



Biology

Why study A Level Biology?

Have you ever wondered....

- Why your sister looks like you?
- How medicines work?
- What DNA is?
- Do clones exist?
- Who Darwin was?

Study A Level Biology to find out the answers.

A Level Biology will give you an exciting insight into the contemporary world of biology. It covers the key concepts of biology and practical skills are integrated throughout the course. This combination of academic challenge and practical focus makes the prospect of studying A Level Biology highly appealing. You will learn about the core concepts of biology and about the impact of biological research and how it links to everyday life. You will learn to apply your knowledge, investigate and solve problems in a range of contexts.

Key features

- Simple straightforward assessment through examinations
- Based on key concepts in biology
- Opportunities to develop practical skills through a range of experiments and investigations.

A level biology is a good subject to study with any other science subject and/ or maths. Many students have also combined biology with geography and English.

Where can A Level Biology take me?

A Level Biology is an excellent base for a university degree in healthcare, such as medicine, veterinary or dentistry, as well as the biological sciences, such as biochemistry, molecular biology or forensic science. Biology can also complement sports science, psychology, sociology and many more.

A Level Biology can open up a range of career opportunities including: biological research, medical, environmental, forensics, sports and science communication. The transferable skills you will learn, such as problem solving, are also useful for many other areas, such as law.

CONTENT OVERVIEW

BIOLOGY A – AS (H020) / A LEVEL (H420)

Module 1 – Development of practical skills in biology	
Skills of planning, implementing, analysis and evaluation.	
Module 2 – Foundations in biology	
Includes: Cell structure; Biological molecules; Nucleotides and nucleic acids; Enzymes; Biological membranes; Cell division, cell diversity and cellular organisation.	
Module 3 – Exchange and transport	Module 4 – Biodiversity, evolution and disease
Includes: <ul style="list-style-type: none"> • Exchange surfaces • Transport in animals • Transport in plants. 	Includes: <ul style="list-style-type: none"> • Communicable diseases, disease prevention and the immune system • Biodiversity • Classification and evolution.
Module 5 – Communication, homeostasis and energy	Module 6 – Genetics, evolution and ecosystems
Includes: <ul style="list-style-type: none"> • Communication and homeostasis • Excretion as an example of homeostatic control • Neuronal communication • Hormonal communication • Plant and animal responses • Photosynthesis • Respiration. 	Includes: <ul style="list-style-type: none"> • Cellular control • Patterns of inheritance • Manipulating genomes • Cloning and biotechnology • Ecosystems • Populations and sustainability.

Emphasis throughout the course is on increasing knowledge, developing competence and confidence in practical skills and developing problem solving. You will learn how society makes decisions about scientific issues and how science contributes to the success of the economy and society.

Biology: Year 12

Scheme of Learning	Assessments
<p>Half Term One:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Microscopy • Magnification <p>Teacher 2:</p> <p>Eukaryote cell structure</p> <ul style="list-style-type: none"> • Ultrastructure of plant cells • Prokaryote Cells <p>Outcomes:</p> <p>Biology is the study of living organisms. Every living organism is made up of one or more cells, therefore understanding the structure and function of the cell is a fundamental concept in the study of biology. Since Robert Hooke coined the phrase 'cells' in 1665, careful observation using microscopes has revealed details of cell structure and ultrastructure and provided evidence to support hypotheses regarding the roles of cells and their organelles.</p>	<p>Teacher 1:</p> <p>Assessed homework 1</p> <p>Past exam questions</p> <p>Teacher 2:</p> <p>Assessed homework 2</p> <p>Past exam questions</p> <p>End of chapter exam questions.</p> <p>October Exam</p>
<p>Half Term Two:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Biological Molecules • Enzyme <p>Teacher 2:</p> <ul style="list-style-type: none"> • Nucleotides and Nucleic acids • Cell cycle <p>Outcomes:</p> <p>Teacher 1</p> <p>Biological Molecules: The cells of all living organisms are composed of biological molecules. Proteins, carbohydrates and lipids are three of the key groups of biological macromolecules that are essential for life. A study of the structure of these macromolecules allows a better understanding of their functions in</p>	<p>Teacher 1</p> <p>Assessed homework 3</p> <p>Past exam questions</p> <p>PAG 9.1, 9.2, 9.3</p> <p>PAG 5.2</p> <p>PAG 4.1, 4.2</p> <p>End of chapter questions.</p> <p>Teacher 2</p> <p>Assessed homework 4</p> <p>Past exam questions</p> <p>PAG 10.1</p> <p>End of chapter exam questions</p>

<p>living organisms.</p> <p>Enzymes: Metabolism in living organisms relies upon enzyme controlled reactions. Knowledge of how enzymes function and the factors that affect enzyme action has improved our understanding of biological processes and increased our use of enzymes in industry.</p> <p>Teacher 2</p> <p>Nucleic acids are essential to heredity in living organisms. Understanding the structure of nucleotides and nucleic acids allows an understanding of their roles in the storage and use of genetic information and cell metabolism.</p> <p>During the cell cycle, genetic information is copied and passed to daughter cells. Microscopes can be used to view the different stages of the cycle.</p> <p>In multicellular organisms, stem cells are modified to produce many different types of specialised cell. Understanding how stem cells can be modified has huge potential in medicine. To understand how a whole organism functions, it is essential to appreciate the importance of cooperation between cells, tissues, organs and organ systems.</p>	
<p>Half Term Three:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Biological Membranes • Transport in Plants <p>Teacher 2:</p> <ul style="list-style-type: none"> • Exchange surfaces and breathing • Transport in animals <p>Outcomes:</p> <p>Teacher 1:</p> <p>Membranes are fundamental to the cell theory. The structure of the plasma membrane allows cells to communicate with each other. Understanding this ability to communicate is important as scientists increasingly make use of membrane-bound receptors as sites for the action of medicinal drugs.</p>	<p>Teacher 1</p> <p>Assessed homework 5</p> <p>Past exam questions.</p> <p>End of chapter exam questions.</p> <p>PAG 5.1</p> <p>PAG 8.1, 8.2 8.3</p> <p>Teacher 2</p> <p>Assessed homework 6</p> <p>Past exam questions.</p> <p>End of chapter questions.</p> <p>PAG 1.3, 2.1</p> <p>January Exam</p>

<p>Understanding how different substances enter cells is also crucial to the development of mechanisms for the administration of drugs.</p> <p>As plants become larger and more complex, transport systems become essential to supply nutrients to, and remove waste from, individual cells.</p> <p>The supply of nutrients from the soil relies upon the flow of water through a vascular system, as does the movement of the products of photosynthesis.</p> <p>Teacher 2: Learners study the structure and function of gas exchange and transport systems in a range of animals and in terrestrial plants.</p> <p>The significance of surface area to volume ratio in determining the need for ventilation, gas exchange and transport systems in multicellular organisms is emphasised. The examples of terrestrial green plants and a range of animal phyla are used to illustrate the principle.</p> <p>Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.</p> <p>As animals become larger and more active, transport systems become essential to supply nutrients to, and remove waste from, individual cells. Controlling the supply of nutrients and removal of waste requires the coordinated activity of the heart and circulatory system.</p>	
<p>Half Term Four:</p> <p>Teacher 1 : Classification and evolution</p> <p>Teacher 2 : Communicable diseases</p> <p>Outcomes:</p>	<p>Teacher 1 Assessed homework 7 Past exam questions. End of chapter exam questions.</p> <p>Teacher 2 Assessed homework 8 Past exam questions. End of chapter questions.</p>

<p>Teacher 1: Learners study the biodiversity of organisms; how they are classified and the ways in which biodiversity can be measured. It serves as an introduction to ecology, emphasising practical techniques and an appreciation of the need to maintain biodiversity. Learners also gain an understanding of the variety of organisms that are pathogenic and the way in which plants and animals have evolved defences to deal with disease. The impact of the evolution of pathogens on the treatment of disease is also considered. The relationships between organisms are studied, considering variation, evolution and phylogeny. Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.</p> <p>Teacher 2: Organisms are surrounded by pathogens and have evolved defences against them. Medical intervention can be used to support these natural defences. The mammalian immune system is introduced.</p>	
<p>Half Term Five:</p> <p>Teacher 1</p> <ul style="list-style-type: none"> • Biodiversity/Revision <p>Teacher 2</p> <ul style="list-style-type: none"> • Revision <p>Outcomes:</p> <p>Biodiversity refers to the variety and complexity of life. It is an important indicator in the study of habitats. Maintaining biodiversity is important for many reasons. Actions to maintain biodiversity must be taken at local, national and global levels.</p>	<p>Teacher 1 Assessed homework 8 Past exam questions. End of chapter exam questions.</p> <p>Teacher 2 Assessed homework 9 Past exam questions. End of chapter questions.</p> <p>Year 12 May Exam</p>
<p>Half Term Six:</p>	<p>Teacher 1 Assessed homework 9</p>

<p>Teacher 1</p> <ul style="list-style-type: none"> • Ecosystems <p>Teacher 2</p> <ul style="list-style-type: none"> • Populations and sustainability <p>Outcomes:</p> <p>Teacher 1:</p> <p>Organisms do not live in isolation but engage in complex interactions, not just with other organisms but also with their environment.</p> <p>The efficiency of biomass transfer limits the number of organisms that can exist in a particular ecosystem. Ecosystems are dynamic and tend towards some form of climax community.</p> <p>Teacher 2:</p> <p>There are many factors that determine the size of a population. For economic, social and ethical reasons ecosystems may need to be carefully managed. To support an increasing human population, we need to use biological resources in a sustainable way.</p>	<p>Past exam questions. End of chapter exam questions. PAG 3.2</p> <p>Teacher 2 Assessed homework 10 Past exam questions. End of chapter questions.</p>
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Assessment Objectives:

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data.
AO3	Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: <ul style="list-style-type: none"> • make judgements and reach conclusions • develop and refine practical design and procedures.

AO weightings in A Level in Biology A

The relationship between the assessment objectives and the components are shown in the following table:

Component	% of A Level in Biology A (H420)		
	AO1	AO2	AO3
Biological processes (H420/01)	13–14	15–16	8–9
Biological diversity (H420/02)	13–14	15–16	8–9
Unified biology (H420/03)	5–6	10–11	9–10
Practical endorsement in biology (H420/04)*	N/A	N/A	N/A
Total	31–34	40–43	25–28

Biology: Year 13

Scheme of Learning	Assessments
<p>Half Term One:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Photosynthesis • Respiration <p>Teacher 2:</p> <ul style="list-style-type: none"> • Hormonal communication <p>Outcomes:</p> <p>Teacher 1: Photosynthesis is the process whereby light from the Sun is harvested and used to drive the production of chemicals, including ATP, and used to synthesise large organic molecules from inorganic molecules.</p> <p>Respiration is the process whereby energy stored in complex organic molecules is transferred to ATP. ATP provides the immediate source of energy for biological processes.</p> <p>Teacher 2: The ways in which specific hormones bring about their effects are used to exemplify endocrine communication and control. Treatment of diabetes is used as an example of the use of medical technology in overcoming defects in hormonal control systems.</p>	<p>Teacher 1: Assessed homework 1 Past exam questions PAG 6.3 12.3</p> <p>Teacher 2: Assessed homework 2 Past exam questions PAG 11.1</p> <p>End of chapter exam questions.</p>
<p>Half Term Two:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Homeostasis • Plant hormones <p>Teacher 2:</p> <ul style="list-style-type: none"> • Neuronal Communication <p>Outcomes:</p> <p>Teacher 1: Organisms use both chemical and electrical systems to</p>	<p>Teacher 1: Assessed homework 3 Past exam questions PAG 10.1 11.3 12.1</p> <p>Teacher 2: Assessed homework 4 Past exam questions PAG 11.2</p> <p>End of chapter exam questions.</p>

<p>monitor and respond to any deviation from the body's steady state.</p> <p>The kidneys, liver and lungs are all involved in the removal of toxic products of metabolism from the blood and therefore contribute to homeostasis. The kidneys play a major role in the control of the water potential of the blood. The liver also metabolises some toxins that are ingested.</p> <p>Plant responses to environmental changes are coordinated by hormones, some of which are important commercially.</p> <p>Teacher 2: The stimulation of sensory receptors leads to the generation of an action potential in a neurone. Transmission between neurones takes place at synapses.</p> <p>In animals, responding to changes in the environment is a complex and continuous process, involving nervous, hormonal and muscular coordination.</p>	
<p>Half Term Three:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Genetics of living systems • Patterns of Inheritance • Manipulating Genomes <p>Teacher 2:</p> <ul style="list-style-type: none"> • Ecosystems <p>Outcomes:</p> <p>Teacher 1: The way in which cells control metabolic reactions determines how organisms, grow, develop and function.</p> <p>Isolating mechanisms can lead to the accumulation of different genetic information in populations, potentially leading to new species. Over a prolonged period of time, organisms have changed and some have become extinct. The theory of evolution explains these changes. Humans use artificial selection to produce similar changes in plants and animals. Genome sequencing gives information about the location of genes and provides evidence for the evolutionary links between organisms.</p>	<p>Teacher 1: Assessed homework 5 Past exam questions PAG 7.1 7.2 7.3 12.2</p> <p>Teacher 2: Assessed homework 6 Past exam questions PAG 3.1 3.2 3.3 End of chapter exam questions.</p> <p>Year 13 exam in January</p>

<p>Genetic engineering involves the manipulation of naturally occurring processes and enzymes. The capacity to manipulate genes has many potential benefits, but the implications of genetic techniques are subject to much public debate.</p> <p>Teacher 2: Organisms do not live in isolation but engage in complex interactions, not just with other organisms but also with their environment.</p> <p>The efficiency of biomass transfer limits the number of organisms that can exist in a particular ecosystem. Ecosystems are dynamic and tend towards some form of climax community.</p>	
<p>Half Term Four:</p> <p>Teacher 1:</p> <ul style="list-style-type: none"> • Cloning and biotechnology <p>Teacher 2:</p> <ul style="list-style-type: none"> • Finish Ecosystems/Populations and • Sustainability <p>Outcomes:</p> <p>Teacher 1: Farmers and growers exploit “natural” vegetative propagation in the production of uniform crops. Artificial clones of plants and animals can now be produced. Biotechnology is the industrial use of living organisms (or parts of living organisms) to produce food, drugs or other products.</p> <p>Teacher 2: As half term 3 for Ecosystems. There are many factors that determine the size of a population. For economic, social and ethical reasons ecosystems may need to be carefully managed. To support an increasing human population, we need to use biological resources in a sustainable way.</p>	<p>Teacher 1: Assessed homework 7 Past exam questions</p> <p>Teacher 2: Assessed homework 8 Past exam questions End of chapter exam questions.</p> <p>March exam</p>
<p>Half Term Five:</p>	<p>Teacher 1:</p>

<p>Teacher 1 Revision</p> <p>Teacher 2 Revision</p> <p>Outcomes: See above and Year 12 plan also.</p>	<p>Assessed homework 9 Past exam questions</p> <p>Teacher 2: Assessed homework 10 Past exam questions</p> <p>End of chapter exam questions.</p>
<p>Half Term Six: Revision</p>	

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Total	31–34	40–43	25–28

Expectations

In order to achieve your potential in biology, there are a number of key areas which you must put in place. These include:-

- Personal organisation. You will need to bring a pen, pencil, ruler and calculator to each lesson. Your teacher will also use the textbook in lessons so you will need to bring this as well. You will also be using a file to store all your work in and this must be kept well organised.
- Time management. You need to organise your time so that reading, revision and homework tasks are completed by the required time.
- The types of homework tasks which are set include reading, revision, questions from textbooks, past exam papers etc. Year 12 will have approximately 3 to 4 hours of homework per week. Year 13 will have 5 to 6 hours of independent learning / homework a week.
- Safe and responsible conduct during practical lessons and full cooperation with safety procedures.
- You will need to be determined, focused and willing to put in the time and effort to learn and understand the different topics.
- You will also be expected to undertake independent learning which will be based around the PAGs, exam questions for each module and wider reading

Help and Support from Teachers

Year 12 – Miss Miller and Miss Black

Year 13 – Miss Miller and Miss Black

This can start now if you wish. It is no secret that there is a big jump in the demand and level of work from GCSE. If you wish to do some preparation for the AS course, you can purchase a booklet entitled, 'Head Start to AS level Biology', which will make the jump easier to manage.

The biology department has a tradition of being available to help sixth formers when they are either stuck with homework, or just want some extra support.

You will be provided with textbooks at the beginning of the course.

BIOLOGY A: ASSESSMENT OVERVIEW

The OCR AS Level in Biology A

The assessment of the AS Level Biology A course consists of two components which are both externally assessed examinations. Both examined components of the AS Level in Biology A cover all four modules in the AS specification.

Component 1 – Breadth in biology (Modules 1-4)	1 hour, 30 minutes (70 marks)	Section A: multiple choice questions, 20 marks Section B: structured questions covering theory and practical skills, 50 marks	50% of total AS Level
Component 2 – Depth in biology (Modules 1-4)	1 hour, 30 minutes (70 marks)	Structured questions and extended response questions covering theory and practical skills	50% of total AS Level

The OCR A Level in Biology A

The assessment of the A Level in Biology A consists of four components: three externally assessed examinations and the Practical Endorsement, which is internally assessed by the centre and externally moderated. The Practical Endorsement is reported separately from the overall grade issued for the A Level, which is determined by performance in the examinations.

Component 1 – Biological processes (Modules 1,2,3,5)	2 hours, 15 minutes (100 marks)	Section A: multiple choice questions, 15 marks Section B: structured questions and extended response questions covering theory and practical skills, 85 marks	37% of total A Level
Component 2 – Biological diversity (Modules 1,2,4,6)	2 hours, 15 minutes (100 marks)	Section A: multiple choice questions, 15 marks Section B: structured questions and extended response questions covering theory and practical skills, 85 marks	37% of total A Level
Component 3 – Unified biology (Modules 1-6)	1 hour, 30 minutes (70 marks)	Structured questions and extended response questions covering theory and practical skills	26% of total A Level
Component 4 – Practical Endorsement	Completed over the course	Minimum of 12 practical activities	Reported separately

Specification

<http://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf>

Useful Websites

There are hundreds out there! Here are a few.

www.ocr.org.uk <http://www.alevelbiology.co.uk/>

<http://www.thealevelbiologist.co.uk/topics/ocr-as-topics>

<http://www.thealevelbiologist.co.uk/topics/ocr-a2-topics>

Past Paper Exam Question Examples

1. After being mixed with iodine, which of the following would show a blue / black colour?
- A potato tuber cells
 - B erythrocytes
 - C sieve tube elements
 - D neutrophils

Your answer

[1]

2. The pancreas is an organ that secretes protease enzymes.

Outline how the organelles in pancreatic cells work together to produce and release these protein molecules from the cells.



In your answer you should use appropriate technical terms, spelled correctly

[5]

Literacy

See glossary at the back of the AS and the A2 text book for all keywords and definitions.