

KS5 - Science - Biology

Subject Leader: Miss S Hazelby

email: shazelby@forgevalley.sheffield.sch.uk

Curriculum Intent:

Science has massive impact on society and is vital to the world's future prosperity. At Forge Valley all pupils are taught to appreciate the achievements of science and to develop their curiosity and excitement about the natural world.

We aim to provide all pupils with a high challenge, high-quality science education that provides the foundations for understanding the world through the specific discipline of Biology. We will do this by embedding a culture of confidence and mastery underpinned by scientific enquiry and by building up a body of key foundational knowledge and concepts. Pupils will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, analyse causes, as well as to develop their ability to see connections between science subject areas. Our pupils will develop an in depth understanding of the world around them and will appreciate how major scientific ideas have played a vital role in society, preparing them for life in an increasingly scientific and technological world.

	Core Knowledge	Procedural Knowledge
	Topic	Pupils will
Autumn Half-Term 1	Y12 Biology: Biological molecules • Monomers and polymers • Carbohydrates • Lipids Cells • Structure of eukaryotic cells • Methods of studying cells • Transport across cell membranes Y13 Biology: Energy transfers in and between organisms • Photosynthesis Organisms respond to changes in their internal and external environments • Survival and response • Receptors	• Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. • Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: - in a theoretical context - in a practical context - when handling qualitative data - when handling quantitative data. • Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: - make judgements and reach conclusions - develop and refine practical design and procedures

	Genetics, Populations, Evolution and Ecosystems • Inheritance • Populations • Evolution	
Autumn Half-Term 2	Y12 Biology: Biological molecules • Proteins • Enzymes • Structure of DNA and RNA Cells • Structure of prokaryotic cells and viruses • All cells arise from other cells • Transport across cell membranes Y13 Biology: Energy transfers in and between organisms • Respiration • Energy and Ecosystems Organisms respond to changes in their internal and external environments • Receptors • Control of heart rate • Nerve impulses The control of gene expression • Mutations can alter protein structure • Stem cells • Regulation of transcription and translation	
Spring Half-Term 1	Y12 Biology: Biological molecules	

	• DNA Replication • ATP • Water • Inorganic ions Cells • Cell recognition and the immune system • Transport across cell membranes Y13 Biology: Energy transfers in and between organisms • Energy and Ecosystems • Nutrient cycles Organisms respond to changes in their internal and external environments • Nerve impulses • Synaptic transmission • Skeletal muscle The control of gene expression • Gene expression and cancer • Using genome projects	
Spring Half-Term 2	Y12 Biology: Cells • Cell recognition and the immune system Organisms exchange substances with their environment • Surface area to volume ratio • Gas exchange • Mass transport in animals Genetic Information, Variation and relationships between organisms • DNA, genes and chromosomes	

	• DNA and protein synthesis • Mutations Y13 Biology: Organisms respond to changes in their internal and external environments • Skeletal muscle • Homeostasis & negative feedback • Control of blood glucose • Control of blood water potential The control of gene expression • Recombinant DNA technology • Genetic testing • Genetic fingerprinting	
Sumer Half-Term 1	Y12 Biology: Organisms exchange substances with their environment • Gas exchange • Digestion & absorption • Mass transport in animals • Mass transport in plants Genetic Information, Variation and relationships between organisms • Meiosis • Genetic diversity • Selection pressures • Species & taxonomy Y13 Biology: • Revision and exam preparation	
Summer Half-Term 2	Y12 Biology: Genetic Information, Variation and relationships between organisms • Diversity in a community • Human impact on diversity	

	- Investigating diversity Genetics, Populations, Evolution and Ecosystems - Populations in ecosystems	
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Homework:

Weekly homework will be set that will take a total of 5 hours per week. This will usually be a booklet of exam questions on topics recently covered to consolidate understanding and to develop exam technique, or preparation/write ups for a required practical. Students will also be expected to use some of this time to work independently to decide which topic areas they need to consolidate by identifying gaps in understanding.

Assessment:

We study the AQA A-level course:

The core content of the course is split into the following topics

1. Biological molecules
2. Cells
3. Organisms exchange substances with their environment
4. Genetic information, variation and relationships between organisms
5. Energy transfers in and between organisms (A-level only)
6. Organisms respond to changes in their internal and external environments (A-level only)
7. Genetics, populations, evolution and ecosystems (A-level only)
8. The control of gene expression (A-level only)

Paper 1 assesses any content from topics 1-4, including relevant practical skills

Paper 2 assesses any content from topics 5-8, including relevant practical skills

Paper 3 assesses any content from topics 1-8, including relevant practical skills

Practical competencies are assessed through 6 required practicals in Y12 and 6 required practicals in Y13. A broad range of skills will be assessed which will lead to an additional practical endorsement alongside their subject grade.

Paper 1 - 2 hours - 35%

Paper 2 - 2 hours - 35%

Paper 3 - 2 hours - 30%

Links to Personal Development:

- Risk assessments: Enabling students to recognise risks to their own wellbeing.
- Social development: Practise using a range of social skills in different situations.
- Teamwork and communication: Completing some tasks in pairs/groups whereby students will need to work together and communicate their knowledge
- Problem-solving and critical thinking: Analysing experimental data, identifying patterns, and evaluating whether evidence truly supports a scientific conclusion.

Applying memorised facts to unseen, real-world biological situations, often utilising multi-step calculations, statistics, or logical deduction.

- Diversity: Opportunities to recognise the contributions that biologists from a range of backgrounds have contributed to the knowledge base that we use today
- Careers: Linking topic areas to the wide range of careers and academic pathways that Biology can lead towards

How is my knowledge further developed post-KS5?

The AQA A-level Biology course is designed not only to help students succeed in examinations, but also to provide the knowledge, practical skills and analytical thinking needed for university study. The specification was developed in consultation with universities so that students develop the skills expected in higher education and are well prepared for degree courses related to health care and medicine, as well as environment and ecology.

We place practical work at the heart of the course, requiring students to complete a range of practical activities and develop competence in laboratory techniques.

Students learn to:

- Use scientific equipment safely and accurately
- Collect and process experimental data
- Draw evidence-based conclusions

These skills are essential for university laboratory courses and research projects.

Students are regularly required to:

- Apply knowledge to unfamiliar situations
- Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:
 - make judgements and reach conclusions
 - develop and refine practical design and procedures.

These higher-order thinking skills mirror the style of learning and assessment found at university, where students must often solve problems independently rather than simply recall facts.

The breadth and depth of the A-level encourage students to:

- Manage their own revision and study time
- Read beyond the specification
- Link concepts across different areas of biology
- Develop resilience when tackling challenging material

These habits help students adapt to the greater independence expected in higher education.