

# National 5 Laboratory Science Skills for Work Course Specification (C781 75)

**Valid from June 2017**

This edition, June 2017 version 1.0

This specification may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged. Additional copies of this course specification can be downloaded from SQA's website: [www.sqa.org.uk](http://www.sqa.org.uk).

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

# Course outline

**Course title:** National 5 Laboratory Science Skills for Work

**SCQF credit points:** (24 SCQF credit points)

**Course code:** C781 75

## Mandatory units

The course comprises the following mandatory units:

<b>HN9X 75</b>	<b>Laboratory Science: Careers Using Laboratory Science</b>	<b>6 SCQF credit points</b>
	OR	
<b>HT8X 75</b>	<b>Laboratory Science: Careers Using Laboratory Science - Scotland</b>	<b>6 SCQF credit points</b>
<b>HN9W 75</b>	<b>Laboratory Science: Working in a Laboratory</b>	<b>6 SCQF credit points</b>
<b>HN9Y 75</b>	<b>Laboratory Science: Practical Skills</b>	<b>6 SCQF credit points</b>
<b>HP00 75</b>	<b>Laboratory Science: Practical Investigation</b>	<b>6 SCQF credit points</b>

## Recommended entry

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

- ◆ National 4 Science
- ◆ National 4 or 5 in Biology, Chemistry or Physics
- ◆ SCQF level 4 units in Biology, Chemistry or Physics
- ◆ SCQF level 5 units in Biology, Chemistry or Physics

### together with

- ◆ National 4 or 5, or SCQF level 4 or SCQF level 5 units in Mathematics

## Progression

This course or its components may provide progression to

- ◆ National Certificate group awards in Applied Science
- ◆ Suitable training/employment in science laboratories
- ◆ Further/Higher Education

## Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this course specification.

There are no automatic certification of Core Skills or Core Skill components in this Course.

## Links to national occupational standards

National occupational standards (NOS) are developed by the key employment sectors of the United Kingdom. These standards set the competences required for job roles within a particular employment sector.

The sector skills council for Science, Engineering and Manufacturing Technology is SEMTA however laboratory science is also linked to other sectors such as LANTRA (environmental and land-based industries) COGENT (chemical, nuclear, oil, petroleum, polymer and pharmaceutical industries), Energy and Utility Skills (electricity, gas, waste management and water industries), Skills for Health (healthcare sector including pharmacy services) and Improve (food and drinks industries).

The course has been designed to provide a broad introduction to some of the underpinning knowledge and skills required for the occupational standards at level 2. Aspects of the national occupational standards for level 2 Laboratory Science: Compound Analysis pathway (CA) and Clinical Laboratory Support (CLS) are broadly reflected through some of the activities within the units in the National 5 Laboratory Science Course. Certain competences in the Skills for Health Sector — Bioscience occupational standards are also introduced by the course.

In this course, *Laboratory Science: Working in a Laboratory* (National 5) broadly reflects the following aspects:

- ◆ maintaining health and safety in a laboratory environment (CA)
- ◆ measuring, weighing and preparing solutions for laboratory use (CA)
- ◆ communicating laboratory information to authorised personnel under supervision (CA)
- ◆ assisting with the preparation of solutions for laboratory use (CA)
- ◆ maintaining health and safety in a chemical laboratory environment (CLS)
- ◆ preparation of solutions for use in the laboratory (CLS)

*Laboratory Science: Practical Skills* (National 5) broadly reflects the following aspects:

- ◆ maintaining health and safety in a laboratory environment (CA)
- ◆ assisting with the preparation of microbiological specimens and samples for laboratory investigations (CA)
- ◆ assisting with the processing of liquid compounds and samples using manual laboratory techniques (CA)
- ◆ following aseptic procedures in the laboratory environment (CA)
- ◆ communicating laboratory information to authorised personnel under supervision (CA)
- ◆ perform manual laboratory techniques (CLS)
- ◆ work in aseptic and clean room conditions (Bioscience)
- ◆ preparing culture media and solutions for laboratory use (CA)

*Laboratory Science: Practical Investigation* (National 5) broadly reflects the following aspects:

- ◆ maintaining health and safety in a laboratory environment (CA)
- ◆ maintaining effective and efficient working relationships in the laboratory (CLS)
- ◆ working effectively in a team (Bioscience)

Further details are provided in the rationale section.

## **Equality and inclusion**

This course specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## **Common rationale for Skills for Work courses**

Skills for Work courses are designed to help learners to develop:

- ◆ skills and knowledge in a broad vocational area
- ◆ Skills for Learning, Skills for Life and Skills for Work
- ◆ Core Skills
- ◆ an understanding of the workplace
- ◆ positive attitudes to learning
- ◆ skills and attitudes for employability

A key feature of these courses is the emphasis on *experiential learning*. This means learning through practical experience and learning by reflecting on experience.

### **Learning through practical experience**

Teaching/learning programmes should include some or all of the following:

- ◆ learning in real or simulated workplace settings
- ◆ learning through role play activities in vocational contexts
- ◆ carrying out case study work
- ◆ planning and carrying out practical tasks and assignments

### **Learning through reflecting at all stages of the experience**

Teaching/learning programmes should include some or all of the following:

- ◆ preparing and planning for the experience
- ◆ taking stock throughout the experience, reviewing and adapting as necessary
- ◆ reflecting after the activity has been completed, evaluating and identifying learning points

## **Core Skills**

### **The five Core Skills are:**

- ◆ Communication
- ◆ Numeracy
- ◆ Information and Communication Technology
- ◆ Problem Solving
- ◆ Working with Others

## Employability

The skills and attitudes for employability, including self-employment, are outlined below:

- ◆ generic skills/attitudes valued by employers
- ◆ understanding of the workplace and the employee's responsibilities, for example: time-keeping; appearance; customer care etc
- ◆ self-evaluation skills
- ◆ positive attitude to learning
- ◆ flexible approaches to solving problems
- ◆ adaptability and positive attitude to change
- ◆ confidence to set goals, reflect and learn from experience
- ◆ specific vocational skills/knowledge
- ◆ course specifications highlight the links to national occupational standards in the vocational area and identify progression opportunities

Opportunities for developing these skills and attitudes are highlighted in each of the course and unit specifications. These opportunities include giving young people direct access to workplace experiences or, through partnership arrangements, providing different learning environments and experiences which simulate aspects of the workplace. These experiences might include visits, visiting speakers, role-play and other practical activities.

*A Curriculum for Excellence* (Scottish Executive 2004) identifies aspirations for every young person. These are that they should become:

- ◆ successful learners
- ◆ confident individuals
- ◆ responsible citizens
- ◆ effective contributors

The learning environments, the focus on experiential learning and the opportunities to develop employability, Skills for Learning, Skills for Life, Skills for Work and Core Skills in these courses contribute to meeting these aspirations.

# Course Rationale for National 5 Laboratory Science Skills for Work

All new and revised National courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this course, and its component units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Skills for Work course is also designed to provide learners with opportunities for developing Core Skills and Skills for Learning, Skills for Life and Skills for Work, with a strong focus on enhancing skills and attitudes for employability.

Science is an important discipline that has been identified by the Scottish Government and Scottish Enterprise as vital to the prosperity of the Scottish Economy. The sector skills councils related to the science disciplines have identified a future need for recruitment due to retirement and expansion of the industries using scientific skills both at technician and graduate level. Research has informed the content of this course, thus providing a course that is relevant to the sector.

The National 5 Laboratory Science Skills for Work Course is designed to introduce learners to the knowledge and skills which are required for employment/further study in the wide range of industries and services using laboratory science, and to develop an awareness of the opportunities and range of employment within the sector.

It is anticipated that the course will build on existing partnerships between schools, colleges, employers and other training providers. This will enable the course to be delivered in a range of appropriate learning environments while having access to relevant teaching expertise and laboratories.

Opportunities for learners to improve their skills in the areas of communication, numeracy, working with others, planning and organising, problem solving, self review and evaluation are to be developed within the four units of the course.

## Purposes and aims of the course

The general aims of the course are to:

- ◆ widen participation in vocationally-related learning for school learners
- ◆ allow learners to experience vocationally-related learning
- ◆ provide learners with an introduction to working in a laboratory
- ◆ encourage learners to foster a good work ethic, including time management, a positive attitude and other relevant employability skills and attitudes
- ◆ provide opportunities to develop a range of Core Skills through practical experience in a vocational environment
- ◆ encourage learners to take charge of their own learning and development
- ◆ provide a range of teaching, learning and assessment styles to motivate learners to achieve their full potential
- ◆ facilitate progression to further/higher education and training
- ◆ help build learners' confidence.

The specific aims of the course are to:

- ◆ encourage learners to consider a career in industries and services using laboratory science
- ◆ develop an awareness of the opportunities there may be within sectors in terms of the types and range of career options
- ◆ develop the basic skills of measuring, weighing and preparing compounds and solutions for laboratory use
- ◆ develop the skills of communicating laboratory information
- ◆ develop learners understanding and use of the requirements of maintaining health and safety in a laboratory environment
- ◆ develop problem solving and numeracy skills in the context of a laboratory
- ◆ provide opportunities for the personal development of skills and attitudes which will improve the learners' employment potential within a sector
- ◆ develop the learners' awareness of their individual strengths and weaknesses in relation to the requirements of a sector, and to reflect on how this affects their employability potential.

## Information about typical learners who might do the course

The primary target group for this course is school learners from third year in secondary education and above. However, the course is also suitable for adult learners who are seeking to enhance their employability and vocational skills in laboratory science. It would be helpful if learners have attained or are studying one of the following, or equivalent: National 4 Science, National 4 or 5 in Biology, Chemistry or Physics, SCQF level 4 units in Biology, Chemistry or Physics, SCQF level 5 units in Biology, Chemistry or Physics **together with** National 4 or 5, or SCQF level 4 or SCQF level 5 units in Mathematics. However, if learners have no prior knowledge and understanding of practical science, it is suggested that appropriate support is provided.

# Course structure and conditions of award

## Summary of course content

The course provides a broad experiential introduction to laboratory science.

Learners will explore a variety and range of industries and services and the career opportunities, in science laboratories, in a local, national and global setting. Learners will have the opportunity to develop the basic practical skills for working in a laboratory: measuring, weighing and preparing compounds and solutions, and to understand and implement the health and safety requirements for a safe working environment. The specific practical skills related to microbiology, radioactivity, chemical handling and laboratory instrumentation are developed. Learners will work with others to produce a plan to undertake a practical investigation to test scientific hypotheses related to a scientific topic. This will also involve reporting of the results, conclusions and evaluations of the investigation.

The course places emphasis throughout all units on the employability skills and attitudes valued by employers which will help to prepare learners for the workplace. The learners review employability skills and they will seek feedback from their peers and teaching staff as appropriate. Learners will evaluate their own strengths and weaknesses thus enabling a review of personal skills, qualifications and experience against career options to be carried out.

The employability skills assessed in this course are:

- ◆ ability to follow instructions
- ◆ awareness of health and safety in a laboratory
- ◆ appropriate use of resources
- ◆ positive attitude to learning
- ◆ flexible approach to problem solving
- ◆ confidence to set goals, reflect and learn from experience
- ◆ time management skills
- ◆ communication skills
- ◆ presentation skills
- ◆ numeracy skills
- ◆ practical skills of weighing, measuring, preparing solutions
- ◆ working co-operatively with others
- ◆ confidence to seek feedback
- ◆ review and self-evaluation skills
- ◆ working independently

## Summary of unit content

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a variety of ways; however, Skills for Work units are designed to provide an experiential learning process.

### **Laboratory Science: Careers using Laboratory Science/Laboratory Science: Careers using Laboratory Science — Scotland (National 5)**

This unit introduces learners to the wide range of industries and services, which use scientific knowledge and laboratory skills. Learners will learn about the variety of ways in which science and laboratory skills are used in different industries and services and about the job roles, which use these skills. Learners will investigate a range of career opportunities within industries and services, which use laboratory science and investigate the skills, qualifications and experience required for a job role of personal interest within the field of laboratory science. Learners will prepare for employment, further education or training through producing their own Curriculum Vitae for a specific job role in a laboratory science setting.

Learners will have the opportunity to reflect on and evaluate their own employability skills and attributes.

### **Laboratory Science: Working in a Laboratory (National 5)**

This unit provides learners with the opportunity to gain practical experience in measuring and weighing quantities, basic laboratory skills such as handling chemicals, preparing solutions, and in calculating and presenting results of practical work. Safety and security procedures are addressed to enable learners to maintain health and safety while working in a laboratory environment and a risk assessment is carried out. Opportunities arise for the development of numeracy and communication skills when recording and reporting practical work.

### **Laboratory Science: Practical Skills (National 5)**

This unit provides learners with the opportunity to learn and develop the skills most commonly used in laboratories. The health and safety issues of working in a laboratory are integral to the unit. Learners will learn how to work safely with potentially hazardous materials such as microorganisms and will measure radioactivity, as well as developing competence in the use of various types of instrumentation found in laboratories. Skills in performing a titration are also developed.

### **Laboratory Science: Practical Investigation (National 5)**

In this unit, learners will work with others to produce a plan to investigate a scientific topic using practical procedures. Learners, working as part of a group, will identify a hypothesis to investigate. Methods for testing the hypothesis using practical procedures are devised and tasks are allocated to each member of the group. Learners will be assessed on their ability to carry out an allocated task competently and in a safe manner. Learners will present their findings to members of the group and will produce a scientific report with their individual analysis and evaluation of the information gathered. Learners will then review and evaluate their own and group contribution to the investigation.

## Conditions of award

To achieve the award of National 5 Laboratory Science Skills for Work Course learners must achieve all the required units as outlined in the course outline. They will be assessed pass/fail within centres. Skills for Work courses are not graded.

## Assessment

### Assessment objectives

Assessment across the units of this course will allow learners to demonstrate:

- ◆ laboratory practical skills: measurement, preparation of solutions, instrumentation
- ◆ scientific data collection and reporting skills
- ◆ health and safety procedures
- ◆ knowledge and understanding in relation to working in a laboratory
- ◆ generic and specific employability skills and attitudes valued by employers
- ◆ skills associated with planning and investigating
- ◆ review and evaluation skills
- ◆ working with others in teams
- ◆ self-evaluation skills

Assessment of the course is through a range of methods including learner folio of written and/or oral evidence, practical activities supported by assessor observation checklists as well as self- evaluation.

### Unit assessment

The assessment of the units in this course will be as follows:

#### **Laboratory Science: Careers using Laboratory Science/Laboratory Science: Careers using Laboratory Science — Scotland (National 5)**

Written and/or oral evidence is required to evidence learners' knowledge of different industries and services, job roles, career options and the skills, qualifications and experience needed for a job role of personal interest within the field of laboratory science. This will take the form of a folio that the learner will gather in open-book conditions at appropriate points throughout the unit and submit as evidence.

Learners will produce a Curriculum Vitae (CV) for a job role with a laboratory science setting. Learners will be provided with an appropriate CV template to help them produce their CV.

Evidence of self-review and evaluation will be gathered in a folio that will hold three reviews of their employability skills. These reviews will be completed at appropriate times throughout the entire course. Learners will gather feedback from the teacher/lecturer on two occasions and another person on one occasion. The other person can be, for example, another learner or placement supervisor who has observed the learner.

### **Laboratory Science: Working in a Laboratory (National 5)**

Evidence for the three outcomes will be gathered in a folio in open-book conditions throughout the unit with the final selection of items for inclusion taking place towards the end of the unit.

Performance evidence must be gathered to show that learners are able to work safely handling chemicals in a laboratory setting on a minimum of two occasions when preparing a chemical solution and dealing with a simulated chemical spill. Learners will also undertake practical activities to take measurements of mass and volume. Assessor observation checklists must be used to provide evidence of performance.

Written and/or oral evidence is required which demonstrates that learners can carry out a risk assessment in a scientific laboratory, record measurements taken and perform a range of calculations on these measurements.

### **Laboratory Science: Practical Skills (National 5)**

Performance evidence obtained during a range of practical activities is required. Working safely with microorganisms in a laboratory setting requires learners to pour agar plates using aseptic techniques, subculture micro-organisms, and prepare wet and dry mounts. Radioactivity is to be measured and detected using the appropriate instrumentation. Two types of instrumentation each covering a different scientific application are to be used appropriately in two separate practical activities. A titration is to be performed safely using appropriate equipment. Assessor observation checklists must be used to provide evidence of performance.

Written and/or oral evidence is also required which demonstrates that learners can describe the safety requirements when working with radioactive materials and can accurately record measurements.

### **Laboratory Science: Practical Investigation (National 5)**

Written and/or oral evidence is required, to demonstrate that learners can plan a practical investigation while working with others. The assessor must use a checklist to confirm that each learner has contributed constructively to the group planning discussions throughout and that all performance criteria have been achieved. Evidence is also required to demonstrate that learners can record results and observations in an appropriate format which will include the correct use of SI units. A written and/or oral report of the analysis, conclusion and evaluation of all results and observations from the investigation is required. Learners should be given suitable templates for the plan and the report to help them produce their evidence in supervised conditions.

Performance evidence supported by an assessor observation checklist is required to demonstrate that the learner can carry out the allocated practical task in accordance with the investigation plan safely. This evidence will be produced under controlled supervised conditions. Performance evidence supported by an assessor observation checklist is required to demonstrate that learners can organise and present findings to others in relation to their allocated practical task.

Learners will be required to identify strengths and areas for improvement in terms of their own contribution to the planning and implementation of the investigation, take account of feedback from others as part of this review, and identify action points using a learner review sheet.

Exemplification of possible assessment approaches for these units will be provided in the Assessment Support Pack (ASP).

### **Quality Assurance**

All instruments of assessment used within this course 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* ([www.sqa.org.uk/GuideToAssessment](http://www.sqa.org.uk/GuideToAssessment)).

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

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

## **1 Literacy**

- 1.1 Reading
- 1.2 Writing
- 1.3 Listening and talking

## **2 Numeracy**

- 2.1 Number processes
- 2.2 Money, time and measurement

## **3 Health and wellbeing**

- 3.1 Personal learning
- 3.2 Emotional wellbeing
- 3.4 Planning for, and making, choices and changes
- 3.5 Relationships

## **4 Employability, enterprise & citizenship**

- 4.1 Employability
- 4.3 Working with others

## **5 Thinking skills**

- 5.1 Remembering
- 5.2 Understanding
- 5.3 Applying
- 5.4 Analysing and evaluating

Amplification of these skills is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the course.

## Employability skills profile

Employability skills covered in this course are detailed in the table below. For the purposes of the table, the units are referred to as A, B, C and D as indicated.

<i>Laboratory Science: Careers using Laboratory Science/</i>	
<i>Laboratory Science: Careers using Laboratory Science — Scotland</i>	= A
<i>Laboratory Science: Working in a Laboratory</i>	= B
<i>Laboratory Science: Practical Skills</i>	= C
<i>Laboratory Science: Practical Investigation</i>	= D

Employability skill/attitude	Evidence
◆ Ability to follow instructions	A, C, D
◆ Awareness of health and safety in a laboratory	A, B, C, D
◆ Appropriate use of resources	A, C, D
◆ Positive attitude to learning	A, C, D
◆ Flexible approach to problem solving	A, D
◆ Confidence to set goals, reflect and learn from experience	A, D
◆ Time management skills	A, D
◆ Communication skills	A, B, C, D
◆ Presentation skills	A, D
◆ Numeracy skills	A, B, C
◆ Practical skills of weighing, measuring, preparing solutions	A, B, C
◆ Working co-operatively with others	A, D
◆ Confidence to seek feedback	A, D
◆ Review and self-evaluation skills	A, D
◆ Working independently	A, D

### Assessment evidence in all units:

- A = Learner folio, completed CV, learner review sheet
- B = Learner folio, assessor observation checklist, written and/or oral evidence
- C = Assessor observation checklists, written/oral evidence
- D = Learner folio of written and/or oral assessment, assessor observation checklists, learner review sheet

## Course support notes

Course support notes are not mandatory; they provide advice and guidance on approaches to delivering and assessing the Skills for Work course. They are intended for teachers and lecturers who are delivering the course and its units.

### Guidance on approaches to delivery and assessment for this course

The main approaches to learning in this course should be experiential and learner centred. Learners should have the opportunity to learn and develop practical skills in a laboratory and if possible in a realistic work environment. Given the practical nature of teaching/learning and assessment, centres should ensure that teaching blocks are of sufficient time to allow a meaningful experience for learners.

### Sequencing/integration of units

Centres should ensure that an induction to the course is given, which will enable learners to understand fully what is required and the approaches to be adopted. It is important that employability skills, both generic and specific to the industries and services using laboratory science are emphasised at this time.

While individual centres should decide the sequence of delivery which is most appropriate to them it is suggested that the unit *Laboratory Science: Careers using Laboratory Science/Laboratory Science: Careers using Laboratory Science — Scotland* (National 5) is introduced early in the course to enable learners to be aware of the broad range of industries and services using laboratory science and hence the variety of career opportunities that can arise when working in a laboratory. Outcome 3 of this unit requires learners to review their own employability skills and assessment of this should take place throughout the course. This unit can be linked to the other units and it is anticipated that some evidence for this outcome will be gathered throughout the course.

It would also be appropriate that the unit *Laboratory Science: Working in a Laboratory* (National 5) is offered early in the course in order to help learners understand the requirements of health and safety to enable a safe environment to be maintained in the units *Laboratory Science: Practical Skills* (National 5) and *Laboratory Science: Practical Investigation* (National 5). Also, the skills developed in this unit can be reinforced in these two practical units. It would be beneficial for learners if the unit *Laboratory Science: Practical Investigation* (National 5) is delivered towards the end of the course as learners will be required to build on skills covered in *Laboratory Science: Working in a Laboratory* (National 5) and *Laboratory Science: Practical Skills* (National 5).

## **Guidance on approaches to delivery**

Learners will achieve maximum benefit from this course if schools can work in partnership with colleges and employers. By allowing learners to access a real working environment, they will gain a much broader understanding of what working in a laboratory entails whilst helping to develop positive attitudes towards the workplace.

Centres should provide an induction to each unit as well as the induction to the course as a whole. This will help learners to understand what is required of them for each unit and the approaches to be taken.

Teaching and learning should encourage learners to take responsibility for their own learning and development. In the practical units of the course, learners need to carry out checks on their own work. This provides a good opportunity to motivate learners to take pride in their own work. The integration of employability skills, in particular self-evaluation skills, will allow learners to take responsibility for seeking feedback and identifying action points for improvement in their own performance. This should help to develop confidence in taking advice and in asking for direction and assistance, where necessary.

As the course is designed to be practical, each part of the learning and teaching should incorporate both theory and practice, to facilitate learning. This will assist learners in understanding the relevance of knowledge and understanding to practical tasks. Health and safety is integral to all practical tasks and should be emphasised at the start of, and throughout, each session.

Learners should be encouraged throughout the course to use as many methods as possible to gain the information required. They should make full use of the internet, journals (on-line and printed), books, national and local newspapers, friends and family who have knowledge or experience of industries and services using science and site visits. Learners should be encouraged to play an active part in their own learning by discussing their own views and thoughts on science, industries and services using laboratory science, careers and personal preferences with peers and teaching staff.

### **Practical work**

Within the skills-specific practical units, learners will produce evidence as a natural part of the teaching and learning process. Learners will first learn and practise the correct techniques and methods for each of the skills they undertake. Assessment of the various practical skills will take place at appropriate points throughout the course.

Each unit will be supported by an ASP which will provide exemplar assessment instruments with the assessor observational checklists that exemplify national standards.

### **Visiting speakers/visits to laboratories**

Centres are encouraged to develop links with employers and industry representatives who may be able to offer support in terms of visiting speakers and arranging a visit to a laboratory. This is particularly relevant to the unit *Laboratory Science: Careers using Laboratory Science/Laboratory Science: Careers using Laboratory Science — Scotland* (National 5). Such visits will be helpful when investigating the different job roles within industries and services and will provide learners with a realistic view of jobs, roles and responsibilities, and conditions within laboratory science.

### **Health and Safety**

Compliance with current, relevant health and safety regulation is of paramount importance in this course. Owing to the health and safety implications involved in working in laboratories, the practical units have been designed so they can be taught and assessed in a laboratory environment.

It is a centre's responsibility to produce risk assessments which set out the safe working/teaching and learning arrangements for teachers, support staff and learners. Centres will be familiar with the requirements of the Health and Safety at Work Act (HASWA), the Management of Health and Safety at Work Regulations (MHSWR), Control of Substances Hazardous to Health (COSHH), Provision and Use of Work Equipment Regulations (PUWER) and other legislative requirements where risk assessments are necessary. This list of statutes is not intended to be exhaustive, and centres must comply with all current relevant legislation whether listed or otherwise.

### **Guidance on approaches to assessment**

Further details about unit assessment for this course can be found in the unit specifications and the assessment support packs.

### **Opportunities for e-assessment**

E-assessment may be appropriate for some assessments in this course. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

### **Opportunities for developing Core Skills**

Opportunities to develop aspects of additional components of Core Skills, where they arise naturally, should be taken. For example, in order to carry out the activities in the practical units, aspects of numeracy will be developed when making calculations and in the analysis of results. Communication skills will be developed in a written and/or oral format when recording results, conclusions and evaluations of the investigations, as well as in written and/or oral format when working in a group and communicating with others.

# General information for learners

## Course overview

The National 5 Laboratory Science Skills for Work Course is made up of four units with an emphasis on development of scientific skills that are used in a wide range of industries and services using laboratory science.

The Scottish Government and Scottish Enterprise have highlighted Science as an important subject for the prosperity of the Scottish Economy. This course has been developed to allow learners to develop scientific skills required for employment or future study in a wide range of industries and services using laboratory science. You will also become more aware of the opportunities and range of employment available in the laboratory science sector.

## To achieve the course

Learners must pass all four units to achieve this qualification. There is a mixture of practical and open book written assessments. The course is not graded.

The four units that you will study are:

- ◆ Laboratory Science: Careers Using Laboratory Science **or** Careers Using Laboratory Science – Scotland (National 5)
- ◆ Laboratory Science: Working in a Laboratory (National 5)
- ◆ Laboratory Science: Practical Skills (National 5)
- ◆ Laboratory Science: Practical Investigation (National 5)

## Subject Specific Knowledge and Skills

In the *Laboratory Science: Careers Using Laboratory Science* (National 5) or *Careers Using Laboratory Science – Scotland* (National 5) you will research a variety and range of industries and services that use laboratory science. You will research career opportunities in science laboratories at a local, national and global setting and present your findings. You will have the chance to investigate the skills, qualifications and experience required for a job role in laboratory science of personal interest to you. You will also produce a CV for a job role within a laboratory science setting. At three different points through this unit you will review your own skills and set personal targets for improvement.

In the *Laboratory Science: Working in a Laboratory* (National 5) you will learn about health and safety and how to handle and store chemicals safely. You will gain expertise in measuring liquids and weighing solids to prepare various solutions safely. You will learn how to write risk assessments and will be required to write these for the procedures you carry out.

In the *Laboratory Science: Practical Skills* (National 5) unit you will learn how to safely work with microorganisms including how to prepare agar plates, sub-culture microorganisms and prepare microscope slides. You will learn how to safely measure radioactivity and record your results. You will get the chance to gain competence in carrying out measurements using two different types of instruments found in laboratories. Scientific and numeracy skills will also be developed when you carry out titrations.

In the *Laboratory Science: Practical Investigation* (National 5) unit you will work as part of a team to identify a hypothesis to investigate. Each person in the team will be responsible for planning a method and carrying out a task to test a different aspect of the hypothesis. You will present your findings to your team and then write up a scientific report based on the information gathered by the whole team. You will review and evaluate your contribution to the investigation.

### **Assessment methods**

Your assessments will be either written, oral or of a practical nature. You will gather evidence of your skills in a folio as you work through the four units. You will have the opportunity to become proficient in the practical skills before you are formally assessed on these.

### **Skills Development**

The main skills you will be developing as you work through this qualification are:

- ◆ safely carrying out practical skills eg measurement, preparing solutions, microbiological techniques, carrying out titrations
- ◆ collecting scientific data
- ◆ recording scientific data
- ◆ knowledge of health and safety procedures
- ◆ generic and specific employability skills and attitudes valued by employers
- ◆ skills associated with planning and investigating
- ◆ review and evaluation skills
- ◆ working with others in teams
- ◆ self-evaluation skills

### **Progression Routes**

This course may provide progression to:

- ◆ National Certificate group awards in Applied Science
- ◆ Suitable training/employment in science laboratories
- ◆ Further/Higher Education

# Administrative information

---

Published: June 2017

---

## History of changes to National Course Specification

Version	Description of change	Date

This specification may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged. Additional copies of this course Specification can be downloaded from SQA's website at [www.sqa.org.uk](http://www.sqa.org.uk).

Note: You are advised to check SQA's website ([www.sqa.org.uk](http://www.sqa.org.uk)) to ensure you are using the most up-to-date version of the course Specification.

© Scottish Qualifications Authority 2017