| | Year 12 Biology Curriculum Plan | | | | | |
|---------------------------------|--|---|---|---|----------------|---|
| Unit | Ca | ore | Hint | erland | NC Coverage | Assessment |
| | Knowledge | Skills | Knowledge | Skills | | |
| Section 1: Biological Molecules | 1- Biological Molecules • 1.1 Introduction to Biological Molecules • 1.2 Carbohydrates – monosaccharides • 1.3 Carbohydrates – Disaccharides • 1.3 Carbohydrates – Disaccharides • 1.3 Carbohydrates – Disaccharides • 1.3 Carbohydrates – Disaccharides • 1.4 Starch, Glycogen, Cellulose • 1.4 Starch, Glycogen, Cellulose • 1.5 Lipids • 1.6 Proteins • 1.7 Enzymes • 1.8 Factors Affecting Enzyme Action • 1.9 Enzyme Inhibition 2- Nucleic Acids • 2.1 Structure of RNA and DNA • 2.2 DNA Replication • 2.3 Energy and ATP • 2.4 Water and Inorganic Ions | Students use, and interpret the results of, qualitative tests for reducing sugars, non-reducing sugars and starch. Students use chromatography, with known standard solutions, to separate a mixture of monosaccharides and identify their components. Students produce a dilution series of glucose solution and use colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown solution. Students use, and interpret the results of, the emulsion test for lipids. Students use, and interpret the results of, a biuret test for proteins. Students use, and interpret the results of, a biuret test for proteins. Students use chromatography with known standard solutions, to separate a mixture of amino acids and identify their components. Students identify the variables that must be controlled in their investigation into rate of reaction. Students select an appropriate format for the graphical presentation of the results of their investigation into the rate of enzyme-controlled reactions. Students use a tangent to find the initial rate of an enzyme-controlled reaction. | What is lactose intolerance and why does it make me ill? Investigate what other energy carrying molecules there are in the body other than ATP How did they map 3 Billion bases in the genome? What is the significance of this? The upside down floating boat – how is this possible? | Conducting research and collating relevant information. · Innovative concept creation and consideration and scrutiny of current practices and methods. | 3.1.1 to 3.1.4 | PLC/End of topic assessment PR point assessments |
| Section 2: Cells | 3 - Cell structure 3.1 Methods of studying cells 3.2 Electron microscope 3.3 Microscopic measurements 3.4 Eukaryotic cell 3.5 Cell specialisation 3.6 Prokaryotic cells and viruses 3.7 Mitosis 3.8 Cell cycle | Students could use iodine in potassium iodide solution to identify starch grains in plant cells. Calculation of a mitotic index. Students determine the water potential of plant | Can we use microscopes do view cells at the atomic level? | Conducting research and collating relevant information. Innovative concept creation and consideration and scrutiny of current practices and methods. | 3.2.1 to 3.2.2 | PLC/End of topic assessment PR point assessments |

| | Whole Education Opportunities |
|---------|---|
| • | SMSC – Should artificial sweetener (aspartame) be banned? You decide Career – Oncology dietician Career - gastroenterologist RSHE – Cholesterol. What is it? Is it all bad? (HDL vs LDL) |
| • • • • | SMSC – Is it ethical to have a nation DNA database? You decide Career - Geneticists Career – Hydrologist RSHE – We can test your DNA to find your true love. ART – How does the double helix structure of DNA compare to other structures on earth with a similar shape |
| • | Hinterland - Maths – using mathematical skills when calculating the magnification of and mitotic index of cells; How can Quantum microscopes change our perception of cells SMSC – Stem cells possibilities – Why do scientists want to use stem cells? What are potential issues related with stem cells research? Career – Microbiologist Career - Pharmacologist |

| | 4.1 Structure of cell surface membrane 4.2 Diffusion 4.3 Osmosis 4.4 Active transport 4.5 Co-transport of glucose | tissues using the intercept of a graph of, eg, water potential of solution against gain/loss of mass. | Can we control aging In humans if we can control the cell cycle? | | | | Hinterland – How c prevents serious di SMSC – Slugs and s allotment, but is l e beer? Career - Researche Career – Gastroent RSHE – How can M lives and relationsh |
|--|---|---|---|---|----------------|---|---|
| | <u>5 - Cell recognition and the</u> <u>immune system</u> 5.1 Defence mechanisms 5.2 Phagocytosis 5.3 T lymphocytes and cell mediated immunity 5.4 B lymphocytes and humoral immunity 5.5 Antibodies 5.6 Vaccination 5.7 HIV | | Investigate the methods used to help discover a vaccine of the Covid-19 virus. | | 3.2.4 | | Hinterland – Can ca Immunotherapy? SMSC – Vaccine Eq Career - Immunolog Career – Allergolog RSHE – How can yo autoimmune diseas |
| Section 3: Organisms exchange substances with their environment | <u>6 - Exchange</u> 6.1 Exchange between organisms and their environment 6.2 Gas exchange in single-celled organisms and insects 6.3 Gas exchange in fish 6.4 Gas exchange in leaf 6.5 Limiting water loss 6.6 Structure of human gas exchange 6.7 Mechanism of breathing 6.8 Exchange of gases in lungs 6.9 Enzymes and digestion 6.10 Absorption of products of digestion | students use agar blocks containing indicator to determine the effect of surface area to volume ratio and concentration gradient on the diffusion of an acid or alkali. Students dissect mammalian lungs, the gas exchange system of a bony fish or of an insect. Students use an optical microscope to: examine prepared mounts of gas exchange surfaces of a mammal, fish and insect, or temporary mounts of gills examine vertical sections through a dicotyledonous leaf. | Which species on earth has the most efficient gas exchange system | Conducting research and collating relevant information. Innovative concept creation and consideration and scrutiny of current practices and methods. | 3.3.1 to 3.3.3 | PLC/End of topic assessment PR point assessments | Hinterland – Effect: SMSC – Pollution ir how developed cou air pollution Career – Respirator Career – Pulmonok RSHE – How can yo Obstructive Pulmon |
| | 7- Mass transport 7.1 Haemoglobin 7.2 Transport of oxygen by haemoglobin 7.3 Circulatory system of a mammal 7.4 Structure of the heart 7.5 Cardiac cycle 7.6 Blood vessels 7.7 Transport of water in xylem 7.8 Transport of organic molecules 7.9 Investigating transport in plants | Students use three-way taps, manometers and simple respirometers to measure volumes of air involved in gas exchange. Students given values of pulmonary ventilation rate (PVR) and one other measure, requiring them to change the subject of the equation: | Investigate the different of artificial human hearts Investigate oxygen dissociation curves in different species of animal | | 3.3.4 | | Hinterland – Genet developed with hun Advantages and dis SMSC – Blood Tran How to treat patier Career – Cardiovase Career – Cardiologi RSHE – How can yo disease? |
| Section 4: Genetic information, variation and relationships between organisms | Chapter 8: DNA, Genes and Polypeptide Synthesis • 8.1 Genes and the Triplet Code • 8.2 DNA and Chromosomes | Students could examine meiosis in prepared slides of suitable plant or animal tissue. | The science behind growth hormone and its influence over polypeptide synthesis. | Conducting research and collating relevant information. Innovative concept creation and consideration and scrutiny of current practices and methods. | 3.4.1 to 3.4.2 | PLC/End of topic assessment PR point assessments | SMSC - The D ability to "fix" threat to thos biologically in Career - Forew within) |

| | | Hinte preve SMSC allotr beer? Caree Caree RSHE lives a | rland – How can tiny proteins in cell membrane ints serious disease. – Slugs and snails can be a plague in a garden or nent, but is I ethical to kill them with salt or er - Researchers/ Investigators er – Gastroenterologist – How can Malabsorption disease impact in our and relationships |
|-----------------------|--|---|--|
| | | Hinte Immu SMSC Caree Caree RSHE autoi | rland – Can cancer be cured with inotherapy? :- Vaccine Equity ir - Immunologist ir – Allergology – How can you live a normal life with an mmune disease |
| PLC/ asse PR | /End of topic ssment point assessments | Hinte SMSC how a air pc Caree Caree RSHE Obstr | rland – Effects of air pollution in lungs – Pollution in poor, developing countries and developed countries help to fight inequalities in llution er – Respiratory Therapist er – Pulmonologist – How can you live a normal life with a Chronic uctive Pulmonary Disease (COPD)? |
| | | Hinte devel Adva SMSC How Caree Caree RSHE disea | rland – Genetic Modified pigs are being oped with human like organs for transplants. ntages and disadvantages :– Blood Transfusions and when is it needed; to treat patients that refuse blood transfusions er – Cardiovascular Technologist er – Cardiologist – How can you live a normal life with sickle cell se? |
| PLC/ asse PR p | 'End of topic ssment point assessments | • | SMSC - The Dark Side of CRISPR. Its potential ability to "fix" people at the genetic level is a threat to those who are judged by society to be biologically inferior. Career - Forensic Science (and the many fields within) |

| • • • • • • • • • • | 8.3 The Structure of RNA 8.4 Protein synthesis – Transcription & Splicing 8.5 Protein Synthesis – Translation 2: Genetic Diversity 9.1 Mutations 9.2 Meiosis and Genetic Variation 9.3 Genetic Diversity and Adaptation 9.4 Types of Selection | Students use a logarithmic scale when dealing with data relating to large numbers of bacteria in a culture. | 4 beneficial evolutionary mutations that are taking place right now. | 3.4.3 to 3.4.4 | |
|--|--|---|--|----------------|--|
| Chapter 10 • • • • • | 10: Biodiversity 10.1 Species and Taxonomy 10.2 Diversity within a Community 10.3 Species Diversity and Human Activity 10.4 Investigating Diversity 10.5 Quantitative Investigations of Variation | Students given data from which to calculate an index of diversity and interpret the significance of the calculated value of the index. design appropriate methods to ensure random sampling carry out random samples to investigate the effect of position on the growth of leaves. | Discover what new species were discovered over the last twelve months | 3.4.5 to 3.4.7 | |

| • | RSHE - DNA damage, repair, and disease |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| • | SMSC – Are humans exerting selection pressure |
| | unfairly on other organisms. |
| | |
| • | SMSC – Lets take this gene out, its inferior. The |
| | arguments in genetic screening. |
| | |
| • | Career – Genomics (Cancer Biology) |
| | Career – Genomics (antihacterial resistance) |
| | career denomics (antibacterial resistance) |
| • | RSHE – Top 5 most unusual mating rituals. Why |
| | is it so significant? |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| • | SMSC – The battle for the soul of biodiversity. |
| | Career - Taxonomist |
| | career - Taxonomist |
| • | Career - Taxidermy |
| | DCHE What door Piodiversity mean to health? |
| • | KSITE – What does blouwersity mean to health: |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |