

KS5 APPLIED SCIENCE, BIOLOGY, CHEMISTRY, PHYSICS

Introduction

We offer three sciences at A-Level and in the past our curriculum has included Applied Science. All our A-Level subjects are two year A-Level courses although some students do take AS in a science after one year if their combination of KS5 studies is appropriate. The courses are examined after two years through five different examinations. Practical skills are included in normal lessons and students maintain a formal record of their work which may be inspected by national moderators. Practical skills are then assessed in the written examinations

A-LEVEL BIOLOGY

Throughout the duration of the course you will cover a broad range of biology theories and principles and at the end of the two years, you will leave with a broad range of knowledge of how living systems work, including the principles of genetics, molecules, taxonomy, natural selection, evolutionary theory, global warming, bacteria and viruses, amongst others.

Course content

Module 1 - Development of practical skills in biology

- Practical skills assessed in a written examination
- Practical skills assessed in the practical endorsement

Year 1

Module 2 - Foundations in biology

- Cell structure
- Biological molecules
- Nucleotides and nucleic acids
- Enzymes
- Biological membranes
- Cell division, cell diversity and cellular organisation

Module 3 - Exchange and transport

- Exchange surfaces
- Transport in animals
- Transport in plants

Module 4 - Biodiversity, evolution and disease

- Communicable diseases, disease prevention and the immune system
- Biodiversity
- Classification and evolution

Year 2

Module 5 - Communication, homeostasis and energy

- Communication and homeostasis
- Excretion as an example of homeostatic control
- Neuronal communication
- Hormonal communication
- Plant and animal responses
- Photosynthesis
- Respiration

Module 6 - Genetics, evolution and ecosystems

- Cellular control
- Patterns of inheritance
- Manipulating genomes
- Cloning and biotechnology
- Ecosystems
- Populations and sustainability

Specification: OCR Biology A H020, H420 <http://www.ocr.org.uk/qualifications/as-a-level-gce-biology-a-h020-h420-from-2015/>

A-LEVEL CHEMISTRY

Chemistry A level is taught over two years. It covers physical, organic and inorganic elements and practical skills are taught in an integrated manner through the two years.

We teach the OCR Chemistry A specification H032, H432

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

Course content

Module 1 Practical Skills

Moles determination, acid base titrations, enthalpy determination, qualitative analysis of ions, organic synthesis (solids and liquids), qualitative analysis of organic functional groups, rates of reactions (continuous monitoring and initial rates), pH measurements and research skills.

Year 1

Module 2

- Atoms, ions and compounds
- Amounts of substance
- Acids and redox
- Electrons and bonding
- Shapes of molecules

Module 3

- Periodicity
- Reactivity trends
- Enthalpy
- Reaction rates and equilibrium

Module 4

- Basic concepts of organic chemistry
- Alkanes
- Alkenes
- Alcohols
- Haloalkanes

- Organic synthesis

Year 2

Module 5

- Rates of reaction
- Equilibrium
- Acids, bases and pH
- Buffers and neutralisation
- Enthalpy and entropy
- Redox and electrode potential
- Transition elements

Module 6

- Aromatic chemistry
- Carbonyls and carboxylic acids
- Amines, amino acids and proteins
- Organic synthesis
- Chromatography and spectroscopy

A-LEVEL PHYSICS

Physics A-Level is one of the most universally accepted qualifications for progression to university. It is taught over two years. The course will develop and stretch your current knowledge such that you have a deeper understanding of how and why our universe appears and behaves the way in which it does. It spans from the unimaginably small realms of the subatomic and quantum level to the unimaginably large realms of astrophysics and cosmology.

You will integrate the concepts studied with a range of practical experiments throughout each topic giving the course both an academic and practical focus. You will learn to apply your knowledge of the key concepts to solve problems in a range of different contexts and applications.

We teach the OCR Physics A specification H556

<http://www.ocr.org.uk/Images/171726-specification-accredited-a-level-gce-physics-a-h556.pdf>

Course content

Module 1 - Development of practical skills in physics

Physics is a practical subject. The development and acquisition of practical skills is fundamental. The Physics A course provides you with the opportunity to develop experimental methods and techniques for analysing empirical data. Skills in planning, implementing, analysing and evaluating will be assessed in the written papers.

Module 2 - Foundations of physics

- Important conventions and ideas that permeate the fabric of physics. Understanding of physical quantities, S.I. units, scalars and vectors helps physicists to effectively communicate their ideas within the scientific community.

Module 3 - Forces and motion

- Model the motion of objects using mathematics, understand the effect forces have on objects, learn about the important connection between force and energy, appreciate how forces cause deformation and understand the importance of Newton's laws of motion. Students finish this section examining the physical properties of materials.

Module 4 - Electrons, waves and photons

- Quantum physics. Electromagnetic waves (e.g. light) have a dual nature.
- Electrons, electric current, electrical circuits, wave properties, electromagnetic waves and, of course, quantum physics. Students have the opportunity to appreciate how scientific ideas of quantum physics developed over time and their validity rested on the foundations of experimental work.

Module 5 - Newtonian world and astrophysics

- Newton's law of gravitation can be used to predict the motion of planets and distant galaxies.
- In the final section you will explore the intricacies of stars and the expansion of the Universe by analysing the electromagnetic radiation from space.
- Thermal physics, circular motion, oscillations, gravitational field, astrophysics and cosmology.

Module 6 - Particles and medical physics

- Electric fields, electromagnetism, nuclear physics, particle physics and medical imaging.
- Coulomb's law, uniform electric fields, electric potential and energy, the basic properties of capacitors and how they are used in electrical circuits.
- Exponential decay and radioactive nuclei.
- Magnetic fields, motion of charged particles in magnetic fields, Lenz's law and Faraday's law.
- Atom, nucleus, fundamental particles, radioactivity, fission and fusion.
- X-rays, CAT scans, PET scans and ultrasound scans. This section shows how the developments in medical imaging have led to a number of valuable non-invasive techniques used in hospitals.

BTEC APPLIED SCIENCE

We currently offer BTEC Applied Science to a small number of students. The format of the course and its assessment is changing which means we are unlikely to offer the BTEC Applied Science in its current form to future cohorts.