



UNIVERSITI TEKNOLOGI MARA

BIO122: HISTOLOGY OF CELL AND TISSUE

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| Course Name (English) | HISTOLOGY OF CELL AND TISSUE APPROVED |
| Course Code | BIO122 |
| MQF Credit | 3 |
| Course Description | This is an introductory course in biology aims to familiarize students with the concepts and principles of biology. Students will be introduced to the world of biology, focusing on the processes in science, theory and concepts in cytology, basic biological chemistry and tissues. |
| Transferable Skills | 1. Demonstrate ability to identify and articulate self skills, knowledge and understanding confidently and in a variety of contexts. 2. Demonstrate ability to apply creative, imaginative and innovative thinking and ideas to problem solving. |
| Teaching Methodologies | Lectures, Lab Work, Case Study, Practical Classes, Tutorial, Discussion, Presentation, Collaborative Learning |
| CLO | CLO1 Describe the structures and functions of cells and tissues. CLO2 Perform (plan, conduct and analyze outcomes of) scientific investigations in area of cells and tissues. CLO3 Demonstrate proactive verbal and written communication in describing structures and functions of cells and tissues. |
| Pre-Requisite Courses | No course recommendations |
| Topics | |
| 1. BIOLOGY AND ITS THEME 1.1) 1.1 INTRODUCTION TO BIOLOGY 1.2) 1.2 BRANCHES IN BIOLOGY 1.3) 1.2.1 major branches : Botany, Zoology, Ecology, Genetics, Microbiology, Biotechnology, Biochemistry 1.4) 1.3 CHARACTERISTICS OF LIFE 1.5) 1.3.1 Organized structure, composed of cells, feed, respire, growth and development, locomotion, homeostasis, response to surrounding, adaptation to environment, excrete wastes, reproduce, evolutionary adaptation 1.6) 1.4 HIERARCHY OF BIOLOGICAL ORGANIZATION 1.7) 1.4.1 atom-molecule-cell-tissue-organ-organ system-organism-population-community-ecosystem-biosphere | |
| 2. SCIENTIFIC METHODS 2.1) 2.1 DISCOVERY BASED SCIENCE (Inductive method) 2.2) 2.2 THE HYPOTHETICO-DEDUCTIVE METHOD (Deductive method) 2.3) 2.3 EXPERIMENTAL ANALYSIS (Dependent/Independent variable) 2.4) 2.4 UNITS OF MEASUREMENT 2.5) 2.4.1 S.I. units: length (km, m, cm, mm, μm , nm), mass (kg, g, mg, μg), volume (L, mL, μL , cm^3 , mm^3), temperature ($^{\circ}\text{C}$, $^{\circ}\text{F}$) | |
| 3. CHEMICAL BONDS AND WATER 3.1) 3.1 BRIEF REVIEW ON THE STRUCTURE AND BEHAVIOUR OF ATOMS 3.2) 3.2 CHEMICAL BONDS AND MOLECULES 3.3) 3.2.1. 4.2.1 Covalent bonds, ionic bonds, hydrogen bonds, Van der Waals forces 3.4) 3.2.2 Biological importance of weak 3.5) 3.3 PROPERTIES OF WATER 3.6) 3.3.1. Structure of water molecule 3.7) 3.3.2 4.3.2 Cohesive and adhesive, high specific heat capacity, high heat of 3.8) vaporization, water expands as it freezes, versatile solvent 3.9) 3.4 AQUEOUS SOLUTIONS 3.10) 3.4.1 Solvent, solute and solution 3.11) 3.4.2 Acids, bases, pH scale, buffers and buffering mechanisms | |

4. BIOLOGICAL MOLECULES

4.1) 4.1 FUNCTIONAL GROUPS

4.2) 4.1.1 Hydroxyl, carbonyl, carboxyl, amino, sulfhydryl, phosphate

4.3) 4.2 MACROMOLECULES (BASIC PROCESSES-CONDENSATION&HYDROLYSIS)

4.4) 4.3 CARBOHYDRATES

4.5) 4.3.1 Monosaccharides, disaccharides and polysaccharides

4.6) 4.4 LIPIDS

4.7) 4.4.1 Fatty acids and glycerol,

4.8) 4.4.2 Simple lipids (steroids, prostaglandins),

4.9) 4.4.3 Complex lipids (triacylglycerol, phospholipids, sphingolipids, waxes)

4.10) 4.5 PROTEINS

4.11) 4.5.1 Amino acids, peptide formation, polypeptide chains, levels of protein structure, (primary/ secondary/ tertiary/quaternary), denaturation, renaturation

4.12) 4.6 NUCLEIC ACIDS

4.13) 4.6.1 Functions of nucleic acids, nucleotides, bases,

4.14) 4.6.2 Introduction to double helix (Watson-Crick model)

4.15) 4.6.3 Types of RNA and functions (mRNA, tRNA, rRNA)

5. PROKARYOTIC AND EUKARYOTIC CELLS

5.1) 5.1 MICROSCOPY

5.2) 5.1.1 Light microscope

5.3) 5.1.2 Electron microscopes (Transmission Electron Microscope & Scanning Electron Microscope)

5.4) 5.2 THE IMPORTANCE OF COMPARTMENTAL ORGANIZATION

5.5) 5.3 NUCLEUS

5.6) 5.3.1 Chromosomes, chromatin, nuclear envelope, nucleolus, nucleosome

5.7) 5.4 STRUCTURE AND FUNCTIONS OF ORGANELLES

5.8) 5.4.1 Ribosomes, endoplasmic reticulum (smooth, rough), golgi apparatus, lysosomes, vacuoles, peroxisomes, mitochondria, chloroplasts, the cytoskeletons: microtubules, microfilaments, intermediate filaments (centrioles, cilia, flagella)

5.9) 5.5 CELL WALLS AND CELL MEMBRANE (glycocalyx)

5.10) 5.6 UNICELLULAR AND MULTICELLULAR ORGANISMS

6. PLASMA MEMBRANE AND TRANSPORT OF MOLECULES

6.1) 6.1 PLASMA MEMBRANE MODEL

6.2) 6.1.1 'Sandwich model' (Davson & Danielli)

6.3) 6.1.2 Fluid Mosaic Model (Singer & Nicholson) – Phospholipids bilayers, integral proteins, peripheral proteins, glycoproteins, glycolipids, cholesterol, permeability of lipid bilayer

6.4) 6.1.3 Transport proteins

6.5) 6.2 TRANSPORT OF SMALL MOLECULES

6.6) 6.2.1 Passive transport (Simple diffusion, osmosis, facilitated diffusion)

6.7) 6.2.1 Active transport: Na⁺-K⁺ pump

6.8) 6.3 TRANSPORT OF LARGE MOLECULES

6.9) 6.3.1 Exocytosis

6.10) 6.3.2 Endocytosis (phagocytosis, pinocytosis)

7. TISSUES

7.1) 7.1 ANIMAL TISSUES (Epithelium tissue, Connective tissue, Muscle tissue, Nervous tissue)

7.2) 7.2 PLANT TISSUES (Meristematic, Dermal, Ground, Vascular)

| Assessment Breakdown | % |
|-----------------------|--------|
| Continuous Assessment | 70.00% |
| Final Assessment | 30.00% |

| Details of Continuous Assessment | Assessment Type | Assessment Description | % of Total Mark | CLO |
|----------------------------------|-----------------|---|-----------------|------|
| | Presentation | A recorded video/online Presentation. Students need to explain the specific topic assigned by the lecturer. Students are assessed based on their oral and written communication skills via video/online presentation. | 20% | CLO3 |
| | Test | Ongoing Online Test | 30% | CLO1 |
| | Written Report | Written laboratory report to be submitted after practical has been done. | 20% | CLO2 |

| Reading List | Recommended Text | <ul style="list-style-type: none"> • Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Jane B. Reece, Neil A. Campbell 2017, <i>Campbell Biology, Global Edition</i> [ISBN: 9781292170435] |
|--------------------|---|--|
| | Reference Book Resources | <ul style="list-style-type: none"> • Audesirk, G., Audesirk T. and Byers, B.E. 2016, <i>Biology: Life on Earth with physiology</i> [ISBN: 978013414295] • Brooker, R., Widmaier, E., Graham, L. and Stiling, P 2016, <i>Biology</i> [ISBN: 978125918812] • Alberts, B., Bray, D., Hopkin, K., Johnson, A.D., Lewis, J., Raff, M., Roberts, K., and Walter, p. 2013, <i>Essential Cell Biology</i> [ISBN: 978081534454] • Solomon, E.P., Berg, L.R., & Martin, D.W. 2015, <i>Biology</i> [ISBN: 978128542358] • Starr, C., Taggart, R., and Evers, C. 2013, <i>Biology: The Unity and Diversity of Life</i> [ISBN: 978111142569] |
| Article/Paper List | This Course does not have any article/paper resources | |
| Other References | This Course does not have any other resources | |