



Advanced Higher Physics — draft Course Rationale and Summary



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Course rationale

Background

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility provide time for learning, more focus on skills and applying learning, and more scope for personalisation and choice.

In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

Relationship between the Course and Curriculum for Excellence values, purposes and principles

Through learning in physics, learners develop their interest in and understanding of the world. They engage in a wide range of investigative tasks, which allows them to develop important skills to become creative, inventive and enterprising, in a world where the skills and knowledge developed by physics are needed across all sectors of society.

Physics Courses should encourage resilience, which leads to becoming a confident individual. Successful learners in physics think creatively, analyse and solve problems. Physics can produce responsible citizens, through studying the impact it makes on their lives, on the environment, and on society.

This Course allows learners to understand and investigate the world in an engaging and enjoyable way. It develops learners' ability to think analytically, creatively and independently, and to make reasoned evaluations. The Course provides opportunities for learners to acquire and apply knowledge, to evaluate environmental and scientific issues, to consider risk, and to make informed decisions. This can lead to learners developing an informed and ethical view of complex issues. Learners will develop skills in communication, collaborative working and leadership, and apply critical thinking in new and unfamiliar contexts to solve problems.

Purpose and aims of the Course

Science is vital to everyday life and allows us to understand and shape the world in which we live and influence its future. Scientists play a key role in meeting society's needs in areas such as medicine, energy, industry, material development, the environment and sustainability. As the importance and application of science continues to grow and develop, more trained scientists will be required. It is also important that everyone has an informed view of science.

The purpose of the Course is to build on the knowledge, understanding and skills developed by the learner in the Higher Physics Course and to provide a useful bridge towards further study of Physics.

Advances in physics mean that our view of what is possible is continually being updated. This Course allows learners to deepen their understanding of the processes behind scientific advances and thus promotes awareness that physics involves interaction between theory and practice.

The aims of this Course are to enable learners to:

- ◆ develop a critical understanding of role of physics in scientific issues and relevant applications, including the impact these could make on society/the environment
- ◆ extend and apply knowledge, understanding and skills of physics
- ◆ develop and apply the skills to carryout complex practical scientific activities, including the use of risk assessments, technology, equipment and materials

- ◆ develop and apply scientific inquiry and investigative skills, including planning and experimental design
- ◆ develop and apply scientific analytical thinking skills, including scientific evaluation in a physics context
- ◆ extend and apply problem solving skills in a physics context
- ◆ develop an understanding of scientific literacy using a wide range of resources, in order to communicate complex ideas and issues and to make scientifically informed choices
- ◆ extend and apply skills of independent/autonomous working in physics

An experimental and investigative approach is used to develop knowledge and understanding of physics concepts. The Course develops learners' curiosity, interest and enthusiasm for physics in a range of contexts. The key skills of scientific inquiry and investigation are integrated and developed throughout the Course. The relevance of physics is highlighted by the study of the applications of physics in everyday contexts.

Learners will develop ability in describing and interpreting physical phenomena using mathematical skills, and will practice scientific methods of investigation from which general relationships are derived and explored.

The Course provides opportunities for learners to develop the ability to think analytically, creatively and independently, and to make reasoned evaluations. It also serves to equip learners with an understanding of the impact of physics on everyday life, and with the knowledge and skills to be able to reflect critically on scientific and media reports. This allows learners to make their own reasoned decisions on many issues within a modern society where the body of scientific knowledge and its applications and implications are ever-developing.

The Course content has been selected to allow learners to study key physics ideas within situations of personal relevance, using up-to-date contexts. Skills of scientific investigation, communication skills, literacy and numeracy are all developed within the Course. The Course offers opportunities for collaborative and independent learning, set within familiar and unfamiliar contexts and for high-quality experimental work.

Information about typical learners who might do the Course

The Course is suitable for learners who are secure in their learning in the Higher Physics Course or an equivalent qualification. This Course emphasises practical and experiential learning opportunities, with a strong 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.

This Course will provide opportunities for learners to develop knowledge and skills in physics, including those that directly relate to everyday life. The development of thinking skills, inquiry and investigative skills, problem-solving and practical skills are fundamental to the Course.

Literacy is developed as this Course encourages reading and learners will be given opportunities to develop scientific ideas and opinions in a coherent logical manner.

This Course encourages independent learning and allows learners to make connections between science and the world in which they live, learn and work. Learners will develop transferable skills and be better prepared for future study and/or employment. Due to the interdisciplinary nature of the sciences, learners will benefit from studying Physics along with Chemistry/Biology/Engineering Science, and Mathematics, as this will provide a strong base for further study or employment.

On successful completion of this Course, learners could progress to:

- ◆ HND/Degree programmes in a physics-based course or a related area such as engineering, electronics, computing, design, architecture or medicine
- ◆ careers in a physics-based discipline or related area, or in a wide range of other areas such as oil and gas exploration, construction, transport or telecommunications

Other learners may choose this Course because they have a particular interest in the subject and wish to take the opportunity of studying it in depth.

Course summary

Course title: Advanced Higher Physics

SCQF level 7 (32 SCQF credit points)

Course outline

Mandatory Units

The Course comprises the following mandatory Units:

Physics: Rotational Motion and Astrophysics (Advanced Higher)	8 SCQF credit points
Physics: Quanta and Waves (Advanced Higher)	8 SCQF credit points
Physics: Electromagnetism (Advanced Higher)	4 SCQF credit points
Investigating Physics (Advanced Higher)	4 SCQF credit points

Course assessment **8 SCQF credit points**

This Course includes eight SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course. Further information on the Course assessment is provided in the Assessment section.

Course structure and conditions of award

Course structure

The Course will develop and extend skills in scientific thinking, set in context and developed through application-led learning.

Learners will acquire knowledge of concepts in physics, relevant to this level of Course, and be able to apply their understanding to real situations. They will develop skills in making informed decisions, and be prepared to make reasoned evaluations on environmental and scientific issues. They will develop investigative and experimental skills in a physics context.

By completing this Course, learners will develop important and relevant skills, attitudes and attributes related to physics, including: scientific and analytical thinking skills in a physics context; an understanding of the role of physics in scientific issues; the ability to solve problems in a physics context; the ability to apply knowledge and understanding of key ideas in physics; and an understanding of relevant applications of physics in society.

As well as developing specific scientific skills, in areas such as experimentation and investigation learners will also gain valuable transferable skills for learning, life and work, including those of literacy, numeracy and citizenship.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a number of ways.

Physics: Rotational Motion and Astrophysics (Advanced Higher)

This Unit develops knowledge and understanding and skills in physics related to rotational motion and astrophysics. The Unit offers opportunities for collaborative and independent learning set within familiar and unfamiliar contexts. It provides opportunities to develop and apply key ideas and principles in a wide variety of situations involving angular motion. An astronomical perspective is developed through a study of gravitation, leading to work on general relativity and stellar physics. Activities are undertaken which develop experimental, investigative and analytical skills.

Physics: Quanta and Waves (Advanced Higher)

This Unit develops knowledge and understanding and skills in physics related to quanta and waves. The Unit offers opportunities for collaborative and independent learning set within familiar and unfamiliar contexts. It provides opportunities to develop and apply key ideas and principles in a wide variety of situations involving quantum theory and waves. The Unit introduces non-classical physics and considers the origin and composition of cosmic radiation. Simple harmonic motion is introduced and work on wave theory is developed. Activities are undertaken which develop experimental, investigative and analytical skills.

Physics: Electromagnetism (Advanced Higher)

This Unit develops knowledge and understanding and skills in physics related to electromagnetism. The Unit offers opportunities for collaborative and independent learning set within familiar and unfamiliar contexts. It provides opportunities to develop and apply key ideas and principles in a wide variety of situations

involving electromagnetism. The Unit develops knowledge and understanding of electric and magnetic fields and capacitors and inductors used in d.c. and a.c. circuits. Activities are undertaken which develop experimental, investigative and analytical skills.

Investigating Physics (Advanced Higher)

In this Unit learners will develop key investigative skills. The Unit offers opportunities for independent learning set within the context of experimental physics. Learners will develop skills of planning, organising and setting up equipment, requiring self-motivation and independent learning. They will also collect and record data in an appropriate format.

Conditions of award

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. The required Units are shown in the Course outline section. Course assessment will provide the basis for grading attainment in the Course award.

Assessment

Information about assessment standards for the Course is included in the *Course Assessment Specification*, which provides full details including advice on how a learner's overall attainment for the Course will be determined.

Unit assessment

All Units are internally assessed against the requirements shown in Unit specifications.

They can be assessed on a Unit-by-Unit basis or by combined assessment.

They will be assessed on a pass/fail basis within centres. SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgements are consistent and meet national standards.

Exemplification of possible assessment approaches for these Units will be provided in the *National Assessment Resource*.

Course assessment

Courses from National 4 to Advanced Higher include assessment of [added value](#)¹. At National 5, Higher and Advanced Higher, the added value will be assessed in the Course assessment. The added value for the Course must address the key purposes and aims of the Course, as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge and application.

In the Advanced Higher Physics Course, added value will focus on:

- ◆ challenge
- ◆ application

Learners will draw on, extend and apply the skills they have learned during the Course. This will be assessed within a [question paper](#)² and [project](#)³, requiring demonstration of the knowledge, skills and understanding acquired from across the Units and how they can be applied in unfamiliar contexts and/or integrated ways.

¹ Definitions can be found here: www.sqa.org.uk/sqa/45528.html

² See link above for definitions.

³ See link above for definitions.