National Unit Specification: general information

UNIT Laboratory Safety (SCQF level 5)

CODE F3TD 11

SUMMARY

This Unit will be suitable for candidates who wish to gain experience and practice in maintaining safety in a laboratory environment. It gives candidates knowledge of safety and security procedures and how these are applied to a specific laboratory. Common laboratory hazards are also categorised.

OUTCOMES

1 Demonstrate knowledge and understanding of common laboratory hazards.
2 Describe safety and security procedures in a specific laboratory.
3 Follow all safety procedures while carrying out an experiment in the laboratory.

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:

- Standard Grade in Biology, Chemistry, Physics or Science at General level
- Intermediate 1 Biology, Chemistry, Physics Units.

CREDIT VALUE

1 credit at Intermediate 2 (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: PL

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Version: 01

National Unit Specification: general information (cont)

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CORE SKILLS

This Unit contains signposting for the Core Skill *Problem Solving* at SCQF level 5.

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

Demonstrate knowledge and understanding of common laboratory hazards.

Performance Criteria

(a) Identify the types of hazards and precautions associated with a range of different chemicals correctly.
(b) Identify a range of non-chemical hazards in the laboratory correctly.
(c) Identify the hazard warning symbols for common laboratory hazards correctly.

OUTCOME 2

Describe safety and security procedures in a specific laboratory.

Performance Criteria

(a) Identify the location of emergency exits and equipment in the specific laboratory correctly.
(b) Describe the procedures for the use of emergency equipment for injuries, spillages and fire correctly.
(c) Describe the safety procedures for emergency alarms and the security procedures in the laboratory correctly.
(d) Describe the procedures to minimise the risk from electrical, chemical, radioactive and fire hazards correctly.
(e) Describe the procedures for reporting accidents and for obtaining medical assistance accurately.

OUTCOME 3

Follow all safety procedures while carrying out an experiment in the laboratory.

Performance Criteria

(a) Identify the hazards and risks for a given laboratory experiment correctly.
(b) Perform the experiment with respect to safety procedures.
(c) Dispose of waste products in accordance with the relevant safety procedures.

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.

Written and/or oral evidence is required to demonstrate that the candidate has achieved Outcomes 1 and 2. This evidence will be produced under closed-book supervised conditions with a time limit of 45 minutes. The evidence should be generated at an appropriate point once candidates have developed the necessary knowledge and skills.

Performance evidence is required to demonstrate that candidates have achieved Outcome 3. The candidate is required to follow all safety procedures while carrying out **one** practical experiment in the laboratory under supervised conditions. Candidates should not have access to notes of the safety procedures. Candidates should be given a suitable template to allow them to generate evidence for **PC (a)**. An assessor observation checklist should be used to support the performance evidence.

The Assessment Support Pack for this Unit provides sample assessment material. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard.

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 an optional Unit in the National Certificate in Applied Sciences at SCQF level 6 but it can also be taken as a free-standing Unit. This Unit could also be integrated with any science Unit that involves practical work in a laboratory.

The content will to a large extent depend on the type of laboratory in which the candidate is working.

It is intended that only a brief description of safety legislation is required. The use of emergency equipment for injuries, spillages and fire should be experienced by candidates.

For Outcome 1, the hazards and the precautions to counteract the hazards listed below should be considered:

Common chemical laboratory hazards — toxic, corrosive, flammable, carcinogenic, oxidising and harmful; hazards in handling, transport and storage of chemicals; poorly labelled containers; glassware; use of safety glasses and protective clothing; precautions for diluting acids.

Electrical hazards — 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 rate value passing through a flex; use of multiple adaptors. Precautions to review are: appropriate fuse sizes; appropriate flex ratings; earthing of equipment; correct wiring of plugs.

Other laboratory hazards that can be considered are: radioactive sources; ultraviolet sources; lasers; microbiological hazards; common fire hazards. Precautions to review are those that are taken in handling radioactive materials, ultraviolet sources; lasers; microbiological materials.

For Outcome 2, the candidate should be able to describe basic precautions necessary to prevent fire in relation to potential fuels, oxygen supply and sources of heat; safety doors; escape routes; fire drills.

The context for the Outcome 3 experiment could be within an Intermediate 2/Higher/Advanced Higher science Unit involving a scientific experiment that is being undertaken or within an experimental situation in a work-based laboratory which offers safety assessment opportunities, including a simple risk assessment.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

As this Unit focuses on safety in the laboratory it is recommended that the Unit is delivered at an early stage of a science programme to enable candidates to work safely in a laboratory when completing the other Units in the programme. It is recommended that the content covered in Outcome 2 — safety and security procedures — should be addressed at the start of a science programme involving practical work. The Unit should be set within the context of laboratory work undertaken by candidates and related to safety and security procedures that are in place. The content of the Unit may be integrated with the teaching and learning of Intermediate 2 or Higher Units in the science catalogue.

A range of teaching and learning strategies may be used such as class discussions, individual and group investigations of the hazards of various chemicals and other laboratory equipment using a variety of resources such as the Internet. Visits to a variety of laboratories to review the safety and security procedures are recommended. Practical experimental work may take place in groups or individually however the evidence for Outcome 3 should be obtained from an experiment carried out by the individual.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

This Unit provides the candidate with the opportunity to develop the Core Skill of *Problem Solving*. Candidates will be able to develop *Critical Thinking, Reviewing* and *Evaluating* while carrying out practical work.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

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).*

During the work of the Unit the candidate should have several opportunities to develop their knowledge, understanding and skills. It is recommended that the teacher/lecturer assesses the candidate at the stage when they are showing consistent competence.

An appropriate Instrument of Assessment would be a closed-book supervised test containing restricted response questions. Such questions should allow candidates to achieve all Performance Criteria related to Outcomes 1 and 2. An appropriate Instrument of Assessment for Outcome 3 would be a practical exercise in which candidates are required to carry out a simple risk assessment and perform a scientific experiment with due regard to safety.

The experiment used for assessment purposes could be an experiment that candidates are performing as part of another science Unit.

National Unit Specification: support notes (cont)

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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)**.