Chichester College

An Introduction to A-Level Physics

What is Physics?

This pack contains a programme of activities and resources to prepare you to start an A-level in Physics in September. It is aimed to be used now and throughout the remainder of the summer term and over the summer holidays to ensure you are ready to start your course in September. The suggested activities will start to engage with and enjoy the world of physics! It's a fantastic subject to study, and we hope you enjoy your learning.

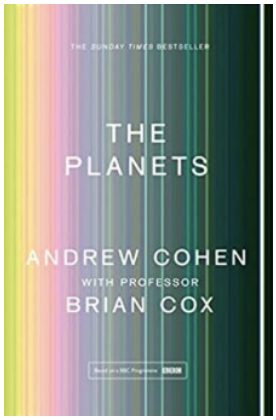
If you need any clarification or find another amazing resource, do get in touch!

stewartg@chichester.ac.uk

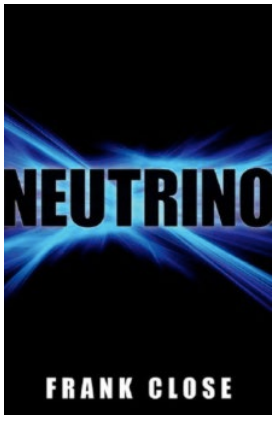
Chichester College

Read Physics Based Books

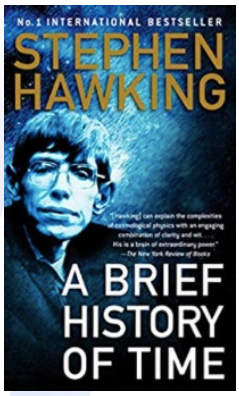
These books are all popular books about physics, and great for extending your knowledge and understanding.



This companion volume to Brian Cox's excellent television series by the same name makes for truly absorbing reading. It tells the same story as the series but with a great deal of extra information, along with a generous quantity of full colour photographs and illustrations.
Andrew Cohen and Brian Cox tell the story of our solar system in a highly readable, conversational style, and every page of text is packed with fascinating and up-to-date insights.



This book tells the story of the search of the mysterious ghost particle, the neutrino. There are more neutrinos in the universe than any other particle and yet we know very little about them. The book tells of the experiments and the people behind them who have spent a lifetime researching this enigmatic particle. It will take you from the research laboratories of the greatest universities to the depth of Russian mines



A book written over 20 years ago. However, many of the ideas are still relevant today. This is an introduction to relativity and quantum mechanics from the beginning of the universe to our present day. Many of the ideas may be complex and difficult to understand. Yet some of the greatest scientific minds have also struggled with these concepts. As you progress through your course many of these ideas will suddenly come to life.

These are numerous books you could read. There are great books available on audible, kindle too. Choose anyone that takes your fancy! Write a book review on it and hand this to your teacher in September.

Chichester College

A-level online videos

The following are short videos which will cover some of the first few topics of our course. They explain the ideas in a simple clear fashion that can support your learning.

There is a video to cover every topic we will cover and you can get a great head start by watching these before our lessons

Particle Physics:

The Nucleus: https://www.youtube.com/watch?v=-vxPGJEJR0Y&list=PLIjHsomtvUiwiFhb6E7bB5_7drh7iSmCN&index=4

The strong force:
https://www.youtube.com/watch?v=C0NyYKJrogw&list=PLIjHsomtvUiwiFhb6E7bB5_7drh7iSmCN&index=5

Quarks:
https://www.youtube.com/watch?v=ORhXRlhrbG0

Chichester College

The standard model:
https://www.youtube.com/watch?v=edgsmtUH954

TED Talks

Download the TED talk app to your device. It's brilliant!!!

If these links don't work, you will find these easily with a google search using TED talk and the name of the speaker.

Complete a summary of each talk using the cornell note making format on explained on the next page.

