



Advanced Higher Biology

Draft National Course Specification



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Please refer to the note of changes at the end of this Course Specification for details of changes from previous version (where applicable).

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Course outline

Course title: Advanced Higher Biology

SCQF: level 7 (32 SCQF credit points)

Course code: to be advised

Mandatory Units

Biology: Cells and Proteins (Advanced Higher)	8 SCQF credit points
Biology: Organisms and Evolution (Advanced Higher)	8 SCQF credit points
Investigative Biology (Advanced Higher)	8 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.

Recommended entry

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

- ◆ Higher Biology Course
- ◆ Higher Human Biology Course

Progression

This Course or its Units may provide progression to:

- ◆ an HND/degree in a biology-based course or a related area
- ◆ a career in a biology-based discipline or related area

Further details are provided in the Rationale section.

Equality and inclusion

This Course Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Course Support Notes*.

Rationale

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 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 develops responsible citizens by allowing learners to investigate current areas of biology research and investigative techniques.

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

The Advanced Higher Biology 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, the Advanced Higher Biology Course aims to develop a sound theoretical understanding and practical experience of experimental investigative work in biological science.

The Course provides candidates with the opportunity to develop a deeper understanding of the cell by studying the key roles of proteins within the cell. This understanding of cellular processes is then related to physiological function. At the whole-organism scale, the Course explores how sexual reproduction and parasitism are major drivers of evolution. This allows candidates to develop a deeper understanding of the mechanism of evolution, the biological consequences of sexual reproduction and the biological inter-relationships involved in parasitism. The Course provides a deeper understanding of laboratory and fieldwork techniques, and in carrying out a biological investigation the candidate has the opportunity to produce an extended piece of scientific work.

Throughout the Course there are ample opportunities to develop a systems approach to the study of biological science, allowing candidates 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.

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

Through 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. These skills enable learners to develop an informed and ethical view of complex issues.

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 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.

The further development of scientific skills and experience acquired in previous learning will extend candidates' capability to embark on independent investigative work, and by designing and carrying out their own investigation candidates will increase their scientific literacy and develop skills for learning, life and work.

Learners will increase their scientific literacy through in-depth analysis and evaluation of scientific publications and media reports, as well as through the production of their own scientific reports and communications. These activities will assist in developing skills for learning, life and work.

The aims of this Course are to enable learners to:

- ◆ develop a critical understanding of the role of biology in scientific issues and relevant applications, including the impact these could make on society/the environment
- ◆ extend and apply knowledge, understanding and skills of biology
- ◆ develop and apply the skills to carry out complex practical scientific activities, including the use of risk assessments, technology, equipment and materials
- ◆ develop and apply scientific enquiry and investigative skills, including planning and experimental design
- ◆ develop and apply scientific analytical thinking skills, including critical evaluation of experimental procedures, in a biology context

- ◆ extend and apply problem solving skills in a biology context
- ◆ further 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 biology

Learners' creativity will be developed and encouraged through opportunities to generate new ideas when planning and designing investigations and experiments, which they will carry out.

Practical investigative skills are particularly important at this level. This is reflected in the opportunity to carry out high-quality experimental work within all the Course Units, and particularly in the *Investigative Biology* (Advanced Higher) Unit, which incorporates both practical techniques and skills of scientific investigation.

The Course allows flexibility and personalisation by offering choice within the key areas studied. The Course content has been selected to allow learners to study key chemical concepts within situations of personal relevance, using up-to-date contexts.

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, enquiry and investigative skills, problem solving skills and practical skills.

Literacy is developed as reading and interpreting scientific literature is encouraged and learners will be given opportunities to develop scientific ideas and opinions in a coherent logical manner. Numeracy will be developed and applied through analysing data in a range of formats including statistics.

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 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 and health
- ◆ careers in a biology-based or related area including the health sector, agricultural science, education, environmental services

As well as providing an excellent grounding for the future study of biology and biology-related subjects, the Course also equips all learners with an understanding of the positive impact of biology on everyday life.

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.

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Course structure and conditions of award

Course structure

Units can be taught sequentially or in parallel to each other. However, learning and teaching approaches should provide opportunities to integrate skills, where possible.

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)

This Unit builds on understanding of the genome from Higher Biology and Higher Human Biology. Learners will develop knowledge and understanding of proteomics, protein structure, binding and conformational change; membrane proteins; detecting and amplifying a stimulus; communication within multicellular organism and protein control of cell division. The study of protein is primarily a laboratory-based activity, so the Unit includes important laboratory techniques for biologists.

This skills-based sequence covers 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 includes techniques related to cell culture and microscopy. These techniques could be delivered in an integrated manner within this Unit.

Biology: Organisms and Evolution (Advanced Higher)

This Unit builds on understanding of selection in the context of evolution and immune response from Higher Biology and Higher Human Biology. Learners will develop knowledge and understanding of evolution; variation and sexual reproduction; sex and behaviour and parasitism. It covers the role of sexual reproduction and parasitism in the evolution of organisms. Biological variation is a central concept in this Unit and is best observed in the natural environment.

This Unit covers 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 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)

This Unit builds on understanding of the scientific method from Higher Biology and Higher Human Biology. Learners will develop knowledge and understanding of the principles and practice of investigative biology and its communication. The Unit covers scientific principles and processes, experimentation and critical evaluation of biological research.

Learners will do this through the key aspects of the scientific method, literature and communication and ethics; pilot studies, variables, experimental design, controls, sampling and ensuring reliability; evaluating background information,

experimental design, data analysis and conclusions. The collection of experimental data will provide an opportunity to develop planning and organising skills. 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.

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Skills, knowledge and understanding

Further information on the assessment of skills, knowledge and understanding for the Course is given in the *Course Assessment Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course is given in this section.

This includes:

- ◆ extending and applying knowledge of biology to new situations, interpreting and analysing information to solve more complex problems
- ◆ planning and designing biological experiments/investigations, including risk assessments, to test a hypothesis or to illustrate particular effects
- ◆ carrying out complex experiments in biology, safely, recording systematic detailed observations and collecting data
- ◆ selecting and presenting detailed information, appropriately, in a variety of forms
- ◆ processing and analysing biological information (using calculations, significant figures and units, where appropriate)
- ◆ making reasoned predictions and generalisations from a range of evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ critically evaluating experimental procedures by identifying sources of error, suggesting and implementing improvements
- ◆ drawing on knowledge and understanding of biology to make accurate statements, describe complex information, provide detailed explanations and integrate knowledge
- ◆ communicating biological findings and information fully and effectively
- ◆ analysing and evaluating scientific publications and media reports

Skills, knowledge and understanding to be included in the Course will be appropriate to the SCQF level of the Course. The SCQF level descriptors give further information on characteristics and expected performance at each SCQF level (www.sqa.org.uk/scqf).

Assessment

Information about assessment 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.

The assessment of the Units in this Course will be as follows.

Biology: Cells and Proteins (Advanced Higher)

Learners who complete the Unit will be able to:

- ♦ apply skills of scientific enquiry, drawing on knowledge and understanding of key areas of this Unit, to carry out an experiment/practical investigation
- ♦ draw on knowledge and understanding of the key areas of this Unit and apply scientific skills

Biology: Organisms and Evolution (Advanced Higher)

Learners who complete the Unit will be able to:

- ♦ apply skills of scientific enquiry, drawing on knowledge and understanding of key areas of this Unit, to carry out an experiment/practical investigation
- ♦ draw on knowledge and understanding of the key areas of this Unit and apply scientific skills

Investigative Biology (Advanced Higher)

Learners who complete the Unit will be able to:

- ♦ apply skills of scientific enquiry, drawing on knowledge and understanding of key areas of this Unit, to carry out a biological investigation
- ♦ draw on knowledge and understanding of the key areas of this Unit to analyse and evaluate reports of biological research

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](#). 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](#)¹ and a [project](#)², requiring demonstration of the breadth of skills, knowledge and understanding acquired from across the Units 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 definition.

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Course. The skills that learners will be expected to improve on and develop through the Course are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Course where there are appropriate opportunities.

1 Literacy

- 1.1 Reading
- 1.2 Writing

2 Numeracy

- 2.1 Number processes
- 2.2 Money, time and measurement
- 2.3 Information handling

5 Thinking skills

- 5.3 Applying
- 5.4 Analysing and evaluating
- 5.5 Creating

Amplification of these skills is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the Course. Further information on building in skills for learning, skills for life and skills for work for the Course is given in the *Course Support Notes*.

Administrative information

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Superclass: to be advised

History of changes to National Course Specification

Course details	Version	Description of change	Authorised by	Date

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