

# Structured Fast Track A level Physics

Course sample

[www.nec.ac.uk](http://www.nec.ac.uk)

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# What can you expect when you enrol on an NEC course?

## Access to our online learning platform

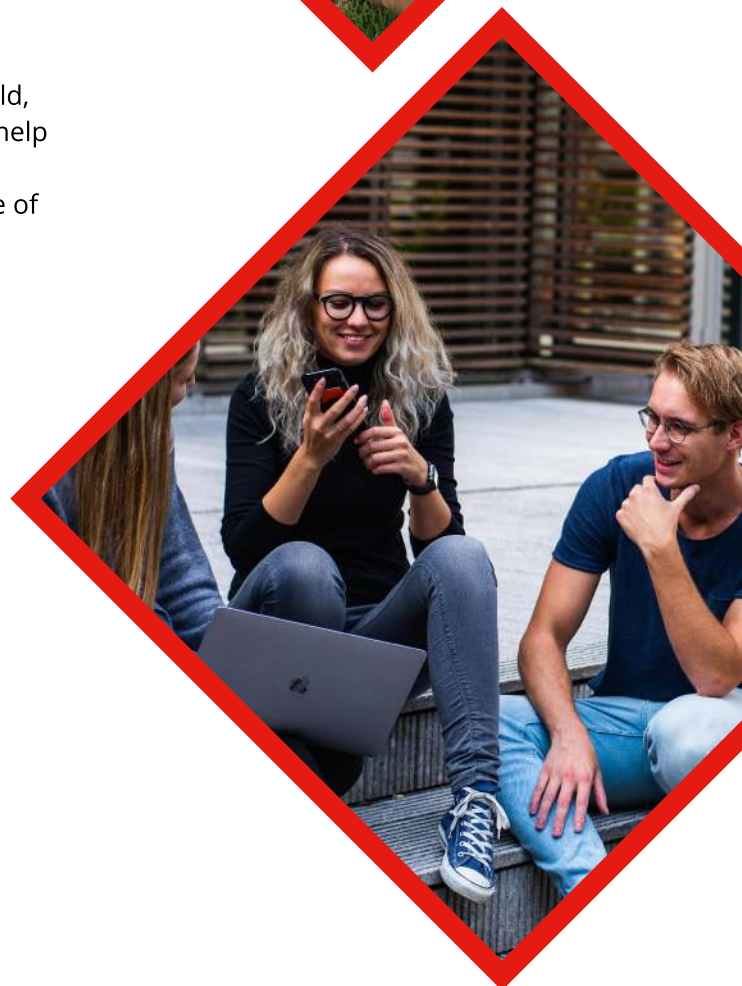
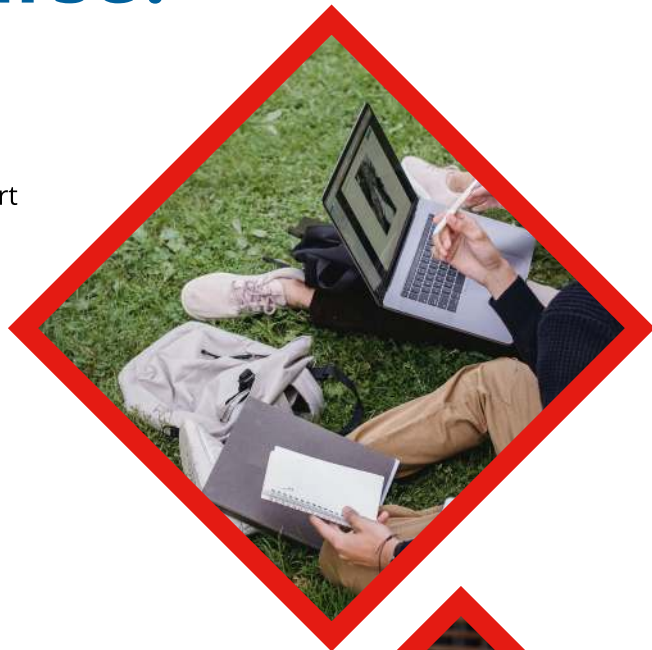
learn@nec is your gateway to the NEC community. As well as your course materials, you'll find additional resources to support your study, forums to connect to fellow NEC students, information about exams and assessment and ways for you to contact your tutor and the Student Support Team.

## Learning materials written by subject experts

Our learning materials are written by subject experts and designed to cover the carefully selected awarding body specifications.

## Tutor-marked assignments

Our tutors have demonstrated expert knowledge in their field, and will provide you with feedback on your assignments to help you progress through your course. Many of our tutors are examiners for the main awarding bodies so have experience of marking exam papers which helps them provide excellent feedback and support.



The online NEC platform is clear and uncomplicated and keeps your interest. You can keep a blog of your own learning diary and liaise with fellow students.

Helen

Superb organisation from signing up to getting results. High quality resources with well linked assignments.

Ceebee

## So what will a course topic look like?

## Section 1 Working as a physicist

**Start on 6 September 2021**

**Tutorial 1 on 11 September 2021**

Section 1 Study schedule

Working as a physicist book

- Introduction
- Maths in physics
- Quantities and units
- Practical skills
- Summary of Section 1

Section 1 quiz

Assignment 1 – **Due 20 September 2021**

**Let's look at part of 'Working as a physicist'**

## Section 2 Mechanics

**Start on 20 September 2021**

**Tutorial 2 on 25 September 2021**

Section 2 Study schedule

Mechanics book

- Introduction
- Maths and equations
- Rectilinear motion
  - Core practical 1: The acceleration of free-fall
- Momentum
- Forces
- Work, energy and power
- Summary of Section 2

Section 2 quiz

Assignment 2 – **Due 18 October 2021**



## Section 3 Electricity

**Start on 18 October 2021**

**Tutorial 3 on 23 October 2021**

Section 3 Study schedule

Electricity book

- Introduction
- Maths and equations
- Charge and current
- Potential difference, electromotive force and power
- Current-potential difference relationships
- Resistance and resistivity
  - Core practical 2: The measurement of resistivity
  - Core practical 3: The measurement of internal resistance
- Internal resistance, series and parallel circuits and the potential divide
- Summary of Section 3

Section 3 quiz

Assignment 3 – **Due 8 November 2021**

## Section 4 Materials and vibrations

**Start on 8 November 2021**

**Tutorial 4 on 13 November 2021**

Section 4 Study schedule

Materials and vibrations book

- Introduction
- Maths and equations
- Fluids
  - Core practical 4: Measurement of viscosity
- Solid materials
  - Core practical 5: Measuring the Young modulus
- Nature of waves
  - Core practical 7: The vibration of a string
- Summary of Section 4
- Section 4 quiz

Assignment 4 – **Due 29 November 2021**

## Section 5 Waves and the particle nature of light

**Start on 29 November 2021**

**Tutorial 5 on 4 December 2021**

Section 5 Study schedule

Waves and the particle nature of light book

- Introduction
- Maths and equations
- Transmission and reflection of waves
- Superposition of waves
  - Core practical 8: Measuring the wavelength of a laser using a diffraction grating
- Particle nature of light
- Summary of Section 5

Section 5 quiz

Assignment 5 – **Due 20 December 2021**

## Progress review/Applications to university

**Request your Progress Review and obtain a predicted grade.**

**If you require a reference for university, please also request this through the reference request form provided in this section by no later than 4 January 2022.**

## Revision week

**Start on 3 January 2022**

**Tutorial 6 on 8 January 2022**

**Past Paper 1 Due 10 January 2022**

## Section 6 Collisions, circular motion and oscillations

**Start on 10 January 2022**

Section 6 Study schedule

Collisions, circular motion and oscillations book

- Introduction
- Maths help
- Safety in the laboratory

- Momentum and energy
- Motion in a circle
- Oscillations
  - Core practical 9: Newton's second law
  - Core practical 10: Analysing collisions
  - Core practical 16: Oscillation of a spring
- Summary of Section 6

Section 6 quiz

Assignment 6 – **Due 31 January 2022**

## Section 7 Gravitational and electric fields

**Start on 31 January 2022**

**Tutorial 7 on 5 February 2022**

Section 7 Study schedule

Gravitational and electric fields

- Introduction
- Maths help
- Universal gravitation
- Electric fields
- Capacitance
  - Core practical 11: Charging and discharging a capacitor
- Summary of Section 7

Section 7 quiz

Assignment 7 – **Due 21 February 2022**

## Section 8 Magnetic fields and particle physics

**Start on 21 February 2022**

**Tutorial 8 on 26 February 2022**

Section 8 Study schedule

Magnetic fields and particle physics book

- Introduction
- Maths help
- Magnetic fields
- Electrons and nuclei
- Particle physics

- Summary of Section 8

Section 8 quiz

Assignment 8 – **Due 7 March 2022**

## Section 9 Thermodynamics

**Start on 7 March 2022**

**Tutorial 9 on 12 March 2022**

Section 9 Study schedule

Thermodynamics book

- Introduction
- Maths help
- Specific heat capacity
  - Core practical 12: Calibrate a thermistor
  - Core practical 13: Measuring the specific latent heat of a phase change
- Internal energy, absolute zero and change of state
- Gas laws and kinetic theory
  - Core practical 14: The relationship between pressure and volume of a gas at fixed temperature
- Summary of Section 9

Assignment 9 – **Due 28 March 2022**

## Section 10 Nuclear decay and space

**Start on 28 March 2022**

**Tutorial 10 on 2 April 2022**

Section 10 Study schedule

Nuclear decay and space

- Introduction
- Maths help
- Nuclear decay
  - Core practical 15: Absorption of radiation
- Astrophysics
- Cosmology
- Summary of Section 10

Assignment 10 – **Due 25 April 2022**

## Revision

Past Paper 1 due **10 January 2022**

Past Paper 2 due **2 May 2022**

**Revision tutorial 7 May 2022**

Past paper 3 due **14 May 2022**



Course topics are studied on-screen and feature interactive elements including quizzes, activities and links to additional resources.

### How to work through this section

Use this book to lead you through Section 1. It explains what you need to do, links you to some resources you will find useful, some experiments to do and guides you to work through Chapters 1, 2 and parts of Chapter 33 of your ebook. This will all prepare you for Assignment 1.

You will need to be logged into Dynamic Learning to access the linked resources in your ebook. If you are not certain how to access your ebook, have a look at this page on [access to your ebook](#) and contact Student Support if you are still having any difficulties.

Any links in this course should open in a new tab when you click on them.

First, however, watch this recorded webinar.



**Recorded webinar - Introduction to Section 1 (08:08)**

Click on the image to view your recorded webinar.

#### What's in Section 1?

- A quick run through some of your GCSE knowledge
- Units and quantities
- Scalar and vector quantities
- Mathematics to support the section
- Plotting graphs
- Finding gradients
- Using graphs to demonstrate that an equation represents a body of data.



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### How long will the section take?

We think that a chapter in the textbook will take about 3–4 hours to work through, so the whole section will probably take you about 14–17 hours.

Everyone works at different rates so don't worry if you spend more or less time. But if you find you are spending much less time, you may need to consider whether you are giving the section enough attention.

### Keep track of your progress

Each section of your course includes a **Study schedule** for that section. The Study schedule lists all of the individual items in a section and when they are due, and provides links to all of these. You can use the Study schedule to keep track of your progress and tick off items as you complete them.

If you want to, you can also add your own items to the schedule keep your study plans organised and in one place.



### Experiments

The experiments in this section introduce you to conducting A level experiments and processing the results. You can do many of these experiments at home, and we encourage you to do at least some of these. However, throughout the course, we will provide sample results for those who cannot do the experiments at home, so that everyone will be able to practise processing the results.

You can find a list of the equipment and resources needed in the A level Physics core practicals [here](#).

Throughout the course and in the assignments, you may need to use physical constants. The constants that are given to you in the examination are listed in the 'Data sheet', link given below. You may find it helpful to print this out and keep it available.



**Section 1 Data sheet**



## Maths in physics

Mathematics is an important tool in science, as it enables us to analyse results and develop theoretical models. For this course you are expected to be able to do the mathematics that is studied in GCSE courses (40% of your marks are based on Maths skills!).

You will need to develop further maths skills to support your Physics studies, but you will learn most of these when you need them during the course.

Before starting on the physics content of this section, have a go at the diagnostic tests in Chapter 33, and study sections 33.1 to 33.5 inclusive. Don't be too concerned if this work is a bit challenging, as you will get plenty of practice throughout the course.



**Work through Chapter 33 in the ebook: Maths in physics, up to 33.5.**

Use the following document for some ideas for additional sources of help with maths.



**Maths help 1**

You should also watch these recorded NEC webinars for more Maths help.



**Recorded webinar - Scale drawings (06:46)**

### Step 1

- Choose a suitable scale. In this case 1 cm representing 1 N is probably a reasonable scale.
- Draw the triangle with a base 10 cm and a height 5 cm. Make sure these lines are at right angles using a protractor.



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**Recorded webinar - Vectors, resolving and finding resultants (09:16)**

Please click the image below to view the recorded webinar.

### A reminder

Vectors have both magnitude and direction. Therefore these two forces, which have the same magnitude, are different because they act in different directions:



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**Chapter 33 resource**

**Answers to Test yourself questions**

## Quantities and units

This page introduces you to many of the quantities and SI units that you will use in the course. Don't worry that at this stage you probably don't recognise many of these. They will be explained as you meet them later in the course.

### Learning outcomes

When you have completed the work on this page you will be able to:

- know and understand the distinction between base and derived units and their SI units
- understand scalar and vector quantities and know examples of each type, and recognise vector notation
- resolve a vector into two components at right angles to one another by drawing and calculation
- find the resultant of two coplanar vectors at any angle to one another by drawing, and at right angles to one another by calculation.

## Chapter 1 Quantities and units



**Work through Chapter 1 Quantities and units now.**

Make sure that you work through all the 'Test yourself' materials and exam practice questions whenever you are studying the textbook. Write down your answers - you'll be able to check them against feedback later, once you reach the bottom of the page.

### Measuring distance

Measuring distance accurately is very important in science. For measuring long distances metre rules and measuring tapes are usually adequate. You can also get sophisticated laser equipment for measuring distances.

Measuring small distances and dimensions requires precision instruments, and for this course you should be familiar with vernier calipers and micrometers. Please read Topic 1 if you are not familiar with these instruments.



**Topic 1 Calipers and micrometers**

### Further resources



**Tutorials**

If you wish to watch tutorials that talk through problems that can be solved as a result of studying this chapter, please choose from the resources below:

1. [A sleigh is pulled by two huskies](#)
2. [A motor boat crossing a river](#)
3. [A roller pulled over a bowling green](#)



**Answers to problems and revision**

1. [Answers to the test yourself questions](#)
2. [Answers to the exam practice questions](#)
3. [Revision summary for Chapter 1](#)

# Want to continue?

Contact our Course Advice Team to enrol now for September 2021 start.

They can help you with finance options, any additional questions, and take you through the enrolment process when you are ready to proceed.

## Helping you succeed

NEC students are eligible for a wide range of offers and additional support, helping you succeed during and after your studies with us:

- Additional services such as revision sessions and exam booking service
- 10% off the first year of undergraduate study with the Open University
- 10% off the first level of study with the Open College of the Arts
- TOTUM card, giving you discounts on everything from groceries to cinema tickets

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**Contact us:**

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