



## **Arrangements for:**

**National Certificate in Applied Sciences  
at SCQF level 5 (G90M 45)  
and level 6 (G90N 46)**

**Validation date: April 2008**

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**Version: 11**

## **Acknowledgement**

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

## 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         |
|----------------|--|--------------|
| 11             | <p><b>G90M 45: Additional Unit added to mandatory section:</b></p> <p>HP9V 44 Mathematics for Science 1 <i>has been added as an alternative to F3GF 10 Numeracy and H225 74 Numeracy</i></p> <p><b>G90M 45: Additional Units added to optional section:</b></p> <p>H23B 74 Electronics and Control<br/>           H23D 74 Mechanisms and Structures<br/>           H23A 74 Engineering Contexts and Challenges<br/>           H23B 75 Electronics and Control<br/>           H23D 75 Mechanisms and Structures<br/>           H23A 75 Engineering Contexts and Challenges<br/>           HN9W 75 Laboratory Science: Working in a Laboratory<br/>           HN9Y 75 Laboratory Science: Practical Skills<br/>           HP00 75 Laboratory Science: Practical Investigation<br/>           HN9X 75 Laboratory Science: Careers using Laboratory Science</p> <p><b>G90M 45: Revision of Units:</b></p> <p>D13F 10 The Human Body (finish date 31/07/2019) has been revised by HL94 44 (Start date: 01/08/2017)<br/>           D13J 11 Introducing Microbiology (finish date 31/07/2019) has been revised by HL95 45 (Start date: 01/08/2017)<br/>           D13E 10 Causes and Prevention of Disease (finish date 31/07/2019) has been revised by HT6T 44 (Start date: 01/08/2017)</p> <p><b>G90N 46: Additional Units added to mandatory section:</b></p> <p>HP9W 45 Mathematics for Science 2<br/>           HT6P 45 Chemistry Fundamentals 1<br/>           HT6R 45 Chemistry Fundamentals 2<br/>           HT8P 45 Introductory Biology<br/>           HT8R 45 Introductory Physics</p> <p><b>G90N 46: Additional Units added to optional section:</b></p> <p>HP9Y 45 Statistics for Science<br/>           HP9X 45 Mathematics for Science 3<br/>           H23A 76 Engineering Contexts and Challenges<br/>           H23D 76 Mechanisms and Structures<br/>           H23B 76 Electronics and Control<br/>           H23A 75 Engineering Contexts and Challenges<br/>           H23D 75 Mechanisms and Structures<br/>           H23B 75 Electronics and Control<br/>           HN9X 75 Laboratory Science: Careers using Laboratory Science<br/>           HP00 75 Laboratory Science: Practical Investigation<br/>           HN9Y 75 Laboratory Science: Practical Skills<br/>           HN9W 75 Laboratory Science: Working in a Laboratory</p> | October 2017 |

|    |  |               |
|----|--|---------------|
|    | <p><b>G90N 46: Revision of Units:</b><br/> D13J 11 Introducing Microbiology (finish date 31/07/2019) has been revised by HL95 45 (Start date: 01/08/2017)<br/> D934 12 Experimental Procedures-Biology (finish date 31/07/2019) has been revised by HN89 46 Experimental Procedures: Biology (Start date: 01/08/2017)<br/> D936 12 Experimental Procedures-Physics (finish date 31/07/2019) has been revised by HN8C 46 Experimental Procedures: Physics (Start date: 01/08/2017)<br/> D935 12 Experimental Procedures-Chemistry (finish date 31/07/2019) has been revised by HN8A 46 Experimental Procedures: Chemistry (Start date: 01/08/2017)<br/> D937 12 Experimental Procedures-Science (finish date 31/07/2019) has been revised by HN8D 46 Experimental Procedures: Science (Start date: 01/08/2017)</p>  |               |
| 10 | <p><b>G90M: Revision of Unit:</b> D36H 11 Work Experience <i>has been revised by HF88 45 Work Placement and will finish on 31/07/2017.</i></p> <p><b>G90N: Revision of Unit:</b> D36H 12 Work Experience <i>has been revised by HF88 46 Work Placement and will finish on 31/07/2017.</i></p>  | July /2016    |
| 9  | <p><b>Additional Units added to frameworks:</b></p> <p>H24P 74 Environmental Science: Living Environment<br/> H24R 74 Environmental Science: Earth's Resources<br/> H24S 74 Environmental Science: Sustainability<br/> H24P 75 Environmental Science: Living Environment<br/> H24R 75 Environmental Science: Earth's Resources<br/> H24S 75 Environmental Science: Sustainability<br/> H24P 76 Environmental Science: Living Environment<br/> H24R 76 Environmental Science: Earth's Resources<br/> H24S 76 Environmental Science: Sustainability</p>  | April 2015    |
| 8  | <p><b>Additional Units:</b> H258 75 Physics: Dynamics and Space <i>has been added as an alternative to D380 11 Electricity and Electronics.</i><br/> H256 75 Physics: Electricity and Energy <i>has been added as an alternative to D379 11 Mechanics and Heat.</i><br/> H25A 75 Physics: Waves and Radiation <i>has been added as an alternative to D382 11 Radioactivity and D381 11 Waves and Optics.</i><br/> H225 74 Numeracy <i>has been added as an alternative to F3GF 10 Numeracy.</i><br/> H4KX 76 Physics: Electricity <i>has been added as an alternative to FE44 12 Electricity.</i><br/> H4KY 76 Physics: Our Dynamic Universe <i>has been added as an alternative to FE42 12 Our Dynamic Universe.</i><br/> H4L0 76 Physics: Particles and Waves <i>has been added as an alternative to FE43 12 Particles and Waves.</i><br/> H4L1 76 Researching Physics <i>has been added as an alternative to FE45 12 Researching Physics.</i></p> <p><b>Revision of Unit:</b> D321 12 Mathematics 1 <i>has been revised by H4LD 76 Mathematics: Relationships and Calculus and will finish on 31/07/2016.</i><br/> D322 12 Mathematics 2 <i>has been revised by H22J 76 Mathematics: Applications and will finish on 31/07/2016.</i><br/> D323 12 Mathematics 3 <i>has been revised by H4LC 76 Mathematics: Expressions and Functions and will finish on 31/07/2016.</i><br/> FH2G 12 DNA and the Genome <i>has been revised by H4KD 76 Biology: DNA and the Genome and will finish on 31/07/2016.</i><br/> FH2H 12 Metabolism and Survival <i>has been revised by H4KE 76 Biology: Metabolism and Survival and will finish on 31/07/2016.</i><br/> FH2J 12 Sustainability and Interdependence <i>has been revised by</i></p> | December 2014 |

|   |  |               |
|---|--|---------------|
|   | <p>H4KF 76 Biology: Sustainability and Interdependence <i>and will finish on 31/07/2016.</i></p> <p>FH2K 12 Human Cells has been revised by H4L8 76 Human Biology: Human Cells and will finish on 31/07/2016.</p> <p>FH2N 12 Immunology and Public Health has been revised by H4LB 76 Human Biology: Immunology and Public Health and will finish on 31/07/2016.</p> <p>FH2M 12 Neurobiology and Communication has been revised by H4LA 76 Human Biology: Neurobiology and Communication and will finish on 31/07/2016.</p> <p>FH2L 12 Physiology and Health has been revised by H4L9 76 Human Biology: Physiology and Health and will finish on 31/07/2016.</p> <p>D837 11 Biodiversity in Scotland <i>finished on 31/07/2013 and has been revised by FV49 11 Biodiversity in Scotland.</i></p>   |               |
| 7 | <p><b>Additional Units:</b> H209 75 Biology: Life on Earth <i>has been added as an alternative to D028 11 Animal Physiology.</i></p> <p>H208 75 Biology: Multicellular Organisms <i>has been added as an alternative to D027 11 Environmental Biology and Genetics.</i></p> <p>H207 75 Cell Biology <i>has been added as an alternative to D026 11 Living Cells.</i></p>   | November 2014 |
| 6 | <p><b>Revision of Unit:</b> D065 10 Chemistry and Life <i>has been revised by H21J 74 Nature's Chemistry and will finish on 31/07/2018.</i></p> <p>D063 10 Chemistry in Action <i>has been revised by H21G 74 Chemical Changes and Structure and will finish on 31/07/2018.</i></p> <p>D064 10 Everyday Chemistry <i>has been revised by H21L 74 Chemistry in Society and will finish on 31/07/2018.</i></p> <p>D066 11 Building Blocks <i>has been revised by H21G 75 Chemical Changes and Structure and will finish on 31/07/2018.</i></p> <p>D067 11 Carbon Compounds <i>has been revised by H21J 75 Nature's Chemistry and will finish on 31/07/2018.</i></p> <p>D068 11 Acids, Bases and Metals <i>has been revised by H21L 75 Chemistry in Society and will finish on 31/07/2018.</i></p> <p>D321 10 and D321 11 Mathematics 1 <i>have been revised by H22F 74 and H22F 75 Mathematics: Expressions and Formulae and will finish on 31/07/2016.</i></p> <p>D322 10 Mathematics 2 <i>has been revised by H225 74 Numeracy and will finish on 31/07/2016.</i></p> <p>D322 11 Mathematics 2 <i>has been revised by H22J 75 Mathematics: Applications and will finish on 31/07/2016</i></p> <p>D323 10 and D323 11 Mathematics 3 <i>have been revised by H22G 74 and H22G 75 Mathematics: Relationships and will finish on 31/07/2016.</i></p> <p>H23W 75 Literacy <i>has been added as an alternative to F3GB 11 Communication.</i></p> | May 2014      |
| 5 | Numeracy unit code amended   | October 2011  |
| 4 | Terminology updated  | April 2010    |
| 3 | Additional Units added to the options of both SCQF level 5 award and SCQF level 6 award.   | August 2009   |
| 2 | Minor amendment to framework to correct code for Science investigation skills.   | August 2009   |

## Contents

|       |  |    |
|-------|--|----|
| 1     | Introduction .....   | 1  |
| 2     | Rationale for the development of the National Certificates .....                 | 1  |
| 3     | Aims of the National Certificates .....  | 2  |
| 3.1   | Aims of the National Certificate in Applied Sciences level 5 .....               | 2  |
| 3.1.1 | Principal aims .....   | 2  |
| 3.1.2 | General aims .....   | 3  |
| 3.2   | The aims of the National Certificate in Applied Sciences level 6 .....           | 3  |
| 3.2.1 | Principal aims .....   | 3  |
| 3.2.2 | General aims .....   | 3  |
| 3.3   | Target groups .....  | 3  |
| 3.4   | Employment opportunities .....   | 4  |
| 4     | Access to National Certificates .....  | 4  |
| 4.1   | Recommended access to the National Certificate in Applied Sciences level 5 ..... | 4  |
| 4.2   | Recommended access to the National Certificate in Applied Sciences level 6 ..... | 4  |
| 4.3   | Alternative access arrangements .....  | 4  |
| 5     | National Certificates structure .....  | 5  |
| 5.1.1 | National Certificate in Applied Science SCQF level 5 .....                       | 5  |
| 5.1.2 | National Certificate in Applied Sciences SCQF level 6 .....                      | 12 |
| 5.2   | Links to Occupational Standards .....  | 19 |
| 5.3   | Articulation, professional recognition and credit transfer .....                 | 19 |
| 6     | Approaches to delivery and assessment .....                                      | 23 |
| 6.1   | Delivery .....   | 23 |
| 6.2   | Assessment .....   | 24 |
| 6.3   | Formative assessment .....   | 24 |
| 6.4   | Open and Distance Learning .....   | 24 |
| 7     | General information for centres .....  | 25 |
| 8     | General information for candidates .....   | 26 |
| 9     | Glossary of terms .....  | 28 |

## 1 Introduction

This is the Arrangements Document for the National Certificates in Applied Sciences at SCQF level 5 and SCQF level 6 which were validated in April 2008. This document includes: background information on the development of the National Certificate, its aims, guidance on access, details of the National Certificate structure, and guidance on delivery.

These National Certificates provide a broad-based study of science containing both theory and practice that is required for progression to areas of scientific study, to science technician apprenticeships and/or employment at laboratory assistant level.

## 2 Rationale for the development of the National Certificates

The rationale to support the new National Certificate in Applied Sciences was developed using desk research, consultations using a questionnaire to all Colleges in Scotland offering science programmes and discussions with stakeholders from industry.

The research indicated that Science is an important discipline that has been identified by the Scottish Executive and Scottish Enterprise as vital to the prosperity of the Scottish Economy and important to the education of the general public. There were no nationally defined programmes for the development of scientific knowledge and skills at SCQF level 5 and 6 other than those available in the academic school curriculum. There was no coherent pathway for candidates to enter the Higher National programmes other than taking the Higher examinations in the science subjects.

**The award at level 5** is designed to provide not only an introductory science course that underpins Access programmes which enable progression to degree and Higher National programmes but also to develop some basic scientific skills. The candidates eg school leavers, adult returners, candidates in S5 or S6 would enter with limited qualifications in science but would wish to develop their knowledge, skills and interest in the discipline. The award developed has been built using the academic science Units already in the catalogue with the addition of practical investigative science and numeracy Units to increase skills important for employment. Science and Technology in Society has been added to develop the candidate's ability to evaluate scientific developments in relationship to everyday life. The mandatory science Units provide automatic certification for the Core Skills Problem Solving component of Critical Thinking at SCQF level 4 and the Numeracy Core Skill at SCQF level 4.

It was felt that the candidates should experience all three major science disciplines: Biology, Chemistry and Physics. The three Units of two sciences at Intermediate 2 would provide a good basis for progression to level 6 and demonstrate to employers that the content of the complete Intermediate 2 course had been covered. Whilst the Units are mandatory, the external examination is optional. Candidates who sit and achieve the external assessment will enhance their academic profile. Colleges could select the options and further Units to make up a full timetable (normally 18 Units) to suit local needs and the progression aspirations of the candidates.

The **National Certificate in Applied Science at SCQF level 6** has been developed not only to provide the core of the present Access to Higher Education programmes but also to provide a coherent award that is understood by industry as basic background knowledge to support competence in laboratory work at SVQ level 2/3.

The core is based on six Units from two chosen Higher Science subjects and one Unit from the third science area at Intermediate 2 level with Units in Experimental Procedures to increase the practical skills development and Mathematics for Science to improve mathematical skills. Science and Technology in Society has been added to develop further the use of IT and report writing in a scientific context and to develop evaluative skills regarding scientific developments in relationship to everyday life. This Unit would provide an introduction to research and report writing thus leading into the HNC Applied Sciences Graded Unit. The mandatory Science Units provide automatic certification for the Core Skills of Numeracy at SCQF level 4, Problem Solving at SCQF level 6, Working with Others at SCQF level 4 and the Core Skills Problem Solving component of Critical Thinking at SCQF level 4.

It was felt that three Units of two sciences would provide a good basis for progression to the HNC Applied Sciences and would demonstrate to employers that the content of the complete Higher course had been covered. Whilst the Units are mandatory, the external examination is optional. Candidates who sit and achieve the external assessment will enhance their academic profile. Colleges could select the options and further Units to make up a full timetable (normally 18 Units) in to suit local needs and the progression aspirations of the candidates.

The school sector could also use the awards for candidates with an interest in Science particularly those considering the Higher National Applied Sciences route for progression.

Candidates may also progress to laboratory employment from both awards either laboratory assistant level or as trainee science technicians. The National Certificate at level 6 would also provide entry into the Modern Apprenticeship in Chemicals Manufacturing and Petroleum Industries VQ level 3 and Laboratory Technicians VQ level 3.

### **3 Aims of the National Certificates**

#### **3.1 Aims of the National Certificate in Applied Sciences level 5**

##### **3.1.1 Principal aims**

The principal aims of the award are to:

- ◆ increase the knowledge and understanding of three sciences to SCQF level 5
- ◆ develop problem solving skills within a scientific context at SCQF level 5
- ◆ develop science practical skills associated with carrying out experimental and investigative work
- ◆ develop critical awareness of the effects of science and technology on society to enable informed decisions as a member of the public
- ◆ develop competence in numerical work at SCQF level 4



### 3.1.2 General aims

The general aims of the award are to:

- ◆ enable progression within the SCQF
- ◆ enhance candidates' employment prospects.
- ◆ enhance candidates' Core Skills of *Communication, Numeracy, Information and Communication Technology, Problem Solving*
- ◆ develop the candidates' important transferable skills such as analytical, evaluation, investigation and research, learning and study and planning skills
- ◆ increase the number of candidates interested in a career in the sciences

## 3.2 The aims of the National Certificate in Applied Sciences level 6

### 3.2.1 Principal aims

The aims of the award are to:

- ◆ increase knowledge and understanding of the two sciences to SCQF level 6 and a third science at SCQF level 5
- ◆ develop problem solving skills within a scientific context at SCQF level 6
- ◆ develop science practical skills associated with carrying out experimental and investigative work
- ◆ develop critical awareness of the effects of science and technology on society to enable informed decisions as member of the public
- ◆ develop competence in mathematical work at SCQF level 5

### 3.2.2 General aims

The general aims of the award are to:

- ◆ enable progression to further studies in science in Higher Education
- ◆ enhance candidates' employment prospects
- ◆ enhance candidates' Core Skills of *Communication, Numeracy, Information and Communication Technology, Problem Solving, Working with Others*
- ◆ develop the candidates' important transferable skills such as analytical, evaluation, investigation and research, learning and study and planning skills
- ◆ increase the number of candidates interested in and qualified for a career in the sciences

## 3.3 Target groups

**The award at level 5** is designed to provide an introductory science course for candidates eg school leavers, adult returners, candidates in S5 or S6 with limited qualifications in Science who wish to develop their knowledge, skills and interest in the discipline.

**The award at level 6** is designed for candidates — school leavers, adult returners. Candidates in S5 and S6 — with science qualifications at SCQF level 5 who wish to progress to HN or gain entry to apprenticeship programmes. It also provides the base of a Science Access to University programme.

### **3.4 Employment opportunities**

Successful completion of the awards will allow candidates to apply for employment as a laboratory assistant or trainee technician.

## **4 Access to National Certificates**

Admission to the National Certificate in Applied Sciences should be based on a broad approach to candidate selection but, at the same time, should ensure that candidates are chosen who have the potential and ability to complete the award successfully.

### **4.1 Recommended access to the National Certificate in Applied Sciences level 5**

Candidates would normally have limited qualifications in Science however they will have a genuine wish to develop their knowledge, skills and interest in the discipline.

The qualifications of a typical candidate may be:

- ◆ a Science subject at Intermediate 1 or Standard Grade at 3/4
- ◆ Mathematics at Standard Grade 3/4 or Intermediate 1
- ◆ English at Standard Grade at 3/4 or Intermediate 1
- ◆ a further Standard Grade at 3/4 preferably a second science

Generally the Core Skills on entry would include *Problem Solving*, Written Communication and Using Graphical Information at Intermediate 1.

### **4.2 Recommended access to the National Certificate in Applied Sciences level 6**

Candidates would normally have qualifications in the sciences at a basic level and have a desire to work towards higher education entry or a career in a science discipline. A typical candidate would have studied the following:

- ◆ two Science subjects at Intermediate 2 or Standard Grade at Credit level
- ◆ Mathematics at Standard Grade at Credit level or Intermediate 2
- ◆ English at Standard Grade Credit level or Intermediate 2

Or successful completion of the National Certificate in Applied Sciences level 5.

Generally candidates on entry will have the Core Skills of *Problem Solving*, Using Graphical Information, Written Communication at Intermediate 2, Using Number at Intermediate 1.

### **4.3 Alternative access arrangements**

The presenting centre may operate alternative access arrangements in cases where the candidate is convinced that they already have the required competences in a given area. These arrangements are as follows:

- ◆ Assessment on demand
- ◆ Credit transfer
- ◆ Accreditation of prior learning

Individual presenting centres will require to outline their systems for each of these as part of any approval procedure.

## 5 National Certificates structure

### 5.1.1 National Certificate in Applied Sciences SCQF level 5

The National Certificate in Applied Sciences SCQF level 5 consists of 12 Unit credits and has a total credit value of 72 SCQF credit points.

| National Certificate classification | SCQF level | SCQF credit points |
|-------------------------------------|------------|--------------------|
| Intermediate 2                      | 5          | 72                 |

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

#### Conditions of award

The condition of the award would be the successful completion of ten listed mandatory Units and two suitable optional Units. The 72 SCQF credit points are to be achieved overall. These are made up from the mandatory section of 60 SCQF credit points — 45 SCQF credit points at level 5 and 15 SCQF credit points at level 4. The further 12 SCQF credit points from the optional Units which may be either at level 4 or level 5.

#### Mandatory Units — 10 credits (7.5 credits at SCQF Level 5 + 2.5 credits at SCQF Level 4)

3 credits are required from the following mandatory units:

| Unit title  | Code                                  | SCQF credit points  | SCQF level          | SQA credit value    |
|---|---------------------------------------|---------------------|---------------------|---------------------|
| Science and Technology in Society                             | F3TA 10                               | 6                   | 4                   | 1                   |
| Science Practical Skills                                      | F3TC 10                               | 3                   | 4                   | 0.5                 |
| Science Investigation Skills                                  | F3TB 11                               | 3                   | 5                   | 0.5                 |
| Numeracy<br>OR<br>Numeracy<br>OR<br>Mathematics for Science 1 | F3GF 10<br><br>H225 74<br><br>HP9V 44 | 6<br><br>6<br><br>6 | 4<br><br>4<br><br>4 | 1<br><br>1<br><br>1 |

3 credits are required from each of two of the three Science areas below and 1 credit is required from the remaining Science area. Note that in the mandatory section Biology, Biotechnology, Environmental Science and Managing Environmental Resources are considered as forming a single Science area – Biology.

**Science area: Chemistry SCQF level 5**

| Unit title                     | Code     | SCQF credit points | SCQF level | SQA credit value |
|--------------------------------|----------|--------------------|------------|------------------|
| Chemical Changes and Structure | H21G 75* | 6                  | 5          | 1                |
| Chemistry in Society           | H21L 75* | 6                  | 5          | 1                |
| Nature's Chemistry             | H21J 75* | 6                  | 5          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

**Science area: Biology SCQF Level 5 – incorporating Biology, Biotechnology, Environmental Science and Managing Environmental Resources.** If this Science area is selected as one of the two Science areas from which 3 credits are required, all 3 credits must come from the same subject.

**Biology SCQF level 5**

| Unit title                         | Code    | SCQF credit points | SCQF Level | SQA credit value |
|------------------------------------|---------|--------------------|------------|------------------|
| <b>3 credits from:</b>             |         |                    |            |                  |
| Biology: Life on Earth             | H209 75 | 6                  | 5          | 1                |
| Biology: Multicellular Organisms   | H208 75 | 6                  | 5          | 1                |
| Cell Biology                       | H207 75 | 6                  | 5          | 1                |
| <b>or 3 credits from:</b>          |         |                    |            |                  |
| Animal Physiology                  | D028 11 | 6                  | 5          | 1                |
| Environmental Biology and Genetics | D027 11 | 6                  | 5          | 1                |
| Living Cells                       | D026 11 | 6                  | 5          | 1                |

**Biotechnology SCQF level 5**

| Unit title                     | Code    | SCQF credit points | SCQF Level | SQA credit value |
|--------------------------------|---------|--------------------|------------|------------------|
| Biotechnology Processes        | DF5G 11 | 6                  | 5          | 1                |
| The Biology of Micro-organisms | DF5F 11 | 6                  | 5          | 1                |
| Working with Micro-organisms   | D039 11 | 6                  | 5          | 1                |

### Environmental Science SCQF level 5

| Unit title                                | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---|---------|--------------------|------------|------------------|
| Environmental Science: Living Environment | H24P 75 | 6                  | 5          | 1                |
| Environmental Science: Earth's Resources  | H24R 75 | 6                  | 5          | 1                |
| Environmental Science: Sustainability     | H24S 75 | 6                  | 5          | 1                |

### Managing Environmental Resources SCQF level 5

| Unit title           | Code    | SCQF credit points | SCQF Level | SQA credit value |
|----------------------|---------|--------------------|------------|------------------|
| Ecosystems           | D310 11 | 6                  | 5          | 1                |
| Natural Resource Use | D312 11 | 6                  | 5          | 1                |
| Local Environment    | D314 11 | 6                  | 5          | 1                |

### Science area: Physics SCQF level 5

| Unit title                      | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---------------------------------|---------|--------------------|------------|------------------|
| <b>3 credits from:</b>          |         |                    |            |                  |
| Physics: Electricity and Energy | H256 75 | 6                  | 5          | 1                |
| Physics: Dynamics and Space     | H258 75 | 6                  | 5          | 1                |
| Physics: Waves and Radiation    | H25A 75 | 6                  | 5          | 1                |
| <b>or 3 credits from:</b>       |         |                    |            |                  |
| Electricity and Electronics     | D380 11 | 6                  | 5          | 1                |
| Mechanics and Heat              | D379 11 | 6                  | 5          | 1                |
| Waves and Optics                | D381 11 | 3                  | 5          | 0.5              |
| Radioactivity                   | D382 11 | 3                  | 5          | 0.5              |

### Optional Units – 2 credits at SCQF Level 4 or 5

**2 credits are required from Units not selected from the remaining Science area above or from the Units listed below. Note that in the optional section, the restrictions relating to Science area: Biology at SCQF Level 5 are removed.**

### Biology SCQF Level 4

| Unit title                       | Code    | SCQF credit points | SCQF Level | SQA credit value |
|----------------------------------|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>     |         |                    |            |                  |
| Cell Biology                     | H207 74 | 6                  | 4          | 1                |
| Biology: Multicellular Organisms | H208 74 | 6                  | 4          | 1                |
| Biology: Life on Earth           | H209 74 | 6                  | 4          | 1                |
| <b>or up to 2 credits from:</b>  |         |                    |            |                  |
| Health and Technology            | D023 10 | 6                  | 4          | 1                |
| Biotechnological Industries      | D024 10 | 6                  | 4          | 1                |
| Growing Plants                   | D025 10 | 6                  | 4          | 1                |

### Managing Environmental Resources SCQF Level 4

| Unit title                   | Code    | SCQF credit points | SCQF Level | SQA credit value |
|------------------------------|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b> |         |                    |            |                  |
| Ecosystems                   | D310 10 | 6                  | 4          | 1                |
| Environmental Issues         | D309 10 | 6                  | 4          | 1                |
| Land Use                     | D311 10 | 6                  | 4          | 1                |

### Environmental Science SCQF Level 4

| Unit title                                | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>              |         |                    |            |                  |
| Environmental Science: Living Environment | H24P 74 | 6                  | 4          | 1                |
| Environmental Science: Earth's Resources  | H24R 74 | 6                  | 4          | 1                |
| Environmental Science: Sustainability     | H24S 74 | 6                  | 4          | 1                |

### Chemistry SCQF Level 4

| Unit title                     | Code     | SCQF credit points | SCQF Level | SQA credit value |
|--------------------------------|----------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>   |          |                    |            |                  |
| Chemical Changes and Structure | H21G 74* | 6                  | 4          | 1                |
| Chemistry in Society           | H21L 74* | 6                  | 4          | 1                |
| Nature's Chemistry             | H21J 74* | 6                  | 4          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

#### Physics SCQF Level 4

| Unit title                      | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---------------------------------|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>    |         |                    |            |                  |
| Physics: Electricity and Energy | H256 74 | 6                  | 4          | 1                |
| Physics: Dynamics and Space     | H258 74 | 6                  | 4          | 1                |
| Physics: Waves and Radiation    | H25A 74 | 6                  | 4          | 1                |
| <b>or up to 2 credits from:</b> |         |                    |            |                  |
| Telecommunications              | D373 10 | 3                  | 4          | 0.5              |
| Practical Electricity           | D374 10 | 3                  | 4          | 0.5              |
| Radiations                      | D375 10 | 3                  | 4          | 0.5              |
| Sound and Music                 | D376 10 | 3                  | 4          | 0.5              |
| Movement                        | D377 10 | 3                  | 4          | 0.5              |
| Electronics                     | D378 10 | 3                  | 4          | 0.5              |

#### Engineering Science SCQF Level 4

| Unit title                          | Code    | SCQF credit points | SCQF Level | SQA credit value |
|-------------------------------------|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>        |         |                    |            |                  |
| Electronics and Control             | H23B 74 | 6                  | 4          | 1                |
| Mechanisms and Structures           | H23D 74 | 6                  | 4          | 1                |
| Engineering Contexts and Challenges | H23A 74 | 6                  | 4          | 1                |

#### Engineering Science SCQF Level 5

| Unit title                          | Code    | SCQF credit points | SCQF Level | SQA credit value |
|-------------------------------------|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>        |         |                    |            |                  |
| Electronics and Control             | H23B 75 | 6                  | 5          | 1                |
| Mechanisms and Structures           | H23D 75 | 6                  | 5          | 1                |
| Engineering Contexts and Challenges | H23A 75 | 6                  | 5          | 1                |

## Laboratory Science SCQF Level 5

| Unit title   | Code    | SCQF credit points | SCQF Level | SQA credit value |
|--|---------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>                         |         |                    |            |                  |
| Laboratory Science: Working in a Laboratory          | HN9W 75 | 6                  | 5          | 1                |
| Laboratory Science: Practical Skills                 | HN9Y 75 | 6                  | 5          | 1                |
| Laboratory Science: Practical Investigation          | HP00 75 | 6                  | 5          | 1                |
| Laboratory Science: Careers using Laboratory Science | HN9X 75 | 6                  | 5          | 1                |

| Unit title                                   | Code               | SCQF credit points | SCQF Level | SQA credit value |
|--|--------------------|--------------------|------------|------------------|
| <b>Up to 2 credits from:</b>                 |                    |                    |            |                  |
| Applied Electronics                          | D186 11            | 6                  | 5          | 1                |
| Biodiversity in Scotland                     | FV49 11            | 6                  | 5          | 1                |
| Causes and Prevention of Disease             | HT6T 44*           | 6                  | 4          | 1                |
| Earth Physics and Earth Movements            | D247 11            | 6                  | 5          | 1                |
| Energy                                       | D185 11            | 3                  | 5          | 0.5              |
| Forensic Science: Applications               | F823 11            | 6                  | 5          | 1                |
| Geology, People and Environment              | D245 10            | 6                  | 4          | 1                |
| Geology and Scenery                          | D244 10            | 6                  | 4          | 1                |
| History of the Earth                         | D8XL 11            | 6                  | 5          | 1                |
| Introducing Microbiology                     | HL95 45*           | 6                  | 5          | 1                |
| Laboratory Safety                            | F3TD 11            | 6                  | 5          | 1                |
| Mathematics: Applications                    | H22J 75*           | 6                  | 5          | 1                |
| Mathematics: Expressions and Formulae        | H22F 74*           | 6                  | 4          | 1                |
| Mathematics: Expressions and Formulae        | H22F 75*           | 6                  | 5          | 1                |
| Mathematics: Relationships                   | H22G 74*           | 6                  | 4          | 1                |
| Mathematics: Relationships                   | H22G 75*           | 6                  | 5          | 1                |
| Mechanical Systems                           | D188 11            | 3                  | 5          | 0.5              |
| Microbiology for Healthcare: An Introduction | DC4H 11            | 6                  | 5          | 1                |
| Minerals and Rocks                           | D8XK11             | 6                  | 5          | 1                |
| Systems and Control                          | D187 11            | 6                  | 5          | 1                |
| The Human Body                               | HL94 44*           | 6                  | 4          | 1                |
| The Human Body                               | F1RH 11            | 6                  | 5          | 1                |
| The Study of the Earth                       | D243 10            | 6                  | 4          | 1                |
| Work Placement                               | HF88 45*           | 6                  | 5          | 1                |
| Communication<br>or<br>Literacy              | F3GB 11<br>H23W 75 | 6<br>6             | 5<br>5     | 1<br>1           |



| <b>Unit title</b>                        | <b>Code</b> | <b>SCQF credit points</b> | <b>SCQF Level</b> | <b>SQA credit value</b> |
|--|-------------|---------------------------|-------------------|-------------------------|
| Information and Communication Technology | F3GC 11     | 6                         | 5                 | 1                       |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

It is strongly suggested that the Unit *Laboratory Safety* SCQF level 5 is selected.

### 5.1.2 National Certificate in Applied Sciences SCQF level 6

The National Certificate in Applied Science SCQF level 6 consists of 12 Unit credits and has a total credit value of 72 SCQF credit points.

#### Condition of award

The condition of the award would be the successful completion of ten listed mandatory Units and two suitable optional Units. The 72 SCQF credit points are to be achieved overall. These are made up from the mandatory section of 60 SCQF credit points — 42 SCQF credit points at level 6 and 18 SCQF credit points at level 5. The further 12 SCQF credit points from the optional Units which may be either at level 5 or level 6.

**Mandatory Units — 10 credits (7 credits at SCQF level 6 + 3 credits at SCQF level 5)**

**3 credits are required from the following mandatory units:**

| Unit title                       | Code     | SCQF credit points | SCQF Level | SQA credit value |
|----------------------------------|----------|--------------------|------------|------------------|
| Experimental Procedures: Science | HN8D 46* | 6                  | 6          | 1                |
| Mathematics for Science          | F3T8 11  | 6                  | 5          | 1                |
| Or<br>Mathematics for Science 2  | HP9W 45  | 6                  | 5          | 1                |
| Science & Technology in Society  | F3T9 11  | 6                  | 5          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

**3 credits are required at SCQF Level 6 from each of two of the three Science areas below. Note that in the mandatory section Biology, Human Biology, Biotechnology, Environmental Science and Managing Environmental Resources are considered as forming a single Science area – Biology.**

**Science area: Chemistry SCQF level 6**

| Unit title                           | Code    | SCQF credit points | SCQF Level | SQA credit value |
|--------------------------------------|---------|--------------------|------------|------------------|
| <b>3 credits from:</b>               |         |                    |            |                  |
| Chemistry in Society                 | H21L 76 | 6                  | 6          | 1                |
| Chemical Changes and Structure       | H4KH 76 | 3                  | 6          | 0.5              |
| Nature's Chemistry                   | H21J 76 | 6                  | 6          | 1                |
| Researching Chemistry                | H4KK 76 | 3                  | 6          | 0.5              |
| <b>or 3 credits from:</b>            |         |                    |            |                  |
| Consumer Chemistry                   | FE4F 12 | 6                  | 6          | 1                |
| Periodicity, Polarity and Properties | FE4H 12 | 3                  | 6          | 0.5              |
| Principles to Production             | FE4D 12 | 6                  | 6          | 1                |
| Researching Chemistry                | FE4J 12 | 3                  | 6          | 0.5              |
| <b>or 3 credits from:</b>            |         |                    |            |                  |
| Energy Matters                       | D069 12 | 6                  | 6          | 1                |
| The World of Carbon                  | D070 12 | 6                  | 6          | 1                |
| Chemical Reactions                   | D071 12 | 6                  | 6          | 1                |

**Science area: Biology SCQF Level 6 – incorporating Biology, Human Biology, Biotechnology, Environmental Science and Managing Environmental Resources. If this Science area is selected as one of the two Science areas from which 3 credits are required, all 3 credits must come from the same subject.**

**Biology SCQF Level 6**

| Unit title                                  | Code     | SCQF credit points | SCQF Level | SQA credit value |
|---|----------|--------------------|------------|------------------|
| <b>3 credits from:</b>                      |          |                    |            |                  |
| Biology: DNA and the Genome                 | H4KD 76* | 6                  | 6          | 1                |
| Biology: Metabolism and Survival            | H4KE 76* | 6                  | 6          | 1                |
| Biology: Sustainability and Interdependence | H4KF 76* | 6                  | 6          | 1                |
| <b>or 3 credits from:</b>                   |          |                    |            |                  |
| Cell Biology                                | D029 12  | 6                  | 6          | 1                |
| Genetics and Adaptation                     | D030 12  | 6                  | 6          | 1                |
| Control and Regulation                      | D031 12  | 6                  | 6          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

### Human Biology SCQF Level 6

| Unit title                                    | Code     | SCQF credit points | SCQF Level | SQA credit value |
|---|----------|--------------------|------------|------------------|
| <b>3 credits from:</b>                        |          |                    |            |                  |
| Human Biology: Human Cells                    | H4L8 76* | 6                  | 6          | 1                |
| Human Biology: Immunology and Public Health   | H4LB 76* | 3                  | 6          | 0.5              |
| Human Biology: Neurobiology and Communication | H4LA 76* | 3                  | 6          | 0.5              |
| Human Biology: Physiology and Health          | H4L9 76* | 6                  | 6          | 1                |
| <b>or 3 credits from:</b>                     |          |                    |            |                  |
| Cell Function and Inheritance                 | D043 12  | 6                  | 6          | 1                |
| The Continuation of Life                      | D044 12  | 6                  | 6          | 1                |
| Behaviour, Populations and the Environment    | D045 12  | 6                  | 6          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

### Biotechnology SCQF Level 6

| Unit title                 | Code    | SCQF credit points | SCQF Level | SQA credit value |
|----------------------------|---------|--------------------|------------|------------------|
| Microbiological Techniques | D042 12 | 6                  | 6          | 1                |
| Microbiology               | DF5H 12 | 6                  | 6          | 1                |
| Biotechnology              | DF5J 12 | 6                  | 6          | 1                |

### Environmental Science SCQF Level 6

| Unit title                                | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---|---------|--------------------|------------|------------------|
| Environmental Science: Living Environment | H24P 76 | 6                  | 6          | 1                |
| Environmental Science: Earth's Resources  | H24R 76 | 6                  | 6          | 1                |
| Environmental Science: Sustainability     | H24S 76 | 6                  | 6          | 1                |

### Managing Environmental Resources SCQF Level 6

| Unit title               | Code    | SCQF credit points | SCQF Level | SQA credit value |
|--------------------------|---------|--------------------|------------|------------------|
| Natural Resource Use     | D312 12 | 6                  | 6          | 1                |
| Investigating Ecosystems | D315 12 | 6                  | 6          | 1                |
| Land Use in Scotland     | D316 12 | 6                  | 6          | 1                |

**Science area: Physics SCQF level 6**

| Unit title                         | Code    | SCQF credit points | SCQF Level | SQA credit value |
|------------------------------------|---------|--------------------|------------|------------------|
| <b>3 credits from:</b>             |         |                    |            |                  |
| Physics: Electricity               | H4KX 76 | 3                  | 6          | 0.5              |
| Physics: Our Dynamic Universe      | H4KY 76 | 6                  | 6          | 1                |
| Physics: Particles and Waves       | H4L0 76 | 6                  | 6          | 1                |
| Researching Physics                | H4L1 76 | 3                  | 6          | 0.5              |
| <b>or 3 credits from:</b>          |         |                    |            |                  |
| Electricity                        | FE44 12 | 3                  | 6          | 0.5              |
| Our Dynamic Universe               | FE42 12 | 6                  | 6          | 1                |
| Particles and Waves                | FE43 12 | 6                  | 6          | 1                |
| Researching Physics                | FE45 12 | 3                  | 6          | 0.5              |
| <b>or 3 credits from:</b>          |         |                    |            |                  |
| Mechanics and Properties of Matter | D383 12 | 6                  | 6          | 1                |
| Electricity and Electronics        | D380 12 | 6                  | 6          | 1                |
| Radiation and Matter               | D384 12 | 6                  | 6          | 1                |

**1 credit is required at SCQF Level 5 from the remaining Science area. Note that in this section Biology, Biotechnology, Environmental Science and Managing Environmental Resources are considered as forming a single Science area – Biology.**

**Science area: Physics SCQF Level 5**

| Unit title                      | Code    | SCQF credit points | SCQF level | SQA credit value |
|---------------------------------|---------|--------------------|------------|------------------|
| <b>1 credit from:</b>           |         |                    |            |                  |
| Physics: Dynamics and Space     | H258 75 | 6                  | 5          | 1                |
| Physics: Electricity and Energy | H256 75 | 6                  | 5          | 1                |
| Physics: Waves and Radiation    | H25A 75 | 6                  | 5          | 1                |
| <b>or 1 credit from:</b>        |         |                    |            |                  |
| Mechanics and Heat              | D379 11 | 6                  | 5          | 1                |
| Electricity and Electronics     | D380 11 | 6                  | 5          | 1                |
| Waves and Optics                | D381 11 | 3                  | 5          | 0.5              |
| Radioactivity                   | D382 11 | 3                  | 5          | 0.5              |
| <b>or 1 credit from:</b>        |         |                    |            |                  |
| Introductory Physics            | HT8R 45 | 6                  | 5          | 1                |

**Science area: Biology SCQF Level 5 – incorporating Biology, Biotechnology, Environmental Science and Managing Environmental Resources**

### Biology SCQF Level 5

| Unit title                         | Code    | SCQF credit points | SCQF level | SQA credit value |
|------------------------------------|---------|--------------------|------------|------------------|
| <b>1 credit from:</b>              |         |                    |            |                  |
| Biology: Life on Earth             | H209 75 | 6                  | 5          | 1                |
| Biology: Multicellular Organisms   | H208 75 | 6                  | 5          | 1                |
| Cell Biology                       | H207 75 | 6                  | 5          | 1                |
| <b>or 1 credit from:</b>           |         |                    |            |                  |
| Living Cells                       | D026 11 | 6                  | 5          | 1                |
| Environmental Biology and Genetics | D027 11 | 6                  | 5          | 1                |
| Animal Physiology                  | D028 11 | 6                  | 5          | 1                |
| <b>or 1 credit from:</b>           |         |                    |            |                  |
| Introductory Biology               | HT8P 45 | 6                  | 5          | 1                |

### Biotechnology SCQF Level 5

| Unit title                     | Code    | SCQF credit points | SCQF level | SQA credit value |
|--------------------------------|---------|--------------------|------------|------------------|
| Biotechnology Processes        | DF5G 11 | 6                  | 5          | 1                |
| The Biology of Micro-organisms | DF5F 11 | 6                  | 5          | 1                |
| Working with Micro-organisms   | D039 11 | 6                  | 5          | 1                |

### Environmental Science SCQF Level 5

| Unit title                                | Code    | SCQF credit points | SCQF Level | SQA credit value |
|---|---------|--------------------|------------|------------------|
| Environmental Science: Living Environment | H24P 75 | 6                  | 5          | 1                |
| Environmental Science: Earth's Resources  | H24R 75 | 6                  | 5          | 1                |
| Environmental Science: Sustainability     | H24S 75 | 6                  | 5          | 1                |

### Managing Environmental Resources SCQF Level 5

| Unit title           | Code    | SCQF credit points | SCQF level | SQA credit value |
|----------------------|---------|--------------------|------------|------------------|
| Ecosystems           | D310 11 | 6                  | 5          | 1                |
| Natural Resource Use | D312 11 | 6                  | 5          | 1                |
| Local Environment    | D314 11 | 6                  | 5          | 1                |

### Science area: Chemistry SCQF Level 5

| Unit title                     | Code     | SCQF credit points | SCQF level | SQA credit value |
|--------------------------------|----------|--------------------|------------|------------------|
| <b>1 credit from:</b>          |          |                    |            |                  |
| Chemical Changes and Structure | H21G 75* | 6                  | 5          | 1                |
| Chemistry in Society           | H21L 75* | 6                  | 5          | 1                |
| Nature's Chemistry             | H21J 75* | 6                  | 5          | 1                |
| <b>or 1 credit from:</b>       |          |                    |            |                  |
| Chemistry Fundamentals 1       | HT6P 45  | 6                  | 5          | 1                |
| Chemistry Fundamentals 2       | HT6R 45  | 6                  | 5          | 1                |

\*Refer to history of changes for revision details. Candidates who have achieved the previous version of the unit may use this in the award.

### Optional Units – 2 credits at SCQF Level 5 or 6

2 credits are required from Units not selected from the remaining Science area above or from the Units listed below. Note that in the optional section, the restrictions relating to Science area: Biology are removed.

| Unit title  | Code     | SCQF credit points | SCQF level | SQA credit value |
|---|----------|--------------------|------------|------------------|
| Applied Electronics                                   | D186 11  | 6                  | 5          | 1                |
| Applied Electronics                                   | D186 12  | 6                  | 6          | 1                |
| Biodiversity in Scotland                              | FV49 11  | 6                  | 5          | 1                |
| Earth Physics and Earth Movements                     | D247 11  | 6                  | 5          | 1                |
| Earth Physics, Structural Geology and Plate Tectonics | D250 12  | 6                  | 6          | 1                |
| Economic Geology                                      | D252 12  | 3                  | 6          | 0.5              |
| Energy  | D185 11  | 3                  | 5          | 0.5              |
| Experimental Procedures: Biology                      | HN89 46* | 6                  | 6          | 1                |
| Experimental Procedures: Chemistry                    | HN8A 46* | 6                  | 6          | 1                |
| Experimental Procedures: Physics                      | HN8C 46* | 6                  | 6          | 1                |
| Forensic Science: Practical Techniques                | F824 12  | 6                  | 6          | 1                |
| Forest Ecology  | D855 12  | 6                  | 6          | 1                |
| Fossils and Stratigraphy                              | D251 12  | 3                  | 6          | 0.5              |
| History of the Earth                                  | D8XL 11  | 6                  | 5          | 1                |
| Human Physiological Processes                         | DC4D 12  | 6                  | 6          | 1                |
| Introducing Microbiology                              | HL95 45* | 6                  | 5          | 1                |
| Laboratory Safety                                     | F3TD 11  | 6                  | 5          | 1                |
| Mathematics: Applications                             | H22J 75* | 6                  | 5          | 1                |
| Mathematics: Applications                             | H22J 76* | 6                  | 6          | 1                |
| Mathematics: Expressions and Formulae                 | H22F 75* | 6                  | 5          | 1                |

| Unit title   | Code     | SCQF credit points | SCQF level | SQA credit value |
|--|----------|--------------------|------------|------------------|
| Mathematics: Expressions and Functions               | H4LC 76* | 6                  | 6          | 1                |
| Mathematics: Relationships                           | H22G 75* | 6                  | 5          | 1                |
| Mathematics: Relationships and Calculus              | H4LD 76* | 6                  | 5          | 1                |
| Mechanical Systems                                   | D188 11  | 3                  | 5          | 0.5              |
| Microbiology for Healthcare: An Introduction         | DC4H 11  | 6                  | 5          | 1                |
| Minerals and Rocks                                   | D8XK 11  | 6                  | 5          | 1                |
| Minerals and Rocks                                   | D8XK 12  | 6                  | 6          | 1                |
| Structures and Materials                             | D190 12  | 3                  | 6          | 0.5              |
| Systems and Control                                  | D187 11  | 6                  | 5          | 1                |
| Systems and Control                                  | D187 12  | 6                  | 6          | 1                |
| Technological Studies: Case Study Report             | D191 12  | 3                  | 6          | 0.5              |
| The Ecology of Scotland                              | D897 12  | 6                  | 6          | 1                |
| The Human Body                                       | F1RH 11  | 6                  | 5          | 1                |
| Work Experience                                      | HF88 46* | 6                  | 6          | 1                |
| Communication  | F3GB 12  | 6                  | 6          | 1                |
| Information and Communication Technology             | F3GC 11  | 6                  | 5          | 1                |
| Library and Information Units in Modern Society      | D10D 12  | 6                  | 6          | 1                |
| Laboratory Science: Working in a Laboratory          | HN9W 75  | 6                  | 5          | 1                |
| Laboratory Science: Practical Skills                 | HN9Y 75  | 6                  | 5          | 1                |
| Laboratory Science: Practical Investigation          | HP00 75  | 6                  | 5          | 1                |
| Laboratory Science: Careers using Laboratory Science | HN9X 75  | 6                  | 5          | 1                |
| Electronics and Control                              | H23B 75  | 6                  | 5          | 1                |
| Mechanisms and Structures                            | H23D 75  | 6                  | 5          | 1                |
| Engineering Contexts and Challenges                  | H23A 75  | 6                  | 5          | 1                |
| Electronics and Control                              | H23B 76  | 6                  | 6          | 1                |
| Mechanisms and Structures                            | H23D 76  | 6                  | 6          | 1                |
| Engineering Contexts and Challenges                  | H23A 76  | 6                  | 6          | 1                |
| Mathematics for Science 3                            | HP9X 45  | 6                  | 5          | 1                |
| Statistics for Science                               | HP9Y 45  | 6                  | 5          | 1                |

\*Refer to history of changes for revision details. Candidates who have already achieved the previous version of the unit may use this in the award.

It is suggested that the Unit *Laboratory Safety* at SCQF level 5, an Experimental Procedures Unit in a separate science at SCQF level 6 or a Mathematics Unit at SCQF level 5 or 6 could be an appropriate selection.



## 5.2 Links to Occupational Standards

Aspects of the underpinning knowledge in the National Occupational Standards for Laboratory Science level 2 and the SVQs in Laboratory and Associated Technical Activities developed by SEMTA (Science, Engineering, Manufacturing and Technologies Alliance) are reflected in the National Certificates.

The core competences which are identified in the new Laboratory Science level 2 are:

- ◆ maintain health and safety in a laboratory environment
- ◆ maintain effective and efficient working relationships in the laboratory
- ◆ receive, sort, transport and store laboratory specimens/samples under supervision
- ◆ communicate laboratory information to authorized personnel under supervision

The pathways following these mandatory Units are Clinical Analysis or Compound Analysis activities. The National Certificate Awards at level 6 can provide the underpinning knowledge and skills for the Compound Analysis pathway. More information on the content of the standards can be found at [www.ukstandards.org.uk](http://www.ukstandards.org.uk).

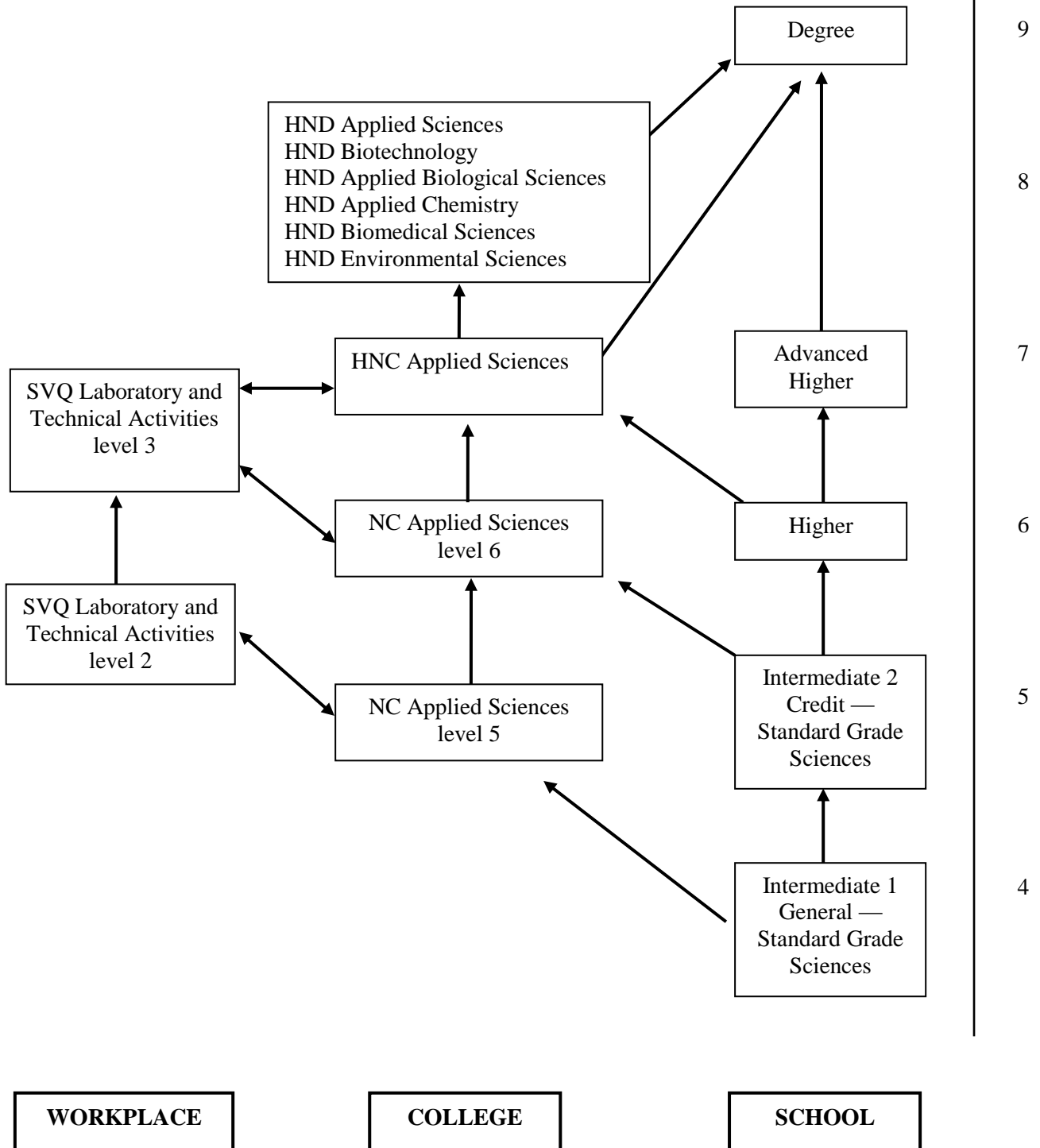
## 5.3 Articulation, professional recognition and credit transfer

Articulation and Progression opportunities for academic development can be seen in the chart below. The SCQF level 5 has been designed to enable a candidate to progress to the SCQF level 6 award. Similarly successful completion of the SCQF level 6 award would enable a candidate to progress to an HNC Applied Science course.

The SCQF level 6 award provides the core of the Access Programmes offered by Colleges in Scotland. Each University and each degree programme has specific requirements for entry. These usually require the successful achievement of between 16– 18 credits. It is important that the candidate is offered a programme of options and supplementary Units which will satisfy the entry requirements of their chosen degree programme. For candidates under 21, it is usually essential that the candidates sit the Higher examinations. Arrangements for mature candidates are available under the Scottish Wider Access programme.

PROGRESSION CHART

SCQF  
levels



## Core Skills

To meet employment and progression needs, the National Certificate in Applied Sciences incorporate opportunities for candidates to develop Core Skills.

On successful completion of the **National Certificate level 5** the candidates will achieve the following automatic Core Skills profile

| Core Skill      | Core Skill component        | Level        |
|-----------------|-----------------------------|--------------|
| Numeracy        | Using Graphical Information | SCQF level 4 |
|                 | Using Number                | SCQF level 4 |
| Problem Solving | Critical Thinking           | SCQF level 4 |

There are opportunities within the Units to develop the candidates Core Skill profile. Guidance and advice on the development of Core Skills is given within the Unit specifications for Science and Technology in Society level 4, Science Practical Skills, Science Investigation Skills.

Possible opportunities for the development of the Core Skills are given below:

**Written Communication Skills:** within Science and Technology in Society level 4 and within the Intermediate 2 Outcome 3 in the Sciences and Science Investigation Skills while candidates write reports.

**Oral Communication Skills and *Working with Others*:** within Science and Technology in Society level 4 these may be enhanced if presentations are used to deliver when delivering the required report. There may also be opportunities while candidates discuss issues and problems in group work and while doing laboratory work.

***Using Information Technology*:** within Science and Technology in Society level 4, Science Investigation Skills and the Intermediate 2 Outcome 3 reports in the Sciences while researching a topic using the internet, while using spreadsheets to process and analyse data, while word processing reports including the production of graphs, diagrams etc.

On successful completion of the **National Certificate National Certificate level 6** the candidates will achieve the following automatic Core Skills profile.

| <b>Core Skill</b>   | <b>Core Skill component</b>         | <b>Level</b> |
|---------------------|-------------------------------------|--------------|
| Numeracy            | Using Graphical Information         | SCQF level 5 |
|                     | Using Number                        | SCQF level 5 |
| Problem Solving     | Critical Thinking                   | SCQF level 6 |
|                     | Planning and Organising             | SCQF level 6 |
|                     | Reviewing and evaluating            | SCQF level 6 |
| Working with Others | Working Co-operatively with Others  | SCQF level 5 |
|                     | Reviewing Co-operative Contribution | SCQF level 5 |

There are opportunities within the Units to develop the candidates Core Skill profile. Guidance and advice on the development of Core Skills is given in the Unit specifications of Science and Technology in Society level 5, Mathematics for Science, Laboratory Safety.

Possible opportunities for the development of the Core Skills are given below:

**Written Communication Skills:** within Science and Technology in Society level 5, and in the Higher — Outcome 3 in the Sciences and Experimental Procedures while candidates write reports.

**Oral Communication Skills:** within Science and Technology in Society level 5 the Core Skill could be developed if presentations were used as a method of reporting their findings. There may also be opportunities while candidates discuss issues and problems in group work and while doing laboratory work.

**Using Information Technology:** within Science and Technology in Society level 5, Experimental Procedures and the Intermediate 2 Outcome 3 reports in the Sciences while researching a topic using the Internet, while using spreadsheets to process and analyse data, while word processing reports including the production of graphs, diagrams etc.

### **Transferable skills**

The transferable skills such as analytical, evaluation, planning, investigation and research skills are problem solving skills. These are inherently developed with the study of the Sciences at Higher and Intermediate 2 levels. Learning and study skills may be developed as the candidates undertake their studies for the National Certificate.

Employability skills may also be developed if the option D36H 11 Work Experience Intermediate 2 or D36H 12 Work Experience Higher SCQF level 6 is chosen for the awards.

## 6 Approaches to delivery and assessment

### 6.1 Delivery

The National Certificate in Applied Sciences has been designed principally for candidates who are seeking to study science to progress either to further studies in Higher Education or to employment in the science industry. As such, these awards can be delivered by a variety of modes which can include full-time, part-time modes which can include day-release, block-release or evening class delivery. It would also be possible to deliver some or all parts of the awards in a work-place environment providing, of course, that suitable accommodation (eg classrooms and laboratories) were available for the delivery of the awards. Some Units of the awards could be delivered by Open/Distance Learning.

In a college a normal full-time programme consists of 18 credits thus an award may be part of the full-time programme. The further 6 credits chosen by the college will depend on local circumstances and the candidates aspirations. For instance, if a candidate on an Access programme wishes to progress to a degree programme at university they could take the award at level 6 and the further 6 Units of the full-time programme could include further science or mathematics Units at level 6 with entry to the examinations for the Higher course awards. The choice would depend on the requirements of entry to the degree programme. However if the candidate wished to progress to the HNC Applied Science, the further 6 credits could be more practically orientated science, laboratory safety, mathematics, study skills, work experience.

Centres have discretion as to the order in which they deliver the Units. However it is recommended that the arrangements documents for the Intermediate 2 and Higher courses for the Science Units in the Biology area, Chemistry and Physics are consulted carefully. In some cases the Units that make up the course content are not independent and require to be taken sequentially. These documents are available on the SQA website under the NQ subject areas. They provide in depth details of the Content Statements which outline the material to be covered in each of these Units.

These Units may be delivered by a combination of lecturing, group work, laboratory work, investigations and case studies. Texts to support the teaching and learning process are readily available for these Units.

The teaching and learning of the science Units are most effective when the concepts, principles and theories are set in a relevant context eg making reference to applications and to real world situations. Appropriate contexts, applications, illustrations and activities relating to the Content statements are provided in the Arrangement documents for each of the sciences. Practical activities provide opportunities to develop a wide range of skills associated with scientific enquiry and practical problem solving. The practical Units —Science Practical Skills, Science Investigation Skills and Experimental Procedures can be integrated into the teaching of the science Units. This provides more time to deliver the content of the science Units thus enabling more relevant practical work to be undertaken, on an individual basis if appropriate, within the Units to enhance the skills and understanding.

It is advised that the Numeracy/Mathematics for Science Unit are taught at the beginning of the delivery of the award to enable the candidates to have facility in dealing with the numerical work in the Science Units.

The Science and Technology in Society Unit should be placed towards the latter stages of the programme to ensure that the candidates have developed some understanding of science behind the topics that might be chosen to consider.

The choice of options should be complementary to the aspirations of the candidates.

## **6.2 Assessment**

The Assessment Support Packs for the Units provide sample assessment material. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard and is advised that centre developed assessment instruments are prior verified by SQA.

The assessment for Outcomes 1 and 2 for each of the Science Units is an end of Unit test. National Assessment Bank material is available for all of the Units. The Outcome 3 is assessed by the performance of an experiment with a report of the method, the results, the analysis and conclusions. Details of the requirement for this Outcome are given in the Unit specifications. Reference to the assessment procedures for these Units is given in the arrangements document. Satisfactory Outcome 3 evidence is required for each Unit in the award. If candidates are entered for the external examination in a science subject, only one piece of Outcome 3 evidence for each subject is required (See the arrangements document for the Intermediate 2 or Higher subject). However it is good practice to allow candidates to tackle several experiments related to the content of the Units and hence develop their report writing skills.

The assessment of Science Practical Skills can be set in the practical work that is carried out within the activities of the Intermediate 2 Science Units. The assessment of the Science Investigation Skills Unit is an experimental report. This can be integrated with the practical work for the Intermediate 2 Outcome 3 assessment. Similarly the assessment of the Experimental Procedures Units can be integrated with the Higher Outcome 3.

The Numeracy and Mathematics for Science Units have end of Unit assessments. The Science and Technology for Society level 4 Unit is assessed using a case study while the level 5 Unit requires the candidates to carry out research and report on their findings and their views of the effects on society of the scientific development.

## **6.3 Formative assessment**

Formative assessment should be used throughout the delivery of Units to reinforce learning, build candidate's confidence and prepare candidates for summative assessment.

## **6.4 Open and Distance Learning**

One of the principal aims of the National Certificates is to develop the practical skills of the candidates to enable them to work effectively in a laboratory. Candidate practical work and live demonstrations provide important aids to the development of the concepts considered in the Science Units while enabling the candidate to become familiar with laboratory equipment. One Outcome in all of the Science Units has been designed to encourage practical work and to ensure the development of practical skills, analytical, evaluative and report writing skills. This is best achieved when the Science and the Science Practical Units are taught using a face-

to-face methodology. Certain of the Units in the awards such as Mathematics for Science, Numeracy, Science and Technology in Society level 4 and 5 may lend themselves to delivery by Open and Distance Learning.

Advice on the use of open and distance learning is given in individual Unit specifications. However, where it is used with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that the assessment or assessments were conducted under the conditions specified in the Unit specification. For example, in the case of a Unit which involved an assessment paper a centre would have to make arrangements for the assessment to be conducted under controlled, supervised conditions. Likewise, where a Unit involves a practical based assessment, a centre would have to make arrangements for candidates to come into the centre to undertake the assessment under conditions specified in the Unit specification.

It should be noted that the same requirements as specified above apply when part or all of a Unit is delivered on-line.

## **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](http://www.sqa.org.uk)).

### **Internal and external verification**

All instruments of assessment used within this/these National Certificates should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification 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 verification can be found in *SQA's Guide to Assessment and Quality Assurance for Colleges of Further Education* ([www.sqa.org.uk](http://www.sqa.org.uk)).

## 8 General information for candidates

### Introduction

Science has changed the way we live — electrical gadgets, new drugs, computers — and new discoveries are made everyday. If you are interested in studying science but are not sure which area – chemistry, life sciences, physics interests you most then the new National Certificates in Applied Sciences introduce you to these areas, develop your practical skills and help you decide whether you would like to progress your studies in science.

- ◆ National Certificate in Applied Sciences at SCQF level 5
- ◆ National Certificate in Applied Sciences at SCQF level 6

### Content of awards

Each National Certificate requires you to achieve a minimum of 12 credits. You may of course take additional Units to add to your portfolio and these also will be credited to you in your certification.

In the National Certificate in Applied Sciences at SCQF level 5 you will have the opportunity to study two science subjects at Intermediate 2 (6 credits) and one credit at Intermediate 2 from the third science. To give you more experience in practical work there are two Units covering practical skills and investigation (1 credit) and to help you with the number work you study Numeracy at Intermediate 1. Science is important in everyday life and Science and Technology in Society is a Unit (1 credit) which enables you to study the effects that a particular scientific development has on society. To make up the award you will study a further two credits from a range of science, mathematics or information technology Units. A suggested Unit is Laboratory Safety (1 credit) as this topic is fundamental when working in a laboratory. Your tutor will help you select these credits to help you reach your ambition for the future.

The National Certificate in Applied Sciences at SCQF level 6 is based on six Units from two chosen Science subjects at Higher level and one Unit from the third science area at Intermediate 2 level (7 credits). To give you more experience of the practical work in the sciences you will take the Unit — Experimental Procedures (1 credit) and to help you with the mathematics in the science Units, a Unit — Mathematics for Science (1 credit) is studied. Science and Technology in Society (1 credit) is a Unit which considers the effects of a scientific development on society. In this Unit you will carry out some research using the Internet and texts to develop your ideas as to whether such a development benefits us in everyday life.

To make up the 12 required credits you may select a further two credits from a range of science, mathematics or information technology. A suggested Unit is Laboratory Safety (1 credit) as this topic is fundamental when working in a laboratory. Your tutor will help you select these credits to help you reach your ambition for the future.



## Teaching and Learning

The awards are likely to be delivered by a combination of lectures, group work, class discussion /debates, case studies, laboratory work and investigations which may involve the use of the Internet. Open learning/supported self study may also be used as a method of delivery by your lecturer/teacher for certain Units.

## Assessment

SQA has designed each National Certificate award to ensure that assessments meet national standards. Every attempt has been made to optimise assessment so that sufficient time is available for you to learn both the practical and theory in order to progress either to further study or employment.

Individual NQ Unit assessments will normally consist of practical exercises, written/oral tests, assignments, laboratory work and project work. Your lecturer/teacher should tell you at the start of the Unit what form the Unit assessment will take.

## Entry requirements

For the National Certificate at SCQF level 5 — you will have a genuine wish to develop your knowledge, skills and interest in science. Typically you would have:

- ◆ a Science subject at Intermediate 1 or Standard Grade at 3/4
- ◆ Mathematics at Standard Grade 3/4 or Intermediate 1
- ◆ English at Standard Grade at 3/4 or Intermediate 1
- ◆ a further Standard Grade at 3/4 preferably a second science

For the National Certificate National Certificate at SCQF level 6 - you would normally have qualifications in the sciences at a basic level and have a desire to work towards higher education entry or a career in a science discipline. Typically you would have studied the following:

- ◆ two Science subjects at Intermediate 2 or Standard Grade at Credit level
- ◆ Mathematics at Standard Grade at Credit level or Intermediate 2
- ◆ English at Standard Grade Credit level or Intermediate 2

## OR

- ◆ Successfully completed the National Certificate in Applied Sciences level 5

If you have other qualifications, you may be considered for entry to the awards depending on the knowledge and understanding that has been covered.

## Progression

On completion of the National Certificate Award at SCQF level 5 you may progress to the Applied Sciences SCQF level 6 award. Similarly successful completion of the SCQF level 6 award enables you to progress to an HNC Applied Sciences course or with further study to university. You could also move into employment in a variety of scientific posts such as a Laboratory Assistant or trainee Technician.

## 9 Glossary of terms

**SCQF:** This stands for the Scottish Credit and Qualifications 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 visit the SCQF website at [www.scqf.org.uk](http://www.scqf.org.uk)

**SCQF credit points:** One SCQF credit point equates to 10 hours of learning. NQ Units at SCQF levels 2-6 are worth 6 SCQF credit points, NQ Units at level 7 are worth 8 SCQF points.

**SCQF levels:** The SCQF covers 12 levels of learning. National Certificates are available at SCQF levels 2-6 and will normally be made up of National Units which are available from SCQF levels 2-7.

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

**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 National Certificate/National Progression Award 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 National Certificates/National Progression Awards** are those developments or revisions undertaken by a group of centres in partnership with SQA.