

## Subject Curriculum Overview for Academic Year 2022/2023

Subject: A Level Biology		Subject Leader: Abigail Harker	Year Group: 12	AUTUMN TERM
Topic	Key Learning Points		Key Vocabulary	Assessments
<b>Biology skills</b>	<p><i>End Point: To understand the mathematical skills needed in biology</i></p> <ul style="list-style-type: none"> <li>Understand how graphs and tables can be drawn and analysed</li> <li>Calculate mean, percentage change and standard deviation</li> <li>Understand and convert numbers into different units</li> </ul>		<ul style="list-style-type: none"> <li>Mean</li> <li>Standard deviation</li> <li>Standard form</li> </ul>	<p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>Year 12 students have test weeks in late October, mid-December and late February.</li> <li>They also have internal Summative Exams in late June of Y12.</li> </ul> <p><b>Homework and Independent study:</b></p> <ul style="list-style-type: none"> <li>Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions.</li> <li>Students complete write up and discussion of practical work in their lab book.</li> </ul>
<b>Classification and evolution</b>	<p><i>End Point: To understand classification of organisms, the process of evolution and the impact humans have on this including how this can be evaluated using statistical tests.</i></p> <ul style="list-style-type: none"> <li>Describe how and why we classify and name organisms using the taxonomic hierarchy</li> <li>Describe the classification of organisms into the kingdoms and why organisms from different taxonomic groups may show similar anatomical features</li> <li>Understand the different types of variation</li> <li>Explain the process of evolution due natural selection and how it was developed by Darwin and Wallace including the evidence they had available</li> <li>Understand and use different statistical tests</li> </ul>		<ul style="list-style-type: none"> <li>Kingdoms</li> <li>Domains</li> <li>Student – t test</li> <li>Spearman's rank</li> <li>Natural selection</li> <li>Evolution</li> <li>Variation</li> </ul>	
<b>Biological molecules</b>	<p><i>End Point: To understand the structure, roles and chemical tests for water, proteins, lipids and carbohydrates and how they relate to life.</i></p> <ul style="list-style-type: none"> <li>Understand the structures, functions and bonding of key biological molecules</li> <li>Know how to draw simple biological molecules such as lipids, sugars and amino acids</li> <li>Understand, carry out and interpret results for chemical tests of biological compounds including chromatography and qualitative and quantitative chemical testing</li> </ul>		<ul style="list-style-type: none"> <li>Protein</li> <li>Carbohydrate</li> <li>Triglyceride</li> <li>Condensation reaction</li> <li>Chromatography</li> </ul>	
<b>Enzymes</b>	<p><i>End Point: To understand the structure and function of enzymes including how they work and the factors that affect them.</i></p> <ul style="list-style-type: none"> <li>Explain what enzymes are and how they work including the different mechanisms of enzyme action</li> <li>Explain and investigate how and why factors impact different impact enzyme activity</li> <li>Describe the effect of different inhibitors, cofactors and coenzymes on enzyme-controlled reactions</li> </ul>		<ul style="list-style-type: none"> <li>Catalyse</li> <li>Activation energy</li> <li>Induced fit</li> <li>Lock and key</li> <li>Denature</li> <li>Optimum</li> </ul>	
<b>Biological membranes</b>	<p><i>End Point: To understand the roles and structure of biological membranes and the processes that allow movement of biological molecules over them.</i></p> <ul style="list-style-type: none"> <li>Describe the fluid mosaic model of membrane structure and the role of membranes within cells and at the cell surface</li> <li>Describe the different methods by which molecules move over membranes</li> <li>Explain and investigate how and why different factors effect membrane permeability and the movement of substances over membranes</li> </ul>		<ul style="list-style-type: none"> <li>Fluid mosaic model</li> <li>Diffusion</li> <li>Active transport</li> <li>Osmosis</li> <li>Water potential</li> <li>Concentration</li> </ul>	

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Nucleic acids	<p><i>End Point: To understand the nature of DNA, how it is replicated and how it is used to produce proteins</i></p> <ul style="list-style-type: none"> <li>Understand the structure and nature of DNA including the structure of its nucleotides</li> <li>Explain the process of DNA replication</li> <li>Describe the process of Transcription and Translation in the production of proteins</li> </ul>		<ul style="list-style-type: none"> <li>Nucleotides</li> <li>Translation</li> <li>Transcription</li> <li>RNA polymerase</li> <li>Ribosomes</li> </ul>	<p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>Year 12 students have test weeks in late October, mid-December and late February.</li> <li>They also have internal Summative Exams in late June of Y12.</li> </ul> <p><b>Homework and Independent study:</b></p> <ul style="list-style-type: none"> <li>Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions.</li> <li>Students complete write up and discussion of practical work in their lab book.</li> </ul>
Cell structure	<p><i>End Point: To understand the intracellular structure of eukaryotic and prokaryotic cells and how they can be viewed using a microscope</i></p> <ul style="list-style-type: none"> <li>Explain the structure and roles of subcellular structures within eukaryotic cells</li> <li>Explain how to prepare and view different cell types under a microscope</li> <li>Compare different types of microscopes</li> <li>Explain the structure and roles of subcellular structures within prokaryotic cells</li> </ul>		<ul style="list-style-type: none"> <li>Prokaryotic</li> <li>Eukaryotic</li> <li>Golgi apparatus</li> <li>Smooth ER</li> <li>Rough ER</li> <li>Vesicles</li> </ul>	
Cell division	<p><i>End Point: To understand the cell cycles including the processes or mitosis and meiosis. To understand the roles of specialised and unspecialised cells in the body and medicine</i></p> <ul style="list-style-type: none"> <li>Describe the how living organisms are organised in terms of cells</li> <li>Describe the cell cycle including the process of mitosis</li> <li>Describe the process and role of meiosis in reproduction</li> <li>Understand the role of different specialised cells in organisms</li> <li>Understand the role of stem cells in organisms and in medical research</li> </ul>		<ul style="list-style-type: none"> <li>Cell Cycle</li> <li>Mitosis</li> <li>Chromosomes</li> <li>Chromatids</li> <li>Centromeres</li> <li>Stem cells</li> <li>Specialised cells</li> </ul>	
Exchange surfaces	<p><i>End Point: To understand ventilation and gas exchange systems in mammals, bony fish and insects as examples of the properties and functions of exchange surfaces in animals.</i></p> <ul style="list-style-type: none"> <li>Calculate and compare SA:Vol for different organisms.</li> <li>Understand the need for specialised exchange surfaces in multicellular organisms.</li> <li>Describe the general features of specialised exchange surfaces.</li> <li>Describe the mechanism of ventilation in mammals.</li> <li>Describe structures and functions of gas exchange system in mammals, fish and invertebrates.</li> </ul>		<ul style="list-style-type: none"> <li>SA:Vol</li> <li>Multicellular</li> <li>Exchange surface</li> <li>Alveoli</li> <li>Trachea</li> <li>Bronchioles</li> <li>Cartilage</li> </ul>	
Transport in plants	<p><i>End Point: To understand the transport systems within plants including their structure, how they work and why they are needed</i></p> <ul style="list-style-type: none"> <li>Describe the structure and function of vascular systems in plants.</li> <li>Explain process of transpiration and the factors that affect it.</li> <li>Describe the mechanism of translocation.</li> <li>Describe how plants have adapted to survive in a range of habitats.</li> </ul>		<ul style="list-style-type: none"> <li>Xylem</li> <li>Phloem</li> <li>Transpiration</li> <li>Translocation</li> <li>Xerophytes</li> <li>Hydrophytes</li> </ul>	

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Transport in animals	<p><i>End Point: To understand how different substances are transported in animals</i></p> <ul style="list-style-type: none"> <li>Describe the different types of circulatory systems</li> <li>Understand the function and structure of different types of blood vessels in humans</li> <li>Understand how tissue fluid and plasma is made in humans</li> <li>Understand the structure and function of the heart including how heart rate is controlled</li> <li>Explain how oxygen and carbon dioxide is transported around the body</li> <li>Understand and analyse ECG traces</li> </ul>		<ul style="list-style-type: none"> <li>Chloride shift</li> <li>Bohr effect</li> <li>Tachycardia</li> <li>Bradycardia</li> <li>Fibrillation</li> <li>Ectopic</li> <li>ECG trace</li> </ul>	<p><b>Formative Assessment:</b></p> <ul style="list-style-type: none"> <li>Teachers constantly assess students, (for example using questioning, mini-whiteboards, short quizzes and true or false activities) and provide immediate verbal feedback during the lesson.</li> </ul> <p><b>Summative Assessment:</b></p> <ul style="list-style-type: none"> <li>Year 12 students have test weeks in late October, mid-December and late February.</li> <li>They also have internal Summative Exams in late June of Y12.</li> </ul> <p><b>Homework and Independent study:</b></p> <ul style="list-style-type: none"> <li>Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions.</li> <li>Students complete write up and discussion of practical work in their lab book.</li> </ul>
Communicable disease	<p><i>End Point: Know how diseases are transmitted and how animals and plants fight against them</i></p> <ul style="list-style-type: none"> <li>Understand the different types of pathogen and explain how they can be transmitted.</li> <li>Understand the non-specific defence against pathogens in animals and plants.</li> <li>Describe the structure and function of immune cells</li> <li>Understand the specific immune response and how immunity can be developed</li> </ul>		<ul style="list-style-type: none"> <li>Pathogen</li> <li>Autoimmune</li> <li>Immune</li> <li>Phagocytosis</li> <li>Lymphocytes</li> </ul>	
Biodiversity	<p><i>End Point: To understand biodiversity, how it can be evaluated using statistical tests, the impacts humans have on it and how it can be conserved.</i></p> <ul style="list-style-type: none"> <li>Understand how species richness and species evenness can be measured</li> <li>Understand biodiversity, the factors that affect it and how it can be calculate</li> <li>Understand different methods for maintain biodiversity including arguments for it</li> <li>Understand genetic biodiversity, how it can change and how it may be assessed</li> </ul>		<ul style="list-style-type: none"> <li>Biodiversity</li> <li>Simpsons index of diversity</li> <li>Spearman's rank</li> <li>Conservation</li> <li>Genetic biodiversity</li> </ul>	
Ecosystems	<p><i>End Point: To understand how ecosystems develop and change due to different factors and how this can be observed using sampling.</i></p> <ul style="list-style-type: none"> <li>Understands how different factors ecosystems</li> <li>Explain how sampling is used to determine distribution and abundance in ecosystems</li> <li>Understand the process of succession</li> <li>Understand how biomass move through ecosystems including the carbon and nitrogen cycles</li> </ul>		<ul style="list-style-type: none"> <li>Ecosystem</li> <li>Sampling</li> <li>Species diversity</li> <li>Succession</li> <li>Pioneer species</li> <li>Biomass</li> <li>Tropic levels</li> </ul>	
Populations and sustainability	<p><i>End Point: To understand what a population of organisms is, the factors that affect them and how they can be conserved.</i></p> <ul style="list-style-type: none"> <li>Understand interactions between populations and how factors determine population size</li> <li>Understand the significance of limiting factors on the carrying capacity of an environment</li> <li>Understand the difference between conservation and preservation</li> <li>Understand how ecosystems are managed and maintained including the reasons why this is done.</li> </ul>		<ul style="list-style-type: none"> <li>Population</li> <li>Interspecific</li> <li>Intraspecific</li> <li>Competition</li> <li>Preservation</li> <li>Carrying capacity</li> </ul>	

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### How parents can support learning in the subject this academic year

All students are provided with their own copy of a text book for home and study room use but there are a variety of other good resources available including revision note books and revision guides. Please contact your child's Biology Teacher if you would like any direction to appropriate resources that you could buy.

Students in the sixth form are set at least 6 hours of homework and independent study per week for each subject. In Biology A level this takes the form of:

- Tutorial questions
- Workshop booklets
- Lab book work
- Reviewing notes from lessons

Parents can support learning by ensuring that students use their free time effectively and are completing all of the homework and independent study. In the event that students are struggling with independent work it is helpful if the teacher can be contacted as soon as possible to enable them to support your child to catch up.

### Recommended Reading

Please find below some suggested Science books/magazines/websites that students may find interesting. These are linked to the topics that are covered in school and so may extend and strengthen their knowledge but are primarily focused on instilling a sense of curiosity and wonder:

- A Selfish Gene - Richard Dawkins
- Creation - Adam Rutherford
- Genome - Matt Ridley
- Pointing from the Grave - Samantha Weinberg
- The Immortal Life of Henrietta Lacks - Rebecca Skloot
- A Crack in Creation - Jennifer Doudna
- Pandemic 1918 - Catharine Arnold
- The Telomere Effect - Elizabeth Blackburn
- Bad Pharma - Ben Goldacre

### Points to note

Biology A level is assessed using three written exams at the end of Y13.

1. Paper 1 makes up 37% of the final grade is 2hr 15min long and includes information from modules 1,2,3 and 5, 10% of which will be math-based skill questions.
2. Paper 2 makes up 37% of the final grade is 2hr 15min long and includes information from modules 1,2,4 and 6, 10% of which will be math-based skill questions.
3. Paper 3 makes up 26% of the final grade is 1hr 30min long and includes more application questions with information from all modules required

The assessment of practical skills is a compulsory requirement of the course of study for A level Biology. It will appear on all students' certificates as a separately reported result, alongside the overall grade for the qualification. Students' practical work will be assessed by teachers, using common practical assessment criteria (CPAC) that are consistent across exam boards.