



COURSE OUTLINE
HUMAN BIOLOGY – GENERAL YEAR 11: 2021
UNIT 1 AND UNIT 2



UNIT 1				
Term	Week	Topic and key teaching points	Syllabus content	Assessment
1	1-2	Science inquiry skills: Investigation/experimental techniques	<ul style="list-style-type: none"> identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes design investigations, including the procedure(s) to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including animal ethics conduct investigations, including monitoring body functions; use microscopy techniques; and perform real or virtual dissection, safely, competently and methodically for the collection of valid and reliable data represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments select, construct and use appropriate representations, including labelled diagrams and images of various cells, tissues and organ systems, to communicate conceptual understanding, solve problems and make predictions communicate to specific audiences, and for specific purposes, using appropriate language, nomenclature, genres and modes, including scientific reports 	Task 1: Scientific Inquiry Skills
1	2-5	Characteristics of life: <ul style="list-style-type: none"> - Life processes - Cell theory - Cell membrane - Structure and function of cell components, including nucleus, mitochondria, ribosomes, lysosomes and cytoplasm Aerobic and anaerobic respiration Active, passive transport. Diffusion.	<ul style="list-style-type: none"> all living things carry out the life processes of respiration, feeding (including digestion and absorption) excretion, movement, reproduction, responding to stimuli and growth the cell theory states that all cells arise from other living cells cells are separated from their surroundings by the cell membrane, which controls the movement of materials into and out of the cell by: passive processes, including diffusion and osmosis; active processes, including active transport, endocytosis body cells contain specialised structures with specific functions, including nucleus, mitochondria, ribosomes, lysosomes and cytoplasm cellular respiration occurs at different locations within the cell to breakdown compounds aerobically or anaerobically to release useable energy for the cell 	

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1	5-7	<p>Body organisation:</p> <ul style="list-style-type: none"> - Hierarchical structural organization – cells, tissues, organs and systems <p>Respiratory system:</p> <ul style="list-style-type: none"> - Structure and function of the respiratory system - Characteristics for efficient gas exchange - Mechanics of breathing <p>Diseases of the respiratory system</p>	<ul style="list-style-type: none"> • the body has a hierarchical structural organisation of cells, tissues, organs and systems; the functions of the systems are related to life processes • the respiratory system is structured to facilitate the exchange of gases between the external environment and the blood • to be efficient, gas exchange surfaces have to have the following characteristics: large surface area, thin, moist, vascular • the mechanics of breathing help to maintain the efficient exchange of gases in the lungs • the function of the respiratory system can be compromised by diseases and conditions that reduce the efficiency of gas exchange. 	Task 2: Effect of exercise investigation
1	8-9	<p>Circulatory system:</p> <ul style="list-style-type: none"> - Structure and function of the circulatory system - Structure of the heart - Science inquiry skills: heart dissection - Components of blood and their function - Diseases of the circulatory system 	<ul style="list-style-type: none"> • the circulatory system is structured to facilitate the transport of materials to and from exchange surfaces, including the lungs, digestive system and kidneys, and the cells of the body • the structure of the heart facilitates the efficient flow of blood around the body • the blood vessels of the circulatory system have specialised structures that provide for efficient distribution and collection of blood around the body • the blood is made up of plasma and several types of blood cells, each with particular functions that aid in the: transport of materials, including oxygen, nutrients and waste, and defence against pathogens • the function of the circulatory system can be compromised by cardiovascular diseases that reduce the efficiency of transport of materials around the body 	Task 3: Heart dissection practical Task 4: Respiratory & Circulatory systems test
2	1-2	<p>Digestive system: Structure and function of the digestive system</p> <ul style="list-style-type: none"> - Mechanical and chemical digestion - Elimination of wastes <p>Diseases of the digestive system</p>	<ul style="list-style-type: none"> • the structure of the digestive system facilitates the breakdown of food to compounds that can be readily absorbed into the blood for use in the cells • mechanical digestion, including the teeth and peristalsis, is required to reduce the size of food pieces and to increase the surface area on which chemical digestion can act • chemical digestion involves the use of enzymes (amylase, protease and lipase) to chemically break down food for absorption • materials eliminated from the digestive system include indigestible contents, excess materials and some metabolic wastes • the function of the digestive system can be compromised by diseases and conditions that reduce the efficiency of digestion or absorption of food. 	Task 5: Digestive disorders

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2	3	<p>Nutrition and diet:</p> <ul style="list-style-type: none"> - Healthy diet - Malnutrition - Nutrient groups and their uses in the body <p>Food testing</p>	<ul style="list-style-type: none"> • a healthy diet contains the right balance of foods to provide the correct amount of energy and materials for cellular function; malnutrition occurs if a diet is not balanced and this may lead to a person being overweight or underweight • the uses of the main nutrient groups required in a healthy diet are: <ul style="list-style-type: none"> ▪ carbohydrates: used as an energy source, for storage and for fibre/roughage ▪ proteins: used for growth and repair of tissues and as components of cell structures, hormones and enzymes ▪ fats (lipids): used in the formation of cell membranes, as an energy source and a storage material, ▪ vitamins and minerals, including calcium and iron, used in many various roles ▪ water, the main solvent in the body, which also has many other uses in the body 	
2	6-7	<p>Urinary system:</p> <ul style="list-style-type: none"> - Structure and function of the urinary system - Water balance - Dysfunctions of the kidneys and diseases of the urinary system 	<ul style="list-style-type: none"> • the urinary system facilitates the removal of toxic nitrogenous wastes and excess water from the blood • the urinary system works with other systems and organs, including the digestive system, the skin and lungs, to maintain the correct water balance within the body • dysfunction of the kidneys may result in death due to accumulation of toxic substances in the blood; treatment using dialysis machines or kidney transplants help to preserve life 	Task 6: Digestive & Urinary systems test

