

**SUMMARY OF INFORMATION ON EACH COURSE**

1.	Name of Course	Cell Biology								
2.	Course Code	HCB1011								
3.	Status of Course [Applies to (cohort) ]	Specialisation Core for B. Sc (Hons) Bioinformatics								
4.	MQF Level/Stage	Bachelor Degree – MQF Level 6								
5.	Version (State the date of the Senate approval – history of previous and current approval date)	Date of previous version: April 2014 Date of current version: August 2015								
6.	Pre-Requisite	None								
7.	Name(s) of academic/teaching staff	Amelia Kassim Ong Chia Sui								
8.	Semester and Year offered	Trimester 1, Year 1								
9.	Objective of the course in the programme :	1. To give an overview of the basic structure, function and organization of cells and sub-cellular organelles 2. To introduce the biology of cells at the level of the molecule with focus on genomic structure and function 3. To show the relationships of cells with one another and with the surrounding tissue environment 4. To introduce the cell cycle control								
10.	Justification for including the course in the programme :	This subject provides fundamental knowledge required for bioinformatics students to understand cellular mechanisms.								
11.	Course Learning Outcomes :	Domain	Level							
	LO1 Describe the basic structural and functional features common to cells and how they differentiate	Cognitive	Level 1							
	LO2 Comprehend the inter-cellular communication and interaction with the tissue environment	Cognitive	Level 1							
	LO3 Comprehend the maintenance, expression and regulation of genome	Cognitive	Level 1							
	LO4 Describe the cell cycle and appreciate the complexity of cell cycle control.	Cognitive	Level 1							
12.	Mapping of Learning Outcomes to Programme Outcomes :	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
	LO1		X							
	LO2	X								
	LO3		X							
	LO4	X								
13.	Assessment Methods and Types :									
	Method and Type	Description/Details						Percentage		
	1 Tests	Midterm test and quizzes						30%		
	2 Assignment	Report & Presentation						10%		
	3 Lab reports							10%		

**SUMMARY OF INFORMATION ON EACH COURSE**

	4 Final exam					50%
14.	Mapping of assessment components to learning outcomes (LOs)					
	Assessment Components	%	LO1	LO2	LO3	LO4
	Final exam	50	55.6	62.5	50	55.6
	Tests (Quiz and Midterm test)	30	33.3	37.5	30	33.3
	Assignment	10			10	11.1
	Lab reports	10	11.1		10	
15.	Details of Course					
	Topics			Mode of Delivery (eg : Lecture, Tutorial, Workshop, Seminar, etc.) Indicate allocation of SLT (lecture, tutorial, lab) for each subtopic		
				Lec	Tut	Lab
	<b>1. Introduction</b> i. Cell Evolution ii. The chemical components of a cell iii. Macromolecules: Structure, shape and information iv. How cells are studied			2	-	-
	<b>2. Normal Cell Structure and Organisation</b> i. Nucleus, nucleolus, nuclear chromatin, other intranuclear structures. ii. Cytoplasm <ul style="list-style-type: none"> <li>• Mitochondria and peroxisomes</li> <li>• Organelles of secretion</li> <li>• Organelles of endocytosis</li> </ul> iii. Cytoskeleton <ul style="list-style-type: none"> <li>• Microfilaments</li> <li>• Microtubules</li> <li>• Intermediate filaments</li> </ul> iv. Membrane system & membrane bound intracellular compartments <ul style="list-style-type: none"> <li>• Membrane composition</li> <li>• Membrane architecture</li> <li>• Dynamic properties</li> </ul> v. Other Components of the Cytosol <ul style="list-style-type: none"> <li>• Lipid droplets</li> <li>• Glycogen deposits</li> </ul>			3	1	3

**SUMMARY OF INFORMATION ON EACH COURSE**

<b>3. Chemistry and Structure of DNA and RNA</b> <ul style="list-style-type: none"> <li>• Nucleotides</li> <li>• The structure of single stranded and double stranded DNA</li> <li>• The structure of RNA</li> <li>• Nucleases and hydrolysis of nucleic acids</li> <li>• Analysis of nucleic acids</li> </ul>	2	-	3
<b>4. Genomic Organization of DNA</b> <ul style="list-style-type: none"> <li>• Viral and bacterial chromosome</li> <li>• Mitochondria and chloroplast DNA</li> <li>• Organization of DNA in chromatin</li> <li>• Organization of the eukaryotic genome</li> <li>• Genomic analysis</li> </ul>	2	-	3
<b>5. DNA Replication</b> <ul style="list-style-type: none"> <li>• The mode of DNA replication</li> <li>• Synthesis of DNA in microorganisms</li> <li>• Eukaryotic DNA synthesis                             <ul style="list-style-type: none"> <li>- Model of the replisome</li> <li>- Initiation and termination of DNA replication</li> <li>- DNA replication</li> </ul> </li> </ul>	2	-	-
<b>6. Transcription and RNA processing</b> <ul style="list-style-type: none"> <li>• Types of RNA</li> <li>• RNA polymerase</li> <li>• Transcription initiation</li> <li>• Transcription termination</li> <li>• Posttranscriptional modification of RNA</li> <li>• Eukaryotic mRNA processing</li> </ul>	3	1	-
<b>7. Protein Synthesis</b> <ul style="list-style-type: none"> <li>• Translation initiation</li> <li>• Transcription termination</li> </ul>	1	-	-
<b>8. Protein Localization</b> <ul style="list-style-type: none"> <li>• Posttranslational membrane insertion</li> <li>• Secretory proteins</li> <li>• Nuclear transport</li> </ul>	2	1	-
<b>9. Extracellular matrix and Cellular Environment</b> <ul style="list-style-type: none"> <li>• Collagen and elastic fibers</li> <li>• Ground substance</li> </ul>	1	-	-

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	<b>10. Cell-Cell and Cell-Matrix Interaction</b> <ul style="list-style-type: none"> <li>• Cell adhesion molecules</li> <li>• Cell junctions</li> <li>• Information processing</li> <li>• Cell proliferation</li> <li>• Homeostasis</li> </ul>	1	-	-
	<b>11. The Cell Cycle and its Regulation.</b> <ul style="list-style-type: none"> <li>• Cell cycle events</li> <li>• Cell cycle control</li> <li>• The mechanics of cell division</li> </ul>	2	1	3
	<b>12. Cell Signaling and Communication Between Cells</b> <ul style="list-style-type: none"> <li>• Stages of chemical signaling</li> <li>• Signaling mediated by intracellular receptors</li> <li>• Mechanism of transduction by cell surface receptor proteins</li> <li>• Mode of action by cyclic AMP</li> <li>• Communication between cells               <ul style="list-style-type: none"> <li>-Endocrine</li> <li>-Neural</li> </ul> </li> <li>• Signaling in apoptosis</li> </ul>	3	-	-
	<b>13. Cell Differentiation and Cell Lineages</b> <ul style="list-style-type: none"> <li>• Molecular basis of differentiation               <ul style="list-style-type: none"> <li>○ Generation of cell type-specific protein patterns</li> <li>○ Mechanism of transcriptional control</li> </ul> </li> <li>• Regulation of differentiation</li> <li>• Abnormal cell growth</li> </ul>	2	-	-
	<b>Total</b>	<b>26</b>	<b>4</b>	<b>12</b>
16.	<b>Laboratory</b>			
	Lab 1: DNA and Cell modeling (Animal cell, plant cell and bacteria) Lab 2: DNA Extraction from Yeast, Onion and Bacteria Lab 3: Introduction to Human Chromosomes using Light Microscopy Lab 4: Mitosis in Onion cells			
	Total Student Learning Time (SLT)	Face to Face / Guided Learning	Independent Learning	
	Lecture	26	26	
	Tutorials	4	4	
	Laboratory/Practical	12	6	

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	Presentation	-	-
	Assignment	-	10
	Mid Term Test	1	5
	Final Exam	2	20
	Quiz	4 times	4
	Sub Total	<b>45</b>	<b>75</b>
	Total SLT	<b>120</b>	
17.	Credit Value	<b>3</b>	
18.	Reading Materials :		
	Textbooks		
	Molecular Cell Biology. 7th Edition. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Matthew P. Scott. W. H. Freeman. 2012		
	Reference Material (including 'Statutes' for Law)		
	Molecular Biology of the Cell. 6th Edition. Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts and Peter Walter. Garland Publishing Inc. NY, 2014.		

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Appendix (to be compiled when submitting the complete syllabus for the programme) :

1. Mission and Vision of the University and Faculty
2. Programme Objectives or Programme Educational Objectives
3. Programme Outcomes (POs)
4. Mapping of POs to the 8 MQF domain
5. Summary of the Bloom's Taxonomy's Domain Coverage in all the Los in the format below :

Subject	Learning Outcomes (please state the learning outcomes)	Bloom's Taxonomy Domain		
		Affective	Cognitive	Psychomotor
ABC1234	Learning Outcome 1			
	Learning Outcome 2			
	Learning Outcome 3			
	Learning Outcome 4			
DEF5678	Learning Outcome 1			
	Learning Outcome 2			
	Learning Outcome 3			
	Learning Outcome 4			

6. Summary of LO to PO measurement
7. Measurement and Tabulation of result for LO achievement
8. Measurement Tabulation of result for PO achievement