

**COURSE INFORMATION**

1 .	<b>Name of Course</b>	Cell and Function	
2 .	<b>Course Code</b>	PCF0145	
3 .	<b>Type of Course</b> (e.g. : Core, major, elective etc.)	Core for Foundation in Life Sciences	
4 .	<b>Synopsis</b>	This course introduces basic knowledge in biology to students. Topics include evolution and ecology of life on earth, essential chemistry, the cell structure and organelles in the cell. Students will study about energy in cellular respiration and the process of photosynthesis. The function and the structure of organs in the human system will also be taught and lessons will include concepts of homeostasis and the function of hormones.	
5 .	<b>Version</b> (State the date of the Senate's approval - previous and the current approval date)	Current: August 2017 Previous: June 2014	
6 .	<b>Name(s) of Academic Staff</b>	Radziah Shaikh Abdullah Leonard Yew Chi Boon	
7 .	<b>Semester and Year Offered</b>	Trimester 1	
8 .	<b>Credit Value</b>	4	
9 .	<b>Pre-Requisite</b>	None	
10 .	<b>Objective of the course in the programme:</b> To expose students to fundamental concepts in biology and helps students build knowledge of the core concepts in Biology at the cellular level with emphasis on the structure and function of cells in biological systems.		
11 .	<b>Justification for including the course in the programme:</b> To provide fundamental knowledge and skills required for further learning in the field of the Life Sciences.		
12 .	<b>Course Learning Outcomes (CLO)</b>	<b>Domain</b>	<b>Level</b>
	<b>CLO1:</b> Define the concepts of evolution and ecology of life on earth.	Cognitive	1
	<b>CLO2:</b> Explain the fundamental building blocks of chemistry and life, the microscopic world of cell structures, organelles, energy flow and chemical cycling in the biosphere with reference to respiration and photosynthesis.	Cognitive	2
	<b>CLO3:</b> Explain the organization of the nervous system and basic mechanism of immune response in human.	Cognitive	2
	<b>CLO4:</b> Explain the path of gaseous exchange and its control, the basic mechanism of fluid transport and hormone functioning in humans and plants.	Cognitive	2

13 .	<b>Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment:</b>														
	<b>Course Learning Outcomes (CLO) (Must tally with CLOs in item 12)</b>	<b>Programme Learning Outcomes (PLO)</b>											<b>Teaching Methods</b>	<b>Assessment Method</b>	
		P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10	P L O 11			P L O 12
	CLO1 Define the concepts of evolution and ecology of life on earth.	√	√											Lecture, Tutorial, Lab	Quiz, Assignment, Lab Report, Test, Final Exam
	CLO2 Explain the fundamental building blocks of chemistry and life, the microscopic world of cell structures, organelles, energy flow and chemical cycling in the biosphere with reference to respiration and photosynthesis.	√	√											Lecture, Tutorial	Quiz, Test, Final Exam
	CLO3 Explain the organization of the nervous system and basic mechanism of immune response in human.	√	√											Lecture, Tutorial, Lab	Quiz, Assignment, Lab Report, Test, Final Exam
	CLO4 Explain the path of gaseous exchange and its control, the basic mechanism of fluid transport and hormone functioning in humans and plants.	√	√											Lecture, Tutorial	Quiz, Assignment, Final Exam
	<b>Total</b>	<b>4</b>	<b>4</b>											<i>Indicate the relevancy between the CLO and PLO by ticking "√" the appropriate relevant box (This description must be read together with standards 2.1.2, 2.2.1, and 2.2.2 in Area 2 – pages 16 &amp; 18 of COPPA 2.0)</i>	
14 .	<b>Transferable Skills:</b>														
	Problem solving, Technical skills and Critical thinking.														
15 .	<b>Distribution of Student Learning Time (SLT)</b>														
	<b>Course Content Outline</b>				<b>**CLO</b>				<b>Teaching and Learning Activities</b>				<b>Guided Learning (NF2F)*</b>	<b>Independent Learning (NF2F)*</b>	<b>Total SLT</b>
									<b>Guided Learning (F2F)*</b>						
									*L	*T	*P	*O			

<p><b>1 Introduction to biology: evolution and ecology</b>  Diversity of life. Concept of unity of life. Importance of biological diversity. Systematics and phylogeny. Descent with modification and natural selection. Speciation. An overview of ecology. Ecology as a scientific study. A hierarchy of interactions. Abiotic factors of the biosphere. Population and community ecology.</p>	CLO1	5	1				6	12
<p><b>2 Essential chemistry for biology</b>  The fundamental building blocks. Atoms, molecules, elements and compounds. Chemical bonding and molecules. Chemical reactions. The structure of water. Properties of water as vital constituent of life. Acids, Bases and pH. Organic molecules. Carbohydrates. Lipids. Proteins. Nucleic acids: DNA and RNA. Biocatalyst – enzymes.</p>	CLO2	4	1				5	10
<p><b>3 Cell structure and organelles</b>  Prokaryotic cell. Eukaryotic cell: animal and plant cell. Cell wall and cell membrane. Transport across membrane. Organelles – nucleus, endoplasmic reticulum, Golgi body, mitochondrion, lysosome, ribosome, chloroplast, cytoskeleton, centriole and vacuole. Specialized cells – animal cells: epithelium, nerve, muscle cells; bone, cartilage and blood. Techniques in cytology. Microscopy: light and electron microscopy. Centrifugation.</p>	CLO2	4	2	4		1	9	20
<p><b>4 Cellular respiration</b>  Energy flow and chemical cycling in the biosphere. Some basic energy concepts. ATP and cellular work. Aerobic respiration. Glycolysis. Krebs cycle. Electron transport chain. Anaerobic respiration: fermentation.</p>	CLO2	3	1	2		1	6	13
<p><b>5 Photosynthesis</b>  The basics of photosynthesis. The light dependent reaction. The light independent reaction – Calvin cycle. Adaptation of C3, C4 and CAM plants. Greenhouse effect.</p>	CLO2	3	1	2		1	6	13
<p><b>6 Gaseous exchange and its control</b>  In human: structure of alveolus, adaptation of lungs for gaseous exchange, structure of hemoglobin, oxygen transport and carbon dioxide transport in blood. In plants: stomata, structure and function of guard cells, regulation of stomatal opening and closing.</p>	CLO4	3	1	2		1	6	13
<p><b>7 Fluid transport</b>  In human: the heart structure and function, mechanism of heart beat, electrocardiography, lymphatic system, cardiovascular disease. In plants: xylem, transpirational pull, cohesion, tension, root pressure, phloem, transport of organic products by translocation.</p>	CLO4	4	1			1	6	12

<b>8 Homeostasis</b> Concepts of homeostasis. Negative and positive feedback mechanism. Structure and function of liver. Structure and function of kidney. Water concentration regulation in plants. Significance of transpiration.	CLO3	4	1				5	10
<b>9 Nervous system</b> Organization of nervous system. Autonomic nervous system (ANS). Sympathetic and parasympathetic nervous system. Drug abuse junction. Definition and types of drugs – stimulant, depressant, hallucinogen, tranquilizer and inhalant.	CLO3	4	1				5	10
<b>10 Hormones</b> In human: endocrine system, types and characteristics of hormones, mechanism of hormone action. In plant: types and functions of hormone (plant growth regulators e.g. auxin, gibberellin, cytokinins, abscisic acid, ethylene), phytochrome and the effects of light on plant development.	CLO4	3	1				4	8
							<b>Total SLT</b>	<b>121</b>

**SUMMATIVE ASSESSMENT**

<b>1. Continuous Assessment</b>	<b>Percentage %</b>	<b>Total SLT</b>	
Online/Written quizzes	10%	2	
Lab submissions	10%	0	
Assignments	10%	10	
Project			
Written test	20%	5	
<b>Total SLT for Continuous Assessment</b>		<b>17</b>	
<b>2. Final Assessment</b>	<b>Percentage %</b>	<b>Total SLT</b>	
		<b>F2F</b>	<b>ILT</b>
Final Exam	50%	2	20
<b>Total SLT for Final Assessment (F2F + NF2F)</b>		<b>22</b>	
<b>Grand Total</b>	<b>100%</b>	<b>160</b>	

**\*\*Indicate the CLO based on the CLO's numbering in Item 12.**  
**\*L= Lecture, \*T= Tutorial, \*P= Practical, \*O= Others, F2F\*= Face to Face, NF2F\*= Non Face to Face**

- 16 . **Identify Special Requirement to Deliver the Course (e.g., software, nursery, computer lab, simulation room):**  
Not available
- 17 . **Main References:**  
Reece, J.B., Taylor, M.R., Simon, E.J., & Dickey, J.L. (2012). Campbell Biology: Concepts and Connections (7th Ed). Pearson Benjamin Cummings.
- 18 . **Additional References:**  
Audesirk, T., Audesirk, G., & Byers, B.E. (2014). Biology: Life on Earth with Physiology (10th Ed). Pearson/Prentice Hall.  
Enger, E.D., Ross, F.C., & Bailey, D.B. (2012). Concepts in Biology (14th Ed). McGraw-Hill.  
Hoefnagels, M. (2012). Biology: Concepts and Investigations (2nd Ed). McGraw-Hill  
Krogh, D. (2014). Biology: A Guide to the Natural World (5th Ed). Pearson Benjamin Cummings.  
Moore, S.S., & Windelspecht, M. (2012). Essentials of Biology (3rd Ed). McGraw-Hill.

