**UNIVERSITI TEKNOLOGI MARA**

**BIO121: INTRODUCTION TO CELL BIOLOGY**

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| **Course Name (English)** | INTRODUCTION TO CELL BIOLOGY APPROVED |
| **Course Code** | BIO121 |
| **MQF Credit** | 3 |
| **Course Description** | This is an introductory course in biology to familiarize students with the concepts of biology and its principles. Students will be introduced to the world of biology, focusing on the processes of science, the study of cells, and basic biological chemistry. |
| **Transferable Skills** | Demonstrate ability to identify and articulate self skills, knowledge and understanding confidently and in a variety of contexts. |
| **Teaching Methodologies** | Lectures, Lab Work, Case Study, Tutorial, Problem Based Learning (PBL) |
| **CLO** | CLO1 Describe basic concept and principle in biology, scientific methods, basic biochemistry, cytology and transport across membrane.<br>CLO2 Explain the scientific experiments in area of cell biology<br>CLO3 Explain important process involve in cell biology |
| **Pre-Requisite Courses** | No course recommendations |

| **Topics** |
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| **1. Introduction**<br>1.1) What is biology?<br>1.2) Branches in biology<br>1.3) (Major Branches: Botany, Zoology, Ecology, Genetics, Microbiology, Biotechnology, Biochemistry)<br>1.4) Characteristics of life<br>1.5) (Organized structure, composed of cells, feed, respire, growth and development, locomotion, homeostasis, response to surrounding, adaptation to environment, excrete their waste, reproduce, able to evolve) |
| **2. Hierarchy of Biological Organization**<br>2.1) Atom-molecules-cells-tissue-organ-organ system-organism<br>2.2) Organism-population-community-ecosystem-biosphere |
| **3. Scientific Methods**<br>3.1) The hypothetico-deductive method<br>3.2) Dependant/independent variable<br>3.3) Experimental analysis<br>3.4) Units of measurement and conversion<br>3.5) (S.I. units: length (km, m, cm, mm, µm, nm), mass (kg, g, mg, µg), volume (L, mL, µL, cm3,mm3), temperature (ºC, ºF)) |
| **4. Water And Its Properties**<br>4.1) Structure of water<br>4.2) Covalent bond<br>4.3) Hydrogen bond<br>4.4) Water properties and its importance<br>4.5) (Cohesion and adhesion, high specific heat capacity, high heat of vaporization, water expands as it freezes, versatile solvent)<br>4.6) Aqueous solutions<br>4.7) Solvent, solute and solution<br>4.8) Acids, bases, pH scale, buffers and buffering mechanisms |

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| **5. Biological Molecules**<br>5.1) Functional groups<br>5.2) (Hydroxyl, carbonyl, carboxyl, amino, sulfhydryl, phosphate)<br>5.3) Macromolecule<br>5.4) Carbohydrates<br>5.5) (Monosaccharides, disaccharides and polysaccharides)<br>5.6) Lipids<br>5.7) (Fatty acids and glycerol, Simple lipids (steroids, prostaglandins), Complex lipids (triacylglycerol, phospholipids, sphingolipids, waxes))<br>5.8) Proteins<br>5.9) (Amino acids, peptide formation, polypeptide chains, levels of protein structure, (primary/secondary/tertiary/quaternary), denaturation, renaturation)<br>5.10) Nucleic acids<br>5.11) Functions of nucleic acids, nucleotides, bases<br>5.12) Introduction to double helix (Watson-Crick model)<br>5.13) Types of RNA and functions (mRNA, tRNA, rRNA) |
| **6. Prokaryotic and Eukaryotic cells**<br>6.1) Microscopy<br>6.2) Light microscope<br>6.3) Electron microscopes<br>6.4) The importance of compartmental organization<br>6.5) Nucleus<br>6.6) Chromosomes, chromatin, nuclear envelope, nucleolus, nucleosome<br>6.7) Structure and functions of organelles<br>6.8) (Ribosomes, endoplasmic reticulum (smooth, rough), Golgi apparatus, lysosomes, vacuoles, peroxisomes, mitochondria, chloroplasts, the cytoskeletons:microtubules, microfilaments, intermediate filaments (centrioles, cilia, flagella))<br>6.9) Cell walls<br>6.10) Glycocalyx of animal cells<br>6.11) Unicell and multicell organisms |
| **7. Plasma membrane and transport of molecules**<br>7.1) Plasma membrane Model<br>7.2) Sandwich model (Davson & Danielli)<br>7.3) Fluid Mosaic Model (Singer & Nicholson)<br>7.4) Phospholipids bilayers, integral proteins, peripheral proteins,<br>7.5) glycoproteins, glycolipids, cholesterols<br>7.6) Permeability of lipid bilayer<br>7.7) Transport proteins<br>7.8) Transport of small molecules<br>7.9) Passive transport (Simple diffusion ,osmosis, facilitated diffusion)<br>7.10) Active transport: Na+-K+ pump<br>7.11) Transport of large molecules<br>7.12) Exocytosis<br>7.13) Endocytosis (phagocytosis, pinocytosis) |

| Assessment Breakdown | % |
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| Continuous Assessment | 40.00% |
| Final Assessment | 60.00% |

**Details of Continuous Assessment**

| Assessment Type | Assessment Description | % of Total Mark | CLO |
|---|---|---|---|
| Quiz | Total of 2 Quizzes | 5% | CLO1 |
| Test | Total of 3 tests | 5% | CLO1 |
| Test | Total of 3 tests | 15% | CLO3 |
| Written Report | Total of 5 lab reports | 15% | CLO2 |

**Reading List**

**Recommended Text**

- **Solomon, E.P., Berg, L.R., & Martin, D.W 2008, *Biology*, 9th Edition Ed., Thomson**

**Reference Book Resources**

- **Campbell, N. A. and Reece, J. B. 2008, *Biology*, 9th Edition Ed., Pearson**
- **Audesirk, G., Audesirk, T. and Pyers, B. 2011, *Biology: Life On Earth With Physiology*, 9th Edition Ed., Pearson**
- **Green, N.P.O., Stout, G.W. & Taylor, D.J 1998, *Biological Sciences*, 2nd Edition Ed., Cambridge University Press**
- **Clegg, C.J. & Mackean, D.G 1994, *Advanced Biology: Principles And Applications*, John Murray (Publishers) Ltd**
- **Becker, W.M., Reece, J.B., & Poenie, M.F. 1996, *The World Of The Cell*, 3rd Edition Ed., Benjamin/Cummings**

**Article/Paper List**: This Course does not have any article/paper resources

**Other References**: This Course does not have any other resources