

***AEHBY – Year 11 Human Biology Learning & Assessment Program 2018***

## ***Semester 1 – Unit 1 The Functioning Human Body***

This unit explores the nervous and endocrine systems and the mechanisms that help maintain the systems of the body to function within normal range, and the body's immune responses to invading pathogens.

Term & Week	Content Focus	References & Assessments
T4 2017 Weeks 5-9 (Rollover)	<p><b>From Cells and Tissues (to be repeated in 2017)</b></p> <ul style="list-style-type: none"> <li>the human body is comprised of cells, tissues and organs within complex systems that work together to maintain life.</li> <li>the various tissues of the human body perform specific functions and can be categorised into four basic tissue types: epithelial, connective, muscular and nervous</li> </ul> <p><b>Musculoskeletal system</b></p> <ul style="list-style-type: none"> <li>the skeletal framework of the body consists of bone and cartilage which function to provide body support, protection and movement, and is facilitated by the structure and function at cell and tissue levels</li> <li>articulations of joints of the skeleton are classified according to their structure or the range of movements permitted</li> <li>osteoporosis and osteoarthritis are diseases, primarily of ageing, that cause disability. Increased understanding of the causes of these conditions leads to improved practices for management and prevention</li> <li>the muscular system is organised to maintain posture and produce movement</li> <li>movement results from the actions of paired muscles, with others acting as stabilisers, to produce the required movement</li> <li>muscle fibre contraction can be explained using the sliding filament theory</li> <li>treatment of conditions due to system or organ dysfunction has changed through improvements in early diagnosis and appropriate use of drugs, physical therapy, radiation therapy, and removal and/or replacement of affected parts.</li> </ul>	<p>Chapter 5</p> <p><b>Wk 7 &amp; 8 Task 1:</b> Science Inquiry - Chicken wing dissection.</p> <p>Chapters 11 &amp; 12</p> <p><b>Wk 9 Task 2:</b> Test - Musculoskeletal system</p>
T1 2018 Week 1 - 2          Weeks 3-4 Term 1, 2018	<p><b>Cells and tissues</b></p> <ul style="list-style-type: none"> <li>the human body is comprised of cells, tissues and organs within complex systems that work together to maintain life.</li> <li>cell organelles maintain life processes and require the input of materials and the removal of wastes to support efficient functioning of the cell</li> <li>the cell membrane separates the cell from its surroundings with a structure, described by the fluid mosaic model, which allows for the movement of materials into and out of the cell by diffusion, facilitated diffusion, osmosis, active transport and vesicular transport (endocytosis/exocytosis)</li> <li>factors affecting the exchange of materials across the cell membrane include surface area to volume ratio, concentration gradients, and the physical and chemical nature of the materials being exchanged</li> <li>the various tissues of the human body perform specific functions and can be categorised into four basic tissue types: epithelial, connective, muscular and nervous</li> </ul> <p><b>Circulatory system</b></p> <ul style="list-style-type: none"> <li>the transport of materials within the internal environment for exchange with cells is facilitated by the structure and function of the circulatory system at the cell, tissue and organ levels</li> <li>the components of blood facilitate the transport of different materials around the body (plasma and erythrocytes), play a role in the clotting of blood (platelets) and the protection of the body (leucocytes)</li> <li>the lymphatic system functions to return tissue fluid to the circulatory system and to assist in protecting the body from disease</li> <li>blood transfusions rely on determining blood groups and can be used to treat many different diseases and conditions</li> </ul>	<p>Chapters 3 &amp; 4</p> <p><b>Wk 3 &amp; 4 Task 3:</b> Science Inquiry - Heart Dissection</p> <p><b>Wk 4 Task 4:</b> Test – Cells &amp; Circulatory System.</p>

