

Table 3. Summary of information on each course / module

1.	<b>Name of Subject:</b> Cellular reproduction and genetics					
2.	<b>Subject Code:</b> PBB0065					
3.	<b>Status of Subject:</b> Core					
4.	<b>Stage:</b> Foundation					
5.	<b>Version:</b> Date of Previous Version:- December 2010 Date of Current Version – October 2011					
6.	<b>Name (s) of academic staff:</b> Radziah Shaikh Abdullah Leonard Yew Chi Boon					
7.	<b>Rationale for the inclusion of the course/module in the programme:</b> To equip students of Foundation in Life Sciences with knowledge of the core concepts in Biology comprising the topics of cellular reproduction and genetics.					
8.	<b>Semester and Year offered:</b> Trimester 3					
9.	<b>Total Student Learning Time (SLT)</b>	<b>Face to Face</b>				<b>Total Guided and Independent Learning</b>
	L = Lecture T = Tutorial P = Practical O = Others (Mid Term + Final)	L 40	T 10	P 10	O 3.5	Guided (40+10+10+3.5) = 63.5 Independent = 102 Total = 165.5
10.	<b>Credit Value:</b> 4 (165.5/40 = 4.14)					
11.	<b>Prerequisite (if any):</b> NIL					
12.	<b>Learning outcomes:</b> i. Interpret the concepts of cell division, Mendelian's genetic inheritance, different types of mutations, population genetics and Hardy-Weinberg law (Cognitive, Level 2) ii. Explain the tools and applications of DNA technology (Cognitive, Level 2) iii. Explain the structure and replication of DNA, synthesis of protein from DNA and regulation of gene expression (Cognitive, Level 2) iv. Explain the process of reproduction, development and growth (Cognitive, Level 2)					
13.	<b>Synopsis:</b> This course covers topics that include an introduction to genetics, making reproductive cells, the DNA structure and replication as well as the reproduction and development of plants and animals. Students will also be provided with a description of how proteins are made and an introduction to molecular biology and DNA technology.					
14.	<b>Mode of Delivery:</b> Lecture					
15.	<b>Assessment Methods and Types:</b> i. Assignments: 10% ii. Quizzes: 10% iii. Lab reports: 10% iv. Mid–Trimester Test: 20% v. Final Exam: 50% Total 100%					
16.	<b>Mapping of the course/module to the Programme Learning Outcomes:</b>					<b>% of contribution</b>
	<ul style="list-style-type: none"> <li>To acquire basic knowledge of life science and fundamental principles of computing for life science students.</li> </ul>					50

	<ul style="list-style-type: none"> <li>To apply basic techniques, skills and modern IT tools, through class activities and project work.</li> </ul>	50		
17.	<b>Content outline of the course/module and the SLT per topic:</b>			
		<b>SLT</b>		
<b>TOPIC</b>	<b>Content Outline</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Self-study</b>
<b>1</b>	<b>Cellular basis of reproduction and inheritance</b> The concept of cell division. The cell cycle. Mitosis. Meiosis. Cytokinesis. The origins of genetic variation.	4	1	5
<b>2</b>	<b>Genetic inheritance</b> Mendel's genetics. Mendel's principles. Monohybrid cross. Dihybrid cross. Variations on Mendel's principles – codominancy, incomplete dominancy, multiple alleles, lethal gene, polygenic inheritance and linked genes. Sex chromosomes and sex-linked genes. Pedigree analysis. Genetic mapping.	6	1	7
<b>3</b>	<b>Mutation</b> Spontaneous and induced mutation. Types of mutation. Genetic mutation – base substitution, insertions, deletions and inversion. Chromosomal mutation. Chromosome aberration. Alterations of chromosome number – aneuploidy, polyploidy and euploidy.	3	1	4
<b>4</b>	<b>Population genetics</b> Gene pool concept. Gene pool and allele frequency. Hardy-Weinberg Law. Hardy-Weinberg equations.	3	1	4
<b>5</b>	<b>Molecular biology of the gene</b> DNA structure – Watson and Crick model. DNA as the carrier of genetic information. Replication of DNA. Protein synthesis from the nucleotide sequence. Transcription. Translation. Gene regulation in bacteria. Lactose Operon. Regulation of eukaryotic gene expression. Regulation of embryonic development. Gene activation and cell signaling. The genetic basis of cancer.	7	1	8
<b>6</b>	<b>DNA technology</b> Recombinant DNA technology. Restriction enzyme. Vector. Host cell. Genetic engineering – cloning. Genomic library and gene bank. Application of recombinant DNA technology. More tools of DNA	7	2	9

