Science Ethos and Teaching

Subject Lead: Mr Alan Daniels

Intent:

At Kilgarth, we believe that the study of science should widen our pupils' understanding about every aspect of the world we live in and how science impacts on their everyday lives. We aim to deliver a science curriculum that is stimulating and challenging; taught using a variety of tasks that are often practically based and always take account of the pupils' individual needs. We have a strong focus on developing the vital skills to enable collaborative and independent learning to take place. All this enables pupils to achieve their individual potential and achieve a qualification in this core subject area at the end of Key Stage 4.

Implementation Programme of Study:

Key Stage 3 – Pupils' follow the national curriculum programme of study in years 7&8 and study ELC science in Year 9.

	Autumn	Spring	Summer
Year 7	**Introduction to science** – pupils will learn about hazards and how to work safely in a science laboratory. **Cells, Tissues and organs** – pupils will learn the structure of living things, how cells are specialised for particular jobs and how to use a microscope. **Particles and reactions** – pupils will be able to explain the properties of solids, liquids and gases using the particle model. They will learn about acids, alkalis and neutralisation. **Environment and adaptation** – Pupils will learn how plants and animals are adapted to live in the different environments that exist around the globe.	**Reproduction** – pupils will learn about sexual and asexual reproduction, fertilisation, gestation and reproduction in animals and plants. **Energy transfers** – pupils will learn that energy can be transferred from one place to another. They will investigate fuels and their uses and why they need to be conserved. **Classification** – pupils will be able to explain how we put living things into groups according to their observable features. **Weathering and fossils** – pupils will be able to explain the features of rocks and how they are formed or changed by physical or chemical processes.	**Rocks and the rock cycle**– Pupils will learn about the structure of the earth and how different rocks formed. **Feeding relationships** – pupils will be able to understand how some living things prey on others and how food weds indicate a flow of energy in an ecosystem. **Forces and speed** – pupils will learn how forces can affect objects, measure the speed of an object and explain the effects of friction, air resistance and streamlining. **Energy & electrical circuits** – pupils will learn to use the concept of energy and work done as well as energy transfer to explain what is happening in components in simple circuits.
Year 8	**Space and the universe** – pupils will learn about our place in the universe, the structure of our solar system and how the force of gravity holds the universe together. **Separating mixtures** –pupils will learn about solubility and how substances can be separated by their physical properties. **Keeping Healthy** – pupils will learn about diet, the digestive and cardiovascular systems as	**Microbes and disease** – pupils will learn about useful and pathogenic micro-organisms, the cycle of disease and natural and acquired immunity. **Magnetism and electricity generation** – pupils will learn about magnetism and its role in generating electricity. **Atoms and elements** – pupils will learn about the periodic table and how matter is arranged into atoms and elements.	**Compounds and mixtures** – Pupils will learn that elements react together to form compounds and mixtures are substances that are not chemically joined together and can be separated without chemical change. **Light** – pupils will learn about light traveling in straight lines, reflection, refraction and how absorption/reflection by objects determines the colour of an object.

	well as monitoring the fitness of an individual. **Life and death** – pupils will learn about the natural cycles that exist in nature and the impact they have on population dynamics in ecosystems. This includes photosynthesis and respiration.	**Sound** – pupils will learn that sound waves transfer energy from one place to another, they will also learn about the structure and function of the ear	**Heating and cooling** – pupils will learn the distinction between heat and temperature and how thermal energy is transferred by conduction, convection and radiation. **The effect of drugs on the body** – pupils will learn about the effects of drugs on the body including smoking and alcohol.
Year 9	**<u>Entry Level Science Biology</u>** **Paper 1: Biology** - Cells, genetics, inheritance and modification **Paper 2: Biology** - Health, disease and the development of medicines	**<u>Entry Level Science Chemistry</u>** **Paper 3: Chemistry** - Atoms, compounds and states of matter **Paper 4: Chemistry** - Separating mixtures, breaking down substances, acids and metals	**<u>Entry Level Science Physics</u>** **Paper 5: Physics** - Forces, movement and energy **Paper 6: Physics** - Waves and radiation

Key Stage 4

At Key Stage 4 pupils can study Edexcel GCSE Biology, Edexcel BTEC Certificate in the Principles of Applied Science or Gateway Level 1 Vocational Studies.

