



## UNIVERSITI TEKNOLOGI MARA

### BIO400: CONCEPTS OF BIOLOGY

<b>Course Name (English)</b>	CONCEPTS OF BIOLOGY <b>APPROVED</b>
<b>Course Code</b>	BIO400
<b>MQF Credit</b>	3
<b>Course Description</b>	This is a general biology course emphasizing the principles of cell and molecular biology, classical genetics, organismal biology, biodiversity and ecology. Students will gain a general understanding of biological processes and structures and will be introduced to the methods and logic of science associated with these topics. Mass lecture sessions will be accompanied with active learning activities besides laboratory practical to provide hands-on learning experience. The outcomes shall be assessed through a variety of tools which include the traditional final examination, tests, assignment, presentation and laboratory reports.
<b>Transferable Skills</b>	1. Knowledge in specific area-content 2. Practical skills 3. Problem solving and scientific reasoning
<b>Teaching Methodologies</b>	Lectures, Lab Work, Tutorial
<b>CLO</b>	CLO1 Explain the concept of biology related to cellular and molecular biology, biodiversity and organismal biology CLO2 Describe the scientific methodology in biology CLO3 Display practical skills in basic experimental biology
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Introduction to Biology</b> 1.1) 1.1 Characteristics of living things 1.2) 1.2 Hierarchy of biological organization 1.3) 1.3 Scientific methods 1.4) LAB 1 : Microscopes- Exploring and viewing	
<b>2. Biological Chemistry</b> 2.1) 2.1 Properties of water and its importance 2.2) 2.2 Organic compounds: Basic structures and functions of carbohydrates, lipids, proteins and nucleic acids 2.3) 2.2.1 Monosaccharides, disaccharides, structural polysaccharides, storage polysaccharides 2.4) 2.2.2 Fatty acids, complex lipids, simple lipids 2.5) 2.2.3 Amino acids, polypeptide chains, peptide conformation, levels of protein structure (primary/secondary/tertiary/quaternary), denaturation, renaturation 2.6) 2.2.4 Nucleotides, introduction to DNA and RNA 2.7) LAB 2 : Biochemistry - CHO	
<b>3. Biology of the Cell</b> 3.1) 3.1 Prokaryotic and eukaryotic cells 3.2) 3.2 Cell structure and function 3.3) 3.3 Membrane structure and function 3.4) 3.3.1 Fluid mosaic model 3.5) 3.3.2 Permeability, impermeability 3.6) 3.3.3 Transport into and out of cell 3.7) LAB 3 : Cell and staining techniques 3.8) LAB 4 : Osmosis	

**4. Energy**

- 4.1) 4.1 Cellular respiration
- 4.2) 4.1.1 Structure of mitochondria and ATP
- 4.3) 4.1.2 Stages of cellular respiration
- 4.4) 4.2 Photosynthesis
- 4.5) 4.2.1 Structure of chloroplasts
- 4.6) 4.2.2 Stages of photosynthesis
- 4.7) LAB 5 : Redox-reactions – catalase activities
- 4.8) LAB 6 : Cellular respiration

**5. Cellular Reproduction, Genetics and Molecular Genetics**

- 5.1) 5.1 Cell division
- 5.2) 5.1.1 Mitosis, meiosis
- 5.3) 5.2 Classical genetics
- 5.4) 5.2.1 Monohybrid and dihybrid cross
- 5.5) 5.2.2 Incomplete dominance and codominance
- 5.6) 5.3 Molecular Genetics
- 5.7) 5.3.1 DNA replication in eukaryotes
- 5.8) 5.3.2 Protein synthesis
- 5.9) 5.4 Introduction to genetic engineering
- 5.10) LAB 7 : Mitosis and meiosis
- 5.11) LAB 8: Extracellular matrix

**6. Biological Diversity**

- 6.1) 6.1 Taxonomy
- 6.2) 6.1.1 Binomial nomenclature
- 6.3) 6.1.2 The three-domain classification system
- 6.4) 6.2 The characteristics of the 3-domain
- 6.5) 6.3 Introduction to viruses

**7. Systems and their Control (selected systems)**

- 7.1) 7.1 Homeostasis and its mechanism
- 7.2) 7.1.1 Homeostasis and its mechanism
- 7.3) 7.1.2 Body parameters
- 7.4) 7.2 Circulatory system
- 7.5) 7.2.1 Open and close circulatory system
- 7.6) 7.2.2 Heart, Blood vessel, Blood
- 7.7) 7.3 Respiratory system
- 7.8) 7.3.1 Gas exchange
- 7.9) 7.3.2 Oxygen and carbon dioxide transport
- 7.10) 7.4 Digestive system
- 7.11) 7.4.1 State of food processing
- 7.12) 7.4.2 Nutrient uptake
- 7.13) 7.5 Urinary system
- 7.14) 7.5.1 Kidney
- 7.15) 7.5.2 Urine production

**8. Reproduction and Development**

- 8.1) 8.1 Introduction to animal reproduction
- 8.2) 8.1.1 Asexual reproduction (advantages and disadvantages)
- 8.3) 8.1.2 Sexual reproduction (advantages and disadvantages)
- 8.4) 8.2 Introduction to plant reproduction
- 8.5) 8.2.1 Asexual reproduction
- 8.6) 8.2.2 Sexual reproduction

**9. Organisms and the Environment**

- 9.1) 9.1 Population ecology
- 9.2) 9.1.1 Characteristics of populations
- 9.3) 9.1.2 Population size and exponential growth
- 9.4) 9.1.3 Limits on the growth of populations
- 9.5) 9.1.4 Human population growth
- 9.6) 9.2 Community interactions
- 9.7) 9.2.1 Factors that shape community structure
- 9.8) 9.2.2 Symbiotic interactions
- 9.9) 9.2.3 Competitive interactions
- 9.10) 9.2.4 Predator-prey interactions
- 9.11) 9.3 Ecosystems
- 9.12) 9.3.1 The nature of ecosystems – an introduction
- 9.13) 9.3.2 Energy flow through the ecosystems
- 9.14) 9.3.3 Biogeochemical cycles
- 9.15) 9.4 Human and the biosphere
- 9.16) 9.4.1 Human impact on the biosphere

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Written Assignment	20%	CLO2
	Lab Exercise	Practical skills and labwork report	10%	CLO3
	Test	Test	20%	CLO1

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>Sylvia S. Mader 2013, <i>Concepts of Biology</i>, 3e Ed., McGraw-Hill Education [ISBN: 13: 978-00735]</li> </ul>
	Reference Book Resources	<ul style="list-style-type: none"> <li>Eldon Enger, Frederick C Ross, David Bailey 2014, <i>Concepts in Biology</i>, 14 Ed., McGraw-Hill Education [ISBN: 13: 978-00734]</li> <li>Amar Chatterjee, Rita Chatterjee, Mohd Hamim Rajikin, <i>Key Concepts of Medical Physiology</i>, University Publication Centre UiTM [ISBN: 9789673630479]</li> <li>Peter Raven and George Johnson and Kenneth Mason and Jonathan Losos and Susan Singer 2017, <i>Biology</i>, 11 Ed., McGraw-Hill Education [ISBN: 13: 978125982]</li> <li>Neil A. Campbell and Jane B. Reece 2015, <i>Biology</i>, 8 Ed., Pearson [ISBN: 13: 978-03215]</li> <li>Martha R. Taylor, Eric J. Simon, Jean L. Dickey, Kelly A. Hogan, Jane B. Reece 2017, <i>Biology: Concepts and Connections</i>, 9 Ed., Pearson [ISBN: 13: 978-01342]</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	