	technology – reverse transcriptase, nucleic acid probes, automated synthesis and sequencing, gel electrophoresis, restriction fragment analysis and polymerase chain reaction. The human genome project. Other applications – genetic screening, gene therapy and DNA fingerprinting. Risks and ethical questions. The controversy about GM foods.			
<b>7</b>	<b>Reproduction and development</b> Asexual reproduction in plants and animals. Sexual reproduction in plants. Reproductive organ in plants. Gamete formation. Pollination. Fertilization. Growth and development in plant. Formation and development of seed. Seed germination. Human reproductive system. Male reproductive system. Spermatogenesis. Female reproductive system. Oogenesis. Roles of hormones. Fertilization. Fetal development. Hormonal changes during pregnancy. Role of hormones in parturition and birth process. Role of hormones in lactation.	7	2	9
<b>8</b>	<b>Growth</b> Growth phases. Methods of measuring growth. Parameters. Types of growth curves. Patterns of growth. Ecdysis and metamorphosis. Seed dormancy, hibernation, aestivation and diapauses.	3	1	4
		<b>Laboratory</b>		<b>Self-study</b>
<b>9</b>	<b>Cell Division: Mitosis</b> Microscope slide preparation of various stages of mitosis. Identify the five stages of mitosis.	2		2
<b>10</b>	<b>Mendelian Genetics – CHI Squared Test (<math>\chi^2</math>)</b> Explain concepts of Mendelian Laws. Apply Chi Squared Test in experiments by using cards or beads with various colors.	2		2
<b>11</b>	<b>Inheritance</b> Make observations on inheritance of certain traits/characteristics among the students population.	2		2
<b>12</b>	<b>ABO blood group inheritance</b> Carry out blood group test and explain the ABO blood group	2		2

	inheritance.		
<b>13</b>	<b>Embryonic development – amphibian</b> Study the stages in the development of a frog	2	2
<b>14</b>	<b>Quizzes</b>		6
<b>15</b>	<b>Assignments</b>		10
<b>16</b>	<b>Midterm Test</b>	1.5	6
<b>17</b>	<b>Final Examination</b>	2	20
	<b>Total</b>	<b>63.5</b>	<b>102</b>
18.	<b>Teaching and Learning Activities/Total Student Learning Time (SLT):</b>		
		<b>Face to Face</b>	<b>Self Learning</b>
	<b>Lecture</b>	40	40
	<b>Tutorial</b>	10	10
	<b>Practical</b>	10	10
	<b>Quiz (3)</b>		6
	<b>Assignment (2)</b>		10
	<b>Midterm Test (1)</b>	1.5	6
	<b>Final (1)</b>	2	20
	<b>Sub-total</b>	<b>63.5</b>	<b>102</b>
	<b>Total SLT(hours)</b>	<b>165.5</b>	
19.	<p><b>Main references supporting the course:</b> Campbell, N.A., Reece, J.B. (2006). <i>Biology: Concepts and connections</i> (5<sup>th</sup> Ed.). Pearson / Benjamin Cummings.</p> <p><b>Additional references supporting the course:</b> Alters, S. (2006). <i>Biology: Understanding life</i>. John Wiley and Sons. Belk, C. M. (2007). <i>Biology: Science for life</i> (2<sup>nd</sup> Ed.). Pearson Education. Krogh, D. (2007). <i>A brief guide to biology</i>. Pearson. Krogh, D. (2005). <i>Biology: A guide to the natural world</i> (3<sup>rd</sup> Ed.). Pearson Education / Prentice Hall. Mader, S.S. (2007). <i>Biology</i> (9<sup>th</sup> Ed.). McGraw-Hill.</p>		