

Welcome to the Science Department

Subject Leader: Mr A Williams

Teachers: Miss S Channer, Mrs J Charlesworth, Miss M Bailey,
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Subject Overview

Key Stage 3: Years 7 and 8

Students are taught modules that provide a better understanding of the world in which they live. They study a range of principles, theories and explanations. A balance is maintained between the three sciences. There is a strong focus on scientific investigations and the scientific method throughout the course.

Key Stage 4: Years 9 - 11

The GCSE courses allow students to develop their knowledge of scientific topics and develop a deeper understanding, enhancing practical skills as well as preparing for A level studies.

Post 16

The AS and A Level courses encourage students to deepen their scientific knowledge and understanding as well as to develop their practical skills further. The final synoptic A Level unit requires students to draw on all their previous studies of the subject.

Teaching Aims and Objectives

The science department aims: to familiarise students with the world in which they live and to help them understand the impact of science on society so as to enable them to adjust themselves to their environment; to acquaint them with the 'scientific method' and to enable them to develop the scientific attitude; to give students a historical perspective, so that they may understand the evolution of the scientific development. Our objectives are to develop scientific knowledge, skills and practical abilities. Students develop an appreciation of the value of science to society and the skills necessary to pursue a scientific career. Through the scientific method students will learn skills that will be valuable in Modern Britain. They will be learning how to plan investigations, trying to avoid major pitfalls, recording results, making judgements and conclusions from these results and then evaluating their work so that they can make improvements in the futures. These skills are of real value in Britain today.

Course Information

Key Stage 3

Year 7 and Year 8: Topics included are:

Cells, Structure and Function of the Body, Reproduction, Particles and their Behaviour, Elements, Compounds and Mixtures, Reactions, Acids and Alkalis, Forces, Sound, Light, Space, Health and Lifestyle, Ecosystems Processes, Adaptation and Inheritance, The Periodic Table, Separation Techniques, Metals and Acids, The Earth, Electricity and Magnetism, Energy, Motions and Pressure

Key Stage 4

Year 9: Topics included are:

Key Concepts in Biology, Cells and Control, Genetics, States of Matter, Separating and Purifying Substances, Atomic Structure, The Periodic Table, Motion, Forces and Motion

Year 10: Topics included are:

Natural Selection, Health, Disease and the Development of Medicine, Plant Structure and their Function, Bonding and Types of Substances, Acids and Alkalis, Calculations involving Mass, Conservation of Energy, Waves, Light and the Electromagnetic Spectrum, Radioactivity, Energy, Forces and their Effects

Year 11: Topics included are:

The building blocks of cells, Organisms and energy, Common systems of living organisms, Atomic structure and the periodic table, Ionic compounds and analysis, Covalent compounds and separation techniques, Groups in the periodic table, Chemical reactions, Quantitative chemistry, Static and current electricity, Controlling and using electric current, Motion and forces, Momentum, energy, work and power, Nuclear fission and nuclear fusion, Advantages and disadvantages of using radioactive materials

Triple science students also study:

Control systems, Behaviour, Biotechnology, Qualitative analysis, Quantitative analysis, Electrolytic processes, Gases, equilibria and ammonia, Organic chemistry, Radiation in treatment and medicine, X-rays and ECGs, Production, uses and risks of missing radiation from radioactive sources, Motion of particles and Kinetic theory and gases

Post 16

Year 12: **Biology**

The Biology Course includes:

1. Biological molecules
2. Cells
3. Organisms exchange substances with their environment
4. Genetic information, variation and relationships between organisms

Practical skills will be developed throughout the whole of the course. The practical skills in this module can be assessed within the two written examinations and (for A Level only) within the Practical Endorsement.

Chemistry

Module 1

Development of practical skills – this module underpins the whole of the specification, and covers the practical skills that students should develop throughout the course. The practical skills in this module can be assessed

within written examinations and (for A Level only) within the Practical Endorsement.

Module 2

Foundations in chemistry covering concepts required throughout the remaining modules. This includes:

- Atoms, compounds, molecules and equations
- Amount of substance
- Acid–base and redox reactions
- Electrons, bonding and structure.

Modules 3

The periodic table and periodicity. This includes:

- Group 2 and the halogens
- Qualitative analysis
- Enthalpy changes
- Reaction rates and equilibrium (qualitative).

Module 4

This includes:

- Organic Basic concepts
- Hydrocarbons
- Alcohols and haloalkanes
- Organic synthesis
- Analytical techniques (IR, MS).

Physics

Module 1

Development of practical skills.

Module 2

Foundations of physics. This includes:

- Physical quantities and units
- Making measurements and analysing data
- Nature of quantities.

Module 3

Forces and motion. This includes:

- Motion
- Forces in action
- Work, energy and power
- Materials
- Newton's laws of motion and momentum.

Module 4

Electrons, waves, and photons. This includes:

- Charge and current
- Energy, power and resistance
- Electrical circuits
- Waves
- Quantum physics

Year 13: **Biology**

The Biology Course includes:

- Energy transfers in and between organisms
- Organisms respond to changes in their internal and external
- Genetics, populations, evolution and ecosystems
- The control of gene expression

Practical skills will be developed throughout the whole of the course. The practical skills in this module can be assessed within the two written examinations and (for A Level only) within the Practical Endorsement.

Chemistry

Module 1

Development of practical skills – this module underpins the whole of the specification, and covers the practical skills that students should develop throughout the course. The practical skills in this module can be assessed within written examinations and (for A Level only) within the Practical Endorsement.

Module 5

Physical chemistry and transition elements: This includes:

- Reaction rates and equilibrium (quantitative)
- pH and buffers
- Enthalpy, entropy and free energy
- Redox and electrode potentials
- Transition elements

Module 6

Organic chemistry and analysis: This includes:

- Aromatic compounds
- Carbonyl compounds
- Carboxylic acids and esters
- Nitrogen compounds
- Polymers
- Organic synthesis
- Chromatography and spectroscopy (NMR)

Physics

Module 1

Development of practical skills.

Module 5

Newtonian world and astrophysics: This includes:

- Thermal physics
- Circular motion
- Oscillations
- Gravitational fields
- Astrophysics and cosmology

Module 6

Particles and medical physics: This includes:

- Capacitors
- Electric fields
- Electromagnetism
- Nuclear and particle physics
- Medical imaging

Homework Expectations (Including ICT resources and websites)

Students in Years 7 and 8 are set homework once a week. This could be consolidation work or new material.

GCSE students (Years 9, 10 and 11) are set homework at least once a week to meet the demands of the course. There may be occasions when more homework is necessary.

AS/A Level students are expected to support their study with extra research and wider reading. This is in addition to questions set.

websites:

www.bbcbitesize.co.uk

www.samlearning.com

www.docbrown.info

Marking and Assessment

Key Stage 3

Students' work is marked regularly to acknowledge effort, knowledge, understanding and development of independent learning.

Marking takes two forms: contact marking and formative assessment. Throughout KS3 there are 2 main forms of assessment. These are end of topic tests and more extensive open style questions. The open questions are marked formatively and the students have the opportunity to make improvements to their answers.

Formative assessment is intended to give specific advice to each individual student. This may also include spelling and grammar.

Key Stage 4

As with KS3 there will be end of topic tests and work will be marked formatively where appropriately. End of topic tests comprise of past examination questions and the marking

of these will be line with examination board's marking criteria. Science teachers do not formally grade written work, but will offer encouragement and point out grammatical and spelling errors or give directions to improve the presentation of the notes.

Sixth Form

At A Level, questions, essays and examination work are marked in a similar way to GCSE. Work is marked according to the examination board's marking criteria.

Examinations

GCSE

For Y9 and 10 – all examined at the end of Y11

Course information can be found at:

<http://qualifications.pearson.com/en/qualifications/edexcel-gcses/sciences-2016.html>

Subject	Exam Board	Course Code	Paper	Length of Paper	Number of Marks on Paper	% towards GCSE
Biology	Edexcel	1BI0	1	105 min	100	50
		1BI0	2	105 min	100	50
Chemistry	Edexcel	1CH0	1	105 min	100	50
		1CH0	2	105 min	100	50
Physics	Edexcel	1PH0	1	105 min	100	50
		1PH0	2	105 min	100	50
Combined Science	Edexcel	1SC0	Bio 1	60 min	60	16.67
			Bio 2	60 min	60	16.67
			Chem 1	60 min	60	16.67
			Chem 2	60 min	60	16.67
			Phys 1	60 min	60	16.67
			Phys 2	60 min	60	16.67

For Y11

All GCSE sciences have three 1 hour written papers and a practical controlled assessment. All four components, Biology, Chemistry, Physics and Controlled Assessment are each worth 25% of the specification towards Additional Science and Further Additional Science final grades.

<http://qualifications.pearson.com/en/qualifications/edexcel-gcses/science-2011-mixed.html#tab-1>

A level

Subject	Exam Board	Course Code	Paper	Length of Paper	Number of Marks on Paper	% towards As Level
Biology	AQA	7402	1	120 min	91	35
	AQA	7402	2	120 min	91	35
	AQA	7402	3	120 min	78	30
Chemistry	OCR	H432	1	135 min	100	37
	OCR	H432	2	135 min	100	37

	OCR	H432	3	90 min	70	26
Physics	OCR	H556	1	135 min	100	50
	OCR	H556	2	135 min	100	50
	OCR	H556	3	90 min	70	

Biology

<http://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402>

Chemistry

<http://www.ocr.org.uk/qualifications/as-a-level-gce-chemistry-a-h032-h432-from-2015/>

Physics

<http://www.ocr.org.uk/qualifications/as-a-level-gce-physics-a-h156-h556-from-2015/>