



National Unit Specification: general information

UNIT Life Science Industries: An Introduction to Laboratory Work
(SCQF level 5)

CODE F846 11

SUMMARY

This Unit is designed for candidates interested in working in the life sciences sector. Knowledge and understanding of issues and processes relevant to this sector will be developed and assessed, along with important practical techniques.

OUTCOMES

- 1 Understand laboratory safety.
- 2 Perform practical lab skills.
- 3 Understand the role of scientific instruments in the life science industry.
- 4 Describe and perform safe manual handling techniques.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- ◆ Numeracy, Communications, Chemistry, Biology and IT at SCQF level 4, or equivalent

CREDIT VALUE

1 credit at SCQF level 5 (6 SCQF credit points at SCQF level 5*).

**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.*

Administrative Information

Superclass: RH

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CORE SKILLS

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit Specification.

There is no automatic certification of Core Skills or Core Skill component in this Unit.

National Unit Specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Understand laboratory safety

Performance Criteria

- (a) Demonstrate knowledge and understanding of common laboratory hazards
- (b) Complete relevant risk assessment and COSHH forms for an experiment in the laboratory

OUTCOME 2

Perform basic practical lab skills

Performance Criteria

- (a) Prepare a standard solution.
- (b) Perform pipetting procedures.
- (c) Carry out the titration of a solution of unknown concentration.
- (d) Use a spectrophotometer to determine concentration .
- (e) Calibrate and use a pH meter.
- (f) Present results of an experiment in an appropriate format and to a specified level of accuracy.

OUTCOME 3

Understand the role of scientific instruments in the life science industry.

Performance Criteria

- (a) Identify the appropriate instrument and method for a particular analysis.
- (b) Describe the use of a range of analytical instruments.
- (c) Describe the purpose of maintenance, calibration and record keeping of scientific instrumentation.

OUTCOME 4

Describe and perform safe manual handling techniques.

Performance Criteria

- (a) Define manual handling.
- (b) Demonstrate safe manual handling techniques used in the workplace.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Outcome 1 PC (a) should be assessed in the form of a short closed-book assessment.

Evidence for outcome 1 PC (b) should be generated by the completion of a relevant Risk Assessment and COSHH forms, ideally for the a procedure to be carried out for outcome 2. The evidence should be generated at an appropriate point once candidates have developed the necessary knowledge and skills. Electronic sources of Material Safety Data Sheets (MSDS) should be investigated.

Performance evidence is required to demonstrate that candidates have achieved Outcome 2. Candidates should carry out examples of the specified practical experiments, which should be in the laboratory, under supervised conditions. Evidence for PCs (a), (b), (c), (d) and (e) can take the form of assessor observation checklists and for PC(f) the completion of a laboratory report on either the titration of a solution of unknown concentration or the use of a spectrophotometer to determine concentration which should be completed in an electronic format.

Evidence for Outcome 3 should be in the form of an investigative report which should describe at least 4 analytical instruments and correctly selects the appropriate instruments for the method in question.

Evidence for outcome 4 PC (a) should be generated by a short answer assessment produced under closed-book, supervised conditions with a time limit of 30 minutes. Performance evidence for PC (b) should take the form of assessor observation checklists.

National Unit Specification: support notes

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This part of the Unit Specification is offered as guidance. The support notes are not mandatory. While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This Unit is intended for candidates starting work in the life science industry who wish to develop their basic knowledge and understanding of this sector and to develop the corresponding key skills. While the Unit is expressed in generic terms, it should be related to a context in which the candidates are familiar.

Outcome 1

Precautions to reduce the risk posed by the following hazards should be identified:

- ◆ Common laboratory chemicals (eg toxic, corrosive, flammable, carcinogenic, oxidising and harmful substances)
- ◆ Handling, transport and storage of chemicals
- ◆ Poorly labelled containers
- ◆ Glassware
- ◆ Electrical hazards (eg consequences of passage of current through the human body; unearthed appliances; careless routing of flex; damaged sockets, plug tops, leads; effect of current in excess of its rated value passing through a flex; use of multiple adaptors)
- ◆ Fire
- ◆ Other laboratory hazards that can be considered are: radioactive sources; ultraviolet sources; lasers; microbiological hazards; common fire hazards

Candidates should demonstrate knowledge on the safe disposal of hazardous materials and how to deal with hazardous spillages.

