

AS Level and A-Level Physics

Entry Requirements: A grade 6 in Physics and grade 6 in either Biology or Chemistry, or grades 6-6 in Combined Science, and a minimum of a grade 6 in Mathematics.

Exam Board: OCR

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Course Description

The **OCR A-Level in Physics A** course provides learners with the opportunity to develop experimental methods and practical techniques for producing empirical data. The emphasis throughout is on the understanding of concepts and the application of physics ideas in novel contexts as well as on the acquisition of knowledge. The course encourages creative thinking and problem-solving skills, transferable to any future career path. The important conventions, systems and concepts that permeate the fabric of physics and engineering are embedded.

During the first year of study students will develop and extend the basics that they studied at GCSE. Areas studied include how we model the motion of objects using mathematics, understand the effect forces on objects, learn about the important connection between force and energy, appreciate how forces cause deformation and understand the importance of Newton's laws of motion. Electricity is also studied in depth although with many aspects of waves. This then leads to the introduction of the key ideas of quantum physics.

In the final year (A-Level) of the course students are shown the impact Newtonian mechanics has on physics. The microscopic motion of atoms can be modelled using Newton's laws and hence provide us with an understanding of macroscopic quantities such as pressure and temperature. Newton's law of gravitation can be used to predict the motion of planets and distant galaxies and the expansion of the Universe is studied by analysing the electromagnetic radiation from space. Other topics covered include capacitors, electric fields, electromagnetism, nuclear physics, particle physics and medical imaging.

Main Syllabus Area

AS Level: Development of practical skills in Physics; Foundations of Physics (2 sub modules); Forces and Motion (5 sub modules); Electrons, Waves and Photons (5 sub modules).

A-Level (*in addition to the AS Level topics*): Newtonian World and Astrophysics (5 sub modules); Particles and medical physics (5 sub modules).

Method of Assessment

AS Level: Paper 1 "Breadth in physics" 1 hr 30 mins. Multiple choice and structured questions
Paper 2 "Depth in physics" 1 hr 30 mins Structured and extended response questions

A-Level: Paper 1 "Modelling physics" 2 hr 15 mins. Multiple choice and structured questions.
Paper 2 "Exploring physics" 2 hr 15 mins. Multiple choice and structured questions.
Paper 3 "Unified physics" 1 hr 30 mins.
Structured and extended response questions
Teacher-assessed "Practical endorsement for physics"

Qualities Required

Studying Physics at A-level demands a combination of qualities that contribute to academic success and personal growth. Key traits include curiosity to explore and question the fundamental aspects of the universe, perseverance to tackle complex problems and concepts, analytical thinking for understanding and applying theories, adaptability to grasp new ideas and approaches, and effective communication to articulate understanding and collaborate with peers. Together, these qualities enable students to excel in A-level Physics while fostering a passion for lifelong learning in the field.

Links with other subjects

Choosing subjects that complement a Physics A-level can lead to a well-rounded education and open up various career paths. Mathematics is usually an essential companion subject, as it provides the necessary quantitative skills to understand and solve complex physics problems. Further Mathematics can also be beneficial, particularly for those interested in pursuing physics at the university level. Chemistry is another natural choice, as it shares many fundamental concepts with physics and helps develop a deeper understanding of the physical world. For students considering engineering, Design and Technology or Computer Science can be useful additions. Additionally, choosing a contrasting subject like English, History, or a modern language can help develop important communication, analytical, and critical thinking skills that are valuable in any field, including physics. Ultimately, selecting subjects that align with individual interests and strengths will provide the best foundation for success in Physics A-level and beyond.

Career Prospects

A-level Physics provides an excellent foundation for a variety of career paths, offering numerous opportunities across multiple industries. Students who study Physics at this level develop strong analytical, problem-solving, and critical thinking skills, which are highly valued by employers. Graduates can pursue careers in engineering, technology, research and development, medicine, finance, and education, among others. Additionally, A-level Physics prepares students for further academic pursuits, such as obtaining a bachelor's, master's, or doctoral degree in Physics or related fields. Overall, the career prospects for those with an A-level Physics qualification are vast, promising, and adaptable to individual interests and goals.

Reading list

Y11s looking to study Physics at KS5

Six Easy Pieces: Essentials of Physics Explained by Its Most Brilliant Teacher by Richard P. Feynman
The Physics Book: Big Ideas Simply Explained by DK
Storm in a Teacup: The Physics of Everyday Life by Helen Czerski
Human Universe Paperback by Professor Brian Cox
Thing Explainer: Complicated Stuff in Simple Words by Randall Munroe

Y13s looking to study Physics at degree level:

Six Not-So-Easy Pieces: Einstein's Relativity, Symmetry and Space-Time by Richard P. Feynman
The Elegant Universe: Superstrings, Hidden Dimensions and the Quest for the Ultimate Theory by Brian Greene
Physics of the Impossible: A Scientific Exploration of the World of Phasers, Force Fields, Teleportation and Time Travel by Michio Kaku
Quantum: Einstein, Bohr and the Great Debate About Nature of Reality by Manjot Kumar
Seven Brief Lessons of Physics by Carlo Rovelli

Independent Study

Reading ahead prior to lessons and consolidation of notes using the course textbook.

Complete and mark questions using the archive of resources on the Tapton SharePoint.

Watch videos and work through learning resources available from

[A-Level Physics Online](#) and [Physics & Maths Tutor](#)

Utilise PhET simulations to support visualisation and understanding at phet.colorado.edu

[PhET: Free online physics, chemistry, biology, earth science and math simulations](#)