



TECHNICAL &
VOCATIONAL
EDUCATION &
TRAINING



**National Competency Standard for School Laboratory
Technician**
Standard Code: SOC27s18v1

[Endorsed by the MALDIVES QUALIFICATIONS AUTHORITY (MQA)]



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PREFACE

Technical and Vocational Education and Training (TVET) Authority was established with the vision to develop a TVET system in the Maldives that is demand driven, accessible, beneficiary financed and quality assured, to meet the needs of society for stability and economic growth, the needs of Enterprise for a skilled and reliable workforce, the need of young people for decent jobs and the needs of workers for continuous mastery of new technology.

TVET system in the Maldives flourished with the Employment Skills Training Project (ESTP) funded by ADB with the objective of increasing the number of Maldivians, actively participating in the labor force, employed and self-employed. The Project supported expansion of demand driven employment-oriented skills training in priority occupations and to improve the capacity to develop and deliver Competency Based Skill Training (CBST). The project supported delivery of CBST programs to satisfy employer demand-driven needs. The National Competency Standards (NCS) provide the base for this training. Currently CBST is offered for five key sectors in the Maldives: Tourism, Fisheries and Agriculture, Transport, Construction and the Social sectors. These sectors are included as priority sectors that play a vital role in the continued economic growth of the country.

The NCS are developed in consultation with Employment Sector Councils representing employers. They are designed using a consensus format endorsed by the Maldives Qualifications Authority (MQA) to maintain uniformity of approach and the consistency of content amongst occupations. This single format also simplifies benchmarking the NCS against relevant regional and international standards. NCS specify the standards of performance of a competent worker and the various contexts in which the work may take place. NCS also describes the knowledge, skills and attitudes required in a particular occupation. They provide explicit advice to assessors and employers regarding the knowledge, skills and attitudes to be demonstrated by the candidates seeking formal recognition for the competency acquired following training or through work experience. By sharing this information, all participants in the training process have the same understanding of the training required and the standard to be reached for certification. Certification also becomes portable and can be recognized by other employers and in other countries with similar standards. NCS are the foundation for the implementation of the TVET system in Maldives. They ensure that all skills, regardless of where or how they were developed can be assessed and recognized. They also form the foundation for certifying skills in the Maldives National Qualification Framework (MNQF).

KEY FOR CODING

Coding Competency Standards and Related Materials

DESCRIPTION	REPRESENTED BY
Industry Sector as per ESC (Three letters)	Construction Sector (CON) Fisheries and Agriculture Sector (FNA) Transport sector (TRN) Tourism Sector (TOU) Social Sector (SOC) Foundation (FOU)
Competency Standard	S
Occupation with in an industry Sector	Two digits 01-99
Unit	U
Common Competency	1
Core Competency	2
Optional/ Elective Competency	3
Assessment Resources Materials	A
Learning Resources Materials	L
Curricula	C
Qualification	Q1, Q2 etc
MNQF level of Qualification	L1, L2 etc
Version Number	V1, V2 etc
Year of endorsement of standard, qualification	By two digits Example- 07

1. Endorsement Application for Qualification 01		
2. NATIONAL CERTIFICATE III IN SCHOOL LABORATORY ASSISTANT		
3. Qualification code: SOC27Q1L318	Total Number of Credits: 40	
4. Purpose of the qualification		
The holders of this qualification are expected to work as a School Laboratory Assistant and will be working under the supervision of a School Laboratory Technician.		
5. Regulations for the qualification	National Certificate III in school Laboratory Assistant will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10	
6. Schedule of Units		
Unit Title	Unit Title	
	Code	
1.	Communication and Interpersonal Skills	SOC ₂₇ S ₁ U ₀₁ V ₁
2.	Relevant Scientific Concepts and Legislative Requirements	SOC ₂₇ S ₁ U ₀₂ V ₁
3.	Follow Established Work plan	SOC ₂₇ S ₁ U ₀₃ V ₁
4.	Maintain Laboratory Fit for Purpose	SOC ₂₇ S ₁ U ₀₄ V ₁
5.	Work Safely in Accordance with Defined Policies and Procedures	SOC ₂₇ S ₁ U ₀₅ V ₁
6.	Apply Quality Systems and Continuous Improvement Process	SOC ₂₇ S ₁ U ₀₆ V ₁
7.	Work Efficiently as Part of Team	SOC ₂₇ S ₁ U ₀₇ V ₁
8.	Perform Instrumental Test/Procedures	SOC ₂₇ S ₁ U ₀₈ V ₁
9.	Perform non-Instrumental Test/Procedures	SOC ₂₇ S ₁ U ₀₉ V ₁
10.	Perform Standardize and Use Solution	SOC ₂₇ S ₁ U ₁₀ V ₁
7. Accreditation requirements	The training provider should have a Laboratory area or similar training facility to provide the trainees the hands-on experience related to this qualification	
8. Recommended sequencing of units	As appearing under the section 06	

RECEIVED

1. Endorsement Application for Qualification 02		
2. NATIONAL CERTIFICATE IV IN SCHOOL LABORATORY TECHNICIAN		
3. Qualification code: SOC27SQ2L418	Total Number of Credits :160	
4. Purpose of the qualification The holders of the level four qualifications are expected to possess all the relevant knowledge and skills to work as a laboratory technician in school laboratories. Referred technician can assist the teachers in science experiments, maintain and keep regular inventory of science laboratory, prepare solution and assist students and teacher during science fairs and science related excursions.		
5. Regulations for the qualification	National Certificate IV in the School Laboratory Technician Qualification will be awarded to those who are competent in unit 1+2+3+4+5+6+7+8+9+10+11+12+15+17+18+19	
6. Schedule of Units		
Unit No	Unit Title	Code
1	Communication and Interpersonal Skills	SOC ₂₇ S ₁ U ₀₁ V ₁
2	Relevant Scientific Concepts and Legislative Requirements	SOC ₂₇ S ₁ U ₀₂ V ₁
3	Follow Established Work plan	SOC ₂₇ S ₁ U ₀₃ V ₁
4	Maintain Laboratory Fit for Purpose	SOC ₂₇ S ₁ U ₀₄ V ₁
5	Work Safely in Accordance with Defined Policies and Procedures	SOC ₂₇ S ₁ U ₀₅ V ₁
6	Apply Quality Systems and Continuous Improvement Process	SOC ₂₇ S ₁ U ₀₆ V ₁
7	Work Efficiently as Part of Team	SOC ₂₇ S ₁ U ₀₇ V ₁
8	Perform Instrumental Test/Procedures	SOC ₂₇ S ₁ U ₀₈ V ₁
9	Perform non-Instrumental Test/Procedures	SOC ₂₇ S ₁ U ₀₉ V ₁
10	Perform Standardize and Use Solution	SOC ₂₇ S ₁ U ₁₀ V ₁
11	Biological Experiment	SOC ₂₇ S ₁ U ₁₁ V ₁
12	Physics and Engineering Rely on Quantitative Experiments	SOC ₂₇ S ₁ U ₁₂ V ₁
13	Perform Microbiological Tests	SOC ₂₇ S ₁ U ₁₃ V ₁

14	Lab Safety Rules and Guidelines	SOC ₂₇ S ₁ U ₁₄ V ₁
15	Laboratory Security	SOC ₂₇ S ₁ U ₁₅ V ₁
16	Laboratory Layout and Furnishing	SOC ₂₇ S ₁ U ₁₆ V ₁
17	Laboratory Emergency Response Procedures	SOC ₂₇ S ₁ U ₁₇ V ₁
18	Calibration and maintenance	SOC ₂₇ S ₁ U ₁₈ V ₁
19	Troubleshooting, service repair and retiring	SOC ₂₇ S ₁ U ₁₉ V ₁

7. Accreditation requirements	The training provider should place trainees in relevant laboratories or similar training facilities to provide the trainees the hands-on experience exposure related to this qualification. (if there are any workshops regarding this we could take them.)
8. Recommended sequencing of units	As appearing under the section 06

UNITS DETAILS

Unit No.	Unit Title	Code	Level	No of credits
1.	Communication and Interpersonal Skills	SOC ₂₇ S ₁ U ₀₁ V ₁	3	3
2.	Relevant Scientific Concepts and Legislative Requirements	SOC ₂₇ S ₁ U ₀₂ V ₁	3	6
3.	Follow Established Work Plan	SOC ₂₇ S ₁ U ₀₃ V ₁	3	3
4.	Maintain laboratory fit for purpose	SOC ₂₇ S ₁ U ₀₄ V ₁	3	4
5.	Work Safely in Accordance with Defined Policies and Procedures	SOC ₂₇ S ₁ U ₀₅ V ₁	3	3
6.	Apply Quality Systems and Continuous Improvement Process	SOC ₂₇ S ₁ U ₀₆ V ₁	3	3
7.	Work Efficiently as Part of Team	SOC ₂₇ S ₁ U ₀₇ V ₁	3	3
8.	Perform Instrumental Test/Procedures	SOC ₂₇ S ₁ U ₀₈ V ₁	3	6
9.	Perform non-Instrumental Test/Procedures	SOC ₂₇ S ₂ U ₀₉ V ₁	3	6
10.	Perform Standardize and Use Solution	SOC ₂₇ S ₂ U ₁₀ V ₁	3	3
11.	Biological Experiment	SOC ₂₇ S ₂ U ₁₁ V ₁	4	15
12.	Physics and Engineering Rely on Quantitative Experiments	SOC ₂₇ S ₂ U ₁₂ V ₁	4	15
13.	Perform Microbiological Tests	SOC ₂₇ S ₂ U ₁₃ V ₁	4	15
14.	Lab Safety Rules and Guidelines	SOC ₂₇ S ₂ U ₁₄ V ₁	4	15
15.	Laboratory Security	SOC ₂₇ S ₂ U ₁₅ V ₁	4	10
16.	Laboratory Layout and Furnishing	SOC ₂₇ S ₂ U ₁₆ V ₁	4	10
17.	Laboratory Emergency Response Procedures	SOC ₂₇ S ₂ U ₁₇ V ₁	4	10
18.	Calibration and maintenance	SOC ₂₇ S ₂ U ₁₈ V ₁	4	15
19.	Troubleshooting, service repair and retiring	SOC ₂₇ S ₂ U ₁₉ V ₁	4	15

Packaging of National Qualifications:

National Certificate III in School Laboratory Assistant will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10

Qualification Code: SOC27SQ1L318

National Certificate IV in School Laboratory Technician will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11+12+15+17+18+19

Qualification Code: SOC27SQ2L418

Competency Standard for

School Laboratory Technician

Unit No	Unit Title
1	Communication and Interpersonal Skills
2	Relevant Scientific Concepts and Legislative Requirements
3	Follow Established Work Plan
4	Maintain laboratory fit for purpose
5	Work Safely in Accordance with Defined Policies and Procedures
6	Apply Quality Systems and Continuous Improvement Process
7	Work Efficiently as Part of Team
8	Perform Instrumental Test/Procedures
9	Perform non-Instrumental Test/Procedures
10	Perform Standardize and Use Solution
11	Biological Experiment
12	Physics and Engineering Rely on Quantitative Experiments
13	Perform Microbiological Tests
14	Lab Safety Rules and Guidelines
15	Laboratory Security
16	Laboratory Layout and Furnishing
17	Laboratory Emergency Response Procedures
18	Calibration and maintenance
19	Troubleshooting, service repair and retiring

BRIEF DESCRIPTION OF THE CURRENT AND FUTURE CONDITIONS IN THE SECTOR:

Science plays a key role in our life. In an ever-changing global world, the importance of science cannot be undermined. Science opens the minds of students and provides a rich context to develop critical thinking and make informed decisions. Laboratory Science is focused on enabling the student to acquire knowledge, skills and attitudes to develop an informed and critical understanding of, laboratory skills, science and technological issues. In Maldives, almost every School is accompanied with a laboratory. Unfortunately, these schools lack many required equipment and skilled laboratory technologists. So, during these technologically advanced days it is important to train laboratory technologists for school in order to provide a better science education for the students.

At the end of this program, students will be having knowledge and skills to work in a school laboratory. They will have the skills to develop the laboratories further and will have knowledge and skills to maintain and take care of all the laboratory facilities.

DESCRIPTION OF THE WORK AND WORKING CONDITIONS:

Laboratory technology increasingly requires professional skills in the field. Training in this field helps the students to acquire knowledge on science back ground and skills required in the laboratory. Programs of recruitment, education and training need to be developed to attract young people in the sector and maintain the necessary skills.

This Course will provide theoretical knowledge to persons with specified practical skill to gain employment in school laboratories. It will develop their passion for laboratory science and encourage them to choose more related fields.

On completion of the course, the graduates will have developed the skill and general knowledge to work in laboratories.

LABORATORY ASSISTANT

UNIT 1

UNIT TITLE	Communication and Interpersonal Skills				
DESCRIPTOR	This unit of competency covers the ability to receive and pass on written and oral messages, provide relevant information in response to requests within timelines and demonstrate effective interpersonal skills.				
CODE	SOC ₂₇ S ₁ U ₀₁ V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Oral and Written communication	1.1. Understands and responds to Occupational Health and Safety risks and practices in the workplace 1.2. Follows oral and written instructions and exchanges relevant information 1.3. Communicates effectively and is able to exchange relevant and scientific information 1.4. Explain relevant and scientific information and give feedback
2. Professional and Interpersonal Skill	2.1 Relate to teaching staff 2.2 Liaises with teaching staff and other school based and external personnel 2.3 Effectively negotiate with required personnel
3. Communication with Students	3.1 Use good communication skills appropriate for use when working with students 3.2 Works directly with students in the laboratory and on excursions 3.3 Understands their own personal legal

	responsibilities when working with students and may inform others of them
4. Use of Communication Technologies	4.1. Know how to use communication technology, such as, but not limited to, telephones, faxes and computer programs including emails, word processing documents spread sheet applications and Internet searches 4.2. Prepare charts, diagrams and required science practical documents using computer as requested by the teacher

RANGE STATEMENT

Procedures included

- Occupational Health and Safety risks and practices in the workplace
- Exchange relevant and scientific information
- Liaises with teaching staff and other school based and external personnel
- Communication appropriate for use when working with students
- Personal legal responsibilities when working with students and may inform others of them

Tools, equipment and materials required may include:

- Charts
- Computers

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicate effectively with people at different organisational levels and from diverse cultural backgrounds
- Use available communication equipment (eg, telephone, on-line and hard copy directories, email, fax, intranet and Internet)
- Listen attentively and clarify messages and instructions to confirm their meaning locate relevant sources of information
- Provide accurate information in an effective and timely manner

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• Knowledge of Communicating with other people standard• General knowledge of common terminologies used in Communicating with other people• Interpersonal interactions, equal opportunity, anti-discrimination, anti-harassment requirements communication protocols and the completion of workplace documentation.	<ul style="list-style-type: none">• Competent to work to meet requirements for Communicate with other people• Communication skills• Technical tasks• Interpersonal skills

UNIT 2

UNIT TITLE	Relevant Scientific Concepts and Legislative Requirements				
DESCRIPTOR	This unit will provide basic knowledge of science concepts and skills required to take safety measures required for safety in science subject areas.				
CODE	SOC ₂₇ S ₁ U ₀₂ V ₁	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Science Concepts	1.1. Possesses a general understanding of <ul style="list-style-type: none"> - Physical - Chemical - Biological 1.2. Earth, Environment and Space core science concepts as they apply to the relevant Science curriculum
2. Content of the NIE Curriculum: Science	2.1 Possesses a fundamental understanding of the three K- 10 strands and their sub strands: Science Understanding 2.2 Science as a Human Endeavour 2.3 Science Inquiry Skills in addition to the required Senior Secondary subjects' figures
3. WHS Acts, Regulations, Codes of Practice, Standards	3.1 Possesses a broad knowledge of <ul style="list-style-type: none"> - WHS Act, Regulations and relevant Codes of Practice - The school's safety policies and procedures and may assist with reviews - Risk Assessment and Hazard Management - Requirements for the Science Area

4. Safety in Science Subject Areas	4.1 Possesses a broad knowledge of <ul style="list-style-type: none">- Chemical Safety in Science- Biological Safety in Science- Physics Safety in Science
5. Licensing Requirements (e.g. animal ethics; flora and fauna licenses)	5.1. Possesses a broad knowledge of the legislative requirements and application procedures for the ethical use and care of animals, as well as other relevant licensing requirements.

RANGE STATEMENT

- Physical, chemical and biological concepts as they apply to the relevant science curriculum
- K-10 strands and their sub- strands and understanding
- WHS Act, Regulations and relevant Codes of Practice
- Safety policies and procedures
- Chemical Safety
- Biological Safety
- Physical Safety
- Legislative requirements and application procedures for the ethical use and care of animals

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must be observed through real or simulated workplace activities.

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of Process and record data.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Physical, chemical and biological concepts as they apply to the relevant science curriculum
- Safety policies and procedures
- Chemical Safety
- Biological Safety
- Physical Safety

Assessment conditions

Assessment must reflect and events processes that occur over a period of time

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• General understanding of<ul style="list-style-type: none">- Physical- Chemical- Biological• General understanding of Earth, Environment and Space core science concepts procedures• General knowledge of	<ul style="list-style-type: none">• Science Inquiry Skills

<ul style="list-style-type: none">- Chemical Safety in Science- Biological Safety in Science- Physics Safety in Science• knowledge of the legislative requirements and application procedures	
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UNIT 3

UNIT TITLE	Follow established work plan				
DESCRIPTOR	This unit of competency covers the ability to complete tasks individually or in a team context. The tasks involve established routines and procedures using allocated resources with access to readily available guidelines and advice. Work plans may need to be modified with supervisor agreement to suit changing conditions and priorities.				
CODE	SOC ₂₇ S ₁ U ₀₃ V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1 Organise daily work activities	1.1 Clarify allocated work activities and required resources if necessary 1.2 Prioritise work activities as directed 1.3 Break down work activities into small achievable components and efficient sequences
2 Follow work plan	2.1 Locate relevant workplace procedures for required tasks 2.2 Undertake task(s) following prescribed and routine work-related sequences 2.3 Seek assistance from relevant personnel when difficulties arise beyond own capacity 2.4 Record completion of activities to confirm outputs in accordance with plan
3 Modify work plan	3.1 Clarify changes in requests, conditions and priorities, if required 3.2 Review tasks and priorities in line with changed circumstances, urgent requests or with a change of instruction from appropriate personnel

	<p>3.3 Update work plan and communicate changes to appropriate personnel</p> <p>3.4 Confirm that all tasks have been completed in the required timeframe.</p>
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RANGE STATEMENT

This unit of competency includes the following types of information sources and documentation:

- SOPs
- job cards, batch cards, production schedules job descriptions
- Methods, recipes, procedures and protocols.

Workplace activities may include but are not limited to performing:

- set up and pre-use checks of laboratory equipment
- calibration checks
- Sampling and testing following standard procedures
- Maintenance and cleaning tasks.

This unit of competency includes communication with relevant personnel to:

- work effectively with others in teams
- clarify individual responsibilities
- Modify work plan to cope with urgent tests, abnormal results, problems with equipment and reagents, problems with production and quality control.

Tools, equipment and material used in this unit may include

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be continuous and holistic and must include real or simulated workplace activities

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment. The candidate should be assessed in the context of performing routine technical tasks.

Critical aspects (for assessment)

Competency must be demonstrated in the ability to plan and achieve work objectives efficiently. In particular, the assessor should look to see that the candidate:

- clarifies job outcomes and recognises resource needs follows relevant procedures
- recognises non-standard behavior in samples and equipment
- recognises potential disruptions or changed circumstances and modifies work plan in conjunction with relevant personnel
- compensates for a variety of working environments (e.g. indoor, outdoor and night work)
- seeks assistance from relevant personnel when difficulties arise
- Achieves quality outcomes within timelines.

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying circumstances.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
Competency includes the ability to apply and explain workplace procedures covering: <ul style="list-style-type: none">• customer service• quality• OHS and environmental legislative requirements• Technical work that the candidate routinely performs.	<ul style="list-style-type: none">• A technical officer was required to perform a series of tasks including the calibration of instruments required for testing of blood samples.