The candidate should be able to complete risk assessment and COSHH forms, describe basic precautions and be able to identify safety doors, escape routes and fire alarms. They should also be able to locate MSDS sheets and other safety information online or within the company or college's intranet system.

Outcome 2

Students should be introduced to the following range of measuring instruments: burette, pipette, measuring cylinder, thermometer, syringe, balance, pH meter and spectrophotometer.

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The candidates should be familiar with the concepts of molar mass, concentration, dilutions, accuracy and precision titrations, A and B glassware, using spectrophotometers to determine concentration and the use of pH meters. The candidates should be able to perform the following tasks:

- ◆ Preparation and use of a standard solution including the selection of clean glassware, calculations of number of moles required, weighing of correct amount of solute, dissolving solute in correct amount of liquid
- ◆ Pipetting procedures including the use of 50 and 25 cm³ bulb pipettes, 10cm³ graduated pipettes and 1cm³ and 10µl micropipettes
- ◆ Carry out the titration of a solution of unknown concentration
- ◆ Use a spectrophotometer to determine concentration, including the use of an absorbance calibration graph
- ◆ Calibrate and use a pH meter

National Unit Specification: support notes (cont)

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Outcome 3

Candidates should be introduced to a range of instrumental techniques. It is expected that the design of spectrometers and chromatography instruments form the main part of this outcome. The actual instruments discussed should be appropriate to the life sciences company. Typical instruments that could be discussed are Atomic Absorption, Atomic emission, UV/Vis, Infra-Red, NMR, GLC, HPLC, Electrophoresis and PCR. Students should become familiar with the types of analyses performed on the various instruments, the overall design and the mode of operation of the main components.

Outcome 4

Candidates are required to define manual handling in terms of the appropriate regulations. They should be able to give practical examples of workplace manual handling applications and identify a range of tasks requiring manual handling. Manual handling techniques complying with safe work practices should be demonstrated.

National Unit Specification: support notes (cont)

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GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

An investigative approach should be taken to the learning and teaching of this Unit. Such an approach should provide opportunities to develop individual and group research using a variety of resources alongside the more traditional approaches of whole class teaching.

Practical work should contain a balance of illustrative experimental work and investigative practical work. Practical work can provide one way of delivering theoretical knowledge related to knowledge and understanding performance criteria. Practical investigations should be used to develop both problem solving and practical skills and not just to provide reports for the purposes of internal assessment. Investigative work provides opportunities to develop the candidate's problem solving skills as the design of an investigation presents the opportunity for the generation of predictions and generalisations, which can then be tested in a practical context.

Laboratory work should include instrumentation and equipment that reflects current scientific use.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

There are opportunities for candidates to develop Core Skills in this Unit however there is no automatic certification of Core Skills.

The following Core Skills or Core Skills components are signposted in this Unit: *Information and Communication Technology* and *Written Communication*. Candidates may develop their. Candidates may develop their ICT skills when carrying out their investigative research and in their use of ICT to produce their report. Written communication skills may be developed in the production of a structured report.

National Unit Specification: support notes (cont)

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GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

For Outcome 1 PC (a) an appropriate Instrument of Assessment should be a series of restricted response questions. The assessment should take place in closed-book controlled conditions on a single occasion.

For Outcome 1 PC (b) an appropriate Instrument of Assessment would be the completion of a Risk Assessment and COSHH form. The forms should allow candidates to achieve all Performance Criteria related to Outcome 1 and it is recommended the procedure is relevant to Outcome 2.

For Outcome 2 checklists and a lab report should be used to record the achievement.

For Outcome 3 for this Unit the candidate will be expected to write a report where they describe the use of a range of analytical instruments.

Outcome 4a for this Unit should be assessed by a closed-book test that will provide evidence that the performance criteria have been achieved. For Outcome 4b candidates are required to demonstrate competence in manual handling

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

DISABLED CANDIDATES AND/OR THOSE WITH ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements