**REPUBLIC OF KENYA**

# COMPETENCY BASED MODULAR CURRICULUM

**FOR**

# AGRICULTURAL ENGINEERING

**KNQF LEVEL 6**

**(CYCLE 3)**

**PROGRAMME ISCED CODE: 0716 554 A**

TVET CDACC
P.O. BOX 15745-00100
NAIROBI

## AGRICULTURAL SOIL AND WATER CONSERVATION

**UNIT CODE:** 0716 451 11A

**TVET CDACC UNIT CODE:** ENG/CU/AGR/CR/04/5/MA

**UNIT DURATION:** 140 Hours

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Conserve agricultural soil and water.**

**Unit Description**

This unit specifies the competencies required by an Agricultural Engineering Technologist Level 6 to conserve agricultural soil and water. It involves designing, establishing and maintaining agricultural soil and water conservation structures

**Summary of Learning Outcomes**

| S/No | Learning Outcomes | Duration (Hours) |
|---|---|---|
| 1. | Design agricultural soil and water conservation structures | 40 |
| 2. | Establish agricultural soil and water conservation structures | 80 |
| 3. | Maintain agricultural soil and water conservation engineering structures | 20 |
| **TOTAL** | | **140** |

**Learning Outcomes, Content and Suggested Assessment Methods**

| Learning Outcome | Content | Suggested Assessment Methods |
|---|---|---|
| 1. Design agricultural soil and water conservation structures | 3.1 Types of soil and water conservation structures e.g.<br>1.1.1 Terraces<br>1.1.2 Contours<br>1.1.3 Contour bunds<br>1.1.4 Mulch<br>1.1.5 Cut off drains<br>1.1.6 Retention ditches | • Practical<br>• Project<br>• Portfolio of evidence<br>• Third party report<br>• Written tests<br>• Oral questioning |

| Learning Outcome | Content | Suggested Assessment Methods |
|---|---|---|
| | 1.1.7 Water ways<br>1.1.8 Check dams<br>1.1.9 Gabions<br>3.2 Consideration for design of soil and water conservation structures e.g.<br>1.2.1 Type of soil and their characteristics.<br>1.2.2 Type of structure<br>1.2.3 Mean annual rain fall<br>1.2.4 Run-off expected<br>1.2.5 Vegetation cover<br>1.2.6 Land terrain<br>3.3 Costs involved in designing Soil and water conservation structures.<br>3.4 Structural Design and Optimization of soil and water conservation structures using AI systems<br>1.4.1 Smart Design Software<br>1.4.2 Material Optimization<br>1.4.3 Energy Efficiency Design | |
| 2. Establish agricultural soil and water conservation structures | 2.1 Relevant tools and equipment required to establish soil and water conservation structures<br>2.2 Construction materials and equipment<br>2.3 Construction procedures<br>2.4 Installation of Renewable Energy in Irrigation | • Practical<br>• Project<br>• Portfolio of evidence<br>• Third party report<br>• Written tests<br>• Oral questioning |

| Learning Outcome | Content | Suggested Assessment Methods |
|---|---|---|
| | 2.4.1 Solar-Powered Pumps: Reduce carbon emissions and energy costs.<br>2.4.2 Wind-Powered Pumps: Utilized in areas with suitable wind conditions for sustainable water lifting. | |
| 3. Maintain agricultural soil and water conservation engineering structures | 3.5 Common failures of agricultural soil and water conservation engineering structures<br>3.6 Maintenance practices of agricultural soil and water conservation engineering structures<br>3.7 Tools and equipment of maintenance of agricultural soil and water conservation engineering structures | • Practical<br>• Project<br>• Portfolio of evidence<br>• Third party report<br>• Written tests<br>• Oral questioning |

**Suggested Methods of Delivery**

1. Demonstration
2. Projects
3. Group discussion
4. Direct instructions

**Recommended Resources for 25 Trainees**

| S/No. | Category/Item | Description/ Specifications | Quantity | Recommended Ratio (Item: Trainee) |
|---|---|---|---|---|
| **A** | **Learning Materials** | | | |
| | Projector | | 1 | 1:25 |

| | | | | |
|---|---|---|---|---|
| | Scientific calculators | | 25 | 1:1 |
| | Computer with internet | | 1 | 1:25 |
| **B** | **Learning Facilities & infrastructure** | | | |
| | Classroom | 40 $M^2$ | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
| | Stationery | Assorted | 1 rim of printing papers<br>1 packet of pens<br>1packet of maker pens | 1:25 |
| **D** | **Tools and Equipment** | | | |
| | Acre farm | | 1 | 1:25 |
| | Toolbox | | 1 | 1:25 |
| | Testing kit | | 1 | 1:25 |