



UNIVERSITI TEKNOLOGI MARA

BMS542: EUKARYOTIC CELL BIOLOGY

Course Name (English)	EUKARYOTIC CELL BIOLOGY APPROVED
Course Code	BMS542
MQF Credit	4
Course Description	This course builds on the material taught in Cell Biology & Genetics and introduces students to the structural and functional dissection of a eukaryotic cell and its interaction with the environment. The plasma membrane structure and function; the endomembrane system, protein targeting, nuclear structure and function; cytoskeleton involvement in intracellular transport cell-cell signaling, cell cycle control, cell injury and death as well as cancer are discussed.
Transferable Skills	At the end of the course students will develop understanding on the eukaryotic cellular biology, various cellular component, and signal transduction pathways. Other skills such as team work and critical thinking will be emphasized.
Teaching Methodologies	Lectures, Practical Classes, Tutorial, Discussion, Presentation, Self-directed Learning
CLO	<p>CLO1 Recall concepts relating to the structure, organisation and functions of various parts of the eukaryotic cell.</p> <p>CLO2 Describe the principles and mechanisms underlying the cytoskeleton, movement of cells and the major signalling pathways in eukaryotic cells</p> <p>CLO3 Illustrate and discuss how current knowledge and understanding of the above concepts has help to solve real world problems e.g. medical treatment of diseases and cancer</p> <p>CLO4 Conduct experiments in basic cell biology e.g. culture and propagation of mammalian cell lines</p>
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.1 Membrane system and organelles	
1.1) 1.1.1 The plasma membrane	
1.2) 1.1.2 The endoplasmic reticulum and vesicular transport	
1.3) 1.1.3 The Golgi body – protein glycosylation and sorting	
2. 1.2 The nucleus and nucleosome	
2.1) 1.2.1 The nuclear envelope	
2.2) 1.2.2 Nucleolus and other nuclear structures	
3. 1.3 Mitochondria	
3.1) 1.3.1 Mitochondrion – structure and function, ATP formation	
4. 1.4 The cytoskeleton and cell movement	
4.1) 1.4.1 Overview	
4.2) 1.4.2 Microtubule – structure and composition	
4.3) 1.4.3 Microfilaments – structure and biochemistry	
4.4) 1.4.4 Actin, myosin and muscle movement	
4.5) 1.4.5 Cytoplasmic streaming	
5. 1.5 Cellular interaction with the environment	
5.1) 1.5.1 The extracellular matrix	
5.2) 1.5.2 Interaction with substrate – attachment and desmosomes	
5.3) 1.5.3 Tight junctions – occlusion between cells	
5.4) 1.5.4 Gap junctions – mediating intracellular communications	

6. 1.6 Cellular signaling and signal transduction

- 6.1) 1.6.1 Overview
- 6.2) 1.6.2 Membrane receptors and ligands
- 6.3) 1.6.3 GTP-binding proteins
- 6.4) 1.6.4 cAMP and G protein coupled receptors
- 6.5) 1.6.5 Tyrosine kinase signaling pathways
- 6.6) 1.6.6 MAP Kinase cascade
- 6.7) 1.6.7 Other signaling pathways

7. 1.7 The cell cycle

- 7.1) 1.7.1 Phases
- 7.2) 1.7.2 Cyclins and cell cycle control
- 7.3) 1.7.3 Cell cycle checkpoints

8. 1.8 Apoptosis

- 8.1) 1.8.1 Definition and process
- 8.2) 1.8.2 Apoptosis signals, genes, proteins and control
- 8.3) 1.8.3 Involvement of cytochrome c and the mitochondria
- 8.4) 1.8.4 Role of apoptosis in development and disease

9. 1.9 Biology of cancer

- 9.1) 1.9.1 Phenotype of a cancer cell
- 9.2) 1.9.2 The causes of cancer
- 9.3) 1.9.3 Genetics of cancer – oncogenes and tumour suppressors

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	n/a	10%	CLO2 , CLO3
	Assignment	n/a	10%	CLO2 , CLO3
	Test	Test 1	10%	CLO1 , CLO2 , CLO3
	Test	Test 2	10%	CLO1 , CLO2 , CLO3
	Written Report	Written report submitted on a weekly basis based on lab/practical session throughout the semester.	10%	CLO4

Reading List	Reference Book Resources	<ul style="list-style-type: none"> • Karp, G. 2010, <i>Cell Biology</i>, 6th Ed., Wiley International • Alberts, B. 2010, <i>Essential Cell Biology</i>, 3rd Ed., Garland Science, New York.
Article/Paper List	Reference Article/Paper Resources	<ul style="list-style-type: none"> • Olga C. Rodriguez, Andrew W. Schaefer, Craig A. Mandato, Paul Forscher, William M. Bement and Clare M. Waterman-Storer 2003, Conserved microtubule-actin interactions in cell movement and morphogenesis, <i>NATURE CELL BIOLOGY</i>, 5, 599
Other References	This Course does not have any other resources	