SCIENCE

A level courses in:

Biology

Chemistry

Physics

Ashby Sixth Form

A level Biology

WHY STUDY BIOLOGY?

A level biology is a highly regarded subject that develops a range of skills including analytical skills, practical skills and maths skills. It covers an array of concepts within human biology, biochemistry, ecology and zoology. Students will have the opportunity to design investigations, use specialist laboratory equipment and analyse data from which to draw their own conclusions.

Studying biology can lead to university study in many different fields Including psychology, criminology, medical science, physiotherapy, zoology, animal science, biomedical science, neuroscience, natural science, midwifery and forensic science.

COURSE CONTENT

Biological molecules

Cells

Organisms exchanging substances with their environment

Genetics, variation and relationships between organisms

Energy transfer in and between organisms

Organisms response to changes in their internal and external environment

Genetics, populations, evolution and ecosystems

The control of gene expression

COURSE ENTRY REQUIREMENTS

A minimum of a grade 5,5 in GCSE 'Trilogy Combined Science'
or
A minimum of a grade 5 in GCSE biology (Separate Sciences) and a minimum of a grade 5 in GCSE maths

ASSESSMENT

There is regular monitoring of performance through 'in house' interim tests, end of topic tests and mock exams.

The public examinations include:
Three 2 hour exams at the end of Year 13
These examinations will assess knowledge on course content, maths skills and practical skills (from the 12 required practical's).

FURTHER INFORMATION

Practical Endorsement
During the two years, students work towards a practical endorsement. They are required to undertake 12 practical's and develop the associated practical-based skills.
Some of the required practical's are listed below:
- Dissection
- Aseptic techniques and microbial growth
- Chromatography
- Factors affecting the permeability of cell membranes
- Environmental variables affecting animal behavior
- Respiration in yeast
- Factors affecting the distribution of plant species

A level Chemistry

WHY STUDY CHEMISTRY?

A level Chemistry is a highly regarded subject that develops a wide range of transferable skills including analytical, practical and mathematical. It covers the three main aspects of chemistry: organic, inorganic and physical. During the course, students will have the opportunity to design practical investigations, get to use specialist laboratory equipment and analyse data to allow them to draw their own conclusions. Studying chemistry can lead on to university study in many different fields including: medicine, veterinary, pharmacy, forensic science, dentistry, chemical engineering, science based degrees and is also looked on favourably by other non- science degrees.

COURSE CONTENT

- Amount of substance
- Atomic structure and bonding
- Energetics and kinetics
- Chemical equilibria, Le Chatelier's principle and *Kc*
- Oxidation, reduction and redox equations
- Thermodynamics and rate equations
- Equilibrium constant *Kp* for homogeneous systems
- Electrode potentials and electrochemical cells
- Acids and bases
- Periodicity, Group 2 and Group 7
- Properties of Period 3 elements and their oxides
- Transition metals and reactions of ions in aqueous solution
- Nomenclature, isomerism and alkanes
- Halogenoalkanes, alkenes and alcohols
- Organic analysis, synthesis and determination
- Aldehydes and ketones
- Carboxylic acids and its derivatives
- Aromatic chemistry
- Amines, polymers, amino acids, proteins and DNA
- Chromatography

COURSE ENTRY REQUIREMENTS

A minimum of a Grade 5,5 in GCSE Trilogy Combined Science
or
A minimum of a Grade 5 in GCSE Chemistry (separate sciences)
and
A minimum of a Grade 5 in GCSE Maths

FURTHER INFORMATION

Practical Endorsement

During the two years, students work towards a practical endorsement. They are required to complete 12 practical's that include:

- Prepare a solution of known concentration and carry out a simple acid and base titration
- Measurement of an enthalpy change
- Investigation of how the rate of a reaction changes with temperature
- Carry out simple test-tube reactions to identify cations and anions in aqueous solution
- Distillation of a product from a reaction
- Carry out tests for the presence of organic functional groups
- Measuring the rate of reaction by an initial rate and continuous monitoring method
- Measuring the EMF of an electrochemical cell
- Investigate how pH changes when a weak acid reacts with a strong base and when a strong acid reacts with a weak base
- Preparation of an organic solid and liquid to test its purity
- Carry out simple test-tube reactions to identify transition metals in aqueous solution
- Separation of a species by thin-layer chromatography

