SOIL SCIENCE PRINCIPLES

ISCED UNIT CODE: 0811 451 05A

TVETCDACC UNIT CODE: AQ/CU/PN/CC/02/6/MA

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply soil science principles

Duration of Unit: 180 HOURS

UNIT DESCRIPTION

This unit specifies the competencies required to apply soil science principles. It includes competencies for performing soil sampling and analysis, and improving soil fertility.

Summary of learning outcomes

By the end of this unit of learning, the trainee should be able to:

S/No	Learning Outcomes	Duration (Hours)
1.	Perform soil sampling	60
2.	Perform soil analysis	60
3.	Improve soil fertility	60
Total		**180**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. soil sampling	1.1 Personal protective equipment 1.1.1 Gloves 1.1.2 Safety goggles 1.1.3 Safety boots 1.1.4 Overalls 1.1.5 Dust coat 1.1.6 Ear muffs 1.1.7 Face masks 1.2 Soil sampling 1.2.1 zigzag	• Practical • Project • Third party report • Portfolio of evidence • Written tests • Oral questioning

	1.2.2 traverse 1.3 Soil sampling tools 1.3.1 Soil probe 1.3.2 Soil auger 1.3.3 Sampler tube 1.3.4 Trowel 1.4 Soil sampling procedures • Field layout • Sample collection • Compositing • Packaging • Processing • Storage 1.5 Soil testing 1.6 Soil testing equipment 1.6.1 Ph meter 1.6.2 soil moisture meter 1.6.3 Texture analysis tools….	
2. Perform soil analysis	**2.1 Personal protective equipment** • Gloves • Safety goggles • Safety boots • Overalls • Dust coat • Ear muffs • Face masks 2.1.2Uses **2.2 Soil analysis** 2.2.1 Definition 2.2.2 Tools equipment &materials **2.3 Soil analysis process** **2.4 Soil properties** **2.4.1 soil physical properties** 2.4.1.1 soil bulk density 2.4.1.2 Water holding capacity 2.4.1.3 Soil texture	• Practical • Project • Third party report • Portfolio of evidence • Written tests • Oral questioning

	2.4.1.4 Soil aggregation and soil colloids 2.4.1.5 Soil consistence 2.4.1.6 Soil colour 2.4.1.7 Soil moisture 2.4.1.8 Soil air **2.4.2 Soil Chemical properties** 2.4.2.1 Soil PH 2.4.2.2 Soil EC 2.4.2.3 Cation exchange capacity 2.4.2.4 Percent base saturation 2.4.2.5 Salt index 2.4.2.6 CN ratio 2.4.2.7 Nutrients concentration **2.4.3 biological properties** 2.4.3.1 microbial activity 2.4.3.2 C:N ratio **2.5 soil analysis report**	
3 Improve soil fertility	**3.1 Personal protective equipment** • 3.1.1 Types • Gloves • Safety goggles • Safety boots • Overalls • Dust coat • Ear muffs • Face masks 3.1.1 Uses **3.2 Soil fertility** 3.2.1 Definition 3.1.2 Characteristics of a fertile so 3.1.3 Micro and Macro nutrients 3.2.4 Ways in which soil losses fert **3.3 Fertilizers** 3.3.1 Organic 3.3.2 Inorganic 3.3.3 Fertilizer application metho **3.4 Soil amendments** 3.4.1 Fertilizers	• Practical • Project • Third party report • Portfolio of evidence • Written tests • Oral questioning

	3.3.4 Agricultural lime 3.3.5 Gypsum… **3.5 Soil conservation measures** 3.5.2 cultural/biological 3.5.2 mechanical/physical/struc	

Suggested methods of delivery

- Project
- Demonstration
- Practicals
- Discussions
- Direct instruction

Recommended resources for 25 trainees

S/No	Item/Category	Description/Specification	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
	Text books	Agricultural engineering	5	1:5
B	**Learning Facilities & infrastructure**			
	Soil science laboratory	Well-equipped lab- • Sieve shakers • Soil grinders • Drying ovens • Mortars and pestles • pH meters and electrodes • Conductivity meters • Spectrophotometers • Test tubes and beakers • Pipettes and volumetric flasks • Soil moisture sensors • Data loggers	1	1:25
	classroom		1	1:25

C	**Consumable materials**			
	notebooks	A4 SIZE	25	1:1
	Flip chart		1	1:25
	Masking tape		5	1:5
D	**Tools and Equipment**			
	Projectors	EPSON 2788 LUMEN or any brand	1	1:25
	Computers	Any brand-5th generation and above COi5	5	1:5
	internet	Reliable and fast		
	Ranging rods/pegs	Wooden 1ft	10	1:3
	Measuring tape	100m long	5	1:5
	Shovels		5	1:5
	Jembes	Wooden handle and sharp	5	1:5
	Mattock	Wooden handle and sharp	5	1:5
	Pangas	Sharp with good handle	1	1:5
	Water taps		5	1:5
	Gutters	pvc	5	1:5
	Rope/strings	100 m long manilla rope	2	1:10
	Soil sample packaging bags	Brown 2kg bags	10	1:3
	Soil auger		10	1:3