

Physics - for students who are 16 -17 years old

Course introduction

Course objectives

“If I have seen further it is through standing on the shoulders of giants” – Sir Issac Newton

Consider for a moment what Sir Issac Newton meant when he made the above statement. He, as a natural philosopher, was only able to uncover so much about reality because of the efforts of those who came before him. Without the work of Descartes and Hooke Newton may never have been able to achieve all he achieved. The concept of standing on shoulders of giants informs scientific practice to this day. Modern research must base itself on what has gone before and push the envelope by its own, incremental, amount. Scientists must have the humility to acknowledge that they are a small part of a big process.

Newton himself was such a giant that physics stood on his shoulders for nearly 200 years after his heyday. Newtonian mechanics underpinned nearly all Physics until the turn of the 20th century. As a paradigm that sort of longevity is unheard of. It took another giant to elevate us to new heights and that giant was Einstein.

In this course we will study the implications of these papers, how they came to change our understanding of space, time, atoms, light and ultimately physics itself. As someone embarking on your career as a physical scientist this course should give you a chance to climb onto Einstein's shoulders, to play with the mind-blowing ideas he created and be a better scientist for it.

Each topic will include a mixture of didactic or learning-assisted content (video, text, powerpoint) and self-directed learning activities to complete.

Topic titles

1. Developing the model of the atom
2. Quantum Mechanics
3. Special Relativity 1
4. Special Relativity 2

Independent project work

This piece of work will combine all of the content covered in the course. Information covered during independent study, webinars and tutorials will contribute. It has been designed to help students achieve solid theoretical background knowledge coupled with data analysis and presentation skills.

Students will be working on creating an argument, convincing the audience as to why Einstein has had the largest impact on physical science to date.