

# Physics

**Qualification Level: A level**

**Qualification Duration: 2 years**

**Exam Board: OCR**

## Summary

The study of advanced Physics allows individuals to examine the laws and principles that govern the behaviour of the physical world works at the very smallest of scales and at the very largest. Many of these physical principles have important applications in contemporary technologies and the advanced Physics course offers the opportunity to see how these technologies were developed and how they are likely to evolve. This is important as technological developments often shape society and culture, and an appreciation of scientific developments can help individuals to better adapt to these changes and perhaps even influence them.

## What you learn

**Units 1 and 2** concern the practical skills of scientific enquiry and the fundamental knowledge and concepts that underpin the ideas that are to follow.

**Unit 3** 'Mechanics' extends several concepts that are encountered during the study of Physics at GCSE level. Students learn to derive mathematical descriptions of an object's motion as well as the forces that influence this motion. In addition to this, students will formalise descriptions of static (stationary) forces and examine the conditions necessary for *equilibrium*. The final section of this unit examines the effect that forces have on the physical properties of a range of materials and establishes how these properties determine the potential applications of a material.

**Unit 4** 'Electrons, Photons and Waves' is a unit that is very broad in scope. In the first two modules of this unit students will learn how to describe the behaviour of electrical circuits. They will then design and construct circuits to perform particular functions and analyse the principal features of the circuit. The third module in this unit involves an exploration of waves and their associated effects. Students will acquire the knowledge and understanding necessary to describe and explain the nature, action and consequences of waves and wave-motion. The final module in this particular unit is entitled 'Quantum Physics' and through the study of this module, students will explore the phenomenon of wave/particle duality at scales of the nanometre and below. They will also learn about the history of the development of what many physicists consider to be the most successful and complete physical theory that mankind has devised.

**Unit 5** 'The Newtonian World' achieves three aims: firstly it extends several of the ideas delivered in the AS 'Mechanics' unit; secondly, it introduces the themes of *circular motion* and *simple harmonic motion* and establishes a link between two important physical concepts whilst introducing astrophysics and gravitational fields. Lastly, the *thermal physics* module explains the nature of heat at the molecular and atomic level and provides mathematical descriptions of thermodynamic systems.

**Unit 6** 'Fields, Forces and Frontiers' is the unit that unifies many of the themes and concepts that have gone before, principally through an examination of gravitational, electric and magnetic fields and the forces that these fields may generate. In addition to this, the

specialist areas of Nuclear Physics and Medical physics are introduced, giving students insight into the most current and cutting-edge work in the realm of the physical sciences.

### **What you gain**

You will be taught by two experienced teachers, in well-equipped laboratories and offered regular after school clinics to provide support where needed. There are also many resources such as fact sheets, past papers and copies of presentations available on-line. You will be encouraged to attend sessions at local universities, in order to better understand what physics has to offer in higher education.

### **What you need**

Five GCSE grades 9 to 4 with a 6 in GCSE Physics (triple award) or 6/6 in Combined Science and a 6 in Maths. Physics complements both Chemistry and Maths at A level, where there are several areas of common interest. Physics also works well alongside Further Maths, Computer Science and Geography.

### **Skills that will be developed**

Students will develop their skills of numeracy through the solving of real-world numerical problems and will further enhance existing skills of experiment design, data-analysis and experiment evaluation.

### **Careers**

The United Kingdom accounts for 1% of the world population yet is responsible for 10% of global research & development and manufacturing. It is engineers who undertake this vital and lucrative work. There are many branches of engineering: electrical, structural, civil, environmental, aeronautical, medical, petrochemical to name but a few. Opportunities within these career sectors are open to individuals with the knowledge, understanding and skills that are delivered through a study of advanced and higher physics. Yet Engineering isn't the only pathway for students who study Physics. You could progress to higher level study in areas such as a medicine, dentistry, materials science, nanotechnology, forensic and environmental science, astrophysics and astronomy. This subject is also highly respected by a wide variety of sectors such as marketing, accountancy and banking organisations, due to the high-level problem-solving skills you will develop.

### **Expenses**

Students are required to purchase the recommended course text in each year of study. There may also be occasional charges associated with assessment packs, departmental trips and university lectures.