

APPLY GENERAL SCIENCE PRINCIPLES

UNIT CODE: 0531 441 05A

TVET CDACC UNIT CODE: SLT/OS/SL/CC/01/5/MA

UNIT DESCRIPTION:

This unit covers the competencies required to apply general science principles. It involves applying animal anatomy and physiology concepts, plant anatomy and physiology concepts, inorganic chemistry concepts, organic chemistry concepts, physical chemistry concepts, mechanics concepts and thermodynamics concepts.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENTS	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace functions	These are assessable statements which specify the required level of performance for each of the elements Bold and italicized terms are elaborated in the range
1. Apply animal anatomy and physiology concepts	1.1 <i>Animal nutrition</i> concept is applied as per work requirement 1.2 Animal transport system is analyzed as per biology laboratory manual 1.3 Animal reproductive system is analyzed as per work requirement 1.4 Animal excretory system is analyzed as per biology laboratory manual 1.5 Animal gaseous exchange system is analyzed as per biology laboratory manual
2. Apply plant anatomy and physiology concepts	2.1 Plant nutrition concept is applied as per work requirement 2.2 Plant transport concept is applied as per work requirement

	<p>2.3 <i>Plant reproduction</i> concept is applied as per work requirement</p> <p>2.4 Plant excretion concept is applied as per work requirement</p> <p>2.5 Plant gaseous exchange structure is analysed as per biology laboratory manual</p>
3. Apply inorganic chemistry concepts	<p>3.1 <i>Elements classification</i> knowledge is applied as per the periodic table</p> <p>3.2 <i>Chemical bonds</i> are modeled according to Valence Shell Electron Pair Repulsion (VSEPR) theory</p> <p>3.3 Inorganic salt is prepared as per chemical solubility rules</p>
4. Apply organic chemistry concepts	<p>4.1 <i>Organic compound classification</i> knowledge is applied as per International Union of Pure and Applied Chemistry (IUPAC) rules</p> <p>4.2 Organic compound is modeled as per chemistry laboratory manual</p> <p>4.3 <i>Organic reaction</i> concept is applied as per work requirement</p>
5. Apply physical chemistry concepts	<p>5.1 <i>Acids</i> and <i>bases</i> are identified as per work requirement</p> <p>5.2 <i>Gas law concept</i> is applied as per work requirement</p> <p>5.3 <i>Electrochemistry concept</i> is applied as per work requirement</p>
6. Apply mechanics concept	<p>6.1 <i>Mechanics force</i> concept is applied as per work requirement</p> <p>6.2 Circular motion concept is applied as per work requirement</p> <p>6.3 <i>Newton's Law of Motion</i> is applied as per work requirement</p>

7. Apply thermodynamics concepts.	<p>7.1 <i>Heat transfer</i> knowledge is applied as per work requirement</p> <p>7.2 <i>Thermodynamics law</i> concept is applied as per work requirement</p> <p>7.3 Work, energy and power concepts are applied as per work requirement</p>
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RANGE

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

Variable	Range
1. Animal nutrition may include but not limited to;	<ul style="list-style-type: none"> • Parasitism • Symbiotism • Saprophytism • Holozoic nutrition
2. Plant reproduction may include but not limited to;	<ul style="list-style-type: none"> • Sexual • Asexual
3. Elements classification may include but not limited to;	<ul style="list-style-type: none"> • S- block elements • P-block elements • D- block elements
4. Chemical bonds may include but not limited to;	<ul style="list-style-type: none"> • Ionic bond • Covalent bond • Metallic bond • Dative bond • Hydrogen bonding
5. Organic compound classification may include but not limited to;	<ul style="list-style-type: none"> • Alkanes • Alkenes • Alkynes • Alkanols • Alkanoic acids
6. Organic reactions may include but not limited to;	<ul style="list-style-type: none"> • Addition • Reduction • Substitution

7. Acids may include but not limited to;	<ul style="list-style-type: none"> • Hydrochloric acid • Sulphuric acid • Nitric acid
8. Bases may include but not limited to;	<ul style="list-style-type: none"> • Sodium hydroxide • Ammonia solution • Calcium hydroxide
9. Gas law concept may include but not limited to;	<ul style="list-style-type: none"> • Boyle's Law • Charle's Law • Daltons Law of partial pressures • Grahams Law of diffusion
10. Electrochemistry concept may include but not limited to;	<ul style="list-style-type: none"> • Reduction • Oxidation • Electrolysis • Faraday's Laws 1\$2 • electrolytes
11. Mechanics force may include but not limited to;	<ul style="list-style-type: none"> • Friction • Tension • Shear
12. Newton's Law of Motion may include but not limited to;	<ul style="list-style-type: none"> • First law of Newton • Second law of Newton • Third law of Newton
13. Heat transfer may include but not limited to;	<ul style="list-style-type: none"> • Conduction • Convection • Radiation
14. Thermodynamics laws may include but not limited to;	<ul style="list-style-type: none"> • First law of thermodynamics • Second law of thermodynamics

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:

- Basic computer
- Critical thinking
- Problem solving
- Communication
- Creativity
- Interpretation

Required knowledge

The individual needs to demonstrate knowledge of:

- Laboratory apparatus and equipment
- Occupation Safety and Health practices
- Characteristics of living organisms
- Elements and compounds
- Mixtures and compounds
- Chemical reactions
- Conductors and insulators
- Classification of organisms
- Cells
- Measurements
- SI units and conversions
- Computer literacy

EVIDENCE GUIDE

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

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Applied animal nutrition concepts as per work requirement 1.2 Analyzed animal transport system as per work requirement 1.3 Analyzed animal reproduction system as per work requirement
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	<p>1.4 Analyzed animal excretory system as per biology laboratory manual</p> <p>1.5 Analyzed Animal gaseous exchange system as per biology laboratory manual</p> <p>1.6 Applied plant nutrition concept as per biology laboratory manual</p> <p>1.7 Applied plant transport concepts as per biology laboratory manual</p> <p>1.8 Applied plant reproduction concepts as per biology laboratory manual</p> <p>1.9 Applied plant excretion concepts as per work requirement</p> <p>1.10 Analyzed plant gaseous exchange structure as per work requirement</p> <p>1.11 Applied elements classification knowledge as per the periodic table</p> <p>1.12 Applied chemical bonds modeled as per VSEPR theory</p> <p>1.13 Applied organic reactions knowledge as per work requirement</p> <p>1.14 Applied gas law concept as per work requirement</p> <p>1.15 Applied electrochemistry concept as per work requirement</p> <p>1.16 Applied circular motion concept as per work requirement</p> <p>1.17 Applied Newton's law of motion as per work requirement</p> <p>1.18 Applied thermodynamics law concepts as per work requirement</p> <p>1.19 Applied work, energy and power concepts as per work requirement</p>
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2. Resource implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Appropriately simulated environment where assessment can take place. 2.2 Access to relevant work environment. 2.3 Resources relevant to the proposed activities or tasks.
3. Methods of assessment	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Practical 3.2 Project 3.3 Third party report 3.4 Portfolio of evidence 3.5 Written test 3.6 Oral test
4. Context of assessment	<p>Competency may be assessed in a workplace or simulated workplace</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace job role is recommended.</p>