UNIT 4

TITLE	Maintain the Laboratory Fit for Purpose				
DESCRIPTOR	This unit of competency covers the general cleaning of work surfaces, cleaning and storage of equipment, and the monitoring of laboratory stocks.				
CODE	SOC ₂₇ S ₁ U ₀₄ V ₁	Level	3	Credit	4

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1 Clean work preparation areas	1.1 Clean preparation areas using appropriate cleaning agents and recommended procedures 1.2 Remove spillages as per the Australian Dangerous Goods Code, Sections 1 to 3, using appropriate agents and protective equipment 1.3 Dispose of wastes in accordance with enterprise procedures and relevant codes and regulations 1.4 Report large spillages and then remove material in accordance with the Australian Code for Transport of Dangerous Goods
2 Clean and store glassware and equipment	2.1 Collect contaminated glassware and equipment for cleaning and, where necessary, for sanitisation 2.2 Examine glassware for faults and remove from service where appropriate 2.3 Use appropriate reagents and recommended procedures to remove residues from glassware and equipment 2.4 Operate automatic cleaning apparatus in accordance with workplace procedures 2.5 Store clean glassware and equipment in the designated locations and

	manner
3 Monitor stocks of laboratory materials and equipment	<p>3.1 Perform stock checks and maintain records of usage as directed</p> <p>3.2 Store labelled stocks for safe and efficient retrieval.</p>
4 Contribute to maintenance of laboratory hygiene	<p>4.1 Follow regulations regarding protective clothing, personal hygiene, movement of people and materials, and work/cleaning sequences to prevent contamination and cross-contamination</p> <p>4.2 Inform other people of potential hazards and contamination in own work area</p> <p>4.3 Perform hygiene monitoring in accordance with laboratory procedures.</p>

Range Statement

- Cleaning work areas and/or equipment surfaces contaminated with blood, faeces, urine or microorganisms in accordance with standard precautions and/or NHMRC guidelines
- Specialised procedures for cleaning and/or autoclaving glassware and equipment, for example:
 - treatments required for killing/deactivating microorganisms
 - treatment required for killing spores
 - types of detergents used for glassware (eg, phosphates free)
 - preparation of plugged pipettes
 - Correct disposal of infected materials (such as pipette tips, disposable containers, gloves and tubes).

Tools, equipment and material used may include

Typical equipment could include:

- Autoclaves
- Balances
- Blenders
- Centrifuges and separating equipment
- Dishwashers
- Freezers

- Fume hoods, biological safety cabinets
- Gas cylinders
- Glassware (burettes, pipettes)
- Plastic ware
- Hydrometers
- Glass, plastic, quartz cuvettes
- Hotplates, mantles, burners
- Microtomes, tissue processors
- Instrument chart recorders
- Incubators
- Light and fluorescence microscopes
- Muffle furnaces
- Ovens, microwave ovens
- Refrigerators
- Thermohygrographs
- Thermometers
- Ultrasonic cleaners
- Water baths
- PH meters and ion selective electrodes
- Cell counters
- Staining machines.

Typical materials could include:

- Reagents
- Agar media and plates
- Disinfectants
- Detergents
- Disposable clothing.
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ASSESSMENT GUIDE

Form of assessment

- Competency in this unit should be assessed over sufficient time to enable the candidate to complete tasks contained in a routine maintenance cycle or schedule. The following assessment methods are suggested:
- Observation of the candidate's techniques for cleaning, decontamination, disinfection and/or removal of spillages and waste disposal
- Review of stock control records completed by the candidate
feedback from supervisors and peers

- Questioning to assess underpinning knowledge of regulations and procedures where direct observation is difficult (such as dealing with hazards) and choice of reagents and equipment. Questioning techniques should be appropriate to the candidate's language and literacy levels.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Critical aspects

Competency must be demonstrated by the ability to safely follow work procedures relating to laboratory maintenance. In particular, the assessor should look to see that the candidate can:

- Safely clean work preparation areas and equipment using appropriate cleaning agents and equipment
- Safely remove spillages and dispose of wastes
- Disinfect and/or decontaminate work areas and equipment as required minimise the risk of contamination of self, others and the laboratory safely store laboratory equipment and materials
- Monitor and report stock levels and the condition of laboratory equipment keep accurate records
- Report potential hazards.

Assessment Conditions

Assessment must reflect and events processes that occur over a period of time

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<p>Competency includes the ability to apply and explain workplace procedures and protocols relating to the:</p> <ul style="list-style-type: none"> • Cleaning, decontamination and/or disinfection of work surfaces • Cleaning, decontamination and/or disinfection and storage of equipment • Minimization and disposal of waste 	<ul style="list-style-type: none"> • Laboratory assistants and technical officers routinely examine fluids for microorganisms using a microscope. • Examine fluids such as urine, sea water, chlorinated pool water, water from catchment areas and bottled water. Record keeping skill • To maintain microscopes in working order, they thoroughly clean the stage, oculars and each objective after use and sometimes

UNIT 5

UNIT TITLE	Work safely in accordance with defined policies and procedures				
DESCRIPTOR	This unit of competency concerns the ability to apply OHS procedures and safe working practices to maintain own health and the health of others in the workplace. It also includes the application of risk control measures to minimise environmental threats.				
CODE	SOC ₂₇ S ₁ U ₀₅ V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Follow established work practices and instruction aimed at keeping immediate work environment safe	1.1. Keep all work areas clean and free from obstacles 1.2. Recognise and report any hazardous work situations 1.3. Maintain workplace standards of personal hygiene at all times 1.4. Recognise shut-off points for all services to the work area and maintain clear access
2. Follow established safe work practices and procedures to maintain safe systems of work	2.1 Recognise and observe hazard warnings and safety signs 2.2 Check safety equipment routinely in accordance with workplace procedures 2.3 Label all reagents and hazardous materials in accordance with workplace procedures 2.4 Handle all hazardous materials and equipment in accordance with labelling, materials safety data sheets and manufacturer's instructions 2.5 Use appropriate personal protective equipment and clothing as required 2.6 Identify and report operating problems or equipment malfunctions 2.7 Clean and decontaminate equipment and work areas regularly using recommended

	<p>procedures</p> <p>2.8 Follow established manual handling procedures for tasks involving manual handling</p>
3. Safely store, collect and dispose of hazardous materials	<p>3.1 Secure and store all potentially hazardous materials safely</p> <p>3.2 Collect, sort and dispose of hazardous waste in accordance with workplace procedures</p>
4. Respond effectively to incidents, accidents and emergencies	<p>4.1 Demonstrate or fully explain workplace fire drill, accident, and emergency evacuation procedures</p> <p>4.2 Follow workplace emergency first aid procedures</p> <p>4.3 Report and record all accidents or safety/ environmental incidents as required</p>
5. Maintain personal health in the workplace	<p>5.1 Use appropriate equipment and procedures to avoid personal contamination and contamination of others</p> <p>5.2 Avoid risk behaviour that impacts on own work practices and those of other workers</p>
6. Refer to relevant regulations and procedures to ensure regulatory requirements are met	<p>6.1 Locate and follow relevant sections of workplace procedures which reflect legislative requirements</p> <p>6.2 Seek assistance to clarify obligations and procedures</p> <p>6.3 Clarify work instructions that impact on safety and legal liability</p> <p>6.4 Apply procedures which relate to transport and storage of dangerous goods and hazardous materials</p>

7. Follow risk control measures to minimise environmental hazards	7.1. Recognise the type and severity of environmental threat posed by the materials and processes used 7.2. Use work practices which minimise waste 7.3. Follow workplace procedures for waste disposal 7.4. Report abnormal emissions to appropriate personnel 7.5 Apply containment procedures in accordance with standard operating procedures (SOPs) where appropriate
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RANGE STATEMENT

Enterprise policies and procedures include those that directly or indirectly cover OHS and environmental issues such as:

- hazards and control measures
- minimisation of environmental threats
- minimisation and disposal of waste
- SOPs and work instructions
- safety, emergency, fire and accidents
- Selection and use of personal protective clothing and equipment.

OHS and environmental issues which may need to be raised by employees with designated personnel may include:

- Identification of hazards
- Assessment of risk and decisions on measures to control risk
- Risk reduction measures
- Implementation of controls
- Investigation of injury and incidents.

Tools, equipment and materials required may include:

Nil

ASSESSMENT GUIDE

Form of assessment

- Observation of the candidate preparing for and undertaking a range of work tasks
- Written and/or oral questioning to assess underpinning knowledge and likely reactions in hazardous/emergency situations (questions will be appropriate to candidate's language and literacy levels)
- Feedback from peers and supervisors.

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of practices.

Critical aspects (for assessment)

Competency must be demonstrated in the ability to follow instructions and procedures developed by the enterprise management to ensure safe systems of work and a safe work environment. In particular, the assessor should look to see that the candidate can:

- Follow OHS and environmental SOPs, instructions and procedures for hazard identification and risk control
- Follow workplace instructions and procedures relating to storage, transport and disposal of dangerous goods
- Recognise hazards common to the industry after appropriate induction information and training
- Follow instructions designed to ensure the correct labelling of samples, reagents, and aliquoted samples
- Use any equipment provided to protect health and safety
- Communicate health and safety and environmental issues with designated personnel.

Assessment conditions

Assessment must reflect both events and processes over a period of time.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none">• symbols used in OHS signs• environmental impacts and effects of interaction with hazards in the work area• information contained in SOPs for materials handled regularly• Workplace procedures and instructions that govern personal work, incidents and emergencies reporting requirements for OHS issues and potentially hazardous situations.	<ul style="list-style-type: none">• After performing and verifying cell counts of plated samples, a technical assistant proceeded to dispose of the waste

UNIT 6

UNIT TITLE	Apply Quality Systems and Continuous Improvement Processes				
DESCRIPTOR	This unit of competency covers the exercise of good laboratory practice and effective participation in quality improvement teams.				
CODE	SOC ₂₇ S ₁ U ₀₆ V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Satisfy quality system requirements in daily work	1.1 Access information on quality system requirements for own job function 1.2 Record and report quality control data in accordance with quality system 1.3 Follow quality control procedures to ensure products, or data, are of a defined quality as an aid to acceptance or rejection 1.4 Recognise and report non-conformances or problems that affect productivity and quality 1.5 Conduct work in accordance with sustainable energy work practice 1.6 Promote sustainable energy principles and work practice to other workers
2 Analyze opportunities for corrective and/or optimization action	2.1 Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records 2.2 Recognise variances that indicate abnormal or sub- optimal performance 2.3 Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance 2.4 Use appropriate quality improvement

		techniques to rank the probabilities of possible causes
3	Recommend corrective and/or optimization actions	<p>3.1 Analyse cause(s) to predict likely impacts of change(s) and decide on the appropriate action(s)</p> <p>3.2 Identify required change(s) to standards and procedures and training</p> <p>3.3 Report recommendations to designated personnel</p>
4	Participate in the implementation of recommended action(s)	<p>4.1 Implement approved action(s) and monitor performance following change(s) to evaluate results</p> <p>4.2 Implement change(s) to systems and procedures to eliminate possible causes</p> <p>4.3 Document outcomes of actions and communicate them to relevant personnel.</p>
5	Participate in the development of continuous improvement strategies	<p>5.1 Review all relevant features of work practice to identify possible contributing factors leading to sub-optimal performance</p> <p>5.2 Identify options for removing or controlling the risk of sub-optimal performance</p> <p>5.3 Assess the adequacy of current controls, quality methods and systems</p> <p>5.4 Identify opportunities to continuously improve performance</p> <p>5.5 Develop recommendations for continual improvements of work practices, methods, procedures and equipment effectiveness</p> <p>5.6 Consult with appropriate personnel to refine recommendations before implementation of approved improvement strategies</p> <p>5.7 Document outcomes of strategies and communicate them to relevant personnel.</p>

ASSESSMENT GUIDE

Forms of assessment

The assessor may select two of the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment may be conducted out of the workplace preferably in a computer classroom

Critical aspects (for assessment)

Assessment must show that the candidate:

- Selected and used hardware components correctly and according to the task requirement
- Identified and explain the functions of both hardware and software used, their general features and capabilities
- Produced accurate and complete data in accordance with the requirements
- Used appropriate devices and procedures to transfer files/data accurately

Assessment conditions

Assessment may be conducted out of the work environment and may include assignments and projects.

UNIT 7

UNIT TITLE	Work Efficiently as Part of a Team				
DESCRIPTOR	This unit of competency covers the ability to participate in a team and contribute to the achievement of team and enterprise goals.				
CODE	SOC ₂₇ S ₁ U ₀₇ V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1 Work in a team environment	1.1. Cooperate with team members to negotiate and achieve agreed outcomes, timelines and priorities 1.2. Recognise personal abilities and limitations when undertaking team tasks 1.3. Confirm personal role and responsibility within the team for particular outputs 1.4. Demonstrate sensitivity to the diversity of other team members' backgrounds and beliefs 1.5. Demonstrate awareness of the impact of personal work on the team's output.
2. Complete allocated work	2.1. Organise and manage allocated work to meet time and resource constraints 2.2. Adapt tasks in response to new information, changed situations or instructions 2.3. Follow enterprise standards of quality, safety and ethical practice in all work
3. Identify and resolve work problems	3.1. Recognise problems or examples of sub-optimal performance within the work of the team 3.2. Apply agreed problem solving

	<p>strategies to consider possible causes and solutions</p> <p>3.3. Identify and access appropriate sources of help</p> <p>3.4. Consider available alternatives and keep them open before agreeing on the most appropriate action.</p>
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RANGE STATEMENT

Tools, equipment and materials required may include:

Relevant tools and equipment.

ASSESSMENT GUIDE

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment under the normal range of work conditions.

UNIT 8

UNIT TITLE	Perform Instrumental Tests/Procedures				
DESCRIPTOR	This unit of competency covers the ability to prepare samples and perform instrumental tests/procedures to test materials.				
CODE	SOC ₂₇ S ₁ U ₀₈ V ₁	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare sample	<p>1.1 Identify materials to be tested, appropriate standard method and safety requirements</p> <p>1.2 Use personal protective equipment and safety procedures as specified for test method and materials to be tested</p> <p>1.3 Record sample description, compare with specification and note and report discrepancies</p> <p>1.4 Prepare sample in accordance with testing requirements</p>
2. Test sample	<p>2.1 Weigh or measure sample and standards (if appropriate)</p> <p>2.2 Set up and operate equipment/instrumentation in accordance with test method requirements</p> <p>2.3 Check calibration status of equipment and check calibration if applicable</p> <p>2.4 Perform tests/procedures in accordance with laboratory methods</p> <p>2.5 Shut down equipment in accordance with operating procedures</p>
3. Process data	<p>3.1 Record test data noting atypical observations</p>

	<p>3.2 Ensure calculated quantities are consistent with estimations</p> <p>3.3 Record and report result in accordance with enterprise procedures</p> <p>3.4 Interpret trends in data and/or results and report “out of specification” or atypical results promptly to appropriate personnel</p> <p>3.5 Troubleshoot basic procedure or equipment problems which have led to atypical data or results</p>
4. Maintain a safe work environment	<p>4.1 Use established work practices to ensure personal safety and that of other laboratory personnel</p> <p>4.2 Minimise the generation of wastes</p> <p>4.3 Ensure the safe disposal of laboratory wastes, including biohazardous wastes</p> <p>4.4 Clean, care for and store equipment and reagents as required</p>
5. Maintain laboratory records	<p>5.1 Record approved data into enterprise system</p> <p>5.2 Maintain confidentiality of enterprise information and laboratory data</p> <p>5.3 Ensure security of enterprise information and laboratory data</p> <p>5.4 Maintain equipment logs in accordance with enterprise procedures.</p>

RANGE STATEMENT

- Use personal protective equipment and safety procedures as specified for test method and materials to be tested
- Use personal protective equipment and safety procedures as specified for test method and materials to be tested
- Prepare sample in accordance with testing requirements
- Ensure calculated quantities are consistent with estimations
- Interpret trends in data and/or results and report “out of specification” or atypical results promptly to appropriate personnel

- Clean, care for and store equipment and reagents as required
- Maintain confidentiality of enterprise information and laboratory data
- Maintain equipment logs in accordance with enterprise procedures

Tools, equipment and materials required may include:

Relevant tools and equipment

ASSESSMENT GUIDE

Forms of assessment

The assessor may select two of the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment may be conducted out of the workplace preferably in a computer classroom

Assessment conditions

Assessment may be conducted out of the work environment and may include assignments and projects.

UNIT 9

UNIT TITLE	Perform non-Instrumental Tests/Procedures				
DESCRIPTOR	This unit of competency covers the ability to prepare samples and use non-instrumental tests and procedures to test materials				
CODE	SOC ₂₇ S ₁ U ₀₉ V ₁	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare sample	1.1 Identify materials to be tested, appropriate standard method and safety requirements 1.2 Use personal protective equipment and safety procedures as specified for test method and materials to be tested 1.3 Record sample description, compare with specification and note and report discrepancies 1.4 Prepare sample in accordance with testing requirements
2. Test sample	2.1 Weigh or measure sample and standards (if appropriate) to be tested 2.2 Set up and operate equipment as per test requirements 2.3 Perform tests in accordance with enterprise procedures
3. Process data	3.1 Record test data noting atypical observations 3.2 Ensure calculated quantities are consistent with estimations 3.3 Record and report results in accordance with enterprise procedures 3.4 Interpret trends in data and/or results and report “out of specification” or atypical results promptly to appropriate personnel

	3.5 Troubleshoot basic procedure or equipment problems which have led to atypical data or results
4. Maintain a safe work environment	4.1 Use established work practices to ensure personal safety and that of other laboratory personnel 4.2 Minimise the generation of wastes 4.3 Ensure the safe disposal of laboratory wastes 4.4 Clean, care for and store equipment and reagents as required
5. Maintain laboratory records	5.1 Record approved results into enterprise system 5.2 Maintain confidentiality of enterprise information and laboratory data 5.3 Ensure security of enterprise information and laboratory data. 5.4 Maintain equipment logs as per enterprise procedures.

RANGE STATEMENT

Tools, equipment and materials required may include:

Relevant tools and equipment's

ASSESSMENT GUIDE

Forms of assessment

The assessor may select two of the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment may be conducted out of the workplace preferably in a computer classroom

Critical aspects (for assessment)

Assessment must show that the candidate:

- Use personal protective equipment and safety procedures as specified for test method and materials to be tested
- Prepare sample in accordance with testing requirements
- Set up and operate equipment as per test requirements
- Record and report result in accordance with enterprise procedures
- Use established work practices to ensure personal safety and that of other laboratory personnel
- Ensure the safe disposal of laboratory wastes

Assessment conditions

Assessment may be conducted out of the work environment and may include assignments and projects.

- Written tests and oral questions.

UNIT 10

UNIT TITLE	Prepare, Standardize and Use Solution				
DESCRIPTOR	This unit of competency covers the ability to prepare, standardise and use solutions to monitor the quality of prepared solutions.				
CODE	SOC ₂₇ S ₁ U10V ₁	Level	3	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare solutions	1.1 Select appropriate procedure for solution preparation 1.2 Select equipment, materials and solvent of specified purity 1.3 Measure appropriate quantities of reagents for solution preparation and record data. 1.4 Select and assemble specified laboratory equipment and appropriate grade of glassware 1.5 Perform specified dilutions 1.6 Prepare solutions to achieve concentration 1.7 Label and store solutions to maintain identity and stability
2. Standardise and use volumetric solutions	2.1 Assemble appropriate laboratory equipment 2.2 Perform serial dilutions as required 2.3 Standardise the solution to the required specified range and precision 2.4 Label and store solutions to maintain identity and stability 2.5 Use standard volumetric solutions to determine concentration of unknown solutions

3. Calculate and record data	3.1. Calculate specified concentrations 3.2. Use authorised procedure if data is to be modified 3.3. Record all relevant details as per laboratory procedures and report results 3.4. Report concentration with appropriate units
4. Monitor the quality of laboratory solutions	4.1 Check solutions for visual deterioration and expiry date 4.2 Standardize or dispose of dated or deteriorated solutions 4.3 Record details and label solutions as per laboratory procedures.

RANGE STATEMENT

Tools, equipment and materials required may include:

Relevant tools and equipment's

ASSESSMENT GUIDE

Forms of assessment

The assessor may select two of the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment may be conducted out of the workplace preferably in a computer classroom

Assessment conditions

Assessment may be conducted out of the work environment and may include assignments and projects.

UNIT 11

UNIT TITLE	Biological Experiment				
DESCRIPTOR	This module offers guidance for teachers on the central issues of the required for the practical activities Biology. The main focus of these activities for students is the attainment of practical skills. The emphasis is on the process rather than on product attainment alone.				
CODE	SOC ₂₇ S ₂ U11V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
4 Fieldwork Activities	<p>4.1 Identify any five fauna and any five-flora using simple keys. Identify a variety of habitats within the selected ecosystem.</p> <p>4.2 Identify and use various apparatus required for collection methods in an ecological study</p> <p>4.3 Conduct a quantitative study of plants and animals of a sample area of the selected ecosystem. Transfer results to tables, diagrams, graphs, histograms or any relevant mode.</p> <p>4.4 Investigate any three abiotic factors present in the selected ecosystem. Relate results to choose of habitat selected by each organism identified in this study.</p>
5 Microscopy	<p>5.1 Be familiar with and use the light microscope.</p> <p>Prepare and examine one animal cell and one plant cell – unstained and stained – using the light microscope (×100, ×400).</p> <p>Prepare and examine microscopically the</p>

	<p>transverse section of a dicotyledonous stem ($\times 100$, $\times 400$).</p>
<p>6 Investigate the effect of pH on the rate of catalase activity</p>	<p>6.1 Familiarize yourself with all procedures before starting</p> <ul style="list-style-type: none"> - Follow instructions step by step <p>6.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Maintain constant temperature (25 °C) in the beaker Obtain enzyme extract - Use the syringe Use the graduated cylinder - Measure pH Use the timer Use the electronic balance <p>6.3 Observation</p> <ul style="list-style-type: none"> - Appreciate the use of washing-up liquid - Note the evolution of bubbles in the mixture - Note the rise of foam in the cylinders - Note the colors on the pH papers before and after dipping in solutions <p>6.4 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Record the volume of foam per unit time - Tabulate the results - Record the pH in each cylinder Draw a graph with labelled axes <p>6.5 Interpretation</p> <ul style="list-style-type: none"> - Draw conclusions from your observations and results

	<p>6.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>6.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner Label as appropriate - Work as part of a group or team Clean up after the practical activity
<p>7 Investigate the effect of temperature on the rate of catalase activity.</p>	<p>7.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher's instructions <p>7.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Prepare the enzyme source - Use the syringe - Use the graduated cylinder Use the thermometer - Use the electronic balance Set up and maintain the water baths - Use the test-tube holder Use the timer <p>7.3 Observation</p> <ul style="list-style-type: none"> - Observe the evolution of bubbles in the mixture - Observe the rise of foam in the cylinders <p>7.4 Recording</p>

	<ul style="list-style-type: none"> - Write up the procedure - Record the volume of foam - Tabulate results - Record the temperature each time the procedure is repeated - Draw a graph with labelled axes <p>7.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>7.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>7.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner - Label as appropriate Work as part of a group or team Clean up after the practical activity
<p>8 Investigate the effect of heat on denaturation on catalase activity.</p>	<p>8.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting Follow instructions step by step Listen to the teacher’s instructions - Listen to the teacher’s instructions <p>8.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Prepare the enzyme source - Use the syringe

	<ul style="list-style-type: none"> - Use the graduated cylinder - Use the thermometer - Use the electronic balance Set up and maintain the water baths - Use the test-tube holder Use the timer <p>8.3 Observation</p> <ul style="list-style-type: none"> - Observe the presence or absence of foam formation <p>8.4 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Tabulate the results <p>8.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>8.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>8.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner Label as appropriate - Work as part of a group or team Clean up after the practical activity
<p>9 Prepare one enzyme immobilization and examine its application.</p>	<p>9.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting Follow instructions step by step

	<ul style="list-style-type: none">- Listen to the teacher's instructions <p>9.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none">- Use the balance- Use a graduated cylinder to measure volumes- Prepare solutions and mixtures- Draw the mixture of alginate solution and yeast suspension into the syringe- Release the mixture drop by drop into the calcium chloride solution- Transfer the beads to the separating funnel- Filter the beads Rinse the beads with distilled water Set up the separating funnels- Warm water to about 40 °C Use a thermometer- Pour 50 cm³ of sucrose solution into each funnel- Use glucose test strips to test for glucose Repeat at two-minute intervals using the timer <p>9.3 Observation</p> <ul style="list-style-type: none">- Note the clarity of both sucrose solutions- See beads forming- Observe any color change using glucose test strips- Compare the turbidity of both end products <p>9.4 Recording</p>
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	<ul style="list-style-type: none"> - Write up the procedure - Tabulate the results Record the time <p>9.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>9.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>9.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner - Label as appropriate Work as part of a group or team Clean up after the practical activity
<p>10 Investigate the influence of light intensity on the rate of photosynthesis.</p>	<p>10.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher's instructions <p>10.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Carefully use the scissors to cut the end of the plant - Place the plant in the boiling tube, cut end pointing upwards - Use the meter stick to measure distances of plant from light source - Use the thermometer Use the timer Use the

	<p>light meter (optional)</p> <p>10.3 Observation</p> <ul style="list-style-type: none">- Observe bubbles being released- After allowing the plant to adjust, observe a steady stream of bubbles- Observe the number of bubbles being released per minute at each distance <p>10.4 Recording</p> <ul style="list-style-type: none">- Write up the procedure- Record the distance of the plant from the light source- Record the number of bubbles being liberated per minute at each distance- Record the average number of bubbles being liberated per minute at each of the given distances- Record the light intensity or $1/d^2$ Draw a graph with labelled axis <p>10.5 Interpretation</p> <ul style="list-style-type: none">- Draw reasonable conclusions from your observations and results <p>10.6 Application</p> <ul style="list-style-type: none">- Become aware of any other application(s) of what you learned in this activity <p>10.7 Organization</p> <ul style="list-style-type: none">- Exercise caution for your personal safety and for the safety of others- Work in an organized and efficient manner
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	<ul style="list-style-type: none"> - Label as appropriate - Work as part of a group or team Clean up after the practical activity
<p>11 Investigate the influence of carbon dioxide on the rate of photosynthesis.</p>	<p>11.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher’s instructions <p>11.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Carefully use the scissors to cut the end of the plant - Place the plant in the boiling tube, cut end pointing upwards - Use the meter stick to measure the distance of the plant from the light source Use the thermometer Use the timer <p>11.3 Observation</p> <ul style="list-style-type: none"> - Observe bubbles being released - After allowing the plant to adjust, observe a steady stream of bubbles - Observe the number of bubbles being released per minute at each of the given concentrations <p>11.4 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Record each concentration used - Record the number of bubbles being released per minute at each of the given

	<p>concentrations</p> <ul style="list-style-type: none"> - Record the average number of bubbles being released per minute at each of the given concentrations - Draw a graph with labelled axes <p>11.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>11.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>11.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner - Label as appropriate Work as part of a group or team Clean up after the practical activity
<p>12 Prepare and show the production of Alcohol by yeast.</p>	<p>12.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher's instructions <p>12.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Use the graduated cylinder to measure the volumes of glucose solution - Use the syringe for measurement of small volumes

	<ul style="list-style-type: none"> - Use the electronic balance Attach the fermentation locks to the conical flasks Filter the suspension - Set the incubator Set and maintain the water bath Use the timer <p>12.3 Observation</p> <ul style="list-style-type: none"> - Observe bubbles of carbon dioxide being liberated - Observe the effect of filtering - Observe color changes during the iodo form test - Observe the presence/absence of yellow crystals <p>12.4 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Record any color changes during the iodo form test - Record the presence/absence of yellow crystals <p>12.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>12.6 Application</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity <p>12.7 Organization</p> <ul style="list-style-type: none"> - Exercise caution for your personal safety and for the safety of others
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	<ul style="list-style-type: none"> - Work in an organized and efficient manner - Label as appropriate - Work as part of a group or team Clean up after the practical activity
<p>13 Conduct any activity to demonstrate osmosis.</p>	<p>13.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher’s instructions <p>13.2 Correct manipulation of apparatus</p> <ul style="list-style-type: none"> - Soften the tubing in water - Tie leak-proof knots - Wash off excess sucrose - Dry the tubes - Use the electronic balance - Suspend the tubes from the rods <p>13.3 Observation</p> <ul style="list-style-type: none"> - Observe the appearance of the tubes at the start - Observe the appearance of the tubes after the test period <p>13.4 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Tabulate the results <p>13.5 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your observations and results <p>13.6 Application</p>

	<p>13.7 Organization</p> <ul style="list-style-type: none"> - Become aware of any other application(s) of what you learned in this activity - Exercise caution for your personal safety and for the safety of others - Work in an organized and efficient manner - Label as appropriate Work as part of a group or team - Clean up after the practical activity
<p>14 Investigate the effect of water oxygen and temperature on germination.</p>	<p>14.1 Following instructions</p> <ul style="list-style-type: none"> - Familiarize yourself with all procedures before starting - Follow instructions step by step Listen to the teacher's instructions - Correct manipulation of apparatus - Prepare petri dishes for seeds - Add seeds, suitably separated Set the incubator <p>14.2 Observation</p> <ul style="list-style-type: none"> - Observe the appearance of the seeds at the start of the activity - Check the seeds for germination Observe the effect of suitable/unsuitable conditions <p>14.3 Recording</p> <ul style="list-style-type: none"> - Write up the procedure - Record the development of the seeds <p>14.4 Interpretation</p> <ul style="list-style-type: none"> - Draw reasonable conclusions from your

	<p>observations and results</p> <p>14.5 Application</p> <ul style="list-style-type: none">- Become aware of any other application(s) of what you learned in this activity <p>14.6 Organization</p> <ul style="list-style-type: none">- Exercise caution for your personal safety and for the safety of others- Work in an organized and efficient manner- Label as appropriate- Work as part of a group or team Clean up after the practical activity
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RANGE STATEMENT

Procedures included

- Introduces them to a scientific method of investigation
- Allows for greater development of affective and psychomotor forms of learning
- Encourages accurate observation and careful recording
- Develops manipulative skills
- Gives training in problem solving
- Elucidates the theoretical work so as to aid comprehension
- Verifies facts and principles already taught
- Arouses and maintains interest in biology
- Makes biological, chemical, and physical phenomena more real through actual experience

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Able to conduct a qualitative
- Able to use various apparatus required for collection methods in an ecological study.
- Able to conduct a quantitative study of plants and animals of a sample area of the selected ecosystem.
- Able to identify and use various apparatus required for collection methods in an ecological study

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
knowledge and understanding of biological experimental techniques	Manipulation of apparatus
scientific method of investigation	Following instructions
accurate observation and careful recording	Observation
	Recording
	Interpretation of observations and results
	Practical enquiry and application of results

UNIT 12

UNIT TITLE	Physics and Engineering Rely on Quantitative Experiments				
DESCRIPTOR	This module offers knowledge and skills of the problem, experimental methods, basic physics procedures and using spreadsheet.				
CODE	SOC ₂₇ S ₂ U12V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. MOTION	1.1. Linear motion <ul style="list-style-type: none"> - Units of mass, length and time – definition of units not required. - Displacement, velocity, acceleration: definitions and units - Equations of motion - Measurement of velocity and acceleration, using any suitable apparatus. - Use of distance-time, velocity-time graphs
2. Vectors and Scalars	2.1. Distinction between vector and scalar quantities 2.2. Vector nature of physical quantities: everyday examples

<p>3. Forces - Newton's laws of motion</p>	<p>3.1. Statement of the three laws. Force and momentum, definitions and units. Vector nature of forces to be stressed. $F = ma$ as a special case of Newton's second law. Friction: a force opposing motion.</p> <p>3.2. Demonstration of the laws using air track or tickertape timer or powder track timer, etc.</p>
<p>4. Conservation of momentum</p>	<p>4.1. Demonstration by any one suitable method. Appropriate calculations (problems involving change of mass need not be considered)</p> <p>4.2. Collisions (ball games), acceleration of spacecraft, jet aircraft.</p>
<p>5. Gravity</p>	<p>5.1. Newton's law of universal gravitation.</p> <p>5.2. Compare gravitational forces between Earth and Sun and between Earth and Moon.</p>
<p>6. Density and pressure</p>	<p>6.1. Definitions and units. Pressure in liquids and gases. Boyle's law. Archimedes' principle. Law of flotation.</p> <p>6.2. Demonstration of atmospheric pressure, e.g. collapsing-can experiment. Appropriate calculations. Demonstration only. Calculations not required.</p>
<p>7. Energy.</p>	<p>7.1. Work</p> <ul style="list-style-type: none"> - Definition and unit. - Simple experiments. Appropriate calculations involving force and displacement in the same direction only

	<p>7.2. Energy</p> <ul style="list-style-type: none"> - Energy as the ability to do work. Different forms of energy - Principle of conservation of energy - Demonstrations of different energy conversions - Appropriate calculations. <p>7.3. Power</p> <ul style="list-style-type: none"> - Power as the rate of doing work or rate of energy conversion. Unit. - Estimation of average power developed by • <ul style="list-style-type: none"> • person running upstairs • person repeatedly lifting weights, etc.
<p>8. Temperature</p>	<p>8.1. Concept of temperature</p> <ul style="list-style-type: none"> - Measure of hotness or coldness of a body. The SI unit of temperature is the kelvin (definition of unit in terms of the triple point of water not required). Celsius scale is the practical temperature scale <p>8.2. Thermometric properties</p> <ul style="list-style-type: none"> - A physical property that changes measurably with temperature. - Demonstration of some thermometric properties: <ul style="list-style-type: none"> - Length of liquid column, e.g. length of mercury column - Resistance - Length of liquid column, e.g. length of

	<p>mercury column</p> <ul style="list-style-type: none"> - Pressure of a gas at constant volume - Volume of a gas at constant pressure
9. Thermometers	<p>9.1. Thermometers measure temperature. Two thermometers do not necessarily give the same reading at the same temperature. The need for standard thermometers – uses any commercial laboratory thermometer as school standard.</p> <p>9.2. Graduate two thermometers at ice and steam points. Compare values obtained for an unknown temperature, using a straight-line graph between reference points.</p> <p>9.3. Practical thermometers, e.g.</p> <ul style="list-style-type: none"> • clinical thermometer, • oven thermometers, • boiler thermometers, • Temperature gauge in a car.
10. Heat	<p>10.1. Concept of heat</p> <ul style="list-style-type: none"> - Heat as a form of energy that causes a rise in temperature when added or a fall in temperature when withdrawn. <p>10.2. Quantity of Heat</p> <ul style="list-style-type: none"> - Heat capacity, specific heat capacity - Latent heat, specific latent heat - Appropriate calculations. <p>10.3. Heat Transfer</p> <ul style="list-style-type: none"> - Conduction: Qualitative comparison of rates of conduction through solids.

	<ul style="list-style-type: none"> - Simple experiments. - Convection: Simple experiments. Domestic hot-water and heating systems. - Radiation: Radiation from the Sun. Solar constant (also called solar irradiance)
<p>11. Waves</p>	<p>11.1. Properties of waves</p> <ul style="list-style-type: none"> - Longitudinal and transverse waves: - Frequency, amplitude, wavelength, velocity. Relationship <p>11.2. Wave phenomena</p> <ul style="list-style-type: none"> - Reflection. Refraction. Diffraction. Interference. - Polarization. Stationary waves; relationship between inter-node distance and wavelength. - Diffraction effects - At an obstacle - At a slit with reference to significance of the wavelength.

RANGE STATEMENT

- Basic physical principles, terminology, facts, and methods
- That physics is fundamental to many technological developments
- That physics contributes to the social, historical, environmental, technological and economic life of society.
- Basic physical principles
- How physical problems can be solved
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ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
Students should be able to <ul style="list-style-type: none"> • present information in tabular, graphical, written and diagrammatic form, as appropriate • report concisely on experimental procedures and results • use calculators • solve numerical problems • read popular science writing • relate scientific concepts to issues in everyday life • explain the science underlying familiar facts, observations, and phenomena. 	measure physical quantities in the appropriate SI units <ul style="list-style-type: none"> • work safely in a laboratory • follow instructions • use scientific equipment appropriately • use experimental data appropriately

UNIT 13

TITLE	Perform Microbiological Tests				
DESCRIPTOR	<p>This unit of competency describes the ability of technical personnel to contribute to the culture, isolation and identification of microorganisms for investigating the physiology and pathology of plants and animals; for monitoring the natural environment; and to assist in the production of foods, pharmaceutical goods and other manufactured materials. Using techniques of aseptic transfer, culture and identification, this unit of competency provides for the development of skill in procedures that can be applied in investigations of bacteria, viruses, protozoans, algae and parasites, as well as addressing the broader needs of biotechnology and tissue culture applications.</p>				
CODE	SOC ₂₇ S ₂ U13V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
<p>1. Receive samples and process associated request forms</p>	<p>1.1. Check samples and request form details before they are accepted</p> <p>1.2. Return samples and request forms that do not comply with requirements to source with reasons for non-acceptance</p> <p>1.3. Log samples, recording details that allow accurate tracking and chain of custody</p> <p>1.4. Distribute samples for local testing or dispatch samples to other testing facilities</p> <p>1.5. Store samples appropriately where testing or transport is to be delayed</p>
<p>2. Prepare for safe microbiological work and aseptic applications</p>	<p>2.1 Select work area and equipment required for the safe handling of materials that may contain micro- organisms of specified risk groups</p> <p>2.2 Wear protective apparel, replacing when contamination is suspected</p> <p>2.3 Apply correct disinfection procedures to work areas before and after use</p> <p>2.4 Locate relevant emergency equipment for timely response to microbiological accidents</p> <p>2.5 Apply standard precautions when handling biological materials</p>

	<p>2.6 Minimise the production and release of aerosols, using biological safety cabinets where necessary</p> <p>2.7 Clean spills, reporting all spills and suspected accidents to supervisor</p> <p>2.8 Wash hands before and after laboratory work and when contamination is suspected</p> <p>2.9 Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures</p>
3. Process samples for direct examination	<p>3.1 Prepare thin smears of samples for subsequent staining to enable microscopic identification of cells</p> <p>3.2 Prepare liquid films of specimens for direct observation for motility or cell structure</p> <p>3.3 Prepare samples to concentrate material for subsequent staining or microscopy</p>
4. Prepare pure cultures for microbiological work and aseptic applications	<p>4.1 Select culture media to maximise growth of microorganisms and cells</p> <p>4.2 Inoculate media aseptically, applying techniques suitable for purpose of culture</p> <p>4.3 Incubate inoculated media in conditions to optimise growth of organisms and cells</p> <p>4.4 Sub culture on suitable media to optimise production of pure cultures</p>
5. Perform procedures that can assist in the identification of micro-organisms	<p>5.1 Select staining techniques to demonstrate required cellular characteristics</p> <p>5.2 Stain prepared films to demonstrate diagnostically useful characteristics</p> <p>5.3 Inoculate and incubate media with pure cultures to assist in the biochemical and immunological identification of micro-organisms</p> <p>5.4 Perform tests on pure cultures to assist in the biochemical and immunological identification of micro-organisms</p>
6. Estimate the number and/or size of micro-organisms in samples	<p>6.1 Count cells in undiluted samples to indicate the dilution necessary to reliably count organisms in culture</p>

	<p>6.2 Aseptically prepare serial dilutions of samples for culture and colony counting</p> <p>6.3 Count colonies for calculating number of viable organisms per unit volume</p> <p>6.4 Count micro-organisms in samples and cultures using spectrometric and electronic methodologies, where relevant</p>
<p>7. Contribute to antibiotic sensitivity testing where required</p>	<p>7.1 Prepare inoculum suitable for antibiotic sensitivity testing</p> <p>7.2 Dispense or position antibiotic discs as indicated by enterprise protocol</p> <p>7.3 Incubate inoculated media under conditions to maximise growth of cultured organism</p> <p>7.4 Read and record sensitivity reactions, noting phenomena that can assist in the correct interpretation of results</p>
<p>8. Maintain records of laboratory work</p>	<p>8.1 Make entries on report forms or into computer systems, accurately recording or transcribing required data as required</p> <p>8.2 Maintain instrument logs as required by accreditation checklists</p> <p>8.3 Keep confidential all clinical information and laboratory data</p> <p>8.4 Ensure security of all clinical information and laboratory data and records.</p>