ASSESSMENT

There is regular monitoring of performance through 'in house' interim tests, end of topic tests, mock exams and homework's. The public examinations will assess knowledge on course content, maths skills and practical skills (from the 12 'required practical's').
Paper 1: Inorganic & relevant physical chemistry. Relevant practical skills. 2 hour written exam: 105 marks of short & long answer questions 35% of the A level grade.
Paper 2: Organic & relevant physical chemistry. Relevant practical skills. 2 hour written exam paper: 105 marks of short & long answer questions 35% of the A level grade.
Paper 3: All practical skills. All content. 2 hour written exam paper40 marks for questions on practical techniques and data analysis, 20 marks of questions testing across the specification and 30 marks of multiple choice questions 30% of the A level grade .

A level Physics

WHY STUDY PHYSICS?

Universities and employers are always impressed by a qualification in Physics; an A-level in this subject will open up a vast array of opportunities and careers within science and beyond.

These are just some examples of industries and jobs an A-level in physics may lead to: Space physics (e.g. cosmologist, planet-hunter, astrophysicist, space engineer), medicine (e.g. medical physicist, radiographer), engineering (e.g. structural engineer, architect), renewables (e.g. solar physicist), film, TV and video games (the laws of physics are used to make visual effects and video games believable), science journalism, sports engineering, business, banking, law, teaching.

COURSE CONTENT

Year 1

Measurements and their errors, 2. Particles, 3. Electromagnetic radiation and quantum phenomena, 4. Progressive and stationary waves, 5. Refraction, diffraction and interference, 6. Force, energy and momentum, 7. Materials, 8. Current electricity

Year 2

9. Periodic motion, 10. Thermal physics, 11. Gravitational fields, 12. Electric fields, 13. Capacitance, 14. Magnetic fields, 15. Radioactivity, 16. Option: Turning points in physics (a. The discovery of the electron, b. wave-particle duality, c. special relativity)

COURSE ENTRY REQUIREMENTS

Grade 5-5 in GCSE Combined Science: Trilogy and Grade 6 in GCSE Mathematics
or
Grade 5 in GCSE Physics (separate sciences) and Grade 6 in GCSE Mathematics

ASSESSMENT

The examination board and specification is:
AQA Physics A-level (Specification code: 7408)
At the end of Year 13, students sit three 2 hour written examinations which make up their overall grade (34%, 34%, 32%).
These papers will include questions on topics spanning the full two years, as well as focusing on the scientific approach to collecting and analysing data and understanding uncertainty.
As part of the course, there is also a practical endorsement that students work towards (details on the back).

FURTHER INFORMATION

Practical Endorsement

In addition to the exams, students undertake 12 required practical investigations (6 in each year). Their performance in these is monitored and their write-ups, together with the associated skills and techniques, demonstrate the CPAC (Common Practical Assessment Criteria). This leads to a practical endorsement printed on their certificate alongside their grade (either Pass or Unclassified). Many university departments are looking for this to be a pass as part of their offer.
They are required to complete 12 practical investigations which are:

- Investigation into the variation of the frequency of stationary waves on a string with length, tension and mass per unit length of the string.
- Investigation of interference effects to include the Young's slit experiment and interference by a diffraction grating.
- Determination of g by a free-fall method.
- Determination of the Young modulus by a simple method.
- Determination of resistivity of a wire using a micrometer, ammeter and voltmeter
- Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it.
- Investigation into simple harmonic motion using a mass–spring system and a simple pendulum.
- Investigation of Boyle's (constant temperature) law and Charles's (constant pressure) law for a gas.
- Investigation of the charge and discharge of capacitors. Analysis techniques should include log-linear plotting leading to a determination of the time constant RC.
- Investigate how the force on a wire varies with flux density, current and length of a wire using a top pan balance.
- Investigate, using a search coil and oscilloscope, the effect on magnetic flux linkage of varying the angle between a search coil and magnetic field direction.
- Investigation of the inverse-square law for gamma radiation.

CONTACT INFORMATION

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Ashby Sixth Form

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