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2	8	<p>Genetic material: DNA structure and function Genes and alleles</p>	<ul style="list-style-type: none"> DNA is the genetic material that carries the code for characteristics from one generation to the next and controls the functioning of cells chromosomes are made up of large molecules of DNA; a small section of DNA is called a gene which can have different forms that are named alleles 	
2	9-11	<p>Cell division:</p> <ul style="list-style-type: none"> Mitosis (including sequence of events & characteristics of daughter cells) Meiosis (including sequence of events & characteristics of daughter cells) <p>Difference between mitosis and meiosis</p>	<ul style="list-style-type: none"> the sequence of events in mitosis ensures that each daughter cell receives a complete set (2N) of chromosomes from the parent cells the sequence of events in meiosis produces daughter cells (gametes) with half the number of chromosomes (N) that may be genetically different from each other 	<p>Task 7: DNA Inheritance Model Task 8: DNA, Mitosis & Meiosis Test</p>
3	1-4	<p>Gamete formation:</p> <ul style="list-style-type: none"> Sperm and ova <p>Female reproductive system with labelled diagram:</p> <ul style="list-style-type: none"> Structure & function: Uterus, fallopian tubes, ovary, ovum, endometrium, vagina, cervix. Ova structure and function and ovulation. <p>The ovarian/menstrual cycle and hormones</p> <p>Male Reproductive System with labelled diagram:</p> <ul style="list-style-type: none"> Structure and function of testes Structure and function of accessory glands 	<ul style="list-style-type: none"> the structure and function of the male and female reproductive systems facilitate the production and delivery of gametes to increase the chances of fertilisation occurring; females have additional structures that support the development of the unborn baby gamete formation is a continuous process in males, whereas females have ovarian and menstrual cycles to develop and deliver a single, viable ovum ready for fertilisation the menstrual and ovarian cycles are coordinated by hormones, including follicle stimulating hormone (FSH), oestrogen, progesterone and luteinising hormone (LH) 	<p>Task 9: Reproductive structures & Menstrual Cycle Test</p>
3	5-8	<p>Pregnancy:</p> <ul style="list-style-type: none"> Purpose of fertilisation Implantation and placenta formation Sequence of zygote, embryonic & foetal development Monitoring foetal development using ultrasound and other technologies <p>Effect of environmental factors on mother and baby – diet, smoking, alcohol and drugs</p>	<ul style="list-style-type: none"> fertilisation restores the 2N number of chromosomes by combining gametes, producing an embryo with genes from both parents pregnancy will be established only if implantation occurs and the placenta is formed and maintained there is a known and predictable sequence of development from the zygote through embryonic stages to foetal development which can be monitored, including the use of ultrasound technology to determine the health of the baby both the mother and foetus are affected by environmental factors; maternal lifestyle choices will affect foetal development and ongoing health of the baby 	<p>Task 10: Virtual Rat reproductive system dissection Task 11: Alcohol & smoking during pregnancy</p>



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3	9-10	<p>Pregnancy:</p> <ul style="list-style-type: none"> - Sequence of events involved during birth for mother and baby - Complications during birth <p>Infant development - milestones</p>	<ul style="list-style-type: none"> • the sequence of events in the birth process prepare the offspring and mother for delivery; complications can arise due to the positioning of the placenta and umbilical cord • infant development proceeds in a known sequence with specific patterns and milestones that can be used to monitor the health of the baby 	
4	1-2	<p>Reproductive technologies:</p> <ul style="list-style-type: none"> - Contraceptive methods - Infertility treatments – IVF, GIFT, ZIFT and FET <p>Parental, foetal and embryonic testing for disorders</p>	<ul style="list-style-type: none"> • contraception methods include the use of hormones to control the menstrual and ovarian cycles, and ways of preventing fertilisation or implantation • infertility treatments use assisted reproductive technologies, including in vitro fertilisation-embryo transfer (IVF-ET), gamete intra-fallopian transfer (GIFT), zygote intra-fallopian transfer (ZIFT), and frozen embryo transfer (FET) which involve the manipulation of reproductive hormones • parental, embryonic and foetal testing can be done to detect a range of conditions that will affect fertility and detect anomalies in foetal development and genetic content 	Task 12: Reproductive technologies
4	3-4	<p>Sexually transmitted diseases:</p> <ul style="list-style-type: none"> - Transmission - Causes - Symptoms <p>Treatment</p>	<ul style="list-style-type: none"> • STIs are transmitted via sexual contact or contact with infected body fluids • STIs can be caused by bacteria, viruses, fungi or parasites, with each having specific symptoms that may not be apparent for some time after infection • not all STIs are curable and many are notifiable diseases 	Task 13: Pregnancy and STI Test