Range Statement

- Check samples and request form details before they are accepted
- Return samples and request forms that do not comply with requirements to source with reasons for non-acceptance

UNIT 14

UNIT TITLE	Lab Safety Rules and Guidelines				
DESCRIPTOR	This unit of competency covers the ability to have a strong set of overall laboratory safety rules which is essential to avoid disasters in the lab. This unit provides skills required to apply for most facilities and deal with the basic upkeep, tidiness, and maintenance of a safe laboratory.				
CODE	SOC ₂₇ S ₂ U ₁₄ V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. General lab safety rules	<p>1.1 Be sure to read all fire alarm and safety signs and follow the instructions in the event of an accident or emergency.</p> <p>1.2 Ensure you are fully aware of your facility's/building's evacuation procedures</p> <p>1.3 Make sure you know where your lab's safety equipment—including first aid kit(s), fire extinguishers, eye wash stations, and safety showers—is located and how to properly use it.</p> <p>1.4 Know emergency phone numbers to use to call for help in case of an emergency.</p> <p>1.5 Lab areas containing carcinogens, radioisotopes, biohazards, and lasers should be properly marked with the appropriate warning signs.</p> <p>1.6 Open flames should never be used in the laboratory unless you have permission from a qualified supervisor.</p> <p>1.7 Always work in properly-ventilated areas.</p> <p>1.8 Do not chew gum, drink, or eat while working in the lab.</p> <p>1.9 Laboratory glassware should never be utilized as food or beverage containers.</p> <p>1.10 If an instrument or piece of equipment fails during use, or isn't operating properly, report the issue to a technician right away. Never try to repair an equipment problem on your own</p> <p>1.11 Report all injuries, accidents, and broken equipment or glass</p>

	<p>right away, even if the incident seems small or unimportant.</p> <p>1.12 In the event of a chemical splashing into your eye(s) or on your skin, immediately flush the affected area(s) with running water for at least 20 minutes.</p> <p>1.13 If you are the last person to leave the lab, make sure to lock all the doors and turn off all ignition sources.</p>
2. Housekeeping safety rules	<p>2.1 Always keep your work area(s) tidy and clean.</p> <p>2.2 Make sure that all eye wash stations, emergency showers, fire extinguishers, and exits are always unobstructed and accessible.</p> <p>2.3 Only materials you require for your work should be kept in your work area. Everything else should be stored safely out of the way.</p> <p>2.4 Only lightweight items should be stored on top of cabinets; heavier items should always be kept at the bottom.</p> <p>2.5 Solids should always be kept out of the laboratory sink.</p> <p>2.6 Any equipment that requires air flow or ventilation to prevent overheating should always be kept clear.</p>
3. Dress code safety rules	<p>3.1 Always tie back hair that is chin-length or longer</p> <p>3.2 Never wear sandals or other open-toed shoes in the lab. Footwear should always cover the foot completely.</p> <p>3.3 Never wear shorts or skirts in the lab.</p> <p>3.4 When working with Bunsen burners, lighted splints, matches, etc., acrylic nails are not allowed.</p>
4. Personal protection safety rules	<p>4.1 When working with equipment, hazardous materials, glassware, heat, and/or chemicals, always wear face shields or safety glasses</p> <p>4.2 When handling any toxic or hazardous agent, always wear the appropriate gloves.</p> <p>4.3 When performing laboratory experiments, you should always wear a smock or lab coat.</p>

	4.4 When using lab equipment and chemicals, be sure to keep your hands away from your body, mouth, eyes, and face.
5. Chemistry lab safety rules	5.1 Before you start an experiment, make sure you are fully aware of the hazards of the materials you'll be using.

RANGE STATEMENT

Procedures included

- Occupational Health and Safety risks and practices in the workplace
- Exchange relevant and scientific information
- Liaises with teaching staff and other school based and external personnel
- Communication appropriate for use when working with students
- Personal legal responsibilities when working with students and may inform others of them

Tools, equipment and materials required may include:

- Charts
- Computers

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicate effectively with people at different organisational levels and from diverse cultural backgrounds
- Use available communication equipment (eg, telephone, on-line and hard copy directories, email, fax, intranet and Internet)
- Listen attentively and clarify messages and instructions to confirm their meaning locate relevant sources of information
- Provide accurate information in an effective and timely manner

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• Knowledge of Communicating with other people standard• General knowledge of common terminologies used in Communicating with other people• Interpersonal interactions, equal opportunity, anti-discrimination, anti-harassment requirements communication protocols and the completion of workplace documentation.	<ul style="list-style-type: none">• Competent to work to meet requirements for Communicate with other people• Communication skills• Technical tasks• Interpersonal skills

UNIT 15

UNIT TITLE	Laboratory Security				
DESCRIPTOR	This unit of competency covers the ability to control access, maintain inventory, reporting and training the lab staffs for the important security procedures.				
CODE	SOC ₂₇ S ₂ U ₁₅ V ₁	Level	4	Credit	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Security Level 1	1.1. Lock doors when not occupied 1.2. Make sure all laboratory personnel receive security awareness training 1.3. Control access to keys and use judgment in providing keys to visitors
2. Physical Security Features	2.1. Lockable doors, windows, and other passageways 2.2. Door locks with high-security cores 2.3. Hardened doors, frames, and locks 2.4. Perimeter walls extending from the floor to the ceiling to prevent access from one area to the other over a drop ceiling
3. Operational and Electronic Security Features	3.1. Lockable doors, windows, and other passageway 3.2. Door locks with high-security cores 3.3. Hardened doors, frames, and locks 3.4. Perimeter walls extending from the floor to the ceiling to prevent access from one area to the other over a drop ceiling 3.5. Secure doors, windows, and passageways when not occupied 3.6. Make sure all laboratory personnel receive security awareness training 3.7. Visitors and contractors cannot enter laboratory unless laboratory personnel are present 3.8. Access control system recommended 3.9. Intrusion alarm recommended where sabotage, theft, or diversion is a concern
4. Reducing the Dual-Use	4.1. Periodically and carefully review laboratory access controls to

Hazard of Laboratory Materials	areas where dual-use agents are used or stored. 4.2. Limit the number of laboratory personnel who have access to dual-use agents. 4.3. Provide training to all laboratory personnel who have access to these substances, including a discussion of the risks of dual use. 4.4. Remain alert and aware of the possibility of removal of any chemicals for illicit purposes and know how to report such activity to a responsible person. 4.5. Maintain inventory records of these materials. 4.6. If electronic access controls are in place, maintain a log of who has gained access to areas where dual-use materials are used or stored.
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RANGE STATEMENT

Procedures included

5. Security Level 1 security measures
6. Operational and Electronic Security Feature

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Physical security measures
- Operational and Electronic Security Features

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• Knowledge of physical security measures• Knowledge of Operational and Electronic Security Features	<ul style="list-style-type: none">• Able to control access of the laboratory• Ability to maintain inventory• Able to effectively communicate and report incidents• Training skill to train lab staffs for the important

UNIT 16

UNIT TITLE	Laboratory Layout and Furnishing				
DESCRIPTOR	This unit of competency covers the ability to have a o locate fixed elements such as laboratory chemical hoods and sinks at the perimeter of the laboratory, ensuring maximum mobility of interior equipment and furniture.				
CODE	SOC ₂₇ S ₂ U ₁₆ V ₁	Level	4	Credit	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Adaptability	<p>1.1. Locate fixed elements such as laboratory chemical hoods and sinks at the perimeter of the laboratory, ensuring maximum mobility of interior equipment and furniture.</p> <p>1.2. Design interstitial spaces between the floors and to have all the utilities above the ceiling.</p> <p>1.3. Keep the interstitial spaces large enough to allow maintenance workers to access these utilities from above the ceiling for both routine servicing and to move plumbing and other utilities as research demands change.</p> <p>1.4. Where interstitial spaces are not possible, overhead service carriers may be hung from the underside of the structural floor system.</p>
2. Casework, Furnishings, and Fixtures	<p>2.1. Casework should be durable and designed and constructed in a way that provides for long-term use, reuse, and relocation</p> <p>2.2. Work surfaces should be chemical resistant, smooth, and easy to clean.</p> <p>2.3. Benchwork areas should have knee space to allow for chairs near fixed instruments or for procedures requiring prolonged operation.</p> <p>2.4. Work areas, including computers, should incorporate ergonomic features, such as adjustability, task lighting, and convenient equipment layout.</p> <p>2.5. Allow adequate space for ventilation and cooling of computers</p>

	<p>and other electronics.</p> <p>2.6. Handwashing sinks for particularly hazardous materials may require elbow, foot, or electronic controls.</p> <p>2.7. Do not install more cup sinks than are needed. Unused sinks may develop dry traps that result in odour complaints.</p> <p>2.8. Any equipment that requires air flow or ventilation to prevent overheating should always be kept clear.</p>
3. Doors, Windows, and Walls	3.1. Each laboratory should have an adequate number and placement of safety showers, eyewash units, and fire extinguishers for its operation
4. Safety Equipment and Utilities	<p>4.1. When working with equipment, hazardous materials, glassware, heat, and/or chemicals, always wear face shields or safety glasses</p> <p>4.2. When handling any toxic or hazardous agent, always wear the appropriate gloves.</p> <p>4.3. When performing laboratory experiments, you should always wear a smock or lab coat.</p> <p>4.4. When using lab equipment and chemicals, be sure to keep your hands away from your body, mouth, eyes, and face.</p>
5. Chemistry lab safety rules	5.1. Before you start an experiment, make sure you are fully aware of the hazards of the materials you'll be using.

RANGE STATEMENT

Procedures included

- Occupational Health and Safety risks and practices in the workplace
- Exchange relevant and scientific information
- Liaises with teaching staff and other school based and external personnel
- Communication appropriate for use when working with students
- Personal legal responsibilities when working with students and may inform others of them

Tools, equipment and materials required may include:

- Charts
- Computers

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicate effectively with people at different organisational levels and from diverse cultural backgrounds
- Use available communication equipment (eg, telephone, on-line and hard copy directories, email, fax, intranet and Internet)
- Listen attentively and clarify messages and instructions to confirm their meaning locate relevant sources of information
- Provide accurate information in an effective and timely manner

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none"> • Knowledge of Communicating with other people standard • General knowledge of common terminologies used in Communicating with other people • Interpersonal interactions, equal opportunity, anti-discrimination, anti-harassment requirements communication protocols and the completion of workplace documentation. 	<ul style="list-style-type: none"> • Competent to work to meet requirements for Communicate with other people • Communication skills • Technical tasks • Interpersonal skills

UNIT 17

UNIT TITLE	Laboratory Emergency Response Procedures				
DESCRIPTOR	This unit of competency covers the ability to take actions that need to be taken in case of an emergency in a laboratory and if a person is affected				
CODE	SOC ₂₇ S ₂ U ₁₈ V ₁	Level	4	Credit	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Fire Emergency	1.1. Alert people in area to evacuate. 1.2. Activate nearest fire alarm or call Security number. 1.3. Close doors to confine fire. 1.4. Evacuate to safe area or exit building through stairwell; do not use lift. 1.5. Have person knowledgeable of incident and laboratory assist emergency personnel. 1.6. Small fires can be extinguished without evacuation. 1.7. Fire extinguishers should only be used by trained personnel. 1.8. Never enter a room that is smoke filled. 1.9. Never enter a room containing a fire without a backup person.
2. Medical Emergency	2.1. Remain calm. 2.2. Initiate lifesaving measures if required. 2.3. Do not move person unless there is danger of further harm. 2.4. Keep person warm. 2.5. Call for emergency response. 2.6. Initiate first aid.
3. Chemical Spill Emergency	3.1. Attend to injured or contaminated persons and remove them from exposure. 3.2. Alert people in the laboratory to evacuate.

	<p>3.3. If spilled material is flammable, turn off ignition and heat sources.</p> <p>3.4. Call for assistance.</p> <p>3.5. Close doors to affected area.</p> <p>3.6. Have person knowledgeable of incident and laboratory assist emergency personnel</p> <p>3.7. Alert people in immediate area of spill.</p> <p>3.8. Wear protective equipment, including safety goggles, gloves, and long-sleeve laboratory coat.</p> <p>3.9. Avoid breathing vapours from spill.</p> <p>3.10. Confine spill to small area.</p> <p>3.11. Use appropriate kit to neutralise and absorb inorganic acids and bases. Collect residue, place in container, and dispose as chemical waste.</p> <p>3.12. For other chemicals, use appropriate kit or absorb spill with vermiculite, dry sand, or diatomaceous earth. Collect residue, place in container and dispose as chemical waste.</p> <p>3.13. The range and quantity of hazardous substances used in laboratories require preplanning to respond safely to chemical spills.</p> <p>3.14. The clean-up of a chemical spill should only be done by knowledgeable and experienced personnel.</p> <p>3.15. Spill kits with instructions, absorbents, reactants, and protective equipment should be available to clean up minor spills.</p> <p>3.16. A minor chemical spill is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. All other chemical spills are considered major.</p>
<p>4. Biological Spill Emergency</p>	<p>4.1. Attend to injured or contaminated persons and remove them from exposure.</p> <p>4.2. Alert people in immediate area of spill.</p>

	<p>4.3. Close doors to affected area.</p> <p>4.4. Put on protective equipment.</p> <p>4.5. Cover spill with paper towels or other absorbent materials.</p> <p>4.6. Carefully pour a freshly prepared 1 in 10 dilution of household bleach around the edges of the spill and then into the spill. Avoid splashing.</p> <p>4.7. Allow a 20-minute contact period for the bleach solution to be effective.</p> <p>4.8. Use paper towels to wipe up the spill, working from the edges into the centre.</p> <p>4.9. Clean spill area with fresh towels soaked in disinfectant.</p> <p>4.10. Place towels in a plastic bag and decontaminate in an autoclave.</p> <p>4.11. Have person knowledgeable of the incident and laboratory assist emergency personnel.</p> <p>4.12. Wear disposable gloves.</p> <p>4.13. Soak paper towels in disinfectant and place over spill area.</p> <p>4.14. Place towels in plastic bag for disposal.</p> <p>4.15. Clean spill area with fresh towels soaked in disinfectant.</p>
<p>5. Hazardous Material Splashed in Eye.</p>	<p>5.1. Immediately rinse eyeball and inner surface of eyelid with water continuously for 15 minutes.</p> <p>5.2. Forcibly hold eye open to ensure effective wash behind eyelids.</p> <p>5.3. Obtain medical attention.</p> <p>5.4. Report incident to supervisor.</p>
<p>6. Minor Cuts and Puncture Wounds</p>	<p>6.1. Vigorously wash injury with soap and water for several minutes.</p> <p>6.2. Obtain medical attention.</p>

	6.3. Report incident to supervisor.
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RANGE STATEMEN

- Carry out small fire extinguish without evacuation
- Have person knowledgeable of incident and laboratory assist emergency personnel.
- Attend to injured or contaminated persons and remove them from exposure
- Able to carry out safety procedures when hazardous material Splashed in eye
- Able to carry out safety procedures in case of minor cuts and puncture wounds

ASSESSMENT GUIDE

Form of assessment

- Assessment for the unit needs to be holistic and observed in a simulated environment
- Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Able to carry safety procedures in case of fire
- Able to conduct safety procedures in case chemical and biological substance spill

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• Knowledge of Communicating and carrying out safety procedures in case of fire and chemical spills	<ul style="list-style-type: none">• Communication skills• Ability to carry out safety procedures with confidence• Ability to act promptly in case of emergency

UNIT 18

UNIT TITLE	Calibrating and Maintenance				
DESCRIPTOR	This unit of competency covers the ability to perform setup and pre-use checks, calibrate testing equipment and assist with its maintenance				
CODE	SOC ₂₇ S ₂ U ₁₈ V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1 Perform setup and pre-use checks of laboratory equipment	1.1 Perform laboratory equipment setup and pre-use checks in accordance with enterprise procedures 1.2 Perform safety checks in accordance with relevant enterprise and instrumental procedures 1.3 Identify faulty or unsafe components and equipment and report to appropriate personnel 1.4 Complete instrument log books to enterprise requirements

<p>2. Perform calibration checks</p>	<p>2.1 Start-up equipment according to operating procedures</p> <p>2.2 Use specified standards for calibration check</p> <p>2.3 Check equipment as per calibration procedures and schedules</p> <p>2.4 Record all calibration data accurately and legibly</p> <p>2.5 Quarantine out of calibration equipment</p>
<p>3 Assist with equipment maintenance</p>	<p>3.1 Ensure all equipment work areas are clean during and after equipment use</p> <p>3.2 Perform basic maintenance in accordance with enterprise procedures</p> <p>3.3 Clean and store equipment as per enterprise and/or manufacturer's specifications/procedures</p> <p>3.4 Identify and replace, repair or dispose of damaged/worn equipment as appropriate</p>

RANGE STATEMENT

Tools, equipment and material used in this unit may include:

- Relevant tools and equipment.

ASSESSMENT GUIDE

Assessment context

This unit may be assessed in a simulated environment where students are assessed on their ability to calibrate and maintain laboratory equipment.

UNIT 19

UNIT TITLE	Troubleshooting, Service Repair and Retiring Equipment				
DESCRIPTOR	This unit develops competency to operate subtle changes such as drift in quality control or calibrator values, or obvious flaws in equipment function. Also, this unit develops the competency to troubleshoot equipment problems in order to quickly get the equipment functioning and resume testing as rapidly as possible.				
CODE	SOC ₂₇ S ₂ U ₁₉ V ₁	Level	4	Credit	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Troubleshooting	<p>1.1. Manufacturers frequently provide a flow chart that can help determine the source of problems. Some of the questions to consider are listed below.</p> <ul style="list-style-type: none"> - Is the problem related to a poor sample? - Has the sample been collected and stored properly? Are factors such as turbidity or coagulation affecting instrument performance? - Is there a problem with the reagents? - Have they been stored properly, and are they still in date? - Have new lot numbers been introduced without updating instrument calibration? - Is there a problem with the water or electrical supply? Is there a problem with the equipment? - Make one change at a time based on symptoms. If the equipment is the problem, review the manufacturer's instructions to verify that all procedures are being followed correctly.
2. When problems cannot be corrected	<p>2.1. If problems cannot be identified and corrected in-house, attempt to find a way to continue testing until the equipment can be repaired. Some ways to achieve this are as follows.</p> <ul style="list-style-type: none"> - Arrange to have access to backup instruments. It is often too costly for the - laboratory to have its own backup instruments, but

	<p>sometimes a central store</p> <ul style="list-style-type: none"> - Ask the manufacturer to provide a replacement instrument during repairs. - Send the samples to a nearby laboratory for testing.
<p>3. Service and repair</p>	<p>3.1. Manufacturers may provide service and repair of equipment that is purchased from them.</p> <p>3.2. Be sure to set up a procedure for scheduling service that must be</p> <p>3.3. Periodically performed by the manufacturer. When instruments need repair,</p> <p>3.4. Remember that some warranties require that repairs be handled only by the manufacturer.</p> <p>3.5. Routine service should be scheduled so as not to interrupt the flow of work.</p>
<p>4. Retiring and disposing of equipment</p>	<p>4.1. It is very important to have a policy and procedure for retiring older laboratory equipment.</p> <p>4.2. This will usually occur when it is clear that the instrument is not functioning and is not repairable, or when it is outmoded and should be replaced with new equipment.</p> <p>4.3. Once a piece of equipment is fully retired and it has been determined that it has</p> <p>4.4. No further use, it should be disposed of in an appropriate manner. This last step is</p> <p>4.5. When disposing of equipment, salvage any usable parts, particularly if the</p>

RANGE STATEMEN

- Troubleshoot problem with the water and electrical supplies and laboratory equipment
- If problems cannot be identified and corrected in-house, attempt to find a way to continue testing until the equipment can be repaired
- Providing routine service

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Form of assessment

- Assessment for the unit needs to be holistic and observed in a simulated environment
- Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Able to carry troubleshoot laboratory equipment.
- Able to conduct routine work flow and routine checking of the laboratory equipment

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
<ul style="list-style-type: none">• Knowledge of following manufacturers manual and assembling the laboratory equipment• Knowledge of troubleshooting the laboratory equipment	<ul style="list-style-type: none">• Communication skills• Ability to follow instructions and assemble laboratory equipment• Ability to troubleshoot the laboratory equipment when a problem arises• Ability to routine check the laboratory equipment