BTEC Level 1/2 Principles of Applied Science

BTEC Applied Science Progression Route			
Unit 1 **Principles of Science**	**Unit 2** **Chemistry and Our Earth**	**Unit 3** **Energy and Our Universe**	**Unit 4** **Biology and Our Environment**
External examination	Four internally assessed assignment briefs	Three internally assessed assignment briefs	Three internally assessed assignment briefs
25%	25%	25%	25%

BTEC Applied Science Progression Route			
	Autumn	**Spring**	**Summer**
Year 10	**BTEC Unit 4** **Assignment 1 -** Threat to the Ecosystem Investigate the relationships that different organisms have with each other and with their environment. **BTEC Unit 2** **Assignment 1 -** Manufacture and Quality Control of Compounds Investigating chemical reactivity and bonding.	**BTEC Unit 3** **Assignment 1 -** Do They Always Glow in the Dark? Understand ionising radiation, its uses and sources. **BTEC Unit 4** **Assignment 2 –** : Advising Industry About Impact on Ecosystems Demonstrate an understanding of the effects of human activity on the environment and how these effects can be measured.	**BTEC Unit 2** **Assignment 2 -** Useful Chemical Products Investigate how the uses of chemical substances depend on their chemical and physical properties. **BTEC Unit 3** **Assignment 2 -** Making Electricity – Really! Know how electrical energy produced from different sources can be transferred through the National Grid to homes and industry.
Year 11	**BTEC Unit 4** **Assignment 3 -** Improving the Use of Medicines Explore the factors that affect human health	**BTEC Unit 3** **Assignment 3 -** Where Is All that Space? Know the components of the Solar System, the way the Universe is changing and the	**Unit 1 Principles of applied science exam preparation and external exam**

		methods we use to explore space	
	BTEC Unit 2 **Assignment 3 -** Controlling Industrial Reactions Investigate the factors involved in the rate of chemical reactions.	**BTEC Unit 2** **Assignment 4 –** Affecting the Environment Understand the factors that are affecting the Earth and its environment.	

All assignment briefs are completed in the classroom. Pupils will have appropriate guidance (in line with BTEC assessment guidelines) and will have the opportunity to improve their work to gain a higher grade if they wish to do so. The following grades are available:

Qualification Grade	GCSE (9-1) Equivalence
PASS	equivalent to GCSE grade 4
MERIT	equivalent to GCSE grade 5.5
DISTINCTION	equivalent to GCSE grade 7

Edexcel GCSE Biology:

GCSE Biology ensures that students can enjoy science and succeed in their studies. The course is structured in a way that means we can best support and stretch our students. The specification are straightforward, and the selection of core practicals are designed to help bring science learning to life. Assessments are shaped to encourage all students to best show what they know and can do.

GCSE Biology Progression Route
Two terminal exams (1 hour and 45 minutes) are taken at the end of the course.

GCSE Biology Progression Route			
	Autumn	**Spring**	**Summer**
Year 10	Topic 1 – Key concepts in Biology Topic 2 – Cells and control	Topic 3 – Genetics Topic 4 – Natural selection and genetic modification	Topic 5 – Health, disease and the development of medicines Topic 6 – Plant structures and their functions
Year 11	Topic 7 – Animal coordination, control and homeostasis Topic 8 – Exchange and transport in animals	Topic 9 – Ecosystems and material cycles Revision of all topics including practice / past papers	Revision and External Assessment

Gateway Level 1 Extended Certificate in Vocational Studies:

These qualifications have been developed to enable learners who are vocationally undecided to have their achievements recognised across a number of different vocational sectors.

Gateway Vocational Science
Ongoing assessment by a portfolio of evidence. Learners must complete 25 credits with at least 13 credits achieved at Level 1. 18 credits must come from Group O1 (Optional Units: Sector Specific Skills) and a maximum of 7 may come from Group O2 (Optional Units: Employability Skills).

Gateway Vocational Science			
	Autumn	**Spring**	**Summer**
Year 10	Concepts and techniques for chemistry The study of living systems	Energy, waves and radiation Healthy living	Using equipment to make scientific observations and measurements
Year 11	Making useful scientific devices Searching for a job	Applying for a job Interview skills	Final preparation – completed portfolio of evidence for submission

Impact:

The progression routes offered can be tailored to accommodate pupils who have a clear ambition to move on to a science related career / course, but also enables learners who are vocationally undecided to experience a range of different science topics. This will support pupils' mental health and wellbeing, knowing that their achievements will be recognised across a number of vocational sectors.

The courses use a variety of different teaching and learning methods, enabling pupils to develop resilience when working independently towards deadlines for each unit. They will also develop the skills needed to work collaboratively as part of a team on various projects whilst each being recognised for their individual contribution.

In all routes, each unit contains many examples of where the learning fits into everyday life, ensuring that the pupils have the experience and skills required for moving on to their next steps in education, employment or training.

The units selected, method of delivery and the variety of formative assessment means that the course can be tailored to the individual needs of students so all can make progress relative to their starting point.

Pupils' evidence must be well presented for submission, including good spelling, punctuation and grammar. Feedback on this will be given throughout the course along with the chance to re-submit work once corrected.