

# **Physics**



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Exam board:OCR Physics ASpecification no.:H156 (AS) / H556 (A Level)

**This is a two year linear A level course -** The AS content forms the first half of the A level content and can be assessed at the end of Year 12 to provide an AS Level qualification if the student is dropping the subject and believes they can get a strong grade. Otherwise the two years of content are assessed at the end of Year 13 to give the A level grade.

# **Course delivery:**

A-level Physics is both a practical and theoretical subject and a number of analytical, practical and computational skills need to be developed during the course. The concepts that you are taught are often related to real life examples. Teaching incorporates demonstrations, practical work, research, computer modelling and problem solving.

# **Course Content:**

Physicists are problem solvers and studying A-Level Physics will introduce you to new and interesting ways of thinking about the world. At it's heart, A-Level Physics is about helping you develop the skills needed to investigate relationships and analyse models to better understand why things happen.

To achieve this goal, the course covers the essential knowledge and understanding in the main 5 areas of Physics:

- Forces and motion.
- Electrical circuits.
- Waves.
- Fields
- Quantum Physics and Stars

In the Forces and motion topics we develop the skills to mathematically model the movement of objects and examine the effect that forces have on them.

Electrical circuits continues the work done in GCSE to make sure you are confident in not only analysing circuits but also building them. This concludes with a study of capacitors where we look at ways to store and release energy quickly. This gives us the means to power the huge particle accelerators vital in the search for new and interesting sub-atomic particles. Mechanical and electromagnetic waves are studied during the waves topics in year 12. If you want to know how guitars and flutes make such beautiful sounds, the answers are found here when we study standing waves and harmonics.

Gravitational, electric and magnetic fields are the focus of the fields topic and help us to understand why charges repel, gravity pulls you down and why there is no such thing as a free lunch when it comes to making energy (google Lenz's law for a sneak peek).

Of Course, most of the above is generally classified as classical physics, but to understand the world completely we need to delve into the quantum world. Here we look at Einstein's photoelectric effect, wave particle duality, hadrons, leptons, quarks and then finally examining the most famous equation in the world,  $E=mc^2$ .

# Below is an outline of the way the course is assessed

# AS level (Year 12)

Module	Assessment	Content	
Breadth in Physics	Exam: 1 hr 30min A mix of multi choice and short answer questions from all modules including some set in a practical context. 50% of AS Grade	Module 1 – Development of practical skills in physics         • Measuring         • Graphing and processing of data         • Uncertainty calculations         Module 2 – Foundations of physics         • Units         • Scalar and vectors         Module 3 - Forces and Motion         • Motion Forces in action	
Depth in Physics	Exam: 1 hr 30min A mix of short answer and extended response questions from all modules with some set in a practical context. 50% of AS Grade	<ul> <li>Motion Forces in action</li> <li>Work, energy and power</li> <li>Materials</li> <li>Laws of motion</li> </ul> Module 4 - Electrons, waves and photons <ul> <li>Charge and current</li> <li>Energy, power and resistance</li> <li>Electric circuits</li> <li>Waves</li> <li>Quantum physics</li> </ul>	

# A level (Modules 5 and 6 taught in Year 13)

Module	Assessment	Content
Modelling Physics	Exam: 2 hr 15min A mix of multi choice and short answer questions from modules 1, 2, 3 and 5. 37% of A Level grade	<u>Module 1 – Development of practical</u> <u>skills in physics</u> <u>Module 2 – Foundations of physics</u> <u>Module 3 - Forces and Motion</u> <u>Module 4 - Electrons, waves and photons</u>
Exploring physics	Exam: 1 hr 30min A mix of multi choice and short answer questions from modules 1, 2, 4 and 6. 37% of A Level grade	Module 5 – Newtonian world and astrophysics Thermal Physics Ideal gases Circular motion Oscillations Gravitational fields Stars Cosmology
Unified physics	Exam: 1 hr 30min A mix of short answer and extended response questions from all the modules. 26% of A Level grade	Module 6 – Particles and medical physics     Capacitance     Electric Fields     Magnetic fields     Particle physics     Radioactivity     Nuclear Physics     Medical Imaging

# Entry requirements:

65 in two science subjects including 6 in Physics if done separately + 6 in Maths.

# Skills & personal qualities:

To be a good physicist you need to have the passion to want to understand and the willingness to use mathematics to describe the patterns you see. It is important that you are comfortable sharing and discussing ideas as a class, even if you are not sure, so that the whole group can work towards an answer together. Physics is not only interesting, it is also highly marketable. With an A level in Physics you have proved that you possess a wide range of key skills, exactly what employers and universities are looking for. A level Physics covers a wide range of transferable skills – from the use of IT in data-logging experiments; to the numerical skills that are the bedrock of the subject, essential in problem-solving and in practical work; to skill in written expression needed to write explanations.

# Frequently asked questions:

In this section we try to summarise those questions we always get asked at open evenings

#### Do I need to do A-Level Maths to do A-level Physics?

No. You do not need to do A-Level Maths to study physics. However, if you want to go on and study Physics or Engineering at University, A-Level Maths is generally a requirement.

#### Is the maths hard?

As long as you get a 6 in GCSE Maths, you will be able to cope with the demands of A-Level Physics. However, please be aware that 40% of the marks in the examinations will be maths based so it is an important part of the course.

#### Is there any coursework?

No, 100% of the A-Level grade comes from the 3 exams at the end of the course.

#### How big are the class sizes?

We are proud of how popular Physics is at Redcliffe. Currently we have three classes at Year 12 and three at Year 13. On average class sizes are about 18 students.

#### Who will I be taught by?

We are very fortunate to have 5 physics teachers on staff meaning that every class will be taught by a subject specialist.

#### How many lessons a week?

In year 12 there are 9 lesson a fortnight, while in year 13 there are 10.

#### How many practicals do you do?

Physics is a practical subject and practical activities play a vital role in our teaching. We are fully equipped with to ensure that students get regular opportunities to develop their practical skills. We have a range of data logging sensors and software so that students get the chance to gain experience handling the equipment they are likely to meant in future studies.

#### **Resources available:**

Dedicated Physics textbook Online platform with revision and support materials.

### Extra-curricular opportunities:

Opportunity to take part in an electronics and coding club Trips to Universities for master classes

# **Recommended reading:**

Black Holes Wormholes and Time Machines	AL-KHALILI J
In Search of Schrodinger's Cat	GRIBBIN J
Physics of Star Trek	KRAUSS L
Physics for Future Presidents	MULLER R
Five Equations that Changed the World	GUILLEN M
What Do You Care What Other People Think	
(or anything else by …)	FEYNMAN R

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