

Arrangements for:
HND Applied Chemistry
Group Award Code: G87H 16

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Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

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History of changes

It is anticipated that changes will take place during the life of the qualification, and this section will record these changes. This document is the latest version and incorporates the changes summarised below.

Version number	Description	Date
05	<p>Mandatory Units</p> <p>Fundamental Chemistry: Theory and Laboratory Skills (H92X 34) added as an alternative to Fundamental Chemistry: Theory and Practice (DH2K 34)</p> <p>Inorganic Chemistry: Theory and Laboratory Skills (H92Y 34) added as an alternative to Fundamental Concepts of Inorganic Chemistry (DP2N 34)</p> <p>Organic Chemistry: Theory and Laboratory Skills (H933 34) added as an alternative to Fundamental Concepts of Organic Chemistry (DP2P 34)</p> <p>Physical Chemistry: Theory and Laboratory Skills (H936 34) added as an alternative to Fundamental Concepts of Physical Chemistry (DP2R 34)</p> <p>Instrumental Techniques 1 (H930 35) added as an alternative to Instrumental Techniques: Theory and Practice 1 (DH54 35)</p> <p>Instrumental Techniques 2 (H931 35) added as an alternative to Instrumental Techniques: Theory and Practice 2 (DH2N 35)</p> <p>Aromatic Chemistry: Theory and Laboratory Skills (H92N 35) added as an alternative to Aromatic Chemistry (DP54 35)</p> <p>Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills (H92P 35) added as an alternative to Base-Catalysed Reactions and Organometallic Reagents on the Organic Synthesis (DP5W 35)</p> <p>Organic Stereochemistry: Theory and Laboratory Skills (H934 35) added as an alternative to Organic Stereochemistry (DX2H 35)</p> <p>Transition Metal Chemistry: Theory and Laboratory Skills (H939 35) added as an alternative to Transition Metal Chemistry (DR0E 35)</p> <p>Main Group Inorganic Chemistry (H932 35) added as an alternative to Main Group Inorganic Chemistry (DV9F 35)</p> <p>Electrochemistry (H92T 35) added as an alternative to Electrochemistry (DP5V 35)</p> <p>Phase Equilibrium and Surface Chemistry (H935 35) added as an alternative to Phase Equilibrium and Surface Chemistry (DP5X 35)</p> <p>Thermodynamics and Kinetics: Theory and laboratory Skills (H938 35) added as an alternative to Thermodynamics and Kinetics (DP4N 35)</p> <p>Optional Units</p> <p>Biotechnology: An Introduction (H926 34) added as an alternative to Biotechnology: An Introduction (DJ00 34)</p> <p>Science Industry: Key Issues (H92K 34) added as an alternative to Science Industry: Key Issues (DP9M 34)</p> <p>Fundamental Chemistry: An Introduction (H92W 33) added as an alternative to Fundamental Chemistry: An Introduction</p>	11/09/2015

	(DX29 33) Biochemistry: Theory and Laboratory Skills (H922 34) added as an alternative to Biochemistry: Theory and Practice (DH2J 34) Cell Biology: Theory and Laboratory Skills (H927 34) added as an alternative to Cell Biology: Theory and Practice (DJ1K 34)	
04	Revised Units: DH55 34 Microbiology: Theory and Practice has been revised by H92G 34 Microbiology: Theory and Laboratory Skills. DN33 33 Physics 1 has been revised by H93D 33. DN34 34 Physics 2 has been revised by H93E 34. DP4Y 34 Environmental Chemistry has been revised by Environmental Chemistry: Theory and Laboratory Skills H92V 35. DP5T 35 Applications of Transition Metal Compounds has been revised by H92M 35. DJ89 34 Applied Sciences: Graded Unit 1 has been revised by H91W 34. DN8C 34 Statistics for Science 1 has been revised by H8XT 33. DV08 35 Statistics for Science 2 has been revised by H8XV 34. DN8D 33 Mathematics for Science 1 has been revised by H8XP 33. DV9V 34 Mathematics for Science 2 has been revised by H8XR 34. Old units will finish on 31/07/2017.	26/05/15
03	The following Units were added to Section E (Additional Optional Units)- DJ1K34 Cell Biology: Theory and Practice, DH5534 Microbiology: Theory and Practice, and D03313 Environmental Biology. Wording of Section B heading changed from 'Minimum 2 credits' to 'from 2 to 3 credits'. Wording of Section C heading changed from 'Minimum 2 credits' to 'from 2 to 3 credits'. Wording of Section D heading changed from 'Minimum 2 credits' to 'from 2 to 3 credits'. Wording of Section E heading changed from '8 credits' to 'from 5 to 8 credits'. Wording of Broadening Units heading changed from 'maximum 5 credits' to 'up to 5 credits'.	22/04/15
02	Revision of Unit: DE1K 33 Workplace Communication in English has been revised by H8T2 33 and finishes on 31/07/2016.	16/03/15

1 Introduction

This is the Arrangements document for the revised Group Award: HND Applied Chemistry (G87H 16) and the associated Graded Units. The HN Units that make up the Group Award have been validated separately in accordance with the new design principles.

The Arrangements Document has been developed in order to assist centres in preparing for approval for the new HND Applied Chemistry Group Award and maintaining the award following successful approval. This award was validated in October 2005 and replaces the existing HND Chemistry award(s).

This document includes details on the background to the development of the new award, its aims (both general and specific), recommended access requirements, information about the structure of the awards, recommendations on delivery, assessment and guidance for centres.

2 Rationale for the revision of the award

2.1 HN Science Frameworks

One of the main objectives in this review was to develop a new HND which would be up-to-date and relevant for the science industry. Most of the current courses that centres were delivering were beyond the normal lapsing period. Chemistry was last been reviewed in 1996. The HN Science conference in February 2004 gave a clear mandate for complete review of the entire HN Science provision. It was therefore an ideal time to rewrite the HND Chemistry course. The review has provided an opportunity for inclusion of updated technical content, revised assessment strategies, flexibility to match current employment needs and recognition of the needs of candidates for progression to Higher Education.

The main project objective was:

- ◆ to design and provide high quality accredited education and training which supports the needs of the science industry for well-trained technical staff.

Specific objectives and outputs, relevant to this HND development are:

- ◆ a response to the large number of government publications calling for an increased number of technically competent people in the science field.
- ◆ A response to the Royal Society of Chemistry's study which highlighted the reduction in the number of people studying analytical chemistry
- ◆ the shared development of curriculum material, with content as advised by the industry, 30 credits over 2 years
- ◆ an increase in the number of young people studying science in schools and colleges
- ◆ an increase in the number of colleges offering chemistry education and training
- ◆ Improved links to the university sector creating a wider range of articulation routes

2.1.1 HND Applied Chemistry

In November 1999, in their document, 'Biotechnology — A Framework for Action', Scottish Enterprise set targets to be achieved over the following five years involving growth in company-based research employment, employment in the cluster, the number of Biotechnology and support and supply companies and an improvement in the performance of the whole sector. Their strategic approach aims to allow key issues, such as skill gaps, to be addressed. A key element of sustaining and maintaining these targets is to develop the skills of the existing and potential workforce.

The updated 'framework for action' documents highlight that the targets set have been overtaken, leading to a significant change in the nature of the science industry in Scotland. At the same time the established companies in the oil and gas sector have been undergoing a period of rationalization. The 'Future Skills Scotland' document projects 500,000 new jobs by 2008, with 56% requiring a qualification at HNC or above. Much of the expansion will be in industries which will require a technically competent workforce.

The market research carried out has shown that there is a need for qualified chemistry technicians. While many of the new companies have developed from a 'Life Science' background, they too highlight the need for analytical chemistry skills.

Throughout the development of this proposal the development group has consulted with employers in the science industry as well as staff across the college and university sectors. The views and needs of employers has provided information which has shaped this course and supported evidence of demand for such a qualification, with particular emphasis on underpinning knowledge, practical laboratory skills and quality systems.

2.2 Consultation Process

Extensive consultation was carried out at all stages of the review process to ascertain both the level of uptake of the award as well as the relevance of the framework and Units.

This consultation involved:

- ◆ Colleges
- ◆ Employers
- ◆ Royal Society of Chemistry(RSC)
- ◆ Scottish Chemical Industry Training Organisation (SCITO)
- ◆ Candidates
- ◆ Universities to which successful candidates could articulate

In reviewing this award, consultations were undertaken at key stages in the development schedule. Development teams and the Team leaders of each group helped to guide the overall development process.

Stakeholder	Method of Consultation
Employers	<ul style="list-style-type: none"> ◆ Questionnaire sent to employers ◆ Phone survey and face to face interviews
RSC	<ul style="list-style-type: none"> ◆ Face to face discussion ◆ Review of publications
SCITO	<ul style="list-style-type: none"> ◆ Presentation to and discussion with the committee ◆ Face to face discussion
Higher Education	<ul style="list-style-type: none"> ◆ Questionnaires ◆ Face to face interviews
Centres	<ul style="list-style-type: none"> ◆ All delivering centres invited onto development teams ◆ Postal questionnaire sent to all centres ◆ Conferences held in January 2003 and January 2004 to update and inform centres ◆ Information updates posted on SQA website — HN Science pages
Candidates	<ul style="list-style-type: none"> ◆ Focus group discussion with existing students to discuss possible changes to the HND

2.2.1 Feedback of Consultation

The consultation confirmed that there was considerable need for the proposed awards from Colleges, candidates, employers and Higher Education Institutions. It was recognized that few centres were running the existing award and that the new award should make it more attractive for more colleges to offer the course. Through consultation, a number of changes were made to the framework, this included changes to the mandatory and optional areas of the framework and changes to individual Units. The course team met on a number of occasions to ensure that the Units covered the required content and to develop a consistent approach to assessment across the award.

2.2.2 Demand for Revised Courses

The need for the Group Awards has been clearly identified. These Group Awards contribute to an overall strategy for reducing the skills gap in the science industry and enhancing the Scottish economy by further expansion of science knowledge.

The evidence of support from employers, professional bodies and universities indicates that the structure and content of the awards meets the needs identified.

2.3 Target groups

The award is designed for those who wish to take up a career in the science-based industries. The skills developed will allow successful candidates to pursue careers in a wide range of industry, including oil and gas, life sciences and the food industry. The specific groups who may take up the award include:

- (a) Students articulating from the suite of National Certificate programmes.
- (b) Students articulating from ACCESS courses.
- (c) School leavers with a minimum of one Science Higher at C grade.
- (d) Students who may have partially completed one or two years of a degree programme.

The HND Applied Chemistry Group Award is a specialised award which allows candidates to gain more advanced knowledge and technical skills in organic, inorganic, physical and analytical chemistry. There is an emphasis on laboratory work, in particular instrumentation and the need to work to a set of quality standards. As such, it is intended to prepare candidates for employment at senior technician level.

The award is designed for both full and part-time candidates.

The award may be delivered by open and distance learning methods, provided that adequate preparations are made. Additional planning and resources will be needed for candidate support, assessment and laboratory work.

In respect of assessment, a combination of new and traditional authentication tools and techniques may have to be devised. Quality assurance procedures must also be sufficient and robust to support open and distance learning. Further advice and guidance is available in the SQA publication *Assessment and Quality Assurance for Open and Distance Learning* — SQA February 2001.

2.4 Employment opportunities

The employment prospects for holders of the HND are excellent. For example **Futureskills Scotland** published jointly by Highlands and Islands enterprise and Scottish Enterprise make labour market projections for the years 2003–2008. These predictions are based on an economic forecasting model produced by the researchers at the universities of Warwick and Cambridge. This model forecast that within Scotland, in the periods covered, there:

- ◆ will be 500,000 new jobs arising of which:
 - 103,000 will be in health and education
 - 5,000 will be in chemicals
 - 8,000 will be in manufacturing
 - 5,000 will be in the food, drink and tobacco industries and
- ◆ that 56% of these new jobs will require a qualification at HNC or above

This programme has been designed to meet the needs of this expanding employment market and candidates will develop the competences required to enhance their ability to obtain employment as a senior technician, junior laboratory manager or production process controller in a science based industry.

3 Aims of the award

3.1 General aims of the award

The overall aim of the HND Applied Chemistry is to provide a progressive, integrated and coherent education which will be responsive to the needs of students, employers and higher institutions. Specifically these are to:

- ◆ **develop candidates' knowledge and skills** such as planning, analysis and synthesising in the area of chemical science.

- ◆ **develop employment skills** and enhance candidates' employment prospects by providing the student with a wide range of practical laboratory skills including a wide range of analytical techniques including spectroscopy and chromatography. Candidates will also become familiar with 'soft skills' such as learning to work on their own or in a team environment as well as developing skills in producing oral and written reports and enhancing their presentation and communication skills.
- ◆ **enable progression** within the SCQF framework to HE level or a PDA/SVQ within the workplace as students are undertaking a wide range of transferable skills and underpinning knowledge.
- ◆ **develop study and research skills** in the area of chemical science the use of which to be demonstrated in the Graded Units.
- ◆ **develop transferable skills** including core skills to be demonstrated across all Units including IT skills, statistics, presentation skills, working in a team and problem-solving.
- ◆ **provide a stimulating and intellectually satisfying learning experience.** The level and content of knowledge necessary for successful completion of this award will require diligence and commitment from the student. The structure of the award, design of the assessments and the relationship between theory and observed good practice are intended to provide a balance between presented learning and developmental thinking on the part of the student.
- ◆ **develop in the candidate skills of independent study and communication** and a sense of the responsibility attached to the work of chemical scientists which should be demonstrated particularly in Graded Unit 2.
- ◆ **provide the candidate with a deeper underpinning knowledge** in chemical science.

3.2 Specific aims of the award

The aims of the HND Applied Chemistry specifying the knowledge and skills required in order to be deemed competent in this subject area are to:

- ◆ **prepare candidates for an appropriate level of employment**, in science areas such as research and industrial laboratories; chemical, pharmaceutical, biotechnology and environmental industries
- ◆ **develop a range of contemporary vocational skills** relating to the use, support and development of systems appropriate to employment at technician or professional level.
- ◆ **develop options to permit an element of vocational specialisation** in a variety of chemical science areas in Units such as: biochemistry, medicinal chemistry, environmental monitoring and biotechnology.
- ◆ **prepare candidates for progression to further studies** in science related disciplines.
- ◆ **provide a flexible route to a qualification**, meeting demand, for example, for those already in employment. The unitised structure of the course and the intended modes of delivery may provide access to this qualification from those in employment through day-release provision and for direct entry or seconded students through full-time provision. Discrete Units will be available for study.

- ◆ **provide candidates with a wider range of practical laboratory skills** to further enhance job prospects through the practical content of the course (see number of practical hours per Unit (Section 6.4.1).

4 Access to awards

4.1 Formal Qualifications

It is intended that admission to these awards should be as broadly based as possible, but that this should be consistent with the selection of candidates who have a reasonable chance of successfully completing the award (s). The following entry requirements are given as guidelines only:

4.1.1 HND Applied Chemistry Year 1 (HNC Applied Sciences)

- ◆ One Science Higher and not fewer than three Standard Grade 3 passes, including Chemistry, Biology, Biotechnology or Human Biology and Mathematics.
- ◆ National Qualification in an appropriate Science and Maths programme, such as Access to Science. Candidates should preferably possess some Units at Higher level.
- ◆ Scottish Group Award (SGA) in Science at Intermediate 2.
- ◆ Qualifications comparable to the above, gained through other awarding bodies, such as GCSE, City and Guilds, Edexcel.
- ◆ At the discretion of the Principal of the presenting centre for applicants with a different experiential background, who could benefit from taking the course or Units within the course, eg adult returners, overseas candidates.

4.1.2 HND Applied Chemistry Year 2

- ◆ Completion of the HND Applied Chemistry year 1 (HNC Applied Sciences) award including the option recommendations shown below:

DN8D 33	Mathematics for Science 1
DN33 33	Physics 1
DP2P 34	Fundamental Concepts of Organic Chemistry
DP2N 34	Fundamental Concepts of Inorganic Chemistry
DP2R 34	Fundamental Concepts of Physical Chemistry

- ◆ Candidates need not have successfully completed all 15 credits of the HNC in order to progress to this award (although it is strongly recommended that they are re-sitting as few credits as possible from the HNC.) Delivering centres will specify their own limits on the maximum number credits which may be re-sat based on their own experience and any recommendations that may be made by the Quality review panel.
- ◆ Qualifications comparable to the above, gained through other awarding bodies, such as GCSE, City and Guilds, Edexcel, University Certificates etc. Such other qualifications would need to be presented in a format which would allow delivering centres to give credits for the Units composing year 1 of the HND.
- ◆ At the discretion of the Principal of the presenting centre for applicants with a different experiential background, who could benefit from taking the course or Units within the course, eg adult returners, overseas candidates.

4.2 Alternative access arrangements

The presenting centre may operate alternative access arrangements in cases where the candidate is convinced s/he already has the required competences in a given area. These arrangements are as follows:

- ◆ Assessment on demand
- ◆ Credit Transfer
- ◆ Accreditation of Prior Learning
- ◆ Work Experience — mature candidates with suitable work experience may be accepted for entry provided the enrolling centre believes that the candidate is likely to benefit from undertaking the award.

Individual presenting centres will outline their systems for each of these as appropriate.

5 Award structure

The 30 credits of the HND Applied Chemistry award would normally be studied on a full-time basis over a two year period. In year 1 candidates would complete the HNC Applied Sciences award, choosing the specific option mentioned in Section 4.2.1. The framework has been designed to ensure that candidate must study at least 3 credits from the main branches of chemistry. Some flexibility has been introduced, with a view to encouraging more centres to offer the award.

5.1 Framework

HND Applied Chemistry

Section A — Mandatory Units (16 credits)

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Presentation Skills in Science	DG70 34	8	7	1
Statistics for Science 1	H8XT 33*	8	7	1
Information Technology Applications Software 1	D75X 34	8	7	1
Fundamental Chemistry: Theory and Practice Or Fundamental Chemistry: Theory and Laboratory Skills	DH2K 34 H92X 34	16 16	7 7	2 2
Quality and Health & Safety Systems in Science Industries	DF82 34	8	7	1
Fundamental Concepts of Inorganic Chemistry Or Inorganic Chemistry: Theory and Laboratory Skills	DP2N 34 H92Y 34	8 8	7 7	1 1
Fundamental Concepts of Organic Chemistry Or Organic Chemistry: Theory and Laboratory Skills	DP2P 34 H933 34	8 8	7 7	1 1
Fundamental Concepts of Physical Chemistry Or Physical Chemistry: Theory and Laboratory Skills	DP2R 34 H936 34	8 8	7 7	1 1
Mathematics for Science 1	H8XP 33*	8	6	1
Physics 1	H93D 33*	8	6	1
Applied Sciences: Graded Unit 1 — Investigation	H91W 34*	8	7	1
Instrumental Techniques: Theory and Practice 1 Or Instrumental Techniques 1	DH54 35 H930 35	8 8	8 8	1 1
Instrumental Techniques: Theory and Practice 2 Or Instrumental Techniques 2	DH2N 35 H931 35	8 8	8 8	1 1
Applied Chemical Sciences: Graded Unit 2 — Project	H92L 35*	16	8	2

Section B — from 2 to 3 credits

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Aromatic Chemistry Or Aromatic Chemistry: Theory and Laboratory Skills	DP54 35 H92N 35	8 8	8 8	1 1
Base-Catalysed reactions and organometallic reagents in organic synthesis Or Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills	DP5W 35 H92P 35	8 8	8 8	1 1
Organic Stereochemistry Or Organic Stereochemistry: Theory and Laboratory Skills	DX2H35 H934 35	8 8	8 8	1 1

Section C — from 2 to 3 credits

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Transition Metal Chemistry Or Transition Metal Chemistry: Theory and Laboratory Skills	DR0E 35 H939 35	8 8	8 8	1 1
Main Group Inorganic Chemistry Or Main Group Inorganic Chemistry	DV9F 35 H932 35	8 8	8 8	1 1
Applications of Transition Metal Compounds	H92M 35*	8	8	1

Section D — from 2 to 3 credits

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Electrochemistry Or Electrochemistry	DP5V 35 H92T 35	8 8	8 8	1 1
Phase Equilibrium and Surface Chemistry Or Phase Equilibrium and Surface Chemistry	DP5X 35 H935 35	8 8	8 8	1 1
Thermodynamics and Kinetics Or Thermodynamics and Kinetics: Theory and Laboratory Skills	DP4N 35 H938 35	8 8	8 8	1 1

Section E — Additional Optional Units — from 5 to 8 credits

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Environmental Chemistry: Theory and Laboratory Skills	H92V 35*	8	7	1
Medicinal Chemistry	DP4W 35	8	8	1
Biotechnology: An Introduction Or Biotechnology : An Introduction	DJ00 34 H926 34	8 8	7 7	1 1
Science Industry: Key Issues Or Science Industry: Key Issues	DP9M 34 H92K 34	8 8	7 7	1 1
Biochemistry: Theory and Practice Or Biochemistry: Theory and Laboratory Skills	DH2J 34 H922 34	8	7	1
Physics 2	H93E 34*	8	7	1
Mathematics for Science 2	H8XR 34*	8	7	1
Food Science: Theory and Practice	DH9Y 35	8	8	1

Employment Experience 2	D77H 34	8	8	1
Fundamental Chemistry: An Introduction Or Fundamental Chemistry: An Introduction	DX29 33 H92W 33	8 8	6 6	1 1
Statistics for Science 2	H8XV 34*	8	7	1
Environmental Sampling and Analysis	DT4X 35	8	8	1
Cell Biology: Theory and Practice Or Cell Biology: Theory and Laboratory Skills	DJ1K 34 H927 34	8 8	7 7	1 1
Microbiology: Theory and Laboratory Skills*	H92G 34*	16	7	2
Environmental Biology	D033 13	8	7	1

Broadening Units — up to 5 credits

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Workplace Communication in English	H8T2 33*	8	6	1
Personal Development Planning	DE3R 34	8	7	1
Work Role Effectiveness (2003) or Work Role Effectiveness (2003)	DG6E 34 DG6G 35	8 8	7 8	3 3

*Refer to history of changes for revision details.

5.1.1 Graded Units

The purpose of the Graded Unit is to assess the candidate's ability to integrate and apply the knowledge and/or skills gained in individual Units, to demonstrate that they have achieved the specific aims as detailed in Sections 3.1 and 3.2, and to grade candidate achievement.

Candidates will take a 1 credit Graded Unit at level 7 in the HNC Applied Sciences award. As well as the 1 credit Graded Unit, candidates will also take a 2 credit Graded Unit at level 8 in year 2 of the HND Applied Chemistry award.

5.1.2 Type of Graded Units

HNC Applied Sciences: Investigation Report

This Unit will be a project based on an investigation which should take place during the last block of study. It will cover a range of skills achieved through studying the mandatory Units of the award.

HND Applied Chemistry: Practical Assignment

This Unit will be a project based on a practical assignment which should take place during the last block of the second year of study. It will cover a range of skills achieved through studying the mandatory Units of the award.

5.1.3 Rationale for Graded Unit Assessment

Investigation Report

Candidates will be given a topic to research. They will produce a report covering the planning, developing and evaluation stages of the investigation. An investigation report allows candidates to integrate knowledge and skills gained in the mandatory Units. It allows them to use research skills, set timescales, identify main issues, methods and sources of research. It also allows them to use written scientific reporting skills in setting out the aims, data, analysis, summary, evaluation and references relevant to their investigation.

Practical Assignment

Candidates will be given a practical assignment to carry out. They will produce a report covering the planning, developing and evaluation stages of the project. A practical assignment allows candidates to integrate knowledge and skills gained in the mandatory Units. It allows them to use practical laboratory skills, GLP, risk assessments and other Health and Safety considerations as well as extending investigative skills to a practical situation. They will be expected to apply the knowledge gained in the theoretical Units when they are planning and discussing the project. It also allows them to use written laboratory reporting skills by producing a logbook/diary of their activities as well as the final project report.

5.1.4 Core Skills

This award has been designed using the new design principles and therefore the importance of core skills has been recognised and these are developed throughout the award. These core skills may be embedded in the entry qualifications that the presenting students have already achieved, eg, Problem Solving at SCQF level 5 is embedded in all Science Highers. It should be noted that although there is no mandatory entry and exit levels the following is recommended:

HND Applied Chemistry

Core Skill	Recommended Entry SCQF level	Recommended Exit SCQF level
Communication	5	6
Numeracy	5	6
Information Technology	5	6
Problem Solving	5	6
Working With Others	5	6

5.1.5 Core Skills Signposting

There may be opportunities to gather evidence towards Core Skills or Core Skills Components (see Appendix 1) however there is only automatic certification as detailed below:

Core Skill	Component	HN Unit	Level	Mandatory/Optional
Communication	Oral Communication	Presentation Skills in Science	6	M
	Written Communication	Presentation Skills in Science	6	M
Numeracy	Using Graphical Information			
	Using Number			
Information Technology	Using Information Technology	Information Technology: Applications Software 1	6	M
Problem Solving	Critical Thinking			
	Planning and Organising			
	Reviewing and Evaluating			
Working with Others				

5.2 Mapping information

The aims of the award will be met across a number of Units in the framework. Full details of where the aims are met by specific Units are given in Appendix 5.

5.3 Articulation, professional recognition and credit transfer

The award has been designed to provide the qualifications which demonstrate the relevant technical and transferable skills to enable immediate entry to employment. At the same time candidates can articulate to degree courses. Care has been taken in the design of the curriculum of this award to ensure that topics and Units required to maintain articulation routes are included. Attempts have been made to include appropriate options, which will allow a wider range of articulation routes.

Candidates should expect to progress to second or third years of degree courses if they pass the 30 credits hence gaining 240 SQCF credit points. Direct entry to year two of a BSc Chemistry course should be automatic. For third year entry candidates may be expected to obtain high pass marks in their Units together with an 'A' or 'B' in the Graded Units. In addition some universities may state which optional Units should be studied, for example, Edinburgh University is looking for the additional mathematics and physics Units to be part of the 30 credits.

6 Approaches to delivery and assessment

6.1 Content and Context

The HND Applied Chemistry is a specialised award which allows candidates to gain advanced knowledge and technical skills in quality issues, organic, inorganic, physical and analytical chemistry and instrumentation. By choosing an appropriate range of options candidates can prepare for employment at senior technician level in general science laboratories across a number of industries.

The evidence of support from employers indicates that the structure and content of the awards meets the need of employers.

The award allows candidates to progress to a range of study options in Higher Education, in the field of chemical sciences.

It is envisaged that the Applied Chemistry will be delivered as one award along with other HND courses. The integrated nature of the new HN Science framework allows centres to offer a range of awards, without having to timetable discrete classes, for the entire week.

While progression to degree level courses is one option open to candidates, it should be remembered that the HND is a vocational qualification. It is therefore important that there is an emphasis on the laboratory elements. The majority of Units contain a practical Outcome. It is essential that time is allowed to offer a wide range of laboratory training, with an emphasis on quality systems. While the number of assessed laboratory exercises has been limited, candidates should cover more than the minimum required to satisfy the assessment requirements.

6.2 Sequencing of Units

Full-time candidates will study the HNC Applied Sciences in year 1, progressing to the HND in year 2. The sequencing of Units is at the discretion of centres, but one alternative is given in Appendix 3. If a centre is offering more than one HND award, they may wish to offer candidates a choice. If this is to be the case, many of the core HNC Units would be offered at the start. This would involve a timetable including Presentation Skills in Science, Statistics for Science 1, Information Technology Applications Software 1, Fundamental Chemistry: Theory and Practice, Quality and Health & Safety Systems in Science Industries. By including, cell biology and environmental biology, candidates could be free to select which HND they wish to study later in the year.

For the second half of year 1, candidates would need to study Units, which will lead to one of the HND's. Those wishing to study Applied Chemistry, would study Maths for Science 1, Physics 1, Fundamental concepts of Organic Chemistry, Fundamental concepts of Inorganic Chemistry, Fundamental concepts of Physical Chemistry, the Graded Unit plus one other, possibly Biochemistry: Theory and Practice.

6.3 Graded Unit

The purpose of the Graded Units is to assess the candidate's ability to integrate and apply the knowledge and skills gained in the individual Units to demonstrate that they have achieved the specific aims. They also allow grading of candidate achievement.

Candidates will undertake two Graded Units, one at level 7 during the first year as part of the HNC Applied Sciences Award. This will be a one credit Unit involving an investigation report. They will also undertake a two credit Graded Unit at level 8 in year two as part of the HND Applied Chemistry award. This will be based on a practical assignment.

Investigation Report (Year 1)

Candidates will be given a topic to research. They will produce a report covering the planning, developing and evaluation stages of the investigation.

An investigation report allows candidates to integrate knowledge and skills gained in the mandatory Units. It allows them to use research skills, set timescales, experience working with others, improve self motivation and identify main issues, methods and sources of research. It also allows them to use scientific reporting skills in setting out the aims, data, analysis, summary, evaluation and references relevant to their investigation.

Laboratory-based Project (Year 2)

Candidates will select a practical assignment to carry out. They will produce a project report covering the planning, developing and evaluation stages of the work.

A laboratory-based project allows candidates to integrate knowledge and skills gained in the mandatory Units. It also allows them to use research skills, set timescales, experience working with others, improve self motivation and identify main issues, methods and sources of research. In addition it allows them to use practical laboratory skills, GLP, risk assessments and other Health and Safety considerations as well as extending investigative skills to a practical situation. It also allows them to use laboratory reporting skills by producing a logbook/diary of their activities as well as the final project report.

6.3.1 Delivery of the Graded Units

Given the integrated nature of the Graded Units, it is important that the entire course team is involved in the development of the Units. Both Units see the candidates carrying out an individual project, a literature survey in the HNC and a laboratory project in the HND. The delivery involves advice and support to the candidates as they complete the work. Centres may find this easier if the supervision is shared across the course team.

Timing of the assessment is important. It is recommended that the Graded Units are scheduled to run during the middle part of the academic year, possible November to April. The two main reasons for this are that:

- ◆ candidates are not completing major pieces of work at the same time as they are preparing for end of Unit tests.
- ◆ centres have time to mark and grade the projects in before sending them for central moderation

Candidates rightly see the Graded Units as hugely significant and may spend a disproportionate amount of time on them. It is important for centres to offer good advice and not allow candidates to neglect the work of other Units in pursuit of an ‘A’ grade.

6.4 Core Skills

Details on how Core Skills can be developed during this award is given in Appendix 1.

6.5 Delivery and Assessment

Although centres can choose the order in which to teach the Units within the awards, guidelines have been produced on timetabling the mandatory Units (Appendix 3). These timetables reflect the building block nature of the Units.

The assessment strategy of the design principles to encourage a more holistic approach to assessment has been adopted in both awards. The new HN Unit specification places the emphasis on reducing assessment load for candidates and centres by devising assessments which assess the entire theory content of the Unit where appropriate, and by sampling of knowledge and/or skills carried out under closed-book conditions on a random basis to ensure the candidates do not have prior knowledge of the sample.

Having end-of-Unit tests means that the majority of assessments need to take place toward the end of the teaching blocks. This represents a change from the current system, where assessments could be spread over a longer period of time. Centres should carefully plan the course to offer candidates every opportunity to succeed. If it is possible, introducing staggered starts for some Units may help with reducing the loading on candidates. Also it may help to plan the delivery to ensure that Units which do not require a closed-book test run in conjunction with those that do. For example the instrumentation Units do have assignments rather than ‘tests’.

Unit specifications detail exactly the Evidence Requirements and assessment procedures for each assessment event. Should centres wish to use a different mode of assessment from that recommended, they should seek prior moderation from SQA.

Assessment exemplar materials for all the Units are available from SQA.

6.5.1 Practical laboratory hours

HND Applied Chemistry

Section A — Mandatory Units (16 credits)

Product code	Product title	Credit value	SCQF level	Lab Hours
DG70 34	Presentation Skills in Science	1	7	0
DN8C 34	Statistics for Science 1	1	7	0
D75X 34	Information Technology Applications Software 1	1	7	0
DH2K 34	Fundamental Chemistry: Theory and Practice	2	7	30
DF82 34	Quality and Health & Safety Systems in Science Industries	1	7	0

Product code	Product title	Credit value	SCQF level	Lab Hours
DP2N 34	Fundamental concepts of Inorganic Chemistry	1	7	10
DP2P 34	Fundamental concepts of Organic Chemistry	1	7	10
DP2R 34	Fundamental concepts of Physical Chemistry	1	7	10
DN8D 33	Mathematics for Science 1	1	6	0
DN33 33	Physics 1	1	6	10
DJ89 34	Applied Sciences: Graded Unit 1 – Investigation	1	7	0
DH54 35	Instrumental Techniques: Theory and Practice 1	1	8	30
DH2N 35	Instrumental Techniques: Theory and Practice 2	1	8	30
DX2J 35	Applied Chemistry: Graded Unit 2 — Project	2	8	60

Section B — from 2 to 3 credits

Product code	Product title	Credit value	SCQF level	Lab Hours
DP54 35	Aromatic Chemistry	1	8	10
DP5W 35	Base Catalysed reactions and organometallic reagents in organic synthesis	1	8	10
DX2H 35	Organic Stereochemistry	1	8	5

Section C — from 2 to 3 credits

Product code	Product title	Credit value	SCQF level	Lab Hours
DR0E 35	Transition Metal Chemistry	1	8	10
DV9F 35	Main Group Inorganic Chemistry	1	8	10
DP5T 35	Applications of Transition Metal Compounds	1	8	5

Section D — from 2 to 3 credits

Product code	Product title	Credit value	SCQF level	Lab Hours
DP5V 35	Electrochemistry	1	8	10
DP5X 35	Phase Equilibrium and Surface Chemistry	1	8	10
DP4N 35	Kinetics and Thermodynamics	1	8	10

Section E — Additional Optional Units — from 5 to 8 credits

Product code	Product title	Credit value	SCQF level	Lab Hours
DP4Y 34	Environmental Chemistry	1	7	10
DP4W 35	Medicinal Chemistry	1	8	10
DJ00 34	Biotechnology: An introduction	1	7	10
DP9M 34	Science Industry: Key Issues	1	7	0
DH2J 34	Biochemistry: Theory and Practice	1	7	10
DN34 34	Physics 2	1	7	10
DV9V 34	Mathematics for Science 2	1	8	0
DH9Y 35	Food Science: Theory and Practice	1	8	10
D77H 34	Employment Experience 2	1	8	30
DX29 33	Fundamental Chemistry: An Introduction	1	8	0
DV08 35	Statistics for Science 2	1	8	0
DT4X 35	Environmental Sampling and Analysis	1	8	30
DJ1K 34	Cell Biology: Theory and Practice	1	7	0
DH55 34	Microbiology: Theory and Practice	2	7	0
D033 13	Environmental Biology	1	7	0

Broadening Units — up to 5 credits

Product code	Product title	Credit value	SCQF level	Lab Hours
DE1K 33	Workplace Communication in English	1	6	0
DE3R 34	Personal Development Planning	1	7	0
DG6E 34	Work Role Effectiveness (2003)	3	7	0
or DG6G 35	Work Role Effectiveness (2003)	3	8	0

7 General information for centres

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs (www.sqa.org.uk).

Internal and external moderation

All instruments of assessment used within this Group Award should be internally moderated, using the appropriate policy within the centre and the guidelines set by SQA.

External moderation will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external moderation can be found in SQA's Guide to Assessment and Quality Assurance for Colleges of Further Education (www.sqa.org.uk).

8 General information for candidates

The HND Applied Chemistry award is designed to prepare you for a range of positions in a broad spectrum of science industries. The practical nature of the course, with the emphasis on what it is like to work in industry will give you the opportunity to seek employment as a technician in the oil and gas, life science, food industries etc. In addition the course is designed to offer entry into second or third year of a degree programme at University. To gain third year entry you will have to gain high marks across the course.

You will develop a range of general skills, for example:

- ◆ study and research skills
- ◆ employment skills
- ◆ independent study and communication skills
- ◆ planning, analysis and team working skills
- ◆ transferable skills including Core Skills

In addition, the HND Applied Chemistry will allow you to:

- ◆ develop options to permit an element of vocational specialisation
- ◆ develop practical skills in a laboratory environment with an emphasis on analytical techniques.
- ◆ develop a range of contemporary vocational skills

The majority of Units have a theory and a practical Outcome. To pass the theory Outcome you will be required to pass an end of Unit test. To pass the practical Outcomes you will be expected to perform a range of laboratory experiments to a required standard, to keep a laboratory diary and to produce a report on the experiment.

As well as undertaking assessments for all Units, you will also be required to undertake two Graded Units.

an investigation in the HND Year 1 (HNC Applied Sciences Graded Unit 1)

and a laboratory based project in the HND year 2 (HND Applied Chemistry Graded Unit 2).

The purpose of these assessments is to integrate the knowledge and skills you have gained during your period of study. On completion of the Graded Units you will be awarded a pass at A, B or C level.

In year 1 you will study for an HNC in Applied Sciences, with the optional Units focusing on chemistry. To progress to year 2 and the HND, you will require to pass the HNC, which is a total of 12 credits. Since the HND is 30 credits, you will be expected to study an additional three Units to give a total of 15 in year 1. It may be possible to move onto the HND with 12 credits, but this is not recommended. Entry to the HND is at the discretion of the centre offering the qualification.

It may be possible to study for the award on a part-time basis. Flexible learning opportunities may be possible, but centres will require a system for covering the practical Outcomes.

9 Glossary of terms

SCQF: This stands for the Scottish Credit and Qualification Framework, which is a new way of speaking about qualifications and how they inter-relate. We use SCQF terminology throughout this guide to refer to credits and levels. For further information on the SCQF see Appendix 2 or visit the SCQF website at www.scqf.org.uk.

SCQF credits: One HN credit is equivalent to 8 SCQF credit points. This applies to all HN Units, irrespective of their level.

SCQF levels: The SCQF covers 12 levels of learning. HN Units will normally be at levels 6–9. Graded Units will be at level 7 and 8 (see Section 6 for further information on this).

Subject Unit: Subject Units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Graded Unit: Graded Units assess candidates' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage candidates to retain and adapt their skills and knowledge.

Dedicated Core Skill Unit: This is a Unit that is written to cover one or more particular Core Skills, eg HN Units in Information Technology or Communications.

Embedded Core Skills: This is where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level.

Signposted Core Skills: This refers to the opportunities to develop a particular Core Skill at a specified level that lie outwith automatic certification.

Qualification Design Team: The QDT works in conjunction with a Qualification Manager/Development Manager to steer the development of the HNC/D from its inception/revision through to validation. The group is made up of key stakeholders representing the interests of centres, employers, universities and other relevant organisations.

Consortium-devised HNCs and HNDs are those developments or revisions undertaken by a group of centres in partnership with SQA.

Specialist single centre and specialist collaborative devised HNCs and HNDs are those developments or revisions led by a single centre or small group of centres who provide knowledge and skills in a specialist area. Like consortium-devised HNCs and HNDs, these developments or revisions will also be supported by SQA.

10 Appendices

Appendix 1: Core Skills Profile

Appendix 2: Progression Routes to the HND Awards: Recommended HNC Content

Appendix 3: Guidelines for timetabling of mandatory Units

Appendix 4: Credit Transfer between Frameworks Exemplar

Appendix 5: Aims against Specific Units

Core Skills Profile

Core Skills Profile

HND Applied Chemistry

Units	Core Skills				
	Numeracy	Communication	Information Technology	Problem Solving	Working with others
Statistics for Science	✓ 6				
Presentation Skills in Science		✓ Embedded 6			
Information Technology: Applications Software 1			✓ Embedded 6		
Quality and Health & Safety Systems in Science Industries		✓ 6			
Fundamental Chemistry: Theory and Practice	✓ 6	✓ 6		✓ 6	
Cell Biology: Theory and Practice		✓ 6			
Fundamental Concepts of Inorganic Chemistry	✓ 6	✓ 6		✓ 6	✓ 6
Fundamental Concepts of Organic Chemistry		✓ 6		✓ 6	✓ 6
Fundamental Concepts of Physical Chemistry	✓ 6	✓ 6		✓ 6	✓ 6
Biochemistry: Theory and Practice		✓ 6		✓ 6	
Applied Biochemical Techniques: An Introduction	✓ 6	✓ 6	✓ 6	✓ 6	✓ 6
Mathematics for Science 1	✓ 6			✓ 6	
Physics 1	✓ 6			✓ 6	
HNC Graded Unit		✓ 6	✓ 6	✓ 6	
HND Graded Unit	✓ 6	✓ 6	✓ 6	✓ 6	
Instrumental Techniques: Theory and Practice 1	✓ 6	✓ 6	✓ 6	✓ 6	✓ 6
Instrumental Techniques: Theory and Practice 2	✓ 6	✓ 6	✓ 6	✓ 6	✓ 6
Aromatic Chemistry		✓ 6		✓ 6	
Base Catalysed reactions and organometallic reagents in organic synthesis		✓ 6		✓ 6	
Organic Stereochemistry		✓ 6		✓ 6	
Transition Metal Chemistry	✓ 6	✓ 6		✓ 6	✓ 6
Main Group Inorganic Chemistry	✓ 6	✓ 6		✓ 6	✓ 6
Applications of Transition Metal Compounds	✓ 6	✓ 6		✓ 6	✓ 6
Electrochemistry	✓ 6	✓ 6		✓ 6	✓ 6
Phase Equilibrium and Surface Chemistry	✓ 6r	✓ 6		✓ 6	✓ 6
Kinetics and Thermodynamics	✓ 6	✓ 6	✓ 6	✓ 6	✓ 6
Environmental Chemistry		✓ 6			✓ 6
Medicinal Chemistry					✓ 6

✓ = Core Skill is signposted in Unit

Units	Core Skills				
	Numeracy	Communication	Information Technology	Problem Solving	Working with others
Biotechnology: An introduction					
Environmental Monitoring	✓ 6	✓ 6			✓ 6
Science Industry: An Introduction		✓ 6	✓ 6		
Physics 2	✓ 6			✓ 6	
Mathematics for Science 2	✓ 6			✓ 6	

✓ = Core Skill is signposted in Unit

Communication (Higher)

Skill component Written Communication (Reading)

Read and Understand complex written communication

- a Identify and summarise all significant information, ideas and supporting details in a complex written environment.
b Evaluate fully the effectiveness of a communication in meeting its purpose and needs of its intended readership.

Unit	Knowledge and Skills/Evidence	Developed/ Assessed	a	b
Statistics for Science	Outcome 2	Developed	√	√
Presentation Skills in Science	Outcome 2	Assessed	√	√
Quality and Health & Safety in Science Industry	Outcome 1 and 2	Developed	√	√
Fundamental Chemistry: Theory and Practice	Outcome 1	Developed	√	√
Cell Biology: Theory and Practice	Outcomes 1, 2 and 4	Developed	√	√
Fundamental Concepts of Inorganic Chemistry	Outcomes 1 and 2	Developed	√	√
Fundamental Concepts of Organic Chemistry	Outcomes 1	Developed	√	√
Fundamental Concepts of Physical Chemistry	Outcomes 1	Developed	√	√
Biochemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√
Applied Biochemical Techniques: An Introduction	Outcomes 1 and 2	Developed	√	√
HNC Graded Unit	Outcomes 1-3	Developed	√	√
HND Graded Unit	Outcomes 1-4	Developed	√	√
Instrumental Techniques: Theory and Practice 1	Outcomes 1-6	Developed	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1-3	Developed	√	√
Aromatic Chemistry	Outcomes 1-3	Developed	√	√
Base Catalysed reactions and organometallic reagents in organic synthesis	Outcomes 1-4	Developed	√	√
Organic Stereochemistry	Outcomes 1	Developed	√	√
Transition Metal Chemistry	Outcomes 1	Developed	√	√
Main Group Inorganic Chemistry	Outcomes 1 and 2	Developed	√	√
Applications of Transition Metal Compounds	Outcomes 1 and 2	Developed	√	√
Electrochemistry	Outcomes 1	Developed	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1	Developed	√	√
Kinetics and Thermodynamics	Outcomes 1	Developed	√	√
Environmental Chemistry	Outcomes 1	Developed	√	√
Medicinal Chemistry	Outcomes 1-3	Developed	√	√

Unit	Knowledge and Skills/Evidence	Developed/ Assessed	a	b
Biotechnology: An introduction	Outcomes 1-5	Developed	√	√
Science Industry: An Introduction	Outcomes 1-4	Developed	√	√

Written Communication (Writing)

Produce well-structured Written Communication on complex topics

- a Present all essential ideas/information and supporting detail in a logical and effective order.
- b Use a structure which takes account of purpose and audience and links major and minor points in ways which assist the clarity and impact of the writing.
- c Use conventions which are effective in achieving the purpose and adapted as necessary for the target audience.
- d Use spelling, punctuation and sentence structures which are consistently accurate.
- e Vary sentence structure, paragraphing and vocabulary to suit the purpose and target audience.

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b	c	d	e
Presentation Skills in Science	Outcomes 1 and 3	Assessed	√	√	√	√	√
Quality and Health & Safety in Science Industry	Outcome 3	Developed	√	√	√	√	√
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	√		
Cell Biology: Theory and Practice	Outcomes 1,2 and 4	Developed	√	√	√		
Fundamental Concepts of Inorganic Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Fundamental Concepts of Organic Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Fundamental Concepts of Physical Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Biochemistry: Theory and Practice	Outcomes 1-5	Developed	√	√	√		
Applied Biochemical Techniques: An Introduction	Outcomes 1-3	Developed	√	√	√		
HNC Graded Unit	Outcomes 1-3	Developed	√	√	√		
HND Graded Unit	Outcomes 1-4	Developed	√	√	√		
Instrumental Techniques: Theory and Practice 1	Outcomes 1 and 2	Developed	√	√	√		
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√		
Aromatic Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Base Catalysed reactions and organometallic reagents in organic synthesis	Outcomes 1 and 2	Developed	√	√	√		
Organic Stereochemistry	Outcomes 1 and 2	Developed	√	√	√		
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√	√	√
Main Group Inorganic Chemistry	Outcomes 1 - 3	Developed	√	√	√	√	√
Applications of Transition Metal Compounds	Outcomes 1-3	Developed	√	√	√		
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√	√	√
Environmental Chemistry	Outcomes 1 and 2	Developed	√	√	√		

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b	c	d	e
Medicinal Chemistry	Outcome 1-3	Developed	√	√	√		
Biotechnology: An introduction	Outcomes 1-4	Developed	√	√	√		
Environmental Monitoring	Outcome 1 and 2	Developed	√	√	√	√	√
Science Industry: An Introduction	Outcome 1	Developed	√	√	√	√	√

Oral Communication

Produce and respond to oral Communication on a complex topic

- a Use vocabulary and a range of spoken language structures consistently and effectively at an appropriate level of formality.
- b Convey all essential information, opinions or ideas with supporting detail accurately and coherently and with varied emphasis as appropriate.
- c Structure communication to take full account of purpose and audience.
- d Take account of situation and audience during delivery.
- e Respond to others, taking account of their contributions.

Unit	Knowledge/Skills/Evidence	Developed/ Assessed	a	b	c	d	e
Presentation Skills in Science	Outcome 4	Assessed	√	√	√	√	√
HND Graded Unit		Developed	√	√	√	√	√

Using Information Technology (Higher)

Use an IT system independently to process a range of information

- a Use a range of IT equipment paying attention to security and other users.
- b Resolve one simple hardware or software problem.
- c Use software in an unfamiliar context requiring some analysis and design, integration of data decision on output format.
- d Carry out two searches to extract and present information from electronic data sources.

Unit	Knowledge/Skills/Evidence	Developed/ Assessed	a	b	c	d
Information Technology: Applications Software 1	Embedded in Unit	Assessed	√	√	√	√
Applied Biochemical Techniques: An Introduction	Outcomes 1-3	Developed	√		√	√
Applied Sciences: Graded Unit 1	Unit	Developed	√		√	√
Applied Chemistry: Graded Unit 2	Unit	Developed	√		√	√
Bioinformatics	Outcomes 1 and 2	Developed	√		√	√
Instrumental Techniques: Theory and Practice 1	Outcomes 1 and 2	Developed	√		√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√		√	√

Numeracy (Higher)

Skill component Using Number

Apply a wide range of numerical skills

- a Work confidently with a numerical or statistical concept.
- b Decide on the steps and operations to be carried out.
- c Carry out a number of sustained, complex calculations.

Unit	Knowledge/Skills/Evidence	Developed/ Assessed	a	b	c
Statistics for Science	Outcomes 1 and 2	Developed	√	√	√
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	√
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	√
Mathematics for Science 1	Outcomes 1-3	Developed	√	√	√
Physics 1	Outcomes 1-3	Developed	√	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√
Environmental Monitoring	Outcome 1-3	Developed	√	√	√
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√	√
HND Graded Unit	Outcomes 1 and 2	Developed	√	√	√

Numeracy (Higher)

Skill component Using graphical information

Interpret and communicate graphical information in everyday and generalised contexts

- a Analyse and interpret complex graphical information.
- b Select an appropriate form of table, graph, chart, diagram or qualitative form and communicate information in that form.

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b
Statistics for Science	Outcomes 1 and 2	Developed	√	√
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√
Mathematics for Science 1	Outcomes 1-3	Developed	√	√
Physics 1	Outcomes 1-3	Developed	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√
Environmental Monitoring	Outcome 1-3	Developed	√	√
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√
HND Graded Unit	Outcomes 1 and 2	Developed	√	√

Numeracy (Higher)

Skill component Using Number

Apply in combination a wide range of numerical/statistical and other mathematical skills to process complex information

- a Work confidently with a numerical or statistical concept.
- b Decide on the steps and operations to be carried out.
- c Carry out a number of sustained, complex calculations.

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Statistics for Science	Outcomes 1 and 2	Developed	√	√	√
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	
Mathematics for Science 1	Outcomes 1-3	Developed	√	√	√
Physics 1	Outcomes 1-3	Developed	√	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√	
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√
Environmental Monitoring	Outcome 1-3	Developed	√	√	
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√	√
HND Graded Unit	Outcomes 1 and 2	Developed	√	√	√

Problem Solving (Higher)

Skill components Critical Thinking

Analyse a complex situation or issue

- a Identify the factors involved in the situation or issue.
- b Assess the relevance of these factors to the situation or issue.
- c Develop and justify an approach to deal with the situation or issue.

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 1	Outcomes 1-3	Developed	√	√	√
Physics 1	Outcomes 1-3	Developed	√	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Fundamental Concepts of Organic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	√
Biochemistry Theory and Practice	Outcomes 1-5	Developed	√	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√
Aromatic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Base Catalysed reactions and organometallic reagents in organic synthesis	Outcomes 1 and 2	Developed	√	√	√
Organic Stereochemistry	Outcomes 1 and 2	Developed	√	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√	√
Applied Sciences: Graded Unit 1	Unit	Developed	√	√	√
Applied Chemistry: Graded Unit 2	Unit	Developed	√	√	√

Problem Solving (Higher)

Skill components Planning and Organising

Plan, organise and complete a very simple, familiar task

- a Identify some very simple steps in the plan.
- b Select appropriate resources to carry out the plan.
- c Carry out the task.

Unit	Knowledge/Skills/Evidence	Developed/assessed	a	b	c
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 1	Outcomes 1-3	Developed	√	√	√
Physics 1	Outcomes 1-3	Developed	√	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Fundamental Concepts of Organic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	√
Biochemistry Theory and Practice	Outcomes 1-5	Developed	√	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√
Aromatic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Base Catalysed reactions and organometallic reagents in organic synthesis	Outcomes 1 and 2	Developed	√	√	√
Organic Stereochemistry	Outcomes 1 and 2	Developed	√	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√	√
Applied Sciences Graded Unit 1	Unit	Developed	√	√	√
Applied Chemistry: Graded Unit 2	Unit	Developed	√	√	√

Problem Solving (Higher)

Skill components Reviewing and Evaluating

Review and evaluate a complex problem solving activity

- a Evaluate the effectiveness of the strategy/strategies.
- b Identify and gather appropriate evidence.
- c Draw conclusions and make recommendations.

Unit	Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Fundamental Chemistry: Theory and Practice	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 1	Outcomes 1-3	Developed	√	√	√
Physics 1	Outcomes 1-3	Developed	√	√	√
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Fundamental Concepts of Organic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	√
Biochemistry Theory and Practice	Outcomes 1-5	Developed	√	√	√
Instrumental Techniques: Theory and Practice 1	Outcome 1 and 2	Developed	√	√	√
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√
Aromatic Chemistry	Outcomes 1 and 2	Developed	√	√	√
Base Catalysed reactions and organometallic reagents in organic synthesis	Outcomes 1 and 2	Developed	√	√	√
Organic Stereochemistry	Outcomes 1 and 2	Developed	√	√	√
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√
Mathematics for Science 2	Outcomes 1 and 2	Developed	√	√	√
Physics 2	Outcomes 1 and 2	Developed	√	√	√
Applied Sciences: Graded Unit 1	Unit	Developed	√	√	√
Applied Chemistry: Graded Unit2	Unit	Developed	√	√	√

Working with Others (Intermediate 2)

Work with Others in a group to analyse, plan and complete an activity

- a Analyse the activity and identify the component tasks and roles which make up the activity.
- b Agree allocation of responsibilities taking account of own strengths and weaknesses and those of others.
- c Support co-operative working.
- d Evaluate and draw a conclusion about own contribution to group activity, and justify this by referring to supporting evidence.

Unit	Knowledge/Skills/Evidence	Developed/ Assessed	a	b	c	d	e
Fundamental concepts in Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√		
Fundamental Concepts of Organic Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Fundamental Concepts in Physical Chemistry	Outcomes 1-3	Developed	√	√	√		
Applied Biochemical Techniques	Outcomes 1-3	Developed	√	√	√		
Instrumental Techniques: Theory and Practice 1	Outcomes 1 and 2	Developed	√	√	√		
Instrumental Techniques: Theory and Practice 2	Outcomes 1 and 2	Developed	√	√	√		
Transition Metal Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Main Group Inorganic Chemistry	Outcomes 1-3	Developed	√	√	√		
Electrochemistry	Outcomes 1 and 2	Developed	√	√	√		
Phase Equilibrium and Surface Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Kinetics and Thermodynamics	Outcomes 1 and 2	Developed	√	√	√		
Environmental Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Medicinal Chemistry	Outcomes 1 and 2	Developed	√	√	√		
Environmental Monitoring	Outcomes 1 and 2	Developed	√	√	√		

**Progression Routes to the HND Awards:
Recommended HNC Content**

Recommended options for progression to **HND Applied Sciences** could include:

Cell Biology: Theory and Practice
Microbiology; Theory and Practice
DNA Structure and Function
Organic Chemistry: Theory and Practice 1
Inorganic Chemistry: Theory and Practice 1
Physical Chemistry: Theory and Practice 1
Physics 1
Maths for Science 1

Recommended options for progression to **HND Biomedical Sciences** could include:

Statistics for Science 1
Cell Biology Theory and Practice
Human Body Structure and Function
Microbiology; Theory and Practice
DNA Structure and Function
Biochemistry : Theory and Practice
Applied Biochemical Techniques

Recommended options for progression to **HND Applied Biological Sciences** could include:

Statistics for Science 1
Cell Biology Theory and Practice
Microbiology; Theory and Practice
Animal Biology 1
Plant Biology
DNA Structure and Function
Protein Structure and Function
Biochemistry : Theory and Practice

Recommended options for progression to **HND Biotechnology** could include:

Statistics for Science 1
Cell Biology Theory and Practice
Microbiology; Theory and Practice
Biotechnology: An Introduction
DNA Structure and Function

Recommended options for progression to **HND Applied Chemistry** could include:

Statistics for Science 1
Mathematics for Science 1
Biochemistry: Theory and Practice
Fundamental concepts of Inorganic Chemistry
Fundamental concepts of Organic Chemistry
Fundamental concepts of Physical Chemistry
Physics 1

Recommended options for progression to **HND Environmental Sciences** could include:

Statistics for Science 1

Ecology and Ecosystems

Earth Science

Genetics

Environmental Biology

Sustainable Development

Guidelines for timetabling of mandatory Units

HNC Applied Sciences — Chemistry option (year 1 of HND)

Two Block timetable

Block 1	Fund. Chem. C	Quality H&S C	Pres. Skills C	Cell Biol C	IT C	Maths or Stats C/O	Option 1 (Env Biol)
Block 2	Org. Chem C	Inorg Chem C	Phys. Chem C	Physics C	Graded Unit C	Option 2	Option 3

HND Applied Chemistry year 2

Two Block Timetable

Block 1	Org. Chem 1st Unit C	Inorg Chem 1st Unit C	Phys. Chem 1st Unit C	Inst. Tech 1 C	Inst tech 2 C	Option 4	Option 5
Block 2	Org. Chem 2nd Unit C	Inorg Chem 2nd Unit C	Phys. Chem 2nd Unit C	Graded Unit 2 C	Option 6	Option 7	Option 8

Additional optional Units: This could be The third Organic, Inorganic and Physical chemistry Units from Sections B, C, and D, or Physics 2, Maths 2, Environmental Chemistry, Environmental Monitoring, medicinal Chemistry Biochemistry, etc.

The options chosen may depend on the intended career path of the students or on which degree course they hope to progress to.

It should be noted that it is recommended that in both the HNC and the HND centres should look at ways of introducing the Graded Units part of the way through block 1. This allows for the Units to be finished half way through block 2.

Credit Transfer between Frameworks Exemplar

Credit Transfer Arrangements

Alternative route for candidates transferring from current HNC/D (Year 1) Applied Chemistry to revised HND Applied Chemistry (Year 2)

New Unit	Credit value	Core/Option	Old Unit	Credit value	Core/Option	Old Outcomes covering new Unit	Outcomes in new Unit not covered
Presentation Skills in Science DG70 34	1	C	Presentation Skills in Science D3AY 04	1	Recommended additional HND Unit for year 2 progression	all	
Statistics	1	C	Probability and Statistics D41Y 04	1.5	O	all	
			Biotechnology: Physical Aspects, Instrumentation and Numerical Analysis, Part 1 D5XK 04	1	O	2,4	
Information Technology: Applications Software 1 D75X 34	1	C	Information Technology Applications 1 A6AM 04	1	Recommended additional HND Unit for year 2 progression	all	
Fundamental Chemistry: Theory and Practice DH2K 34	2	C	General Chemical Principles and A6LF 04	1	C	All	Part of 1 Covered in A6WX 04 and A6WY 04
			Laboratory Skills: Analytical Techniques A6LK 04	1.5		2	
Quality and Health & Safety in Science Industries DF82 34	1	C	Quality and Safety Systems in Biotechnology D3B6 04	1	Recommended additional HND Unit for year 2 progression	all	
Fundamental Concepts of Organic Chemistry	1	C	Organic Chemistry: An Introduction A6WX 04	1		1, 2	
			Organic Chemistry: Mechanisms and Stereochemistry A6Y1 04	0.5			
Fundamental Concepts of Inorganic Chemistry	!	C	Periodicity; An Introduction A6Y2 04	1		All	
Fundamental Concepts of Physical Chemistry	!	C	Chemical Reactions: An Introduction A6WY 04	1		All	
Aromatic Chemistry	1	C	Organic Chemistry: Aromatic Synthesis and stereochemistry A6LS 04	1			

New Unit	Credit value	Core/Option	Old Unit	Credit value	Core/Option	Old Outcomes covering new Unit	Outcomes in new Unit not covered
Base Catalysed Reactions and Organometallic Reagents..	1	C	Organic Chemistry :Organic Synthesis A6LR 04	1	HND core Unit	1,2,4	4
Organic Stereochemistry	1	C	Organic Chemistry: Aromaticity and Stereochemistry A6LS 04	1		1.2	
Transition Metal Chemistry	1	C	Inorganic Chemistry: d-metal and coordination compounds A6LT 04	1	O	All	
Main Group Inorganic Chemistry	1	C	Inorganic Chemistry: main Group Elements A6LM 04	1	C	All	
Applications of Transition Metal Chemistry	1	C	No equivalent Unit	1			
Electrochemistry	1	C	Physical Chemistry: Electrochemistry A6LW 04	0.5	C	All	
Phase Equilibrium and Surface Chemistry	1	C	Physical Chemistry: Phase Equilibrium A6LV 04	0.5	C	All	
Kinetics and Thermodynamics	1	C	Physical Chemistry: Kinetics A6LN 04 Physical Chemistry: Thermodynamics A6LP 04	0.5 0.5	C C	All of both Units would be required	
Physics 1	1	C	Physics: Fundamental Concepts A6YO 04 Optics and Spectroscopy A6X3 04	1	C	1,3 1,2	
Maths for Science 1	1	C	Statistics for Quality Analysis	1		1	2,3

Aims against Specific Units

General aims of the HND Applied Chemistry

General aims	Develop candidates' knowledge and skills	Develop employment skills	Enable progression with the SCQF	Develop study and research skills	Develop transferable skills	Provide a stimulating and intellectually satisfying learning experience	Develop in the candidate skills of independent study and communication	Provide the candidate with a deeper underpinning knowledge
Unit titles								
Presentation Skills in Science	√	√	√	√	√	√	√	
ITA Software 1	√	√	√		√	√	√	
Fundamental Chemistry: T&P	√	√	√	√	√	√	√	√
Quality and H&S Systems in Science Industries	√	√	√	√	√	√	√	√
Graded Unit 1	√	√	√	√	√	√	√	
Statistics for Science	√	√	√	√	√	√	√	
Cell Biology: T&P	√	√	√	√	√	√	√	√
Fund. Concepts in Organic Chemistry	√	√	√		√	√	√	√
Fund. Concepts in Inorganic Chemistry	√	√	√	√	√	√	√	√
Fund. Concepts in Physical Chemistry	√	√	√	√	√	√	√	√
Mathematics for Science 1	√	√	√	√	√	√	√	√
Physics 1		√	√		√	√	√	√
Inst. Techniques: Theory/ Practice 1	√	√	√	√	√	√	√	√
Inst. Technique Theory/Practice 2	√	√	√	√	√	√	√	√

General aims	Develop candidates' knowledge and skills	Develop employment skills	Enable progression with the SCQF	Develop study and research skills	Develop transferable skills	Provide a stimulating and intellectually satisfying learning experience	Develop in the candidate skills of independent study and communication	Provide the candidate with a deeper underpinning knowledge
Unit titles								
Aromatic Chemistry	√	√	√	√	√	√	√	√
Base catalysed reactions and organometallic	√	√	√	√	√	√	√	√
Organic Stereochemistry	√	√	√	√	√	√	√	√
Transition Metal Chemistry	√	√	√	√	√	√	√	√
Main Group Inorganic Chemistry	√	√	√	√	√	√	√	√
Applications of Transition Metal Chemistry	√	√	√	√	√	√	√	√
Electrochemistry	√	√	√	√	√	√	√	√
Phase Equilibrium and Surface Chemistry	√	√	√	√	√	√	√	√
Kinetics and Thermodynamics	√	√	√	√	√	√	√	√
Graded Unit 2	√	√	√	√	√	√	√	√
Biochemistry Theory and Practice	√	√	√	√	√	√	√	√
Environmental Chemistry	√	√	√	√	√	√	√	√
Medicinal Chemistry	√	√	√	√	√	√	√	√
Science Industry: an Introduction	√	√	√	√	√	√	√	
Physics 2	√	√	√	√	√	√	√	√
Mathematics for Science 2	√	√	√	√	√	√	√	√
Food Science: T/P	√	√	√	√	√	√	√	√

Specific aims of the HND Applied Chemistry

Specific aims	Prepare candidates for an appropriate level of employment	Develop a range of contemporary vocational skills	Develop options to permit an element of vocational specialisation	Prepare candidates for progression to further studies	Provide a flexible route to a qualification	Provide the student with a sound academic basis	Provide candidates with a wider range of practical laboratory skills
Unit title							
Presentation Skills in Science	√	√	√	√	√	√	
ITA Software 1	√	√	√	√	√	√	
Fundamental Chemistry: T&P	√	√	√	√	√	√	√
Quality and H&S Systems in Science Industries	√	√	√	√	√	√	
Graded Unit 1	√	√	√	√	√	√	
Statistics for Science	√	√	√	√	√	√	
Cell Biology: T&P	√	√		√	√	√	√
Fund. Concepts in Organic Chemistry	√	√	√	√	√	√	√
Fund. Concepts in Inorganic Chemistry	√	√	√	√	√	√	√
Fund. Concepts in Physical Chemistry	√	√	√	√	√	√	√
Mathematics for Science 1	√	√	√	√	√	√	√
Physics 1	√	√	√	√	√	√	√
Inst. Techniques: Theory/ Practice 1	√	√	√	√	√	√	√

Specific aims	Prepare candidates for an appropriate level of employment	Develop a range of contemporary vocational skills	Develop options to permit an element of vocational specialisation	Prepare candidates for progression to further studies	Provide a flexible route to a qualification	Provide the student with a sound academic basis	Provide candidates with a wider range of practical laboratory skills
Unit title							
Inst. Technique Theory/Practice 2	√	√	√	√	√	√	√
Aromatic Chemistry	√	√	√	√	√	√	√
Base catalysed reactions and organometallic	√	√	√	√	√	√	√
Organic Stereochemistry	√	√	√	√	√	√	√
Transition Metal Chemistry	√	√	√	√	√	√	√
Main Group Inorganic Chemistry	√	√	√	√	√	√	√
Applications of Transition Metal Chemistry	√	√	√	√	√	√	√
Electrochemistry	√	√	√	√	√	√	√
Phase Equilibrium and Surface Chemistry	√	√	√	√	√	√	√
Kinetics and Thermodynamics	√	√	√	√	√	√	√
Graded Unit 2	√	√	√	√	√	√	√
Biochemistry Theory and Practice	√	√	√	√	√	√	√
Environmental Chemistry	√	√	√	√	√	√	√
Medicinal Chemistry	√	√	√	√	√	√	√
Science Industry: an Introduction	√	√	√	√	√	√	√
Physics 2	√	√	√	√	√	√	√
Mathematics for Science 2	√	√	√	√	√	√	√
Food Science: T/P	√	√	√	√	√	√	√