



# **Advanced Higher Biology — 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 more time for learning, more focus on skills and applying learning, and 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**

Biology Courses should encourage the development of skills and resourcefulness, which lead to becoming a confident individual. Successful learners in biology think creatively, analyse and solve problems. The Course will help to develop responsible citizens by allowing learners to study areas such as the environment and sustainability.

Biology affects everyone and aims to find solutions to many of the world's problems. Biology, the study of living organisms, plays a crucial role in our everyday existence, and is an increasingly important subject. Advances in technologies have made this varied subject more exciting and relevant than ever.

Learners will engage in a wide range of investigative tasks, which allows them to develop important skills to become inventive and enterprising, in a world where the skills and knowledge developed in biology are needed across all sectors of society and the economy.

## **Purpose and aims of the Course**

The purpose of the Course is to develop learners' interest and enthusiasm for biology in a range of contexts. The skills of scientific inquiry and investigation are developed, throughout the Course, by investigating the applications of biology. This will enable learners to become scientifically literate citizens, who are able to make rational decisions that are based on evidence and interpretation of scientific information.

This Course will build on the knowledge, understanding and skills developed by the learner in the Higher Biology Course or the Higher Human Biology Course to provide a useful bridge towards further study of Biology.

This Course allows learners to understand and investigate the living world in an engaging and enjoyable way. It provides opportunities for learners to acquire and apply knowledge to evaluate biological evidence, assess risk and make informed decisions. These skills enable learners to develop an informed and ethical view of complex issues.

The aims of this Course are to enable learners to:

- ◆ develop and apply knowledge and understanding of biology
- ◆ develop an understanding of biology's role in scientific issues and relevant applications of biology, including the impact these could make in society and the environment
- ◆ develop scientific inquiry and investigative skills
- ◆ develop scientific analytical thinking skills, including scientific evaluation, in a biology context
- ◆ develop the use of technology, equipment and materials, safely, in complex practical scientific activities, including risk assessments

- ◆ develop planning skills, including experimental design
- ◆ develop problem solving skills in a biology context
- ◆ use and understand scientific literacy to communicate complex ideas and issues and to make scientifically informed choices
- ◆ develop the knowledge and skills for more advanced learning in biology
- ◆ develop skills of independent/autonomous working

Learners will be able to develop their communication, collaborative working and leadership skills and be able to apply critical thinking in new and unfamiliar contexts to solve problems.

This Course is based on integrative ideas and unifying principles of modern biological science. It covers key aspects of life science at the molecular scale and extends to aspects of the biology of whole organisms that are among the major driving forces of evolution. In addition, it aims to develop a sound theoretical understanding and practical experience of experimental investigative work in biology.

Throughout the Course there are ample opportunities to develop a systems approach to the study of biological science. This allows learners to integrate their learning and to develop an appreciation of the global dimension to life on Earth and the importance of understanding biological issues in our society. The further development of scientific skills and experience acquired in previous learning will extend learners' capability to embark on independent investigative work. By designing and carrying out their own investigation, learners will increase their scientific literacy and develop skills for learning, life and work.

The Course allows flexibility and personalisation by offering choice within the key areas studied.

## **Information about typical learners who might do the Course**

This Course is designed for all learners who can respond to a level of challenge especially those considering further study or a career in Biology and related disciplines. It takes account of the needs of all learners and provides sufficient flexibility to enable learners to achieve in different ways.

This Course is suitable for learners who are secure in their learning of the Higher Biology Course, the Higher Human Biology Course or an equivalent qualification. This Course emphasises practical and experiential learning opportunities, with a strong skills-based approach to learning. The Course will allow opportunities for learners to develop biological knowledge and skills that directly relate to real situations. On completing the Course, learners will have developed analytical thinking skills, inquiry and investigative skills, problem solving skills and practical skills.

In addition, this Course encourages independent learning skills 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

*successful learner, confident individual, responsible citizen, effective contributor*

sciences, learners taking this Course, along with other science subjects, will enhance their skills, knowledge and understanding.

On successful completion of this Course, the learner could progress to:

- ◆ a biology-based HND/degree programme or one from a wide range of related areas, such as medicine, dentistry, veterinary medicine, professions allied to medicine, horticulture, pharmacology, environmental science
- ◆ careers in a biology-based or related area including the health service, agricultural science, education, environmental management

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# Course summary

**Course title: Advanced Higher Biology**

**SCQF level 7 (32 SCQF credit points)**

## Course outline

### Mandatory Units

The Course comprises the following mandatory Units:

<b>Biology: Cells and Proteins (Advanced Higher)</b>	<b>8 SCQF credit points</b>
<b>Biology: Organisms and Evolution (Advanced Higher)</b>	<b>8 SCQF credit points</b>
<b>Investigative Biology (Advanced Higher)</b>	<b>8 SCQF credit points</b>

### 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

The Course is practical and experiential, developing skills in a biological context. Learners will gain knowledge and understanding of biology and develop this through a variety of approaches, including practical activities.

By completing this Course, learners will develop important skills, attitudes and attributes related to biology, including: developing scientific and analytical thinking skills in a biological context; developing understanding of biological issues; and acquiring and applying knowledge and understanding of biology.

Some activities and experiences will lend themselves to developing particular skills more than others. For example some practical activities will be particularly suitable for developing planning and designing skills, some for presenting and analysing data skills and others for the skill of drawing conclusions. In selecting appropriate activities and experiences teachers and lecturers should identify which skills are best developed in each activity to ensure the progressive development of all skills and to support learners' learning.

Learners will also develop their understanding of relevant applications of biology in society and a deeper understanding of the underlying themes of biology.

In addition to developing specific scientific skills, in areas such as experimentation and investigation, learners will also gain valuable transferable skills, for learning, life and work, such as literacy, numeracy and communication.

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

## **Biology: Cells and Proteins (Advanced Higher)**

In this Unit, learners will develop knowledge and understanding of biology laboratory techniques and of the role proteins play in the structure and functioning of cells and organisms. The study of protein is primarily a laboratory-based activity, and consequently the Unit begins with a selection of important laboratory techniques for biologists. This skills-based sequence of concepts leads from health and safety considerations, through the use of liquids and solutions, to a selection of relevant separation and antibody techniques. In addition, much work on cell biology is based on the use of cell lines, so techniques related to cell culture and microscopy are included. These techniques could be delivered in an integrated manner within this Unit.

## **Biology: Organisms and Evolution (Advanced Higher)**

In this Unit, learners will develop knowledge and understanding of biology field techniques and the role of sexual reproduction and parasitism in the evolution of organisms. Biological variation is a central concept in this Unit. Variation is best observed in the natural environment, so this Unit begins with an outline of suitable techniques for ecological field study. Methods of sampling and the classification and identification of organisms are introduced. Evolution is considered from the impact of drift and selection on variation. The study of sexual

behaviour provides opportunities to use the techniques of ethology. There are many opportunities within the Unit to explore the systems approach required for the understanding of parasite biology. In addition, there are many opportunities to explore wider ethical issues relating to the importance of scientific knowledge and its application in challenging social and economic circumstances.

### **Investigative Biology (Advanced Higher)**

In this Unit, learners will develop knowledge and understanding of the principles and practice of scientific investigative work in biology and the skills to analyse and evaluate biological research. Learners will be able to carry out their own biological investigation, which will develop their skills to plan and design experiments appropriate to the aim of the investigation and to consider ethical issues of experimentation and any potential hazards. The collection of experimental data will provide an opportunity to develop planning and organising skills. Science is introduced as the gathering and organisation of knowledge and particular focus is placed on the testability and refinement of knowledge through experimentation. Essential ethics for biologists, as well as an introduction to the purposes and forms of different types of scientific communication, are covered.

This Unit can be integrated across the other Units of the Course.

## **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 the Unit Specification.

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 judgments are consistent and meet national standards.

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

## Course assessment

Courses from National 4 to Advanced Higher include assessment of [added value](#)<sup>1</sup>. 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 or application.

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

- ◆ challenge
- ◆ application

The learner will draw on and extend the skills they have learned during the Course. These will be assessed within a [question paper](#)<sup>2</sup> and a [project](#)<sup>3</sup>, requiring demonstration of the breadth of skills, knowledge and understanding acquired from across the Units in unfamiliar contexts and/or integrated ways.

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<sup>1</sup> Definitions can be found here: [www.sqa.org.uk/sqa/45528.html](http://www.sqa.org.uk/sqa/45528.html)

<sup>2</sup> Definitions can be found here: [www.sqa.org.uk/sqa/45528.html](http://www.sqa.org.uk/sqa/45528.html)

<sup>3</sup> See link above for definition.

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