Term & Week	Content Focus	References & Assessments
Weeks 5 – 11 Term 1 2018	<p><b>Respiratory system</b></p> <ul style="list-style-type: none"> <li>the exchange of gases between the internal and external environments of the body is facilitated by the structure and function of the respiratory system at the cell, tissue and organ levels</li> <li>the efficient exchange of gases in the lungs is maintained by the actions of breathing, blood flow and the structure of the alveoli.</li> </ul> <p><b>Excretory system</b></p> <ul style="list-style-type: none"> <li>the excretory system regulates the chemical composition of body fluids by removing metabolic wastes and retaining the proper amounts of water, salts, and nutrients; components of this system include the kidneys, liver, lungs, and skin functioning at the organ level</li> <li>deamination of amino acids in the liver produces urea, which then is transported to the kidneys for removal</li> <li>the nephrons in the kidney facilitate three basic processes: filtration, reabsorption and secretion during urine formation to maintain the composition of body fluids (hormone control is not required).</li> <li>lifestyle choices, including being active or sedentary, the use of drugs and type of diet, can compromise body functioning in the short term and may have long-term consequences</li> </ul> <p><b>Digestive system</b></p> <ul style="list-style-type: none"> <li>the supply of nutrients in a form that can be used in cells is facilitated by the structure and function of the digestive system at the cell, tissue and organ levels</li> <li>digestion involves the breakdown of large molecules to smaller ones by mechanical digestion (teeth, bile and peristalsis) and chemical digestion (by enzymes with distinctive operating conditions and functions that are located in different sections of the digestive system)</li> <li>the salivary glands, pancreas, liver and gall bladder produce or store secretions which aid the processes of digestion</li> <li>absorption requires nutrients to be in a form that can cross cell membranes into the blood or lymph and occurs at different locations, including the small intestine and large intestine</li> <li>elimination removes undigested materials and some metabolic wastes from the body.</li> </ul>	<p><b>Wk 6</b> Homework: Lung capacity &amp; Respiratory Diseases</p> <p><b>Wk 8 Task 5:</b> Science Enquiry - Water balance exercise.</p> <p><b>Wk 9:</b> Prac lesson – Stomach acid</p> <p><b>Wk 11 Task 6:</b> Test - Respiratory, Digestive and Excretory Systems</p>
Term 2 weeks 1- 3 (prior to exams).	<p><b>Metabolism</b></p> <ul style="list-style-type: none"> <li>biochemical processes, including anabolic and catabolic reactions in the cell, are controlled in the presence of specific enzymes</li> <li>cellular respiration occurs, in different locations in the cytosol and mitochondria, to catabolise organic compounds, aerobically or anaerobically, to release energy in the form of adenosine triphosphate (ATP)</li> <li>for efficient metabolism, cells require oxygen and nutrients, including carbohydrates, proteins, lipids, vitamins and minerals</li> <li>enzyme function can be affected by factors including pH, temperature, presence of inhibitors, co-enzymes and co-factors, and the concentration of reactants and products</li> </ul>	<p><b>Wk 2 Task 7:</b> Science Inquiry - Metabolism, Enzymes and Soybeans.</p>
Term 2 week 3	<p><b>Semester 1 Exam Revision</b></p>	<p><b>Wks 4 &amp; 5 Task 8:</b> Semester 1 Exam</p>

## Semester 2 Program: Unit 2 – Reproduction and Inheritance

Week & Content	Content Focus	References & Assessments
T2 2018 Weeks 6 - 9 DNA and Cell reproduction. and possibly weeks 1 and 2 of term 3.	<p><b>DNA</b></p> <ul style="list-style-type: none"> <li>DNA occurs bound to proteins in chromosomes in the nucleus and as unbound DNA in the mitochondria</li> <li>DNA stores the information for the production of proteins that determines the structure and function of cells</li> <li>the structural properties of the helical DNA molecule, including double-stranded, nucleotide composition and weak bonds involved in base pairing between the complementary strands, allow for its replication</li> <li>protein synthesis involves the transcription of a gene on DNA into messenger ribonucleic acid (RNA) in the nucleus, and translation into an amino acid sequence at the ribosome with the aid of transfer RNA</li> <li>epigenetics is the study of phenotypic expression of genes, which depends on the factors controlling transcription and translation during protein synthesis, the products of other genes, and the environment</li> </ul> <p><b>Science as a Human Endeavour</b></p> <ul style="list-style-type: none"> <li>discoveries made through the use of modern biotechnological techniques have increased understanding of DNA and gene expression.</li> <li>the use of genetic profiling and genetic screening of adults and embryos have implicit ethical considerations</li> </ul> <p><b>Cell reproduction</b></p> <ul style="list-style-type: none"> <li>mitosis forms part of the cell cycle producing new cells with the same genetic content</li> <li>the sequence of DNA replication, chromosome duplication and chromosome separation are important processes in the production of identical daughter cells by mitosis for growth, repair and replacement of tissues within the body</li> <li>stem cells have the ability to divide by mitosis and differentiate into many different tissues, depending on the level of cell potency</li> <li>uncontrolled division of cells can result in the development of tumours/cancers</li> <li>meiosis produces gametes for reproduction and involves DNA replication, chromosome pairing, and two successive nuclear divisions distributing haploid sets of chromosomes to each gamete</li> <li>crossing over, non-disjunction and random assortment of chromosomes during meiosis will produce gametes with different genetic content</li> <li>differences between mitosis and meiosis reflect their roles in the body</li> <li>variations in the genotypes of offspring, including gender, arise as a result of the processes of meiosis and fertilisation</li> </ul>	<p><b>Wk 7&amp;8 Task 9:</b> Ext. Resp. – Cancer and Stem Cells</p> <p><b>Wk 9 Task 10:</b> Test - Cell reproduction and DNA.</p>
T3 2018 Weeks 2-6	<p><b>Types of inheritance</b></p> <ul style="list-style-type: none"> <li>probable frequencies of genotype and phenotype of offspring can be predicted using Punnett squares and by taking into consideration patterns of inheritance, including the effects of dominance, co-dominance, autosomal or sex-linked alleles, and multiple alleles: Huntington's disease, phenylketonuria (PKU), ABO blood groups, red-green colour blindness/haemophilia show different inheritance patterns</li> <li>pedigree charts can be constructed for families with a particular genetic disorder and can be used to reveal patterns of inheritance and assist in determining the probability of inheriting the condition in future generations</li> <li>DNA profiling identifies the unique genetic make-up of individuals and can be used in determining parentage</li> </ul> <p><b>Science as a Human Endeavour</b> Discoveries made through the use of modern biotechnological techniques have increased understanding of DNA and gene expression.</p>	<p><b>Wk 5 – Task 11:</b> Ext Response - In class genetics problem solving activity</p>

<p>T3 2018 Weeks 7 – 10 and Week 1 Term 4</p>	<p><b>Human Reproduction</b></p> <ul style="list-style-type: none"> <li>the production of offspring is facilitated by the structure and function of the male and female reproductive systems in producing and delivering gametes for fertilisation and providing for the developing embryo and fetus</li> <li>both male and female reproductive systems are regulated by hormones, including the regulation of the menstrual and ovarian cycles</li> <li>human gametes are produced through spermatogenesis and oogenesis, which are specific forms of meiosis, but varying significantly in process and products</li> <li>for the establishment of a pregnancy, conception requires the union of viable sperm and ovum at the optimal time in the ovarian cycle</li> <li>the development of the embryo after implantation involves the differentiation of cells into three different germ layers that will eventually produce specific systems in the body and the placenta</li> <li>the stages of labour include birth, during which there are circulatory system changes in the child</li> <li>contraception methods that reduce the probability of the union of gametes or implantation all have limitations, risks and benefits, and include methods that: <ul style="list-style-type: none"> <li>use steroid hormones</li> <li>use physical barriers between gametes</li> <li>use chemical spermicides</li> <li>use sterilisation (tubal ligation, vasectomy)</li> <li>function after coitus (emergency contraceptive pill and intrauterine devices [IUDs]).</li> </ul> </li> <li>Sexually transmitted infections (STIs), diseases transmitted through unprotected sex or genital contact, can be prevented through safe sex methods; early detection and treatment of infection are important and, if left untreated, STIs can lead to serious health consequences</li> <li>there are a variety of assisted reproductive technologies to help overcome infertility problems, but each has its limitations, risks and benefits</li> <li>there are a range of techniques available to genetically screen embryos before implantation or during early development, including blood tests, amniocentesis and chorionic villi sampling</li> </ul> <p><b>Science as Human Endeavour</b></p> <p>New technologies, including Pap smear, breast screening and blood tests for prostate cancer, have made early detection of cancers possible</p> <ul style="list-style-type: none"> <li>greater understanding of the menstrual cycle, conception and implantation has produced improved methods of the establishment of a pregnancy, along with advancements in contraceptive methods; both have ethical considerations</li> <li>lifestyle choices, including diet, illicit drugs, alcohol and nicotine, may affect foetal development.</li> </ul>	<p><b>Wks 7 &amp; 8 Task 12:</b> Ext. Resp. – Assisted Reproduction Technology</p> <p><b>Wk 1 Term 4 Task 13:</b> Test - Human Reproduction.</p>
<p>T4 2018 Week 3 - 4</p>	<p><b>Year 11 Semester 2 Exams</b></p>	<p><b>Wks 3 &amp; 4 Task 14:</b> Sem 2 Exam</p>

## Assessment Outline:

Timing	Topic	Assessment item	Assessment Weighting
Rollover 2017	Cells and Tissues (Brief introduction. This section to be revisited later in the course.) Musculoskeletal System	<i>Wk 7/8 Task 1: Science Inquiry - Chicken wing dissection.</i> <i>Wk 9 Task 2: Test - Musculoskeletal system</i>	5% 5%
Term 1 2018 Week 1-4	Cells and tissues. Circulatory System	<i>Wk 3/4 Task 3: Science Inquiry - Heart Dissection</i> <i>Wk 4 Task 4: Test –Cells &amp; Circulatory System.</i>	5% 5%
Term 1 2018 Weeks 5-11	Respiratory, Digestive & Excretory Systems.	<i>Wk 7/8 Task 5: Science Inquiry - Water balance exercise.</i> <i>Wk 10 Task 6: Test - Respiratory, Digestive and Excretory Systems</i>	5% 5%
Term 2 2018 Weeks 1-3	Metabolism Revision	<i>Wk 3 Task 7: Science Inquiry - Metabolism, Enzymes and Soybeans.</i>	5%
T2 2018 Weeks 4-5	Semester 1 exam covers all work in Unit 1	<i>Wk 5 Task 8: Semester 1 Exam</i>	20%
T2 2018 Weeks 6/7-10 Weeks 1/2 Term 3	Cell reproduction and DNA	<i>Wk 6/7 Task 9: Ext. Response - Cancer &amp; Stem Cells.</i> <i>Wk 10 Task 10: Test - Cell reproduction and DNA.</i>	5% 5%
Term 3 Weeks 3-6	Genetics and Inheritance	<i>Wk 5/6 Task 11: Ext. Response – Genetics problem solving</i>	5%
Term 3 Weeks 5-10	Human Reproduction	<i>Wks 8 &amp; 9 Task 12: Ext. Response – Assisted Reproductive Technology</i>	5%
Term 4	Complete all work and revision for Semester 2 exam  Semester 2 exam covers Units 1 & 2	<i>Wk 10 Task 13: Test - Human Reproduction.</i> <i>Wk 3/4 Task 14: Sem 2 Exam based on both Units 1 and 2.</i>	5% 20%

**\*\*\*Please Note – assessment outline may change during the course of the year\*\*\***