BTEC Applied Science

Science Curriculum Intent - Pearson Level 3 Alternative Academic Qualification BTEC National in Applied Science (Extended Certificate)

The qualification has been developed in consultation with higher education representatives and sector experts from associated professional bodies to ensure students have the knowledge, understanding and skills they need to progress to, and thrive, in higher education. The qualification has four mandatory units covering the following topics:

- Principles and Applications of Biology – Structure and function of cells and tissues, biological molecules, enzymes and their role in organisms
- Principles and Applications of Chemistry – Structure of the Periodic Table and its implications on physical and chemical properties of substances, through analysis of different bonding methods
- Principles and Applications of Physics – Waves and their applications; force principles and their application in transportation and construction of electrical circuits • Practical Scientific Procedures and Techniques – Practical applications across the sciences, including chromatography, colorimetry and electrical circuits.

Students then study the optional unit covering the following topics:

- Contemporary Issues in Science – Contemporary scientific issues including the reliability of sources of scientific information and their associated validity.

CURRICULUM LESSONS ALLOCATED OVER THE WEEKLY TIMETABLE

Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
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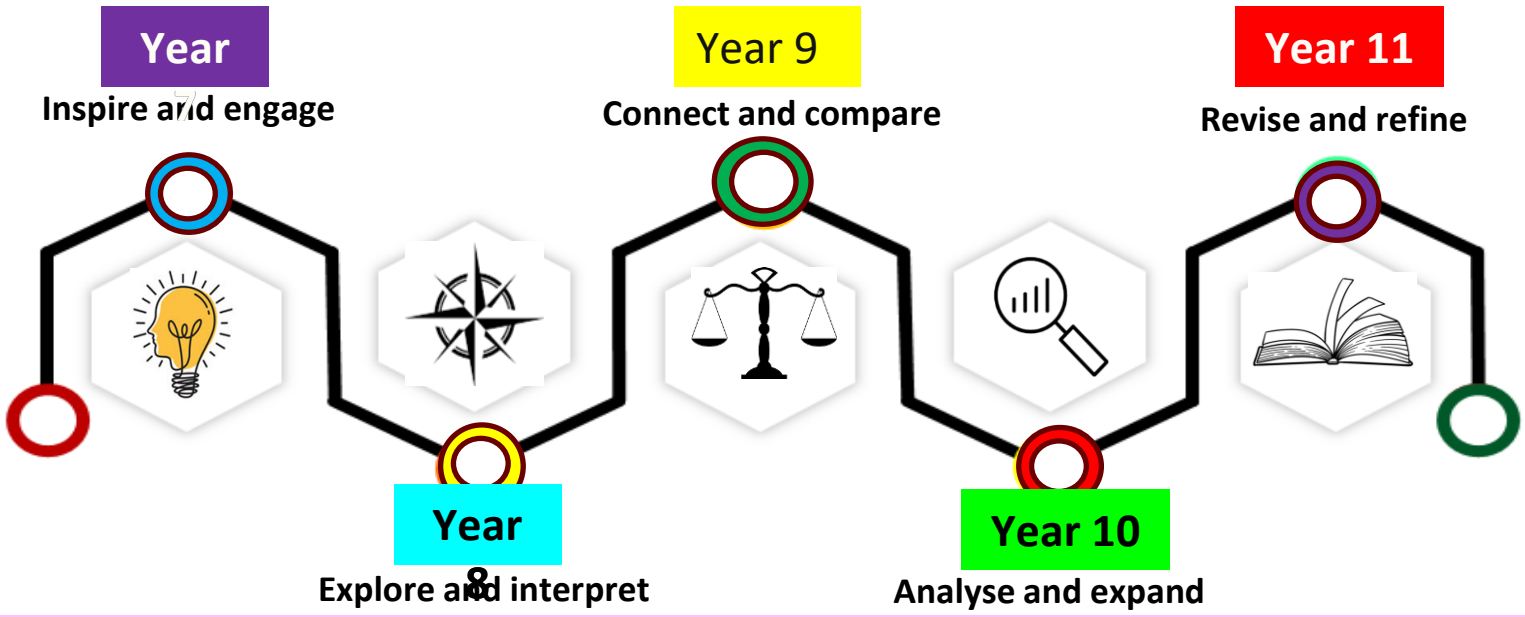
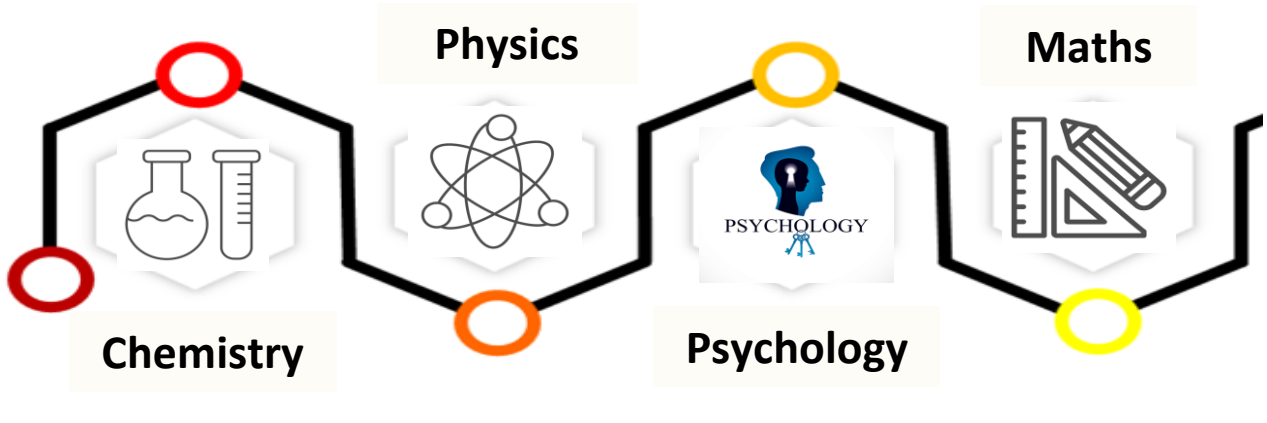
INSPIRE	MOTIVATE	ACHIEVE
Students will develop the following knowledge and skills from the mandatory units: • Fundamental scientific principles and applied knowledge relating to biology, chemistry and physics • Laboratory techniques, including health and safety assessment, and associated professional practice • Problem solving. Students will develop the following knowledge and skills from the optional units: • Scientific Research skills including researching and planning methodologies, primary data collection and analysis, drawing justified conclusions. • Secondary research skills including collecting information from a range of sources, its evaluation and interpretation, and its use to draw reasoned conclusions. • Transferable skills such as critical thinking, taking personal responsibility and written communications.	Students develop the ability to practically apply scientific concepts, which is beneficial to the analytical approach of related degrees. Critical thinking and independent learning help students to be better prepared for the self-directed learning approach used in higher education and become more open-minded to learning. Research and extended writing skills with the other skills, creates a good foundation for academic success.	The Pearson Level 3 Alternative Academic Qualification BTEC National in Applied Science (Extended Certificate) is an Alternative Academic Qualification (AAQ) designed for post-16 students with an interest in science and aiming to progress to higher education as a route to graduate level employment. Equivalent to one A Level in size, it is suitable for students looking to develop their applied knowledge and skills in science alongside two A Levels.

SUBJECT CURRICULUM THEMES



CONTINUING THE CURRICULUM PATH



Future Pathways

This qualification can lead to progression to the following degrees:

- BSc (Hons) Applied Sport and Exercise Sciences
- BSc (Hons) Nursing
- BSc (Hons) Secondary Science Education

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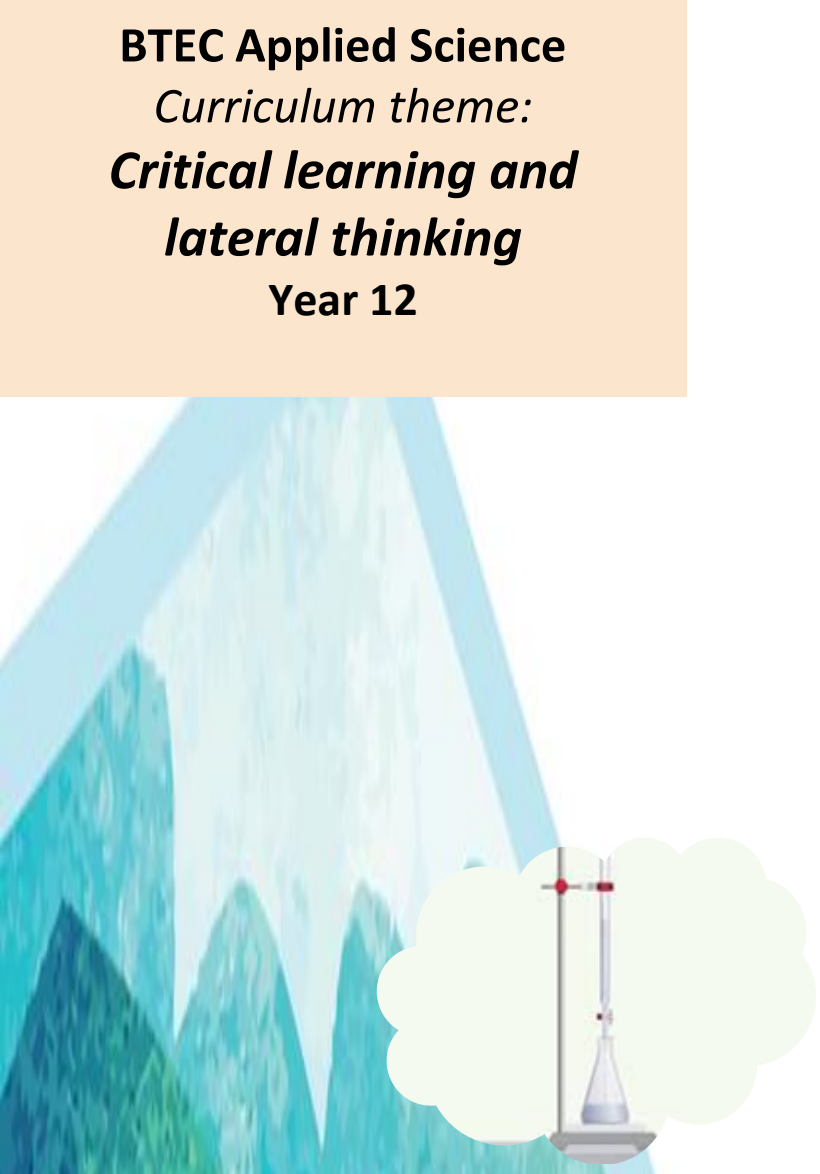
Curriculum theme:

Critical learning and lateral thinking

Year 12

12



Unit 4 - Chemistry coursework
Learning aim A: Undertake techniques to determine chemical concentration and composition of substances.
Pupils will work to demonstrate accurate procedures to prepare, dilute and calculate correctly the concentration of a standard solution. Then use practical techniques to estimate the purity of an organic solid.
Milestone: Coursework

Unit 3 - Unit 3 - Principles and applications of Physics
A: Understanding waves and optical fibres
In this unit, you will learn about waves and how electromagnetic waves are the basis for our modern communication systems. Mobile phones, Wii-FI and Bluetooth© will no doubt be concepts you're already familiar with. This unit will enable you to develop an insight into how these systems work and the activities they perform.
A1 Working with waves
A2 Principles of optical fibres
3 Uses of electromagnetic waves in communication
Milestone: Waves test and Y12 PPE

Unit 4 - Biology coursework
Learning aim B: Undertake biological procedures to investigate concentration and distribution of biological components
Pupils will work to accurately use colorimetry to determine the concentration of a solution. Then carry out an investigation into the factors which affect the distribution and growth of plants. Finally, they analyse plant characteristics using microscopy.
Milestone: Coursework

Unit 2 - Principles and applications of Chemistry
D: Physical chemistry
D1.1 Concept of the mole and use in calculations involving mass, molar mass, empirical formula, gas volumes and percentage yield.
Milestone: Year 12 PPE

Unit 2 - Principles and applications of Chemistry
C: Periodicity
Periodicity will be explored through the study of Period 3 elements and their compounds, focusing on changes in oxidation number, physical and chemical properties, and making predictions for other elements.
Milestone: Periodicity test

Unit 4 - Physics coursework
Learning aim C: Undertake physical procedures to examine energy transfer
Pupils will work to correctly obtain data to construct cooling curves. Then create a circuit using a circuit diagram that can be used to take readings of current and voltage, to find the resistance of a carbon resistor. Finally, they demonstrate how voltage is produced by a solar panel.
Milestone: Coursework

Unit 1 - Principles and applications of Biology
B: Structure and function of biological molecules
B1 Structure and function of water
B2 Structure and function of carbohydrates
B5 Structure and function of lipids
Milestone: End of year PPE

Unit 2 - Principles and applications of Chemistry
B: Bonding and structure
In this unit, you will re-examine basic chemistry of bonding and structure with more advanced concepts such as ionisation energy, electronegativity, polarity, molecular shape and intermolecular forces.
Milestone: Bonding test

Unit 3 - Principles and applications of Physics
C: Electrical circuits and the transfer of energy
Electricity, electrical circuits and their relationship to energy usage, are also very important as our use of electrical devices continues to rise. By using physics, it is possible to understand how we can create energy alternatives that can help us develop greater more sustainability in our future environment.
C1 Use of electrical components
C2 Equations
C3 Electrical energy usage
C4 Energy transfer
C5 Change of state
Milestone: Electrical circuits test

Unit 1 - Principles and applications of Biology
A - Structure and function of cells and tissues
A1 Structure and function of cells and tissues
A2 Structure and function of specialised cells in multicellular organisms
A3 Structure and function of biological tissues
Milestone: Cells and tissues test

Unit 2 - Principles and applications of Chemistry
A: Atomic and electronic structure
In this unit, you will re-examine basic chemistry (the periodic table, atomic and electronic structure, with more advanced concepts such as ionisation energy.
Milestone: Atomic structure test

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Curriculum theme:

Academic study and self directed learning

Year 13

Potential destinations

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Unit 6: Contemporary Issues in Science - coursework

This unit will explore contemporary science issues and their impact on the world we live in. It will develop the students' skills of analysis and interpretation across a broad range of scientific issues while exploring how they are reported in the media and in publications.

Learning aims

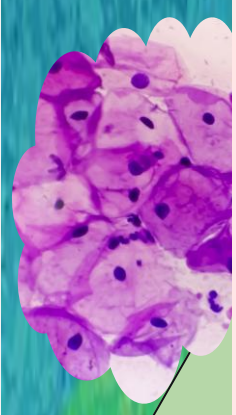
In this unit you will:

A Investigate contemporary scientific issues that impact the global population and environment.

B Examine the effect different organisations have on contemporary science.

C Understand how to evaluate and report scientific information.

Milestone: Coursework



Unit 1 - Principles and applications of Biology

C: Cellular transport and enzyme activity

C1 Cell transport mechanisms

C2 Enzymes as biological catalysts

C3 Homeostasis

Milestone: Cellular transport test and Unit 1 exam Jan 2027

Unit 2 - Principles and applications of Chemistry

E: Organic chemistry

You will learn the basics of organic chemistry, naming and drawing formulae, understanding isomerism and other properties, the reactions of different types of organic compound, and the benefits or problems that organic chemistry can provide.

Milestone: Organic Chemistry test and Unit 1 exam Jan 2027

Unit 3 - Principles and applications of Physics

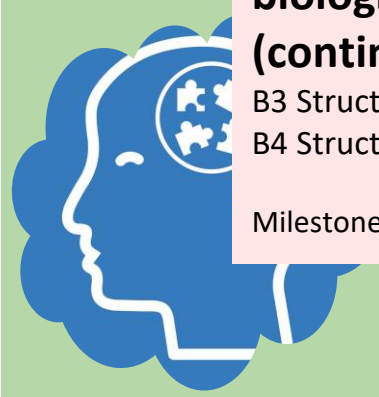
B: Forces in transportation and Newtons Laws of Motion

The study of motion and laws of motion are also important when developing safety products for our everyday lives. Seat belts, air bags and crumple zones are just three innovations that came about through the study of motion.

B1 Measurement and representation of motion

B2 Laws of motion

Milestone: Forces test then Unit 1 exam Jan 2027



Unit 1 - Principles and applications of Biology

B: Structure and function of biological molecules (continued from year 12)

B3 Structure and function of proteins

B4 Structure and function of nucleic acids

Milestone: Biological molecules test

Unit 2 - Principles and applications of Chemistry

D: Physical chemistry (cont)

You will learn about the main branches of physical chemistry (chemical kinetics, energetics and equilibrium), perform mole calculations, and consider the impact of green chemistry in the chemical industry.

D1.2 Chemical kinetics

D1.3 Chemical energetics

D1.4 Chemical equilibrium

D1.5 Application of chemical kinetics, energetics and equilibrium to the chemical industry

D1.6 Application of green chemistry in the chemical industry

Milestone: Physical Chemistry test