

Physics National 4

- The Course gives learners an insight into the underlying nature of our world and its place in the universe. From the sources of the power we use, to the exploration of space, it covers a range of applications of the relationships that have been discovered through experiment and calculation, including those used in modern technology. Advances in physics mean that our view of what is possible is continually being updated. This Course allows learners to understand the processes behind scientific advances, and to appreciate and contribute to topical scientific debate.

The Course has four mandatory Units including the Added Value Unit.

Physics: Electricity and Energy

The Unit covers the key areas of generation of electricity, electrical power, electromagnetism, practical electrical and electronic circuits, gas laws and the kinetic model.

Physics: Waves and Radiation

The Unit covers the key areas wave characteristics, sound, electromagnetic spectrum and nuclear radiation.

Physics: Dynamics and Space

The Unit covers the key areas of speed and acceleration, relationships between forces, motion and Energy, satellites and cosmology.

Added Value Unit: Physics Assignment

The Physics Added Value Unit is assessed by an Assignment. This Assignment will be carried out under supervised, open-book conditions. Learners will use the skills, knowledge and understanding necessary to undertake an investigation into a topical issue in physics.

In this Unit, learners will draw on and extend the skills they have learned from across the other Units, and demonstrate the breadth of knowledge and skills acquired, in unfamiliar contexts and/or integrated ways.

Progression into this Course

The course is suitable for learners who have experienced learning across the sciences experiences and outcomes at level 3 and have demonstrated satisfactory knowledge and understanding in class work and assessments.

The main aims of this Course are for learners to:

- develop and apply knowledge and understanding of physics
- develop an understanding of the role of physics in scientific issues and relevant applications of physics in society and the environment
- develop scientific inquiry and investigative skills
- develop scientific analytical thinking skills in a physics context
- develop the use of technology, equipment and materials, safely, in practical scientific activities
- develop problem solving skills in a physics context
- use and understand scientific literacy, in everyday contexts, to communicate ideas and issues
- develop the knowledge and skills for more advanced learning in physics

Assessment:

For each unit there are three assessment tasks:

Task 1: a scientific report of an experiment or practical investigation.

Task 2: a short scientific report of a research investigation.

Task 3: answering a set of questions.

Homework:

Before each Physics lesson pupils will be expected to have read over any notes they have made or been

given the previous lesson.

Homework exercises from homework or tutorial sheets will also be set regularly and these will be collected in, marked, and returned by the class teacher.

For some parts of the course, pupils may be expected to write their own summary notes, or carry out a piece of research, at home, or to complete summary notes issued to them.

This Course or its components may provide progression for the learner to:

- National 5 Physics Course
- National 4 or 5 Course in another science subject
- Skills for Work Courses (SCQF levels 4 or 5)
- National Certificate Group Awards
- National Progression Awards (SCQF levels 4 or 5)
- Employment and/or training

Physics National 5

- Physics gives learners an insight into the underlying nature of our world and its place in the universe. From the sources of the power we use, to the exploration of space, it covers a range of applications of the relationships that have been discovered through experiment and calculation, including those used in modern technology. An experimental and investigative approach is used to develop knowledge and understanding of physics concepts. This Course will enable learners to develop a deeper understanding of physics concepts and the ability to describe and interpret physical phenomena using mathematical skills. They will develop scientific methods of research in which issues in physics are explored and conclusions drawn.

The Course has four mandatory Units including the Added Value Unit.

Physics: Electricity and Energy

The Unit covers the key areas of conservation of energy, electrical charge carriers and electric fields, potential difference (voltage), practical electrical and electronic circuits, Ohm's Law, electrical power, specific heat capacity, gas laws and the kinetic model

Physics: Waves and Radiation

The Unit covers the key areas of wave parameters and behaviours, electromagnetic spectrum, light and nuclear radiation.

Physics: Dynamics and Space

The Unit covers the key areas of velocity and displacement — vectors and scalars, velocity-time graphs, acceleration, Newton's Laws, projectile motion, space exploration and cosmology.

Progression into this Course

The Course is suitable for learners who have experienced learning across the sciences experiences and outcomes at levels 3 and 4 and have demonstrated their secure knowledge and understanding in class work and assessments. The Course may be suitable for those wishing to study physics for the first time.

This Course has a skills-based approach to learning. It takes account of the needs of all learners and provides sufficient flexibility to enable learners to achieve in different ways.

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills and knowledge required by one or more of the following or by equivalent qualifications and/or experience:

- National 4 Physics

There may also be progression from National 4 Biology, National 4 Chemistry, National 4 Environmental Science and National 4 Science Courses.

The main aims of this Course are for learners to:

- develop and apply knowledge and understanding of physics
- develop an understanding of the role of physics in scientific issues and relevant applications of physics, including the impact these could make on society and the environment
- develop scientific inquiry and investigative skills
- develop scientific analytical thinking skills in a physics context
- develop the use of technology, equipment and materials, safely, in practical scientific activities
- develop planning skills
- develop problem solving skills in a physics context
- use and understand scientific literacy, in everyday contexts, to communicate ideas and issues and to make scientifically informed choices
- develop the knowledge and skills for more advanced learning in physics
- develop skills of independent working
- The Course also serves to equip all learners with an understanding of the impact of physics on everyday life, and with the knowledge and skills to be able to evaluate media reports. This will also equip learners to make their own decisions on issues within a modern society where the body of scientific knowledge and its applications and implications are ever developing. By using the skills base and knowledge and understanding of physics, learners will become scientifically literate citizens.

Internal assessment

There are three assessment tasks for each Unit:

Task 1: a scientific report of an experiment or practical investigation.

Task 2: a short scientific report of a research investigation.

Task 3: a set of questions.

External assessment

The Course assessment will consist of two Components: a question paper, and an assignment.

Component 1 — The question paper will have 80 marks (80% of the total mark). (2 hours)

This question paper has two Sections.

Section 1, titled 'Objective Test', will have 20 marks.

Section 2, titled 'Paper 2', will contain restricted and extended response questions and will have 60 marks.

Marks will be distributed approximately proportionately across the three Units. The majority of the marks will be awarded for applying knowledge and understanding. The other marks will be awarded for applying scientific inquiry, scientific analytical thinking and problem solving skills.

A data booklet containing relevant data and formulae will be provided.

Component 2 — The assignment will have 20 marks (20% of the total marks).

Learners will carry out the investigation stage in no more than 7 hours. Learners will complete the controlled assessment stage in no more than 1 hour and under open-book supervised conditions. The purpose of the assignment is to allow the learners to carry out an in-depth study of a physics topic. The topic will be chosen by the learner, who will investigate/research the underlying physics and the impact on society/the environment. The assignment will assess the application of skills of scientific inquiry and related physics knowledge and understanding. This assignment has one Section.

The majority of the marks will be awarded for applying scientific inquiry and analytical thinking skills. The other marks will be awarded for applying related knowledge and understanding.

In preparation for the controlled assessment, the learner will carry out an investigation stage:

- select an appropriate physics topic within the set guidelines provided by SQA
- investigate/research the topic, focussing on applications and impact on society/the environment
- process the information/data collected

In the controlled assessment stage, the learner will present evidence of:

- the process they have undertaken
- physics knowledge and understanding related to the topic investigated/researched

- the application of the topic
- a balanced evaluation of the impact on society/the environment
- a reasoned conclusion

- **Total marks 100 marks**
- To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. Course assessment will provide the basis for grading attainment in the Course award.

Homework:

Before each Physics lesson pupils will be expected to have read over any notes they have made or been given the previous lesson.

Homework exercises from homework or tutorial sheets will also be set regularly and these will be collected in, marked, and returned by the class teacher.

For some parts of the course, pupils may be expected to write their own summary notes, or carry out a piece of research, at home, or to complete summary notes issued to them.

This Course or its components may provide progression for the learner to:

- National 5 Physics Course
- National 4 or 5 Course in another science subject
- Skills for Work Courses (SCQF levels 4 or 5)
- National Certificate Group Awards
- National Progression Awards (SCQF levels 4 or 5)
- Employment and/or training