CARRY OUT ECOLOGICAL AND SOIL STUDIES

UNIT CODE: APB/OS/AB/CR/05/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to carry out ecological and soil studies. It involves applying ecological principles, applying population ecology, carrying out aquatic studies, carrying out terrestrial studies and applying soil formation. It also involves carrying out soil science and applying environmental conservation.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the **key outcomes** which make up workplace function (to be stated in active)	**PERFORMANCE CRITERIA** These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice) ***Bold and italicized terms are elaborated in the Range***
1 Apply ecological principles	1.1 ***Abiotic and biotic factors*** are identified as per ecological principles 1.2 Abiotic and biotic factors are measured as per ecological principles 1.3 Food chains and food webs are constructed based on type of ecosystem 1.4 Ecological pyramids are constructed based on type of ecosystem
2 Apply population ecology	2.1 ***Population estimation methods*** are determined based on the type of organisms 2.2 Population size estimation is carried out based on ecological principles 2.3 ***Population dynamics*** are determined based on type of organism
3 Carry out aquatic studies	3.1 Types of ***aquatic ecosystems*** are determined based on water quality 3.2 Aquatic organisms are collected and identified based on the type of ecosystem 3.3 Adaptive features of aquatic organisms are identified based on their observable features
4 Carry out terrestrial studies	4.1 Types of ***terrestrial ecosystems*** are determined based on water quality

	4.2 Terrestrial organisms are collected and identified based on the type of ecosystem 4.3 Adaptive features of terrestrial organisms are identified based on their observable features
5 Demonstrate biogeochemical cycles	5.1 Gaseous cycles are demonstrated as per ecological procedures 5.2 Hydrological cycle is demonstrated as per ecological procedures 5.3 Nutrient cycles are demonstrated as per ecological procedures
6 Apply soil formation	6.1 ***Soil components*** are determined based on type of soil 6.2 Soil formation process is determined based on the ecological zone 6.3 ***Soil profile*** is determined based on the ecological zone 6.4 Classification of soils is carried out based on biophysiochemical properties.
7 Carry out soil science	7.1 Soil structure and texture are determined based on the soil type 7.2 Soil water, air and temperature are determined based on soil type 7.3 ***Mineral elements*** in soil are analyzed based on soil type 7.4 Soil pH and cation exchange capacity are determined based on soil type 7.5 ***Soil organisms*** are isolated and identified based on observable features 7.6 Soil organic matter is determined based on soil type
8 Apply environmental conservation	8.1 Causes of ecosystem degradation are identified based on ecosystem type 8.2 ***Methods of environmental conservation*** are identified based on degradation cause 8.3 Environment conservation exercise is carried out based on degradation cause

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
Abiotic and biotic factors include but are not limited to:	• Wind • Light • Water • Temperature • Humidity • Competition • Predation
Population estimation methods include but are not limited to:	• Capture-recapture • Direct count • Line transects • Belt transects • Quadrat
Population dynamics include but are not limited to:	• Predation • Competition • Migration • Edaphic factors
Aquatic ecosystems include but not limited to:	• Marine • Brackish water • Fresh • Wet land
Terrestrial ecosystems include but not limited to:	• Forest • Grassland • Range land • Arid and semi-arid
Soil components include but not limited to:	• Air • Water • Organic matter • Minerals
Soil profile includes but not limited to:	• Top soil • Sub soil • Parent rock

Mineral elements include but not limited to:	• Major elements • Trace elements
Soil organisms include but not limited to:	• Earthworms • Protozoa • Fungi • Nematodes • arthropods
Methods of environmental conservation include but not limited to:	• Re-afforestation • Control soil erosion • Building dams • Pollution control

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

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

Required Knowledge

The individual needs to demonstrate knowledge of:

- Biotic and abiotic factors
- Ecosystems
- Food chains
- Food webs
- Ecological pyramids
- Population
- Succession

- Aquatic ecology
- Terrestrial ecology
- Biogeochemical cycles
- Environmental conservation
- Soil science
- Soil conservation

EVIDENCE GUIDE

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

1 Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified and measured abiotic and biotic factors 1.2 Constructed food chains, food webs and ecological pyramids 1.3 Determined population estimation methods and population dynamics 1.4 Carried out population size estimation 1.5 Determined types of aquatic and terrestrial ecosystems 1.6 Collected and identified adaptive features of aquatic and terrestrial organisms 1.7 Determined soil components, soil formation process and soil profile 1.8 Carried out classification of soils 1.9 Determined soil structure, texture, water, air and temperature 1.10 Analyzed mineral elements in soil 1.11 Determined soil pH and cation exchange 1.12 Isolated and identified soil organisms 1.13 Determined soil organic matter based on soil type 1.14 Identified causes of ecosystem degradation 1.15 Identified methods of environmental conservation 1.16 Carried out environment conservation exercise
2 Resource Implications	The following resources should be provided: 2.1 Well-equipped biology laboratory facility 2.2 Biology laboratory procedures manual 2.3 Laboratory reagents and chemicals 2.4 Laboratory tools and equipment 2.5 PPEs

3	Methods of Assessment	Competency in this unit may be assessed through: 3.1 Oral 3.2 Written 3.3 Observation 3.4 Third party 3.5 Practical test
4	Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.