SOIL SCIENCE PRINCIPLES

ISCED UNIT CODE: 0811 551 17A

TVETCDACC UNIT CODE: HO/CU/HP/CC/01/6/MA

Unit duration: 100 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Apply soil science principles**

Unit Description

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

Summary of Learning Outcomes

SNO	Learning Outcome	Duration (Hours)
1.	Perform soil sampling	30
2.	Perform soil analysis	40
3.	Improve soil fertility.	30
	TOTAL	**110**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcomes	Content	Suggested Assessment Methods
1. Soil sampling	**1.1 Theory** 1.1 Soil sampling 1.1.1 Define soil sampling 1.1.2 Importance of soil sampling 1.1.3 Methods of soil sampling 1.1.4 Procedure of soil sampling 1.2 Personal Protective Equipment	• Practicals • Written tests • Projects • Interviews/ Oral questions • Individual/group assignments

	1.2.1 PPE requirements 1.2.2 Importance of PPE 1.2.3 Uses and care 1.3 Soil sampling tools 1.3.1 Machetes 1.3.2 Secateurs 1.3.3 Shovels 1.3.4 Soil augur 1.3.5 Panga 1.3.6 Hammer 1.3.7 Saw 1.3.8 Bucket 1.3.9 Shears 1.3.10 Dibbler 1.4 Soil testing equipment 1.4.1 Digestion block 1.4.2 Kjeldahl apparatus 1.4.3 UV-VIS Spectrophotometer 1.4.4 Atomic absorption spectrophotometer (AAS) 1.4.5 Flame photometer 1.4.6 pH meter 1.4.7 EC meter 1.4.8 TDS meter 1.4.9 Fume chamber 1.4.10 Measuring cylinders 1.4.11 Assorted glassware for routine laboratory procedures 1.4.12 Mechanical stirrer 1.4.13 Electric shaker	• Third party report

	1.4.14 Eureka cans 1.4.15 Meteorological equipment 1.5 Maintenance of farm tools and equipment 1.6 Sampling procedures 1.6.1 Field layout 1.6.2 Sample collection 1.6.3 Compositing 1.6.4 Packaging 1.6.5 Processing 1.6.6 Storage **Practice** 1.7 Conduct soil sampling using various sampling methods 1.7.1.1 Traverse method 1.7.1.2 Zigzag method 1.8 Conduct soil testing using various testing equipment 1.8.1 pH meter 1.8.2 EC meter	
2. Soil analysis	**Theory** 2.1 Soil analysis 2.1.1 Define soil analysis 2.1.2 Importance of soil analysis 2.2 Soil analysis equipment and materials 2.2.1 Physical Analysis Equipment 2.2.2 Chemical Analysis Equipment 2.2.3 Biological Analysis Equipment 2.2.4 Laboratory Materials 2.2.5 Data Loggers and Sensors 2.3 Types of soil analysis	• Practicals • Written tests • Projects • Interviews/ Oral questions • Individual/group assignments • Third party report

	2.3.1 Physical Analysis 2.3.2 Chemical Analysis 2.3.3 Biological Analysis 2.3.4 Soil organic matter **Practical** 2.4 Conduct soil analysis using various methods 2.4.1 Physical methods 2.4.2 Chemical methods 2.4.3 Organic matter 2.4.4 Biological 2.5 Conduct soil analysis using various equipment 2.5.1Physical Analysis Equipment 2.5.2Chemical Analysis Equipment	
3. Soil fertility	**Theory** Soil fertility 3.1.1 Define soil fertility 3.1.2 Define soil nutrients 3.1.3 Importance of soil fertility 3.1.4 Ways soil losses fertility 3.1.5 Soil fertility improvement and management 3.2 Types of fertilizers 3.2.1 Inorganic fertiliser 3.2.1.1 Simple/ primary /individual fertilisers	• Practicals • Written tests • Projects • Interviews/ Oral questions • Individual/group assignments • Third party report

	3.2.1.2 Compound/complex 3.2.1.3 Calculations involving fertilizer rates 3.2.1.3.1 Fertilizer ration 3.2.1.3.2 Fertilizer grade 3.2.1.4 Methods of fertiliser application 3.2.1.4.1 placement method 3.2.1.4.2 broadcasting method 3.2.1.4.3 foliar application 3.2.1.4.4 drip method 3.2.1.4.5 band/ ring method 3.2.2 Organic manure 3.2.2.1 Farmyard manure 3.2.2.2 green manure 3.2.2.3 compost manure 3.3 Soil fertility and plant nutrition 3.3.1 Definition of terms 3.3.2 Macro-Nutrients 3.3.3 Micro-Nutrients 3.4 Personal Protective Equipment 3.4.1 PPE requirements	

	3.4.2 Importance of PPE 3.4.3 Uses and care 3.5 Tools, equipment and materials used soil fertility testing 3.6 Soil amendments 3.6.1 Fertilizers 3.6.2 Agricultural lime 3.6.3 Gypsum 3.7 Soil conservation measures 3.7.1 Cover cropping 3.7.2 Mulching 3.7.3 Strip cropping 3.7.4 Building of terraces 3.7.5 Minimum tillage 3.7.6 Contour ploughing **Practice** 3.8 Perform fertilizer rationing basing on N:P:K ratio	

Suggested Methods of Instruction

- Role playing
- Experiment
- Demonstration
- Group discussion

- Direct instruction

Recommended Resources for 30 Trainees

Soil sampling Tools

- 30 Machetes
- 30 Secateurs
- 30 Shovels
- 30 Soil augur
- 30 Panga
- 30 Hammer
- 30 Saw
- 30 Bucket
- 30 Shears
- 30 Dibbler

Soil testing equipment

- 30 Digestion block
- 30 Kjeldahl apparatus
- 30 UV-VIS Spectrophotometer
- 30 Atomic absorption spectrophotometers (AAS)
- 30 Flame photometer
- 30 pH meter
- 30 EC meter
- 30 TDS meter
- 30 Fume chamber
- 30 Measuring cylinders
- 30 Assorted glassware for routine laboratory procedures
- 30 Mechanical stirrer
- 30 Electric shaker
- 30 Eureka cans