

## PERFORM BIOLOGY TECHNIQUES

**UNIT CODE:** 0511 441 09A

**TVET CDACC UNIT CODE:** SLT/OS/SL/CR/03/5/MA

### UNIT DESCRIPTION

This unit specifies the competencies required to Perform Biology Technique. It involves performing cytological test, performing food test, Care for laboratory animal and carrying out microbiological techniques. It also entails carrying out herbarium techniques, carrying out museum techniques and conducting ecological experiments

### ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the <b>key outcomes</b> which make up workplace function (to be stated in active)	These are <b>assessable statements</b> which specify the required level of performance for each of the elements (to be stated in passive voice) <i><b>Bold and italicized terms are elaborated in the Range</b></i>
1. Perform cytological test	1.1 <i><b>Cytological specimen</b></i> is extracted as per work requirement 1.2 Specimen is prepared as per laboratory manual 1.3 Specimen is observed under <i><b>a microscope</b></i> as per work requirement. 1.4 Cytological test report is prepared as per science laboratory procedures
2. Perform food test	2.1 <i><b>Food test apparatus</b></i> and <i><b>equipment</b></i> are assembled as per work requirement 2.2 <i><b>Food test reagents</b></i> are prepared as per standard laboratory procedures 2.3 Food sample is tested as per laboratory manual procedures. 2.4 <i><b>Food test</b></i> report is prepared as per work requirement

3. Carry out microbiological technique	<p>3.1 <b>Microbiology apparatus</b> and <b>Equipment</b> is sterilized as per laboratory manual procedure</p> <p>3.2 Culture media is prepared as per manufacturer's specification.</p> <p>3.3 <b>Microbial Specimen</b> is cultured as per work requirement.</p> <p>3.4 Microbial culture report is prepared as per work requirement Culture media is disposed as per work requirement</p>
4. Care for laboratory animals	<p>4.1 <b>Laboratory animals</b> are handled as per science laboratory requirements</p> <p>4.2 Sexing of laboratory animals is carried out as per anatomical procedures</p> <p>4.3 <b>Humane killing</b> is carried out as per laboratory procedures</p> <p>4.4 Laboratory animals is dissected as per anatomy and physiology laboratory manual</p> <p>4.5 Animal carcasses are disposed as per work requirement</p>
5. Carry out herbarium technique	<p>5.1 <b>Herbarium tools</b> are assembled as per work requirement</p> <p>5.2 <b>Botanical garden maintenance</b> is carried out as per Botanical accreditation standards</p> <p>5.3 Plant specimens are collected as per botanical guidelines</p> <p>5.4 Plant specimen processing is carried out according to herbarium laboratory manual</p> <p>5.5 <b>Herbarium specimen</b> is labeled according to herbarium handbook</p>

	<p>5.6 Herbarium specimen is displayed according to herbarium handbook</p> <p>5.7 Herbarium specimens are stored according to work requirement</p>
6. Carry out museum technique	<p><b>6.1 Museum apparatus and equipment</b> are assembled as per work requirement</p> <p><b>6.2 Museum specimens</b> are collected as per work requirement</p> <p><b>6.3</b> Museum specimens are preserved according to work requirement</p> <p><b>6.4</b> Museum specimens are labeled as per museum handbook</p> <p><b>6.5</b> Museum specimens are displayed as per museum handbook</p> <p><b>6.6</b> Museum specimens are stored as per museum handbook</p>
7. Conduct ecological experiments	<p>7.1 Terminologies used in ecology</p> <p>7.2 <b>Ecological equipment</b> is maintained as per science laboratory procedures</p> <p>7.3 <b>Abiotic factors</b> are measured as per weather station manual</p> <p>7.4 <b>Biotic factors</b> are measured as per work requirement</p> <p>7.5 Ecological factors report is prepared as per work requirement</p>

## RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
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1. Cytological specimen includes but not limited to:	<ul style="list-style-type: none"> <li>• Plant cells</li> <li>• Animal cells</li> <li>• Microbial cells</li> <li>• Tissue samples</li> </ul>
2. Microscopes include but not limited to:	<ul style="list-style-type: none"> <li>• Florescent microscope</li> <li>• Bright field microscope</li> <li>• Dark ground microscope</li> <li>• Electron microscope</li> <li>• Phase contrast microscope</li> <li>• Dissecting microscope</li> </ul>
3. Food test apparatus and equipment includes but is not limited to:	<ul style="list-style-type: none"> <li>• Water bath</li> <li>• Test tube</li> <li>• Scapula</li> <li>• White tile</li> <li>• Reagent bottle</li> <li>• mortar and Pestle</li> <li>• Glassware</li> </ul>
4. Food test reagents include but is not limited to:	<p>Reagents for testing;</p> <ul style="list-style-type: none"> <li>• reducing sugars</li> <li>• non reducing sugars</li> <li>• lipids</li> <li>• proteins</li> <li>• starch</li> <li>• vitamins</li> </ul>

5. Food test include but not limited to:	Test for <ul style="list-style-type: none"> <li>• Protein</li> <li>• Vitamins</li> <li>• reducing sugars</li> <li>• non-reducing sugars</li> <li>• starch</li> <li>• lipids</li> </ul>
6. Microbiology apparatus and equipment includes but not limited to:	<ul style="list-style-type: none"> <li>• Autoclaves</li> <li>• Ovens</li> <li>• Incubator</li> <li>• Incinerator</li> <li>• Wire loops</li> <li>• Bunsen burners</li> <li>• Culture plates</li> <li>• Microbiological glassware</li> <li>• Biosafety hoods</li> <li>• Refrigerator</li> </ul>
7. Microbial Specimen includes but not limited to:	<ul style="list-style-type: none"> <li>• Bacteria</li> <li>• Fungi</li> <li>• Protozoa</li> </ul>
8. Laboratory animals include but not limited to:	<ul style="list-style-type: none"> <li>• Rats</li> <li>• Guinea pigs</li> <li>• Rabbits</li> <li>• Mongolian gerbil</li> <li>• Hamsters</li> <li>• Insects</li> <li>• Birds</li> </ul>

9. Humane killing includes but not limited to:	<ul style="list-style-type: none"> <li>• Physical methods</li> <li>• Chemical methods</li> <li>• Electrical methods</li> </ul>
10. Herbarium tools include but not limited to:	<ul style="list-style-type: none"> <li>• Cutting tools</li> <li>• Digging tools</li> <li>• Collection bags</li> <li>• Field stationery</li> <li>• Plant press</li> <li>• Blotting papers</li> <li>• Source of heat</li> </ul>
11. Botanical garden maintenance include but not limited to:	<ul style="list-style-type: none"> <li>• Weeding</li> <li>• Pruning</li> <li>• Irrigation</li> <li>• Pest control</li> <li>• Planting</li> </ul>
12. Herbarium specimens includes but not limited to:	<ul style="list-style-type: none"> <li>• Leaves</li> <li>• Roots</li> <li>• Flowers</li> <li>• Fruits</li> <li>• Whole plants</li> <li>• Seeds</li> <li>• Stems</li> </ul>

13. Museum apparatus and equipment includes but not limited to:	<ul style="list-style-type: none"> <li>• Museum jars</li> <li>• Killing jars</li> <li>• Pouter</li> <li>• Nets</li> <li>• Traps</li> <li>• Field stationeries</li> <li>• Collection bags</li> <li>• Pair of tongs and forceps</li> </ul>
14. Museum specimens include but not limited to:	<ul style="list-style-type: none"> <li>• Arthropods</li> <li>• Mammals</li> <li>• Reptiles</li> <li>• Birds</li> <li>• Plants</li> <li>• Fish</li> <li>• Annelids</li> </ul>
15. Ecological equipment includes but not limited to:	<ul style="list-style-type: none"> <li>• Quadrats</li> <li>• Nets</li> <li>• Tape measure</li> <li>• Ropes and strings</li> <li>• Marker pens</li> <li>• Instruments of measuring elements of weather</li> </ul>

16. Abiotic factors include but not limited to:	<ul style="list-style-type: none"> <li>• Rainfall</li> <li>• Humidity</li> <li>• Salinity</li> <li>• Ph</li> <li>• Soil</li> <li>• Temperature</li> <li>• Atmospheric pressure</li> <li>• Oxygen</li> <li>• Air</li> </ul>
17. Biotic factors include but not limited to:	<ul style="list-style-type: none"> <li>• Symbiosis</li> <li>• Competition</li> <li>• Parasitism</li> <li>• Commensalism</li> <li>• Predation</li> </ul>

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Maintenance
- Communication
- Interpersonal
- Analytical
- Critical thinking
- Problem solving
- First aid
- Innovation
- Creativity

- Drawing
- Organisation
- Management
- Planning
- Decision making

### Required Knowledge

The individual needs to demonstrate knowledge of:

- Microscopy
- Photography
- Scientific report writing
- Occupational safety and health
- Basic mathematics
- Computer application
- Environmental conservation
- Entrepreneurship

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1 Critical Aspects of Competency</p>	<p>1.1 Assessment requires evidence that the candidate:</p> <p>1.2 Observed specimen under a microscope as per work requirement.</p> <p>1.3 Prepared food test reagents as per standard laboratory procedures</p> <p>1.4 Tested food sample as per laboratory manual procedures</p> <p>1.5 Prepared culture media as per manufacturer's specification.</p> <p>1.6 Cultured Microbial Specimen as per work requirement.</p> <p>1.7 Handled laboratory animal as per science laboratory requirements</p> <p>1.8 Carried out humane killing as per laboratory procedures</p> <p>1.9 Dissected laboratory animals as per anatomy and physiology laboratory manual</p>
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	<p>1.10 Collected plant specimens as per work requirement</p> <p>1.11 Carried out plant specimen processing according to herbarium laboratory manual</p> <p>1.12 Stored herbarium specimens according to work requirement</p> <p>1.13 Collected museum specimens as per work requirement</p> <p>1.14 Preserved museum specimens according to work requirement</p> <p>1.15 Measured abiotic factors as per weather station manual</p> <p>1.16 Measured biotic factors as per work requirement</p>
2. Resource implications	<p>The following resources should be provided:</p> <p>2.1 Appropriately simulated environment where assessment can take place.</p> <p>2.2 Access to relevant work environment.</p> <p>2.3 Resources relevant to the proposed activities or tasks.</p>
3. Methods of assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1 Practical</p> <p>3.2 Project</p> <p>3.3 Third party report</p> <p>3.4 Portfolio of evidence</p> <p>3.5 Written test</p> <p>3.6 Oral test</p>
4. Context of assessment	<p>Competency may be assessed in a work place or simulated workplace</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector and workplace job role is recommended.</p>