

Science



Department Intent: To provide students with the tools to understand science and its relevance in the modern world, and be able to think critically and evaluate information presented to them through a variety of media in society.

KS4 - Combined Science

Intention Overview:

Curriculum Knowledge	
<p>Year 9: Students begin the Biology component of the GCSE course studying the cell biology topic 4.) which includes cell structure/specialisation, microscopy, culturing microorganisms, cell division, stem cells and transport in cells.</p> <p>Students begin the Physics component of the GCSE course studying the Forces topic. Which includes describing motion, Newton’s laws, Types of forces, Hooke’s Law. In Chemistry, students begin with the fundamentals of Atomic Structure, the development and use of the Periodic Table and begin Bonding and Structure.</p> <p>Year 10:In Biology students continue with Organisation 4.2, focussing on the human digestive, respiratory and circulatory systems and plant transport system. Infection and response 4.3 looks at pathogens and disease, 4.4 Bioenergetics and 4.7 Ecology. In Physics the students study energy; types of energy, energy transfers and calculating KE, GPE and EP, waves; wave motion, including types of waves, uses and dangers of waves, production and detection of waves and the electromagnetic spectrum. electricity; fundamentals of electricity, current, resistance, voltage relationship, series and parallel circuits. In Chemistry, students continue with Bonding and Structure, then move on to Reactivity and Chemical Changes, Quantitative Chemistry, Energy Changes and Rates of Reaction.</p> <p>Year 11: In Biology students study Homeostasis and response 4.5 and Inheritance, variation and evolution 4.6</p> <p>In Physics students study magnetism and eletro-magnetism, National grid, transformers. Atomic structure of matter; density calculations, changes of state, SHC, pressure and temperature. Radioactivity; nuclear model, subatomic particles, radioactive particles, radioactive decay. In Chemistry, students study Organic Chemistry, Chemical Analysis, Chemistry of the Atmosphere and the Use of Resources.</p>	
Skill Development	
<p>Subject Specific Skills:</p> <ul style="list-style-type: none"> • Use a variety of models to solve problems, make predictions and to develop scientific explanations and understanding. • Use scientific theories and explanations to develop hypotheses. • Making predictions and identifying variables. • Evaluate risks in relation to data and consequences. • Making, explaining and recording observations and measurements using a range of apparatus and methods, record these in appropriate tables. Carry out mathematical and statistical analysis. • Drawing and labelling bar and line graphs using a suitable scale, identify trends and patterns. • Making conclusions and evaluating whilst recognising the importance of 	<p>Wider Academic Skills / Attributes:</p> <ul style="list-style-type: none"> • Develop skills in analysis, evaluation, planning and critical thought. • Evaluate personal, social, economic, ethical and environmental implications of technological advancement; and make decisions based on the evaluation of evidence and arguments. • Recognise the importance of peer review of results and of communicating results to a range of audiences. • Support mathematical competency through the embedded use of applied skills such as arithmetic and numerical computation, handling data, algebra, geometry and trigonometry, percentage calculations, graph drawing and interpretation and other mathematical operations. • Promote literacy by enabling pupils to construct an argument and support it with evidence. • Opportunities for discussion and debate • Develop independence.

<p>peer review of results and be able to suggest possible improvements and further investigations.</p> <ul style="list-style-type: none"> • Be objective, evaluate data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error • Using a variety of sources to find information. 	
Personal Development - SMSC and Cultural Capital (opportunities/experiences)	
<ul style="list-style-type: none"> • Support the development of student's self-awareness, risk assessment and safe working practices through practical planning, implementation and evaluation. Increase their knowledge of these sound scientific principles by allowing them to develop these skills independently as part of planning safe, valid science investigations. • Thorough exposure to controversial scientific ideas, theories and research, help students to make ethical judgements and consider ethical arguments in relation to current and past scientific fields such as vaccination, evolution, flat Earth, genetics and stem cell technology. Support pupils to be able to develop cogent scientific arguments and be able to look at research and evaluate it in terms of author, bias etc. So their opinions are informed by fact. • Fostering an awareness of diversity and employment opportunities within the scientific community. Not all scientists wear lab coats, encouraging pupils through work experience, the internet and careers guidance to consider further scientific study in order to pursue a career in science. • Widening pupils' understanding of the contribution of science to their everyday lives from the phone in their pocket to the shampoo they use to wash their hair. Widen pupils understanding of the implications of ongoing scientific research to their everyday life and experience e.g. vaccine development 	

Implementation:

- Students start the GCSE in Y9. They have six lessons divided between three subject specialists. They work through the first and part of the second unit of the GCSE but very slowly and with lots of opportunities for really exploring the topics.
- Students in Y10 and Y11 have 10 lessons a fortnight split between three subject specialists with a book for each subject. There is an assessment every half term for students to complete and an in depth feedback sheet with post-test tasks for the students to complete. All of this is kept in an assessment folder per teacher. Books and homework in Y10 in line with the whole school marking policy.
- There is an intervention programme in Y11 where students complete a Pop Quiz every third week. All assessments are marked within a week and the next week, data is analysed and students are selected for intervention that week. Homework is mainly past paper question based.

Measuring Impact:

- Half termly assessment for each of the Sciences.
- Mock assessment in Y10 and then two more in Y11.
- As part of the intervention programme, there is a 20 min assessment every third week which informs the intervention sessions the week after.
- Students constantly complete past paper questions in lessons. Often short answer questions at the start of lessons and then longer answer questions to really dig into students' understanding.