00
13.	Assessment Methods and Types :	

	Method and Type	Description/Details	Percentage
	Test		20%
	Quiz		10%
	Assignment	Report & Presentation	10%
	Lab		10%
	Final Exam		50%
14.	Details of Subject		
	Topics	Mode of Delivery	
		Lecture	Tutorial
	1. Metabolism: Basic Concepts and design	1	1
	2. Glycolysis <ul style="list-style-type: none"> • Pathways • Regulation • Disorders of metabolism 	2	1
	3. The Citric Acid Cycle <ul style="list-style-type: none"> • The metabolites involved • Regulation of Citric Acid Cycle • The Glyoxylate Cycle • Disorders of metabolism 	3	
	4. Additional Pathways in Carbohydrate Metabolism <ul style="list-style-type: none"> • Glycogen degradation • Glycogen synthesis • Regulation of glycogen metabolism • Gluconeogenesis • Regulation of gluconeogenesis • The Pentose Phosphate Pathway • Disorders of metabolism 	3	
	5. Electron Transport and Oxidative Phosphorylation <ul style="list-style-type: none"> • The Complexes: I, II, III and IV • The cofactors in Electron Transport • Regulation of oxidative phosphorylation • Disorders of metabolism 	3	1
	6. Photosynthesis <ul style="list-style-type: none"> • The Chloroplast • The light capturing pigments • Electron transport in photosynthesis • The dark reaction • The RPP cycle • Additional Carbon-Fixing Pathway • Synthesis of sucrose and starch from RPP metabolites 	1	

	7. Lipid Metabolism <ul style="list-style-type: none"> • Absorption and mobilization of fatty acids • Fatty acid oxidation • Fatty acid synthesis • Fatty acid elongation and desaturation • Regulation of fatty acid oxidation • Synthesis of eicosanoids • Synthesis of sphingolipids • Synthesis of cholesterol • Disorders of metabolism 	2	
	8. Protein Turnover and Amino Acid Metabolism <ul style="list-style-type: none"> • Nitrogen cycle and nitrogen fixation • Transamination reactions • Synthesis of nonessential amino acids • Synthesis of essential amino acids • Protein turnover • Amino acid catabolism • Disorders of metabolism 	2	
	9. Nucleotide Metabolism <ul style="list-style-type: none"> • Synthesis of purine nucleotides • Synthesis of pyrimidine nucleotides • Reduction of ribonucleotides to deoxyribonucleotides • Salvage of purines and pyrimidines • Purine catabolism • Pyrimidine catabolism 	2	
	10. Integration of metabolism <ul style="list-style-type: none"> • Principle fuel metabolism by organs • Characteristics of fuel consumption of major organs 	2	1
	11. Responding to environmental changes <ul style="list-style-type: none"> • Sensory system • The immune system • Molecular motors • Drug Development 	3	
	12. Drug Design <ul style="list-style-type: none"> • Overview of early-stage drug discovery • Using information and technology in finding a new drug 	2	
	Total	26	4
15.	Laboratory <ul style="list-style-type: none"> • Web Investigation: Metabolism on the Internet • Web Investigation : Glycolysis: Variations and Defects • Web Investigation: Energetics of Movement • Web Investigation : Nucleotide Analogs: Weapons Against Disease/ Tools 		
16.	Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning
	Lecture	26	26

	Tutorials	4	4
	Laboratory/Practical	24	12
	Presentation	-	-
	Assignment	-	10
	Mid Term Test	1	5
	Final Exam	2	15
	Quiz	2 times	2
	Sub Total	57	74
	Total SLT	$131/40 = 3.275 \Rightarrow 3$	
17.	Credit Value	3	
18.	Reading Materials :		
	Textbook	Reference Materials	
	1. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. "Biochemistry". 6 th Edition. WH Freeman, New York, 2006.	Horton, Moran, Ochs, Rawn, Scrimgeour, "Principles of Biochemistry," 4 th Edition. Prentice Hall, 2006.	
19.	Appendix (to be compiled when submitting the complete syllabus for the programme) :		
	<ol style="list-style-type: none"> 1. Mission and Vision of the University and Faculty 2. Mapping of Programme Objectives to Vision and Mission of Faculty and University 3. Mapping of Programme Outcome to Programme Objectives 4. Programme Objective and Outcomes (Measurement and Descriptions) 		