



Higher Chemistry — 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 chemistry, learners develop their interest in and understanding of the world in an engaging and enjoyable way. They engage in a wide range of investigative tasks which, while fostering an enjoyment of chemistry and learning, allow them to develop important skills to become creative, inventive and enterprising, in a world where the knowledge and skills developed in chemistry are needed across all sectors of society.

Chemistry Courses should encourage resilience, which leads to becoming a confident individual. Successful learners in chemistry think creatively, analyse and solve problems. Chemistry can produce responsible citizens through studying the impact it makes on developing sustainability and its effect on the environment, society, and the lives of themselves and others.

Higher Chemistry allows learners to understand and investigate the world. It develops learners' ability to think analytically, creatively and independently, and to make reasoned evaluations. The Course will allow opportunities for learners to acquire and apply knowledge to evaluate environmental and scientific issues, assess risk, and make informed decisions. This leads to the learner developing 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.

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. Everything in our world is made from the elements, and chemistry is the science of understanding how the elements combine and react together. Chemistry plays a key role in meeting society's needs in areas such as medicine, energy, industry, material development, analysis, the environment and sustainability. Chemistry is vital for the beneficial future development of our world, and it is essential that everyone has an informed view of science.

As the importance and application of science continues to grow and develop, more trained scientists will be required and it is key that everyone has an informed view of scientific issues in order to make balanced decisions.

The Course provides well-mapped concept and skill development pathways. The Course develops scientific understanding of issues relating to chemistry, and uses the development of chemical theory to build an extensive set of skills for the learners. Through application of a detailed knowledge and understanding of chemical concepts, in practical situations, learners develop an appreciation of the impact of chemistry on their everyday lives. By using the broad skills base and

knowledge and understanding of detailed chemistry concepts, learners will become scientifically literate citizens.

The main aims of this Course are for learners to:

- ◆ acquire and apply knowledge and understanding of chemistry concepts
- ◆ develop scientific and analytical thinking skills in a chemistry context
- ◆ develop applied problem solving skills in a chemistry context
- ◆ develop an understanding of chemistry's role in scientific issues
- ◆ develop understanding of how and why chemical products are formed
- ◆ develop understanding of relevant applications of chemistry in society

The Course also serves to equip all learners with an understanding of the impact of chemistry 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 chemical concepts 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 Units offer opportunities for collaborative and independent learning, set within familiar and unfamiliar contexts and for high-quality experimental work.

Due to the interdisciplinary nature of the sciences, learners will benefit from studying chemistry along with the other science subjects, as this enhances their skills, knowledge and understanding.

Information about typical learners who might do the Course

The Course is suitable for learners who are secure in their attainment of Chemistry (National 5) 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.

The Course will allow opportunities for learners to develop chemical knowledge and scientific skills 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.

successful learner, confident individual, responsible citizen, effective contributor

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

- ◆ Advanced Higher Chemistry
- ◆ Higher in another science subject
- ◆ National Certificate Group Awards
- ◆ HNC, HND or degree in a chemistry-based course or a related area
- ◆ employment

Draft

Course summary

Course title: Higher Chemistry

SCQF level 6 (24 SCQF credit points)

Course outline

Mandatory Units

| | |
|--|------------------------|
| Chemistry: Structure and Research (Higher) | (6 SCQF credit points) |
| Chemistry: Nature's Chemistry (Higher) | (6 SCQF credit points) |
| Chemistry: Chemistry in Society (Higher) | (6 SCQF credit points) |

Course assessment

(6 SCQF credit points)

This Course includes six SCQF credit points for 40 additional programmed hours to allow 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 chemical context. Through a variety of real-life contexts, learners will acquire and apply knowledge and understanding of chemical concepts and develop this through an application-led approach including practical activities.

By completing this Course, learners will develop important and relevant skills, attitudes and attributes related to chemistry, including: developing scientific and analytical thinking skills in a chemistry context; developing an understanding of chemistry's role in scientific issues; and acquiring and applying knowledge and understanding of chemistry concepts.

Learners will also develop understanding of how chemical products are formed, and of relevant applications of chemistry 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, such as literacy, numeracy and citizenship.

Higher Chemistry will deepen learners' understanding of chemical concepts through a contextual and application-led process, where the concepts of sustainability and the balance between benefit and cost will be addressed.

The Higher Chemistry Course has three Units, totalling 18 SCQF credit points, with an additional six SCQF credit points to allow the use of an extended range of learning and teaching approaches, consolidation of learning, integration, and preparation for external assessment.

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

Chemistry: Structure and Research (Higher)

This Unit develops knowledge and understanding of periodic trends and strengthens the learner's ability to make reasoned evaluations by recognising underlying patterns and principles. Developing a deeper understanding of the concept of electro-negativity allows the key themes of the Unit to be developed. Learners will gain an understanding of the different types of intermolecular force and their role in determining a material's physical properties. From the starting point of electro-negativity, learners look at the ability of substances to act as oxidising or reducing agents and their use in analytical chemistry through the context of volumetric titrations.

In this Unit, learners will be given the opportunity to carry out research in chemistry. Learners will develop the key skills associated with collecting and synthesising information from a number of different sources. Equipped with the knowledge of common chemistry apparatus and techniques, they will plan and carry out a practical investigation related to a topical issue.

Chemistry: Nature's Chemistry (Higher)

This Unit develops a knowledge and understanding of organic chemistry within the context of everyday consumer products. The relationship between the structure of organic compounds and their physical and chemical properties is explored. Key functional groups and types of organic reaction are covered. The Unit will equip learners with the scientific background and skills necessary to evaluate scientific and technological claims, in order to make informed choices and decisions. The Unit provides learners with the opportunity to solve problems, apply critical thinking in new contexts, and evaluate and analyse scientific articles.

Chemistry: Chemistry in Society (Higher)

This Unit develops a knowledge and understanding of the principles of physical chemistry which allow a chemical process to be taken from the researcher's bench through to industrial production. Learners will calculate quantities of reagents and products, develop skills to manipulate dynamic equilibria, understand the mechanisms by which rates can be controlled, and predict enthalpy changes. Analytical chemistry is used to determine the purity of reagents and products.

This Unit highlights the need for chemists to think creatively to develop new processes and products. Within the Unit, learners will evaluate the environmental issues surrounding a chemical process in order to make informed choices and decisions about the most ethical means of production.

To gain the award of the Course, the learner must pass all 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 will be included in the *Course Assessment Specification*, which will provide 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 will be assessed pass/fail 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 Higher Chemistry Course, added value will focus on:

- ◆ breadth
- ◆ 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 a [case study](#)³, requiring demonstration of the breadth of 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.