

**THE REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**SOIL MANAGEMENT**

**LEVEL 3**



TVET CDACC

P.O BOX 15745-00100

NAIROBI

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## 

# FOREWORD

The provision of quality education and training is fundamental to the Government’s overall strategy for social economic development. Quality education and training will contribute to achievement Kenya’s development blue print and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this Curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Agriculture sector’s growth and sustainable development.

**PRINCIPAL SECRETARY**

**VOCATIONAL AND TECHNICAL TRAINING**

**MINISTRY OF EDUCATION**

# PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need toreform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Agriculture (Soil Management) Sector Skills Advisory Committee (SSAC) have developed this curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya National Qualification Authority.

The curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Agriculture (Soil Management) SSAC, expert workers and all those who participated in the development of this curriculum.

**CHAIRMAN**

**TVET CDACC**

# ACKNOWLEDGEMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organizations.

I recognize with appreciation the role of Agriculture (Soil Management) SSAC in ensuring that competencies required by the industry are addressed in this curriculum. I also thank GIZ (Soil Protection and Rehabilitation for Food Security) and all the stakeholders in the Soil sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in Soil sector will acquire competencies that will enable them to perform their work more efficiently.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

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## **ABBREVIATIONS AND ACRONYMNS**

BC Basic competency

CA Conservation agriculture

CC Common competency

CDACC Curriculum Development, Assessment and Certification Council

CR Core competency

CU Curriculum

EMCA Environmental management and co-ordination Act

GAP Good agricultural practices

IPM Integrated pest management

ISFM Integrated soil fertility management

ISO International Organization for Standardization

K.C.P.E Kenya Certificate of Primary Education

K.C.S.E Kenya Certificate of Secondary Education

KNQA Kenya National Qualification Authority

KNQF Kenya National Qualification Framework

NEMA National Environmental Management Authority

OHSAS Occupational Health and Safety Assessment Series

PPE Personal Protective Equipment

SL Soil

SM Soil management

SOP Standard Operating Procedures

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE

AG/ CU/ SM/ BC /01 /3/A

Industry or sector

Curriculum

Occupational area

Type of Unit

Unit number

Competency level

Version control

**COURSE OVERVIEW**

**Description of the course**

This course is designed to equip individuals with competencies required to manage soil fertility, practise conservation agriculture, and conserve soil and water.

The units of learning comprising Soil Technician Level 3 qualification include the following:

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in hours** | **Credit Factor** |
| AG/CU/SM/BC/01/3/A | Communication Skills | 15 | 1.5 |
| AG/CU/SM/BC/02/3/A | Numeracy Skills | 15 | 1.5 |
| AG/CU/SM/BC/03/3/A | Digital Literacy | 20 | 2 |
| AG/CU/SM/BC/04/3/A | Entrepreneurial Skills | 40 | 4 |
| AG/CU/SM/BC/05/3/A | Employability Skills | 20 | 2 |
| AG/CU/SM/BC/06/3/A | Environmental Literacy | 15 | 1.5 |
| AG/CU/SM/BC/07/03/A | Occupational Safety and Health Practices | 15 | 1.5 |
| **TOTAL** | | **140** | **14** |

**Common Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in hrs** | **Credit Factor** |
| AG/CU/SM/CC/01/3/A | Principles of Agriculture | 40 | 4 |
|  | **Total** | 40 | 4 |

**Core Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| AG/CU/SM/CR/01/3/A | Management of Soil Fertility | 40 | 4 |
| AG/CU/SM/CR/02/3/A | Conservation Agriculture | 30 | 3 |
| AG/CU/SM/CR/03/3/A | Soil and Water Conservation | 50 | 5 |
| **SUB TOTAL** | | **120** | **12** |
|  | Industrial Attachment | 300 | 30 |
| **GRAND TOTAL** | | **420** | **42** |

**Industrial attachment**

It is envisaged that the trainee will undergo an industrial attachment for 300 hours with a recognized soil management firm.

**Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

1. KCSE Certificate

**Or**

1. Completion of KNQA Level 1 or 2

**Or**

1. Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

**Trainer qualification**

A trainer for this course should have a higher qualification than level 3.

**Assessment**

The course will be assessed at two levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an internal accredited verifier while external assessment is the responsibility of TVET/CDACC.

**Certification**

A candidate will be issued with a Certificate of Competency on demonstration of competence in a Unit of Competency. To attain National Soil Management Certificate Level 3, the candidate must demonstrate competence in all the units of competency as given in qualification pack. These certificates will be issued by TVET CDACC in conjunction with training provider.

# BASIC UNITS OF LEARNING

# COMMUNICATION SKILLS

**UNIT CODE:** AG/CU/SM/BC/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate communication skills. It involves, obtaining and conveying workplace information, speaking English at a basic operational level, participating in workplace meetings and discussions, and completing relevant work-related documents.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work-related documents

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain and convey workplace information | * Communication process * Modes of communication * Medium of communication * Effective communication * Barriers to communication * Flow of communication * Sources of information * Types of questions * Organizational policies * Workplace etiquette * Ethical work practices in handling communication | * Written tests * Oral questioning |
| 1. Speak English at a basic operational level | * English grammar   + Nouns, verbs, adjectives, adverbs, pronouns prepositions * English speaking   + Pronunciation   + Simple conversations * Taking verbal instructions * Reading and writing in English * Forms of expression in English | * Written tests * Oral * Role play |
| 1. Participate in workplace meetings and discussions | * Nature of workplace meetings * Meeting protocols * Workplace interactions | * Oral questioning * Written tests |
| 1. Complete relevant work-related documents | * Types and purposes of workplace documents and forms * Methods used in filling forms and documents * Recording workplace data * Process of distributing workplace forms and documents * Report writing * Types of workplace reports | * Written tests * Oral questioning |

**Suggested Methods of Instruction**

* Discussion
* Role play
* Brainstorming
* Viewing of related videos
* Role play

**Recommended Resources**

* Desktop computers/laptops
* Projectors
* Report writing templates
* Pens
* Notebooks

# NUMERACY SKILLS

**UNIT CODE:** AG/CU/SM/BC/02/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit covers the competencies required to identify and undertake simple numerical processes. The person who is competent in this unit shall be able to use / work with whole numbers and money up to one hundred thousand; Locate, compare and use highly familiar measurement; Use highly familiar maps and diagrams; Identify and use some common 2D shapes; and locate specific Information in highly familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Use whole numbers for work
2. Locate, compare and use highly familiar measurement for work
3. Use highly familiar maps and diagrams for work
4. Identify and use some common 2D shapes for work
5. Locate specific Information in highly familiar tables, graphs and charts for work

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Use whole numbers for work | * Whole numbers * Use of Zeros * Use of halves * Sizes * Grouping of numbers * Addition and subtraction of whole numbers * Numerical information, * Symbols | * Written tests * Assignments * Supervised exercises |
| 1. Locate, compare and use highly familiar measurement for work | * Measurements * Units of measurements and their use * Digital time am and pm * Calendars | * Written tests * Assignments * Supervised exercises |
| 1. Use highly familiar maps and diagrams for work | * + Use of Maps and * Diagrams simple * symbols and pictorial   + Giving simple oral directions to locate objects | * Oral * Assignments * Supervised exercises |
| 1. Identify and use some common 2D shapes for work | * + Two dimensional shapes   + Describe common objects in terms of size and shape   + Compare objects   + Group common objects based on shape, size, color and features | * Written tests * Assignments * Supervised exercises |
| 1. Locate specific Information in highly familiar tables, graphs and charts for work | * + Simple tables   + Features of simple graphs and charts   + Numerical information in tables, graphs & charts | * Oral * Assignments * Supