Science

Teachers: Helen Booth and Maria Brennan

The Science department offer practical and theoretical engaging lessons. All KS3 pupils study a three year rolling programme which covers units in Biology, Chemistry and Physics. The programme covers the skills outlined in the National Curriculum. It offers a clear transition and progression from KS3 to KS4. Students in Key Stage 4 will have the opportunity to study either Entry Level Science Award or Dual Award Science GCSE.

Schemes of work:

Key Stage 4

Year 10

Autumn One	Autumn Two	Spring One	Spring Two	Summer One	Summer Two
P5 – Alternative Energy Students will learn: • about energy resources including both renewable and non-renewable sources. • how electricity is generated and how important sustainable energy resources are for our futures. KEYWORDS • Energy source • Renewable • Non-renewable • Fuel • Tidal power • Wind turbine • Solar cell	**B5 – Grasping for Breath** Students will learn: • about their lungs, how breathing works and that different things including smoking, poisons and pollution can affect how our lungs work. • that the lungs play a role in the gas exchange necessary for respiration. • about the skeletal and muscular systems and how they interact. KEYWORDS • Lung • Asthma • Oxygen • Carbon dioxide • Respiration	**C3 – Everything in its place** Students will learn: • about atoms and how the atomic model has developed over time. • more about the periodic table and the properties for group 0, 1 and 7. • About isotopes and be able to calculate the number of protons, neutrons and electrons in an atom. KEYWORDS • Proton • Neutron • Electron • Element	**P10 – Driving along** Students will learn: • that speed is a measure of distance/time and how to interpret a distance/time graphs. • about speed limits, stopping distances and things that can help prevent or protect us in a car accident. KEYWORDS • Speed • Stopping distance Suggested practical skills: P1, P2, P3, U1, U4	**B8 – Body Wars** Students will learn: • about pathogens and how they can affect both plants and animals. • How the body can protect itself, how antibiotics work and how vaccinations can help protect us. • about non-communication diseases like cancer and diabetes. KEYWORDS • Microbe • White blood cell • Immune system • Vaccine • Antibiotic	**C5 – Novel Materials** Students will learn: • about carbon and how different atomic structures and bonding lead to different material properties including those of diamond and graphite. • that an alloy is a mixture of two or more elements in which at least one is a metal and that alloys can have very useful properties. KEYWORDS • Metal • Alloy • Smart alloy • Mineral

Suggested practical skills: P1, P2, P3, U1, U3, U4 **P7 – Electricity Supply** Students will learn: • about electricity including series and parallel circuits and the components involved in circuits. • about conducting and insulating components. • about energy efficiency and ways to reduce energy loss from the home. KEYWORDS • Battery • Fossil fuel • Power station • Power grid • Unit Suggested practical skills: P3, P4, U1, U3, U4	• Glucose Suggested practical skills: B1, U1, U3, U4 **B6 – Casualty** Students will learn: • about the heart and how it working pumping blood around our bodies. • about the different blood vessels and blood cells and their jobs. • about respiration and how. important this process is for all living things as it releases energy from our food. KEYWORDS • Heart • Artery • Vein • Capillary Suggested practical skills: B1, B4, U1, U3, U4	Suggested practical skills: U1 **C9 – Fuels** Students will learn: • about crude oil and our reliance on hydrocarbons in the modern world. • how crude oil is separated by fractional distillation and be able to recall uses for the different fractions. • that plastics are made from polymers which are long chains of monomers joined together. KEYWORDS • Crude oil • Petrol • Diesel • Fuel • Burning Suggested practical skills: : C1, C3, U1, U2, U3, U4	**P6 – Nuclear Energy** Students will learn: • about atoms about their structure. • that isotopes are different forms of the same atom. • the benefits and risks associated with nuclear power. KEYWORDS • Radioactive • Plutonium • Nuclear safety Suggested practical skills: C1, C2, C3, U1, U2, U3, U4	• Hygiene Suggested practical skills: B1, B2, U1, U3, U4 **B12 – Food factory** Students will learn: • about the chemicals and conditions needed for photosynthesis and how important this process is for life on Earth. • how substances are transported around plants and how these are used in the process of photosynthesis. • how cloning plants and selective breeding have impacted on our modern lives and the ethical considerations around these. KEYWORDS • Sperm • Egg • Embryo • Foetus • Cord • Placenta Suggested practical skills: B1, B2, B4, U1, U2, U3, U4	Suggested practical skills: C1, C3, U1, U2, U3, U4 **C7 – Let's get together** Students will learn: • about bonding involving metals and non-metals such as sodium and chlorine. • how to write chemical formulae and be able to work out of the charge on an ion. • about electrolysis and how it can be used to separate ionic compounds. KEYWORDS • Ion • Cations • Anion • Conservation of mass • Cathode • anode Suggested practical skills: C1, C2, C3, C4, U1, U2, U3, U4

Year 11

Autumn One	Autumn Two	Spring One	Spring Two	Summer One	Summer Two
B1 – You are your genes Students will learn: • about the genome and what it does. • how genetic information is inherited. • how gene technology can and should be used. KEYWORDS • Genome • Nucleus • DNA • Gene • Allele • Variation • Dominant • Recessive • Carrier • Gender • Genetic testing **B2 – Keeping healthy** Students will learn: • about what causes disease. • how organisms protect themselves against pathogens and how can we prevent infections from spreading? • how lifestyle, genes and the environment affect health and how we treat disease. KEYWORDS • Symptom • Pathogen • Incubation period	**B3 – Living together** Students will learn: • about photosynthesis and how producers get the substances they need. • about organisms in an ecosystem and how they are interdependent. • how populations are affected by conditions in an ecosystem. KEYWORDS • Photosynthesis • Chloroplast • Enzyme • Catalyst • Diffusion • Osmosis • Active transport • Community • Ecosystem • Food chain • Interdependence • Carbon cycle • Bioaccumulation • Representative sample • Indicator species **B4 - Using food and controlling growth** Students will learn: • about cellular respiration and the functions of mitochondria and other cell structures. • how organisms grow and develop and how we use stem cells to treat damage and disease.	**B5 – The human body** Students will learn: • about how substances get into, out of and around our bodies. • how the nervous system helps us respond to changes. • how hormones control responses in the human body and the role they play in human body. • why we need to maintain a constant internal environment and what can happen if our organs or control systems stop working. KEYWORDS • Circulatory system • Digestive system • Excretory system • Deoxygenated blood • Oxygenated blood • Red blood cell • Surface area • Stimulus • Effector • Neuron • Synapse • Reflex • Hormone • Endocrine system • Homeostasis • Menstrual cycle • Contraceptive pill B6 – Life on earth – past, present and future			

• Immune system • Antibodies • Immunity • Contamination • Vaccine • Herd immunity • Coronary heart disease • Correlation • Peer review • Anti-biotic resistance • Clinical testing • Placebo	KEYWORDS • Cellular respiration • Mitochondria • Exothermic • Fermentation • Magnification • Resolution • Mitosis • Meiosis • Sexual reproduction • Unspecialised • Embryonic stem cells • Stem cell treatment • Hazard	Students will learn: • about the theory of evolution. • how DNA helped us to classify organisms. • how biodiversity is threatened and how we can protect it. KEYWORDS • Evolution • Natural selection • Variation • Extinction • Selective breeding • Fossil record • Classification • Species • Biodiversity • Sustainability • Biodegradable			

Year 8-10 Practical Skills	
Universal science skill areas (U)	
U1	Use of appropriate apparatus to make and record a range of measurements accurately.
U2	Safe use of appropriate heating devices and techniques.
U3	Obtaining and recording the results of a practical activity in an appropriate format.
U4	Follow a plan.
Biology skill areas (B)	
B1	Use of appropriate apparatus to observe and measure a biological change or process.
B2	Measure the rate of a reaction in biology.
B3	Use appropriate sampling techniques to investigate the distribution and abundance of organisms in an ecosystem via direct use in the field.
B4	Use of appropriate apparatus, and techniques to magnify a biological sample.
Chemistry skill areas (C)	
C1	Use of appropriate apparatus to conduct and monitor chemical reactions
C2	Safe use of a range of equipment to purify and/ or separate chemical mixtures.
C3	Safe and careful handling of gasses, liquids and solids.
P4	Use of appropriate apparatus and techniques carry out electrolysis.
Physics skill areas (P)	
P1	Use of appropriate apparatus and techniques to measure and observe the effects of forces on the extension of springs
P2	Use of appropriate apparatus and techniques for measuring motion.
P3	Safe use of appropriate apparatus to measure energy changes/transfers including work done.
P4	Use of appropriate apparatus to measure current, potential difference and resistance. Some of these skill areas are sub-divided into individual skills. Learners can be given half a point.

Syllabus materials KS4:

Entry Level - Science - R483 (from 2016) – OCR

GCSE - Twenty First Century Science Suite - Combined Science B (9-1) - J260 (from 2016) - OCR

Careers in Science:

1438_My Learning My Future_Science_FINAL.pdf (careersandenterprise.co.uk)