Table 3. Summary of information on each course / module

<table>
<tr><td>1.</td><td colspan="6">Name of Subject: Cell and function</td></tr>
<tr><td>2.</td><td colspan="6">Subject Code: PBB0055</td></tr>
<tr><td>3.</td><td colspan="6">Status of Subject: Core</td></tr>
<tr><td>4.</td><td colspan="6">Stage: Foundation</td></tr>
<tr><td>5.</td><td colspan="6">Version: Date of Previous Version:- December 2010
Date of Current Version – October 2011</td></tr>
<tr><td>6.</td><td colspan="6">Name (s) of academic staff:
Radziah Shaikh Abdullah
Leonard Yew Chi Boon</td></tr>
<tr><td>7.</td><td colspan="6">Rationale for the inclusion of the course/module in the programme:
To equip students of Foundation in Life Sciences with knowledge of the core concepts in Biology at the cellular level with emphasis on the structure and function of cells in biological systems.</td></tr>
<tr><td>8.</td><td colspan="6">Semester and Year offered: Trimester 2</td></tr>
<tr><td rowspan="2">9.</td><td>Total Student Learning Time (SLT)</td><td colspan="4">Face to Face</td><td>Total Guided and Independent Learning</td></tr>
<tr><td>L = Lecture
T = Tutorial
P = Practical
O = Others (Mid Term + Final)</td><td>L

45</td><td>T

11</td><td>P

6</td><td>O

3.5</td><td>Guided (45+11+6+3.5) = 65.5
Independent = 104
Total = 169.5</td></tr>
<tr><td>10.</td><td colspan="6">Credit Value: 4 (169.5/40 = 4.24)</td></tr>
<tr><td>11.</td><td colspan="6">Prerequisite (if any): NIL</td></tr>
<tr><td>12.</td><td colspan="6">Learning outcomes:
i. Define the concepts of evolution and ecology of life on earth (Cognitive, Level 1)
ii. 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, Level 2)
iii. Explain the organization of the nervous system and basic mechanism of immune response in human (Cognitive, Level 2)
iv. Explain the path of gaseous exchange and its control, the basic mechanism of fluid transport and hormone functioning in humans and plants (Cognitive, Level 2)</td></tr>
<tr><td>13.</td><td colspan="6">Synopsis:
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.</td></tr>
<tr><td>14.</td><td colspan="6">Mode of Delivery: Lecture</td></tr>
<tr><td>15.</td><td colspan="6">Assessment Methods and Types:
i. Assignments: 10%
ii. Quizzes: 10%
iii. Lab reports: 10%
iv. Mid–Trimester Test: 20%
v. Final Exam: 50%
Total 100%</td></tr>
</table>

16.	Mapping of the course/module to the Programme Learning Outcomes:	% of contribution
	• To acquire basic knowledge of life science and fundamental principles of computing for life science students.	50
	• To apply basic techniques, skills and modern IT tools, through class activities and project work.	50

17. Content outline of the course/module and the SLT per topic:

TOPIC	Content Outline	SLT		
		Lecture	Tutorial	Self-study
1	**Introduction to biology: evolution and ecology** 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.	5	1	6
2	**Essential chemistry for biology** 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.	4	1	5
2	**Cell structure and organelles** 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.	6	2	8
4	**Cellular respiration** 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:	5	1	6

	fermentation.			
5	**Photosynthesis** The basics of photosynthesis. The light dependent reaction. The light independent reaction – Calvin cycle. Adaptation of C_3, C_4 and CAM plants. Greenhouse effect.	5	1	6
6	**Gaseous exchange and its control** 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.	4	1	5
7	**Fluid transport** 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.	5	1	6
8	**Homeostasis** 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.	4	1	5
9	**The nervous system** 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.	4	1	5
10	**Hormone** 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, absisic acid, ethylene), phytochrome and the effects of light on plant development.	3	1	4

			Laboratory	Self-study
	11	**Transport across Membrane** Determine the osmotic pressure of a cell. Determine the osmotic pressure in the atmosphere. Determine the concentration of sodium chloride solution that causes haemolysis. Determine the concentration of sodium chloride that is isotonic to red blood cells.	2	2
	12	**Reaction of Yeast Cells with Methylene Blue** Observe the reaction of yeast cells with methylene blue. Study on oxidation and reduction reactions.	2	2
	13	**Chromatography** Separate the photosynthetic pigments by chromatography. Determine R_f value.	2	2
	14	**Quizzes**		6
	15	**Assignments**		10
	16	**Midterm Test**	1.5	6
	17	**Final Examination**	2	20
		Total		

18. **Teaching and Learning Activities/Total Student Learning Time (SLT):**

	Face to Face	Self Learning
Lecture	45	45
Tutorial	11	11
Practical	6	6
Quiz (3)		6
Assignment (2)		10
Midterm Test (1)	1.5	6
Final (1)	2	20
Sub-total	**65.5**	**104**
Total SLT(hours)	**169.5**	

19. **Main references supporting the course:**

Campbell, N.A., Reece, J.B. (2006). *Biology: Concepts and connections* (5th Ed.). Pearson / Benjamin Cummings.

Additional references supporting the course:

Alters, S. (2006). *Biology: Understanding life.* John Wiley and Sons.
Belk, C. M. (2007). *Biology: Science for life* (2nd Ed.). Pearson Education.
Krogh, D. (2007). *A brief guide to biology.* Pearson.
Krogh, D. (2005). *Biology: A guide to the natural world* (3rd Ed.). Pearson Education / Prentice Hall.
Mader, S.S. (2007). *Biology* (9th Ed.). McGraw-Hill.