

Abingdon School Physics Department – Introduction to the A-Level Course

“I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.”

Isaac Newton 1855

Physics at Abingdon

All students studying Physics in the Sixth form at Abingdon have two teachers. In both the upper and lower sixth, students have ten lessons per fortnight. Physics A-level is taught in mixed ability sets.

What will I learn in A-level Physics?

You will already be familiar with many of the topics that you will study, including forces, waves, radioactivity, electricity and magnetism. At A-level, you'll look at these areas in more detail and find out how they are interconnected. You will explore new areas such as particle physics, cosmology and medical physics and also learn how to apply maths to real-world problems.

Perhaps more importantly, you will develop skills that can be transferred to just about any other area of work. Even if you don't go on to become a physicist, learning to think like one will help you get to the root of any problem and draw connections that aren't obvious to others. Physics won't give you all the answers, but it will teach you how to ask the right questions.

Assessment Information

At Abingdon we study the Edexcel A-Level Physics specification.

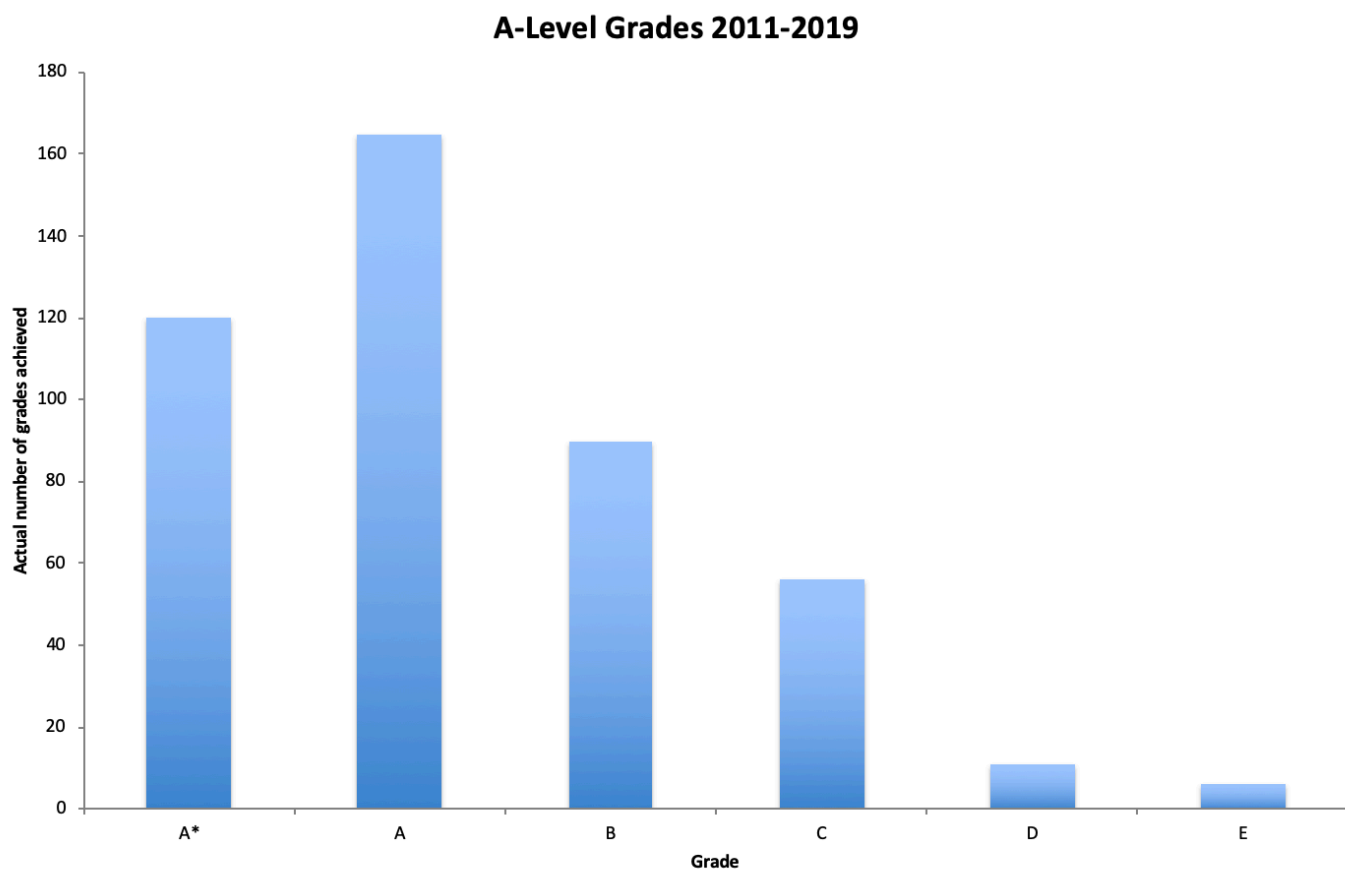
Assessment is by means of 3 written papers. Paper 1 and paper 2 assess the main content of the syllabus whilst paper 3 is aimed at assessing the conceptual and theoretical understanding of experimental methods. All papers include multiple-choice, short open, open-response, calculations and extended writing questions.

Examination

Unit	Name	Duration	Total Marks	Weighting
				A-Level
Paper 1	Advanced Physics 1	1 hr 45 mins	90	30%
Paper 2	Advanced Physics 2	1 hr 45 mins	90	30%
Paper 3	General and Practical Principles in Physics	2hrs 30 mins	120	40%

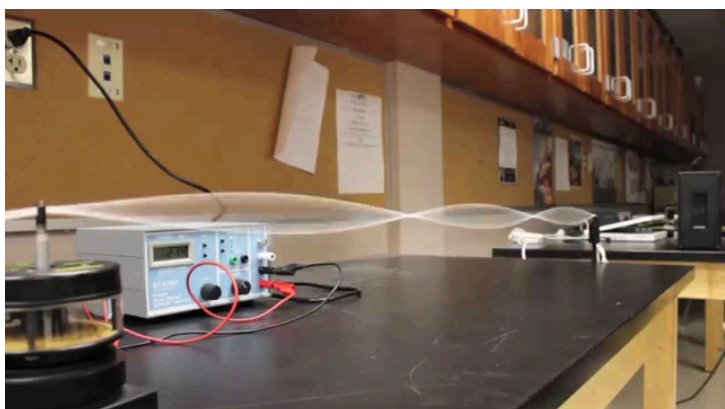
Results

The total proportion of each A-level grade achieved by the department between 2011 and 2019 are shown in the chart below:



Core Practicals

As part of the A-level course, students are required to complete a series of specific core practical activities on top of the numerous experiments that are conducted in the department on a weekly basis. Students are required to keep a record of their results for these and are tested on their knowledge of them in exam paper 3. An example of one of these is investigating the factors which affect the formation of a standing wave on a string.



A few other examples of experiments conducted in the Lower Sixth year are outlined below.

<p>Spectroscopy investigation</p>  A photograph showing a laboratory setup for spectroscopy. A black metal frame holds a horizontal glass tube containing a gas. A power supply unit is connected to the tube. A digital multimeter is also connected to the circuit. The setup is on a white lab bench.	<p>Calculating Planck's constant with stopping potential</p>  A photograph of an experimental setup for calculating Planck's constant. It includes a power supply, a variable resistor, a digital multimeter, and a small electronic circuit board connected by wires. A small box and a yellow object are also visible on the bench.
<p>Microwave standing waves investigation</p>  A photograph of a laboratory bench with a window in the background. A small electronic circuit is connected to a power supply. A wooden ruler is placed on the bench. A small box and a yellow object are also visible.	<p>Resonance investigations</p>  A photograph showing a resonance experiment. A blue rectangular plate is placed on a black base. A small metal object is on the plate. A power supply is connected to the setup. The setup is on a white lab bench.
<p>Forces with a data logger investigation</p>  A photograph of a laboratory setup for forces with a data logger. A black data logger is connected to a power supply and a small electronic circuit. A metal plate is also visible. The setup is on a white lab bench.	<p>Measuring g by freefall</p>  A photograph of a laboratory setup for measuring g by freefall. A vertical metal rod is connected to a power supply and a small electronic circuit. A small box and a yellow object are also visible. The setup is on a white lab bench.

Beyond the syllabus

As well as ensuring that students are introduced to parts of Physics beyond the syllabus in lessons, the department also offers many additional opportunities for Physics extension. Over the past year these have included:

Blott Matthew's Engineering Challenge

Two Abingdon Teams won £1000 and £500 prizes respectively in the 2017 Blott Matthew's Engineering Challenge. This involved designing a mass transport system for London to connect together the airports. The teams worked together in academic priority time during the course of the year and each made a presentation to a group of professional engineers to showcase their designs. In 2018, four teams entered the Energy for Everything Challenge designing a carbon neutral city in the south of England. One team achieved third place with two others gaining merit awards. In 2019 the challenge was to design a craft and route that could transport a 1 ton load from the North Pole to the South Pole with no pick-ups and drop offs along the way. Abingdon entered four teams into this challenge with team "Polar Reach" coming away as national winners and "Team Apex" gaining third place.

Physics in Action Trips

Each year the department takes two, lower sixth day trips during the Michaelmas term to the Physics in Action Lectures. This year the lecture titles included:

- "How to build a particle accelerator"
- "Electrifying the voice"
- "Measuring temperature with sound"
- "Shining light on the brain"
- "The weird world of quantum physics"

Residential trip to Geneva

In the Christmas holidays this year, forty eight L6th students will visit Geneva on a Physics trip for a total of four days. During the course of the trip they will:

- Have a walking tour of Geneva.
- Visit the Seujet Hydroelectric Dam for a tour
- Have a tour of CERN and visit the exhibitions
- Undertake an afternoon workshop at the s-cool lab in CERN
- Undertake two workshops at the University of Geneva Physics department
- Visit the Geneva Observatory
- Tour the history of science museum

Local visits

We are lucky that there are many world class physics experimental centres within an hour of Abingdon. We have recently taken Sixth form on the following visits:

- The Culham centre for fusion energy
- The Diamond Light Source
- Oxford University Materials Science Department
- Particle Physics Masterclass at the Rutherford Appleton Laboratory

Facilitating subjects

Some advanced level courses are more frequently required for entry to degree courses than others. These subjects are known as “facilitating” because choosing them at advanced level leaves open a wide range of options for university study. These facilitating subjects are:

Biology
English Literature
History
Modern and Classical Languages

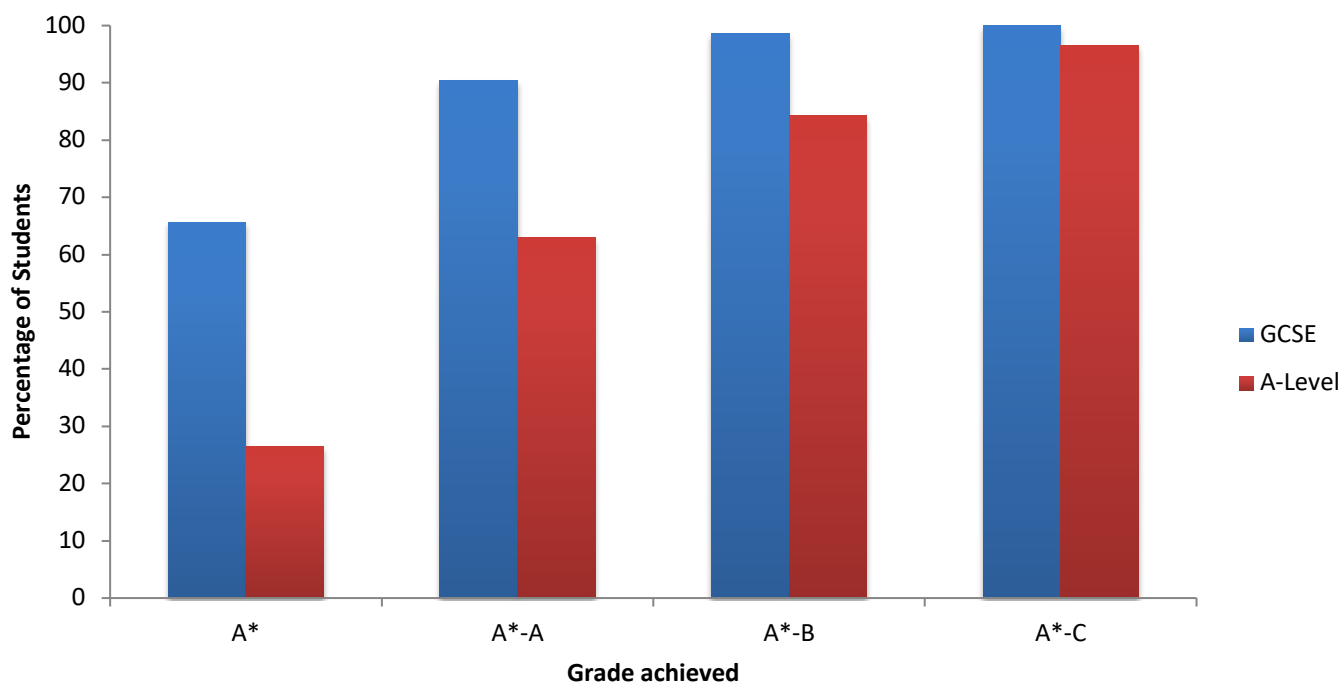
Chemistry
Geography
Physics
Maths and Further Maths

Source: <http://russellgroup.ac.uk/for-students/school-and-college-in-the-uk/subject-choices-at-school-and-college/>

What else should I consider?

Just because you may expect to achieve an A* grade at GCSE does not mean that you will go on to do the same at A-Level. The graph below shows that around 65% of Abingdon students since 2011 have achieved an A* grade in their GCSE Physics compared to only around 25% at A-level. Please note that 2019 has not been used for comparison here due to the change to numerical grades at GCSE making a direct comparison more difficult.

Correlation of GCSE and A-Level Grades 2011-2018



Should I study Maths?

Although it is not essential to study maths, it is extremely helpful and students who do not often find Physics much more difficult. If you choose to study Physics and then decide that you want to go on and do Physics/Engineering further study then it is likely that having a Maths A-level will be an essential pre-requisite.