

**COURSE INFORMATION**

1 .	<b>Name of Course</b>	Cellular reproduction and Genetics	
2 .	<b>Course Code</b>	PCG0245	
3 .	<b>Type of Course</b> (e.g. : Core, major, elective etc.)	Core for Foundation in Life Sciences	
4 .	<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.	
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 2	
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> Interpret the concepts of cell division, Mendelian's genetic inheritance, different types of mutations, population genetics and Hardy-Weinberg law.	Cognitive	2
	<b>CLO2:</b> Explain the tools and applications of DNA technology	Cognitive	2
	<b>CLO3:</b> Explain the structure and replication of DNA, synthesis of protein from DNA and regulation of	Cognitive	2
	<b>CLO4:</b> Explain the process of reproduction, development and growth.	Cognitive	2

13 . Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment:															
Course Learning Outcomes (CLO) (Must tally with CLOs in item 12)	Programme Learning Outcomes (PLO)												Teaching Methods	Assessment Method	
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12			
CLO1 Describe the structure and nomenclature of various organic compounds.	√	√												Lecture, Tutorial, Lab	Quiz, Assignment, Lab Report, Test, Final Exam
CLO2 Define the physical properties of various organic compounds.	√	√												Lecture, Tutorial	Quiz, Final Exam
CLO3 Apply various important reactions.	√	√												Lecture, Tutorial	Quiz, Final Exam
CLO4 Comprehend the chemistry of carbohydrates, amino acids, proteins and lipids.	√	√												Lecture, Tutorial, Lab	Assignment, Lab Report, 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.
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15 . Distribution of Student Learning Time (SLT)								
Course Content Outline	**CLO	Teaching and Learning Activities				Guided Learning (NF2F)*	Independent Learning (NF2F)*	Total SLT
		Guided Learning (F2F)*						
		*L	*T	*P	*O			
<b>1 Cellular basis of reproduction and inheritance</b> The concept of cell division. The cell cycle. Mitosis. Meiosis. Cytokinesis. The origins of genetic variation.	CLO1	3	1	2		1	6	13
<b>2 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	CLO1	8	2	4			12	26
<b>3 Population genetics</b> Gene pool concept. Gene pool and allele frequency. Hardy-Weinberg Law. Hardy-Weinberg equations.	CLO1	3	1	2			5	11

<b>4 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.	CLO3	6	2			1	9	18
<b>5 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.	CLO1	2	1			1	4	8
<b>6 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 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.	CLO2	6	2			1	9	18
<b>7 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.	CLO4	6	2	2		1	10	21
<b>8 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.	CLO4	2	1				3	6

**Total SLT**                      **121**

**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>

2. Final Assessment	Percentage %	Total SLT	
		F2F	ILT
Final Exam	50%	2	20
<b>Total SLT for Final Assessment (F2F + NF2F)</b>		<b>22</b>	
<b>Grand Total</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.  
 Mader, S.S., & Windelspecht, M. (2012). Essentials of Biology (3rd Ed). McGraw-Hill.

**Note:**

Cells shaded light grey contain formulas / fixed values. Edit these formulas only if needed.
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