A Level Science (Years 12 - 13)

Overview of the Curriculum

A Level Biology - Key Stage 5 (Years 12 & 13)

At A Level, our students study for the qualification offered by AQA. As well as linking seamlessly with the GCSE course, the subject content is relevant to real world experiences. It also introduces students to some of the skills required for higher education courses.

There is a strong emphasis on literacy throughout, with students expected to use scientific terminology accurately. The course requires students to develop and apply their mathematical skills in the context of Biology. This requires students to become confident in a range of mathematical skills, including multi-step numerical or algebraic calculations, graphical work and a range of statistical techniques.

The skills needed for the 12 required practicals are covered by a series of experiments carried out over the 2 year course. Records of practical work are kept by each student, so they can achieve their practical endorsement. Although students join the A Level course already being able to carry out practical procedures, the aim is to ensure they leave Year 13 with the ability to independently plan and carry out practicals with some degree of mastery.

Students often find the course content links to their studies in other subjects, for example, Geography (ecology), body systems (PE) and Art (microscopy drawings). The delivery of the A Level course is supported by external speakers. Dr Guy Sutton, who visits the school on 'Brain Day', an event jointly run by the Psychology and Biology departments. A number of our A Level Biology students run, or enjoy attending, extra-curricular clubs such as the Dissection Club or competing in the Biology Olympiad. For our students considering a medical based degree, we run Medicine Day in July, when doctors, surgeons and medical students share their insight and experience.

A Level Chemistry - Key Stage 5 (Years 12 & 13)

At Parmiter's, our students study the OCR A specification. This specification has a content-led approach and is divided into chemical topics, each covering different key concepts of chemistry. Within each topic we focus on embedding strong, detailed subject knowledge, mathematical and problem solving skills and confidence. Practicals are delivered within their related topics, developing students' practical competencies and their understanding of 'How Science Works'. This course allows students to build knowledge and critical thinking skills that will be useful to students regardless of their chosen pathway, but particularly suits those who will be progressing to further education, science based apprenticeships or work.

The course specification can be divided into 3 areas, Physical, Inorganic and Organic. The order of topics allows students to develop their knowledge and skills sequentially, adding breadth and depth over the course. The skills needed for the required practicals are covered by a series of experiments over the 2 year course. The course requires students to develop and apply their mathematical skills in the context of Chemistry. This requires students to become confident in a range of mathematical skills, including multi-step numerical or algebraic calculations, graphical work, relevant geometry knowledge and a range of statistical techniques. There is also a strong emphasis on literacy throughout, with students expected to use scientific terminology accurately.

Although there is no requirement for students to study all the A Level Sciences, there are links between the courses. For example, with the topic of atomic structure in Physics and with the topic of polymers in Biology. To challenge those students with a particular interest in Chemistry, some Year 12 students enter the Royal Society of Chemistry (RSC) analytical competition and in Year 13 students can enter the Chemistry Olympiad competition.

A Level Physics - Key Stage 5 (Years 12 & 13)

At A Level we offer the Physics AQA specification. The specification covers traditional, but fundamental topics within Physics and so ensures students develop a secure foundation of knowledge that prepares them for further study in a range of related higher education or workplace pathways. The AQA A Level specification allows this content to be delivered in the contexts and applications of the teacher's choosing and so teaching can be tailored to student and teacher's experience, expertise and interests. There are 8 core topics studied by all students and one option topic. At Parmiter's, the option topic is normally a choice between Engineering and Astrophysics, with student input sought as to which they would prefer to study.

Through the course, students are required to develop secure algebraic manipulation skills and the analysis of both graphical and numerical data is essential for the highest grades. Whilst the requirement for extended writing is limited, students need to write to convey understanding using appropriate subject specific vocabulary. Practical work runs throughout the course and students are offered numerous opportunities to develop their practical skills and use practical experiences to link theory to reality. As well as ensuring students work towards the practical endorsement, the required practical tasks can form part of the final assessment.

There are a range of opportunities for students to engage in Physics beyond the curriculum. We offer a student-led Astronomy Society and for the last 3 years we have worked with PhD students from UCL on the ORBYTS project ,where a team of students work on research projects relating to the study of exoplanets. The department offers the British Physics Olympiad, we have entered teams in the Rampaging Chariots competition, and we actively seek guest speakers through our alumni links and through institutions who undertake outreach activities.

Overview of schemes of work in each A Level Science

A Level Biology	**A Level Chemistry**	**A Level Physics**
● Biological molecules ● Cells ● Organisms exchange substances with their environment ● Genetic information, variation and relationships between organisms ● Energy transfer in and between organisms ● Organisms respond to changes in their environment ● Genetics, populations, evolution and ecosystems ● The control of gene expression Skills also learned include: ● Mathematical skills, handling data and statistical analysis ● Practical techniques including use of equipment and fine motor skills ● Appropriate analysis and synthesising of practical work to draw valid conclusions ● Making synoptic links between topics in written essays ● Discussing the ethics surrounding biological concepts and their impact on the wider world	● Development of practical skills in chemistry ● Foundations in chemistry ● Periodic table and energy ● Core organic chemistry ● Physical chemistry and transition elements ● Organic chemistry and analysis Skills also learned are: ● Practical techniques which are embedded throughout the scheme of work. ● Numerical skills building on those from KS4, including arithmetic and numerical computation, handling data, algebra, graphs, geometry and trigonometry. ● How Science Works where students cover how society makes decisions about scientific issues, and how the sciences contribute to the success of the economy.	● Particles and radiation ● Waves and optics ● Mechanics and materials ● Electricity ● Thermal mechanics and thermal physics ● Fields ● Nuclear physics ● Option topic ○ Astrophysics ○ Medical physics ○ Engineering physics ○ Turning points in physics ○ Electronics Skills also learned are: ● Practical skills, where students use a range of apparatus and learn a variety of techniques ● Mathematical skills building on those from KS4, including arithmetic and numerical computation, handling data, algebra, graphs and geometry and trigonometry