



UNIVERSITI TEKNOLOGI MARA

BMS415: CELL BIOLOGY AND GENETICS

Course Name (English)	CELL BIOLOGY AND GENETICS APPROVED
Course Code	BMS415
MQF Credit	3
Course Description	This course introduces students to the basic concepts of cell biology and genetics. The syllabus includes topics on cell structures and functions, transport and divisions, Mendelism, linkage, crossing over and chromosome mapping, sex chromosome and sex linkage, gene interactions, mutation as well as genetic population are also dealt with.
Transferable Skills	Preparing of samples for microscopic observation. Manipulating microscope correctly. Performing Mendelian calculation on given genetic data. Skills developed during practical classes and assessed by practical exam and observations.
Teaching Methodologies	Lectures, Practical Classes, Problem Based Learning (PBL)
CLO	CLO1 Describe the various cell structures and differences in prokaryotic and eukaryotic cell CLO2 Explain the relation of structure to function of selected cellular organelles, the differences between prokaryotic and eukaryotic cells, the principles of cellular transport processes, cell division processes, DNA structure, flow of genetic information and population genetics CLO3 Apply the principles of Mendelian genetics, mutation and genetic linkage to construct a genetic cross and predict its outcome CLO4 Prepare slide specimens and manipulate a microscope to observe selected cells and cellular structures; perform Mendelian calculations when given genetic data and present a written report
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Cell Structure and Function 1.1) 1.1 The cell theory 1.2) 1.2 Organelles of support and transport 1.3) 1.3 The cell wall 1.4) 1.4 The plasma membrane 1.5) 1.5 The cytoskeleton 1.6) 1.6 Control and cell reproduction 1.7) 1.6.1 Nucleus and nuclear pore 1.8) 1.7 Organelles of synthesis, storage and cytoplasmic transport. 1.9) 1.7.1 The endoplasmic reticulum and ribosomes 1.10) 1.7.2 The Golgi Body or apparatus 1.11) 1.7.3 Lysosomes 1.12) 1.7.4 Vacoules 1.13) 1.7.5 Plastids 1.14) 1.8 Energy generating organelles 1.15) 1.8.1 The Chloroplast 1.16) 1.8.2 Mitochondria 1.17) 1.9 Organelles of cellular movement 1.18) 1.9.1 Centrioles 1.19) 1.9.2 Cilia 1.20) 1.9.3 Flagella 1.21) 1.9.4 Basal bodies 1.22) 1.9.5 Microtubules and microfilaments 1.23) 1.10 Prokaryotic cell structures and a comparison	

1.24) with eukaryotic cell in terms of size and 1.25) compartmentation
2. 2.0 Cell Transport 2.1) 2.1 The plasma membrane 2.2) 2.2 The membrane chemistry and structure based 2.3) on the fluid mosaic model 2.4) 2.3 Mechanism of transport 2.5) 2.2.3.1 Diffusion and facilitated diffusion 2.6) 2.2.3.2 Osmosis, osmosis and the cell 2.7) 2.2.3.3 Active transport 2.8) 2.2.3.4 Endocytosis and exocytosis
3. 3.0 Cell Division 3.1) 3.1 The cell cycle 3.2) 3.2 Mitosis: significance and stages- prophase, 3.3) metaphase, anaphase and telophase 3.4) 3.3 Meiosis: significance and stages-M1 and M2 3.5) 3.4 Comparison between mitosis and meiosis 3.6) 3.5 Gametogenesis in plants 3.7) 3.6 Gametogenesis in animals
4. 4.0 DNA and Genetic Information 4.1) 4.1 DNA structure 4.2) 4.2 DNA structure in relation to gene transcription and translation
5. 5.0 Mendelian Genetic 5.1) 5.1 Alleles, genotype and phenotype 5.2) 5.2 Mendel's work 5.3) 5.3 Monohybrid inheritance and the principle of segregation 5.4) 5.4 Dihybrid inheritance and the principle of independent assortment 5.5) 5.5 Chromosomal explanation of independent 5.6) assortment
6. 6.0 Linked Genes 6.1) 6.1 Crossing over and cross over value 6.2) 6.2 Gene mapping 6.3) 6.3 Sex determination and linkage
7. 7.0 Extension of Mendelian Genetics 7.1) 7.1 Gene Interaction 7.2) 7.2 Codominance and incomplete dominance 7.3) 7.3 Multiple alleles 7.4) 7.4 Lethal alleles 7.5) 7.5 Polygenic inheritance
8. 8.0 Mutation 8.1) 8.1 Mutation frequency and causes of mutation 8.2) 8.2 Chromosome mutation 8.3) 8.3 Gene Mutation
9. 9.0 Population Genetic 9.1) 9.1 Gene population 9.2) 9.2 Hardy Weinberg's Principle 9.3) 9.3 Factors that change the frequency in a population.

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Practical	Lab test/calculations related to genetics	20%	CLO4
	Test	Structured essay/MCQs cover chapter 1-5	20%	CLO2
	Written Report	Problems and calculations related to genetics	10%	CLO4

Reading List	Recommended Text	<ul style="list-style-type: none"> M.Stubbs, N Suleyman and J Evans 2013, <i>Cell Biology and genetics</i>, 4th Ed., Mosby/Elsevier
	Reference Book Resources	<ul style="list-style-type: none"> Gerald Karp 2007, <i>Cell and Molecular Biology. Concepts and Experiments</i>, Fifth Ed. Ed., John Wiley & Sons Inc. William S. Klug 2006, <i>Concept of Genetics</i>, Eight Ed. Ed., Pearson Education Inc. Ricki Lewis 2009, <i>Human Genetics: Concepts and Applications</i>, Ninth Ed. Ed., McGraw-Hill Higher Education Bruce Alberts et al. 2009, <i>Essential Cell Biology</i>, Garland Publishing Inc. R.J, Brooker 2015, <i>Genetics: Analysis and Principles</i>, 5th Ed., Mc Graw-Hill education [ISBN: 9780073525341]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	