Biology – ATAR Year 11 Semester 2 July - November 2019

Unit 2 From single cells to multicellular organisms

| **Week** | **Key teaching points** | **Resources** | **Assessment** |
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| 1-2 | **Cells** * Cells require energy inputs, including light energy or chemical energy in complex molecules, and matter, including gases, simple nutrients and ions, and removal of wastes, to survive.
* Prokaryotic and eukaryotic cells have many features in common, which is a reflection of their common evolutionary past, but prokaryotes lack internal membrane-bound organelles, do not have a nucleus, are significantly smaller than eukaryotes, usually have a single circular chromosome, and exist as single cells.
* Eukaryotic cells carry out specific cellular functions in specialised structures and organelles.
* Biological molecules are synthesised from monomers to produce complex structures, including carbohydrates, proteins and lipids.
 | - **NB** pg. 152-182- **AS** 7, 7.1, 7.2, 7.3, 7.4, 7.5.- **PPT: Cells**- **KA** 1. Structure of a cell2. Macromolecules  | **Task 7:** Practical – cells and microscopy.  |
| 3–4 | **Cells in their environments*** The cell membrane separates the cell from its surroundings and controls the exchange of materials, including gases, nutrients and wastes, between the cell and its environment.
* The currently accepted model of the cell membrane is the fluid mosaic model
* Movement of materials across membranes occurs via

- passive processes, including diffusion, facilitated diffusion, osmosis- active processes, including active transport, endocytosis and exocytosis* Factors that affect exchange of materials across membranes include

- the surface area to volume ratio of the cell- concentration gradients- the physical and chemical nature of the materials being exchanged | **- NB** pg. 184-210**- AS** 8, 8.1, 8.2, 8.3, 8.4, 8.5.- **PPT: Cells in their environments**- **KA** 1**.** Membranes and transport. |  |
| 5–7 | **Inside cells*** Metabolism describes the sum total of the physical and chemical processes by which cell components transform matter and energy needed to sustain life.
* Biochemical processes in the cell are controlled by factors, including the nature and arrangement of internal membranes, and the presence of specific enzymes.
* Enzymes have specific functions which can be affected by factors, including temperature, pH, presence of inhibitors, concentrations of reactants and products.
* Two models that are used to explain enzyme action are the lock and key model and the induced fit model
* Photosynthesis is a biochemical process that uses light energy to synthesise organic compounds; light dependent and light independent reactions occur at different sites in the chloroplast; and make up separate parts of the overall process that can be represented as a balanced chemical equation
* The rate of photosynthesis can be affected by the availability of light and carbon dioxide, and temperature
* Cellular respiration is a biochemical process that occurs in different locations in the cytosol and mitochondria, and metabolises organic compounds, aerobically or anaerobically, to release useable energy in the form of ATP; products of anaerobic respiration vary between organisms (plants, yeast, bacteria, animals); the overall process of aerobic respiration can be represented as a balanced chemical equation
* The rate of respiration can be affected by the availability of oxygen and glucose, and temperature
 | - **NB** pg. 212-240.**- AS** 9, 9.1, 9.2, 9.3, 9.4, 9.5.- **PPT: Inside cells**- **KA** 1. Energy and enzymes2. Photosynthesis.3. Cellular respiration. | **Task 8:** Test - Cells and Metabolism. |
| 8–9 | **Cells to multicellular organisms*** Multicellular organisms have a hierarchical structural organisation of cells, tissues, organs and systems
* The specialised structure and function of tissues, organs, and systems can be related to cell differentiation and cell specialisation.
 | - **NB** pg. 242-264.**- AS** 10, 10.1, 10.2, 10.3, 10.5.- **PPT: Cells to multicellular organisms** | **Task 9:** Investigation – Shark Bay. |
| 10–13 | **Animal systems for life*** In animals, the exchange of gases between the internal and external environments of the organism is facilitated by the structure of the exchange surface(s), including spiracles, gills, alveoli and skin
* In animals, the acquisition and processing of nutrients is facilitated by the structure of the digestive system; animals may have a gastrovascular cavity with one opening or a specialised alimentary canal with two openings; specialisation of alimentary canals is related to diet, for example, herbivores and carnivores
* In animals, the transport of materials within the internal environment for exchange with cells is facilitated by the structure of open and closed circulatory systems according to the different metabolic requirements of organisms and differing environments
 | - **NB** pg. 266-296.**- AS** 11, 11.1, 11.2, 11.3, 11.4, 11.5.- **PPT: Animal systems for life** | **Task 10:** ExtendedResponse – Control of Cellular Activities. |
| 14–15 | **Plant systems for life*** in vascular plants, gases are exchanged via stomata and the plant surface and does not involve the plant transport system
* in vascular plants, transport of water and mineral nutrients from the roots occurs via xylem through root pressure, capillary action (adhesion and cohesion of water molecules), transpiration; transport of the products of photosynthesis and some mineral nutrients occurs by translocation in the phloem
* terrestrial Australian plants are adapted to minimise water loss in an arid environment
 | - **NB** pg. 298-320**- AS** 12, 12.1, 12.2, 12.3, 12.4, 12.5.- **PPT: Plant systems for life** | **Task 11:** Test- Multicellular organisms. |
| 16 | **Task 12:** Semester 2 Examination |  | **Task 12**: Exam |

**Abbreviations key**

**NB = Nelson Biology NBO = Nelson Biology Online KA = Khan Academy PPT = PowerPoint Presentation AS = Activity Sheet**