1. The levitating superconductor

How can a super-thin 3-inch disk levitate something 70,000 times its own weight? In a riveting demonstration, Boaz Almog shows how a phenomenon known as quantum locking allows a superconductor disk to float over a magnetic rail -- completely frictionlessly and with zero energy loss.

https://www.ted.com/talks/boaz_almog_the_levitating_superconductor#t-86058

2. Yup, I built a nuclear reactor

Taylor Wilson believes nuclear fusion is a solution to our future energy needs, and that kids can change the world. And he knows something about both of those: When he was 14, he built a working fusion reactor in his parents' garage.

https://www.ted.com/talks/taylor_wilson_yup_i_built_a_nuclear_fusion_reactor

Chichester College

3. How a blind astronomer learned to hear the stars

Wanda Diaz Merced studies the light emitted by gamma-ray bursts, the most energetic events in the universe. When she lost her sight and was left without a way to do her science, she had a revelatory insight: the light curves she could no longer see could be translated into sound. Through sonification, she regained mastery over her work, and now she's advocating for a more inclusive scientific community. "Science is for everyone," she says. "It has to be available to everyone, because we are all natural explorers."

https://www.ted.com/talks/wanda_diaz_merced_how_a_blind_astronomer_found_a_way_to_hear_the_stars

4. How we can turn the cold of outer space into a renewable resource

What if we could use the cold darkness of outer space to cool buildings on earth? In this mind-blowing talk, physicist Aaswath Raman details the technology he's developing to harness "night-sky cooling" -- a natural phenomenon where infrared light escapes earth and heads to space, carrying heat along with it -- which could dramatically reduce the energy used by our cooling systems (and the pollution they cause). Learn more about how this approach could lead us towards a future where we intelligently tap into the energy of the universe.

https://www.ted.com/talks/aaswath_raman_how_we_can_turn_the_cold_of_outer_space_into_a_renewable_resource#t-775

5. The most detailed map of galaxies, black holes and stars ever made

Humans have been studying the stars for thousands of years, but astrophysicist Juna Kollmeier is on a special mission: creating the most detailed 3-D maps of the universe ever made. Journey across the cosmos as she shares her team's work on the Sloan Digital Sky Survey, imaging millions of stars, black holes and galaxies in unprecedented detail. If we maintain our pace, she says, we can map every large galaxy in the observable universe by 2060. "We've gone from arranging clamshells to general relativity in a few thousand years," she says. "If we hang on 40 more, we can map all the galaxies."

https://www.ted.com/talks/juna_kollmeier_the_most_detailed_map_of_galaxies_black_holes_and_stars_ever_made

Chichester College

Effective Note Making

Making effective notes in lessons is an essential skill for A-level Physics. Practice producing notes using the Cornell System by summarising two of the videos or TED talks you have listened to. Complete your notes in the following format and show them to your teacher when you start your course in September.

<table>
<tr><td colspan="2">SUBJECT TOPIC

DATE</td></tr>
<tr><td colspan="2">LESSON FOCUS</td></tr>
<tr><td>QUESTIONS AND CUE-WORDS</td><td>NOTE TAKING

1. Record: During the lecture, use the note-taking column to record the lesson using concise sentences and abbreviations.

2. Questions: As soon after class as possible, write questions in the left hand column based on the notes in the note taking column. Writing questions helps to clarify meanings, reveal relationships, establish continuity, and strengthen memory. Also, the writing of questions sets up a perfect stage for exam studying later.

3. Recite: Cover the note-taking column with a sheet of paper. Then, looking at the questions or cue-words in the question and cue word column only, say aloud, in your own words, the answers to the questions, facts, or ideas indicated by the cue-words.</td></tr>
</table>

Chichester College

	4. Reflect: Reflect on the material by asking yourself questions, for example: “What’s the significance of these facts? What principle are they based on? How can I apply them? How do they fit in with what I already know? What’s beyond them? 5. Review: Spend at least ten minutes every week reviewing all your previous notes. If you do, you’ll retain a great deal for current use, as well as, for the exam.
SUMMARY After class, use this space at the bottom of each page to summarize the notes on that page.	

Adapted from: How to Study in College 7/e by Walter Pauk, (2001) Houghton Mifflin Company

Chichester College

Topics to Research

Particle accelerators and the LHC (Large hadron collider):

This is related to the first two topics we will study on particle physics. Find out what happens in a 26 km tunnel under the group on the French-Swiss border. Research how the collisions created in the vacuum tubes of this tunnel, whose temperatures are as cold as outer space, allow us to see back in time to the start of the Universe and view the particles of our creation

https://www.youtube.com/watch?v=qQNpucos9wc

https://home.cern

https://www.diamond.ac.uk/Public.html

Build your own Newtownian reflecting telescope:

http://www.astromediashop.co.uk/Telescopes.html

For those of you interested in our Astrophysics option in the second year. This kit is available online to purchase and then you can build your own telescope. This fully functioning Newtonian reflecting telescope is a great starter kit that will allow you to identify craters on the moon and see the moons of Jupiter. It will also help you understand the lessons on lenses and telescopes in this option

For any budding engineers who wish a similar challenge you can try building a Stirling engine which will run on a cup of hot water

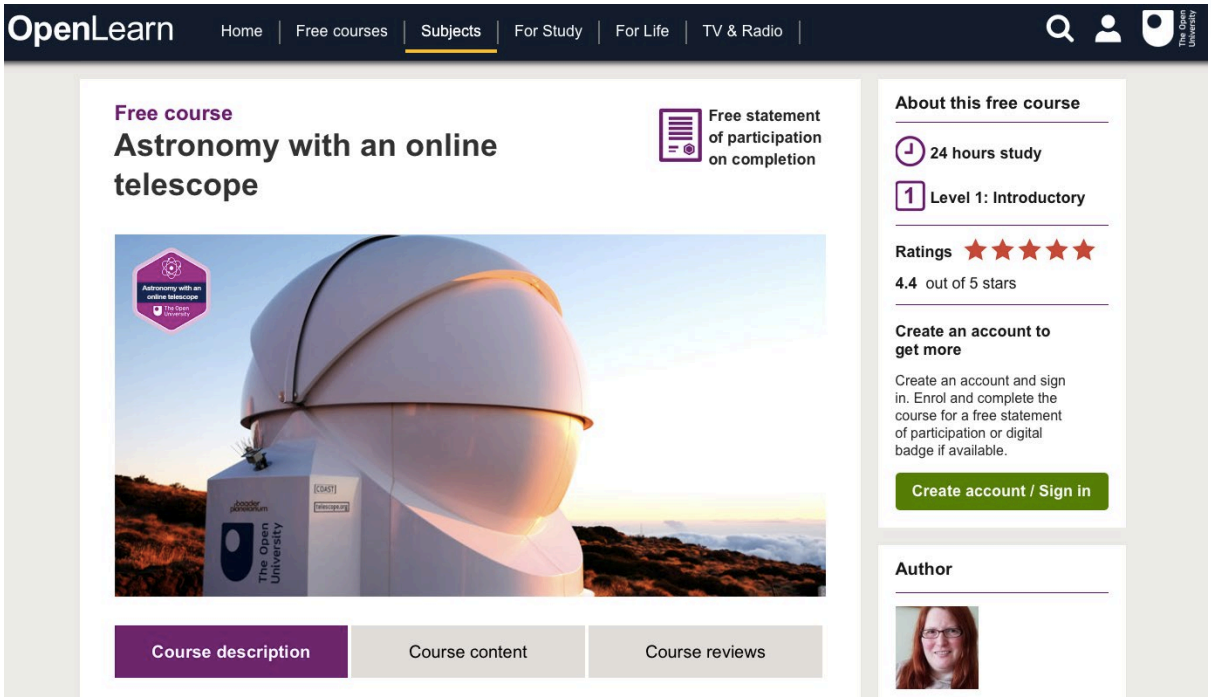
http://www.astromediashop.co.uk/Other_kits.html

Chichester College

Online Learning Courses

For those who would like a summer challenge you can set up your own virtual telescope based in Tenerife and search the night sky.

The Open University has offered for free the following course on Astronomy with an online telescope.



https://www.open.edu/openlearn/science-maths-technology/astronomy/astronomy-online-telescope/content-section-overview?active-tab=description-tab

You can join the course for free and will be required to download the **Stellarium** software to access the virtual telescope. Directions on how to do this and set up the location parameters are available on the course site.

There are many more STEM course of interest aimed at different levels of ability on the Open University site

https://www.open.edu/openlearn/science-maths-technology/free-courses

Good luck!