KS4 Curriculum

CURRICULUM INTENT: What does Science help young people achieve at KS4?

After building a solid foundation to students' science education in KS3, they continue their hands-on approach to science studies at KS4. Students have a range of tools available to support them in both extra-curricular and home learning which includes revision tools and student-centred revision sessions. Students are provided with opportunities to experience all the Required Practicals in the classroom and develop their understanding of the Scientific Method. We continue to collaborate with the maths department to guide students as the develop their mathematical and analytical skills. Opportunities to develop A01 (acquiring knowledge), A02 (applying knowledge), A03 (analysing information) are embedded into the curriculum and skills days. Assessment is a regular component of the science curriculum and we provide detailed and constructive feedback allowing students to identify their next steps and develop as learners.

In year 11, students complete all parts of the combined science course for the Biology, Chemistry and Physics GCSEs. Students that show a high level of proficiency in science will also complete the content required to sit the Separate Science qualification. All the work that we do with students ties in with the national curriculum and is based on the 5yr science framework developed by AQA. We also link all our work to the 'Principles and big ideas in Science' developed by the Association for Science Education.

TERM BY TERM BREAKDOWN – Knowledge acquired and skills developed:

	Year 10 Course Outline	Year 11 Course Outline	Opportunities beyond the classroom
Autumn Term	*Knowledge: homeostasis; nerves and hormones; reproduction and DNA; inheritance and genetic disorders; rates of reaction including collision theory; energy profiles; substances and mixtures; forces; speed; acceleration; momentum and weight.* *Key Skills: students will cover all Required Practicals. They will have opportunities to discuss experimental design and analysis data. They will discuss risk when using chemicals and scientific equipment. Use of Physics formulae, calculations, and graphing skills for explaining motion.*	*Knowledge: bacterial growth; plant diseases and responses; making and using monoclonal antibodies; the brain and the eye; transition elements and bonding; chemical calculations and change; electrolysis; energy changes; organic chemistry and polymers, energy, circuits and matter.* *Key Skills: students will cover all Required Practicals. They will have opportunities to discuss biohazards and risk, safety and evaluate practical design. They will discuss risk when using chemicals and scientific equipment. Physics formulae and calculations for analysing electrical circuits and energy transfers.*	School trips, skills days, tassomai, SAM learning, revision sessions.

Spring Term	*Knowledge: variation, natural selection; fossils and classification; genetic engineering, atmosphere, climate change; finite and renewable resources; kinematics and stopping distances.* *Key Skills: students will cover all Required Practicals. They will have opportunities to discuss experimental design and analysis data. They will discuss human impact including how to reduce their own and reflect on individual and societal behaviours. Physics formulae will be used to calculate changes in motion and stopping distances.*	*Knowledge: plant responses and hormones; thermoregulation and kidney function; reproduction strategies; DNA; protein synthesis; gene expression; decomposition rates; biomass and efficient food production; evolution and speciation; chemical analysis; using resources; motion, pressure, waves and electromagnets.* *Key Skills: students will cover all Required Practicals. They will have opportunities to discuss human impact on food production and rates of extinction. In practical work they will analyse data and draw conclusion. They will discuss risk when using chemicals and scientific equipment. Physics formulae and calculation will be used to determine wave and electromagnetic properties.*	School trips, skills days, tassomai, SAM learning, revision sessions.
Summer Term	*Knowledge: competition and adaptation; nutrient cycles and feeding; types of pollution and deforestation; waste; natural cycles and water treatment; waves properties; electromagnetic spectrum and electromagnetism.* *Key Skills: students will cover all Required Practicals. They will have opportunities to draw conclusions, evaluate and analysis data. They will continue to consider human impact and how development in technology allows the preservation of resources. Physics formulae and calculation will be used to determine wave and electromagnetic properties.*	*Revision and GCSE exams*	School trips, skills days, tassomai, SAM learning, revision sessions.

Covering the big idea in science	**Key Independent Learning Resources**
During KS4, students will develop their understanding that all material in the universe is made of very small particles and link this to both Chemistry and Physics topics including energy and the law of conservation of energy. • They will learn to appreciate how the structure of an atom changes which can impacts its role in chemical reactions and bonding. • They will use their lessons on sound, light and magnets to learn how objects can affect each other at a distance and how energy is in turn transferred. • Whilst learning about the composition of the earth, they will gain an understanding of how raw materials can be used to develop new materials and technologies. • Students will have an in-depth understanding of chemical reactions allowing them to make predictions for investigations.	Range of websites including BBC bitesize and YouTube channels including 'fuse school'. Tassomai GCSEpod SAM Learning SENECA Oak Academy learning

• They will also understand how human impact can lead to pollution and food shortages and know strategies to reduce this impact by managing raw materials including metals and water. • Students will understand how the organisms that live on top of the earth are organised not just at a cellular level but also in communities and ecosystems. • They will understand how new life is created and how one cell can go on to form complex organisms that compete, mate and interact with other organisms. • They will understand how genetic information is inherited and allow some species to evolve at the expense of others. • Students will be able to discuss how different forms of energy and forces interact in different scenarios including those that they are unfamiliar with and calculate values in these situations.	