

1.	Name of Course/Module	Biochemistry I
2.	Course Code	HBC1019
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	NONE
7.	Name(s) of academic/teaching staff	Tan Chai Hong Leila Hilout Ong Chia Sui
8.	Semester and Year offered	Trimester 1 (Beta level)
9.	Objective of the course/module in the programme :	
	<p>1. To introduce and provide the basic principles of biochemistry.</p> <p>2. To provide an appreciation of the importance necessity of biochemical knowledg in various biomedical field.</p> <p>3. To provide exposure to various basic methods of analysis and an understanding of the characteristics and reactions of biomolecules.</p>	
10.	Learning Outcomes :	
	<p>At the completion of the subject, students should be able to:</p> <p>LO1: Comprehend the structural and chemical properties of the major biological molecules (Cognitive, Level 2)</p> <p>LO2: Explain the laboratory methods used in proteomics and genomics research (Cognitive, Level 2)</p> <p>LO3: Relate key steps in a molecular circuit to signal transduction pathway disorders (Cognitive, Level 3)</p> <p>LO4: Acquire basic skills in handling laboratory equipment (Psychomotor, Level 1)</p>	
11.	Synopsis:	
	<p>The course will cover the structure, function, and importance of the various biomolecules in living cells, such as proteins, DNA, carbohydrate and lipids, thus allowing students to develop an understanding of the major classes of biochemical compounds found in living organisms. Practical classes is integrated with the lectures to allow students to understand concepts covered in the lectures, and familiarize students with use of materials and equipment commonly used in biochemistry laboratories.</p> <p>Kursus ini merangkumi struktur, fungsi dan kepentingan pelbagai biomolekul dalam sel hidup, seperti protein, DNA, karbohidrat dan lemak. Ini akan membolehkan pelajar memahami kompaun bio-kimia yang utama dalam organisma hidup. Integrasi antara kelas praktikal dan kuliah akan membantu pelajar dalam memahami konsep yang diajar dan memperkenalkan mereka dengan bahan dan radas yang biasa diguna dalam makmal bio-kimia.</p>	
12.	Mapping of Subject to Programme Outcomes :	
	Programme Outcomes	<b>% of Contribution</b>
	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
	<b>1. Introduction to Biochemistry:</b> <ul style="list-style-type: none"> <li>History of Biochemistry</li> <li>Biomolecules,</li> <li>Biochemistry and the Genomic Revolution</li> <li>Overview of Cell Structure</li> </ul>	2	1
	<b>2. Biochemical Evolution</b> <ul style="list-style-type: none"> <li>Key Organic Molecules</li> <li>Reproduction, variation and selective pressure</li> <li>Energy transformations</li> <li>Cells' respond to changes in their environment</li> </ul>	2	
	<b>3. Water</b> <ul style="list-style-type: none"> <li>Properties of water</li> <li>Ionization of water</li> <li>Acid base chemistry</li> </ul>	2	
	<b>4. Protein Structure and Function</b> <ul style="list-style-type: none"> <li>Amino acids</li> <li>Primary Structure</li> <li>Secondary Structure</li> <li>Tertiary structure</li> <li>Quaternary structure</li> <li>Structure and function relationship</li> </ul>	3	1
	<b>5. Exploring Proteins</b> <ul style="list-style-type: none"> <li>Protein Purification</li> <li>Amino acid sequence</li> <li>Peptide Synthesis</li> <li>Three Dimensional Structure Determination</li> </ul>	3	
	<b>6. DNA, RNA and the Flow of Genetic Information</b> <ul style="list-style-type: none"> <li>Nucleic Acids</li> <li>DNA Replication</li> <li>Gene Expression</li> </ul>	2	1

	<b>7. Exploring Genes</b> <ul style="list-style-type: none"> <li>• Basic Tools of gene exploration</li> <li>• Recombinant DNA Technology</li> <li>• Gene Manipulation</li> <li>• Site specific mutagenesis</li> </ul>	2	
	<b>8. Exploring Evolution and Bioinformatics</b> <ul style="list-style-type: none"> <li>• Statistical analysis of sequence alignments</li> <li>• Evolutionary relationships</li> </ul>	2	
	<b>9. Enzymes: Basic Concepts and Kinetics</b> <ul style="list-style-type: none"> <li>• Properties of enzymes</li> <li>• Enzyme kinetics</li> <li>• Regulation</li> <li>• Catalytic Strategies</li> <li>• Regulatory strategies</li> </ul>	2	1
	<b>10. Carbohydrates: Nomenclature, Structure and Function of</b> <ul style="list-style-type: none"> <li>• Monoglycerides</li> <li>• Complex Carbohydrates</li> <li>• Glycoproteins</li> <li>• Lectins</li> </ul>	2	
	<b>11. Lipids and Cell Membranes</b> <ul style="list-style-type: none"> <li>• Structure and function of the various classes of lipids</li> <li>• Structure and function of biological membranes</li> <li>• Membrane Channels and Pumps</li> </ul>	2	
	<b>12. Signal Transduction Pathways</b> <ul style="list-style-type: none"> <li>• Key Steps in signal transduction</li> <li>• Common 2<sup>nd</sup> messenger systems</li> </ul>	2	
	<b>Total</b>	<b>26</b>	<b>4</b>
15.	<b>Laboratory</b> <ul style="list-style-type: none"> <li>• Operation of basic laboratory equipment Implementation using Socket API</li> <li>• Measurement of volume- Use of pipettes, micropipettes and correct pipetting techniques</li> <li>• Amino acids- Separation and Identification</li> <li>• Quantitative Determination of Protein</li> <li>• Protein separation-Chromatography</li> <li>• Protein Separation-Native gel electrophoresis, SDS gel electrophoresis</li> <li>• Enzyme Assay</li> <li>• Bioinformatics- Flow of Genetic Information</li> <li>• Protein Structure and Function I</li> </ul>		
16.	<b>Total Student Learning Time (SLT)</b>	<b>Face to Face (Hour)</b>	<b>Total Guided and Independent Learning</b>
	Lecture	26	26
	Tutorials	4	4
	Laboratory/Practical	27	13
	Presentation	-	-
	Assignment	-	10

	Mid Term Test	1	5
	Final Exam	2	15
	Quiz	2 times	2
	Sub Total	60	75
	Total SLT	$135/40 = 3.375 \Rightarrow 3$	
17.	Credit Value	3	
18.	Reading Materials :		
	Textbook	Reference Materials	
	1. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. "Biochemistry". 6 <sup>th</sup> Edition. WH Freeman, New York, 2006.	Horton, Moran, Ochs, Rawn, Scrimgeour, "Principles of Biochemistry," 4 <sup>th</sup> Edition. Prentice Hall, 2006.	
19.	Appendix (to be compiled when submitting the complete syllabus for the programme) :		
	<ol style="list-style-type: none"> <li>1. Mission and Vision of the University and Faculty</li> <li>2. Mapping of Programme Objectives to Vision and Mission of Faculty and University</li> <li>3. Mapping of Programme Outcome to Programme Objectives</li> <li>4. Programme Objective and Outcomes (Measurement and Descriptions)</li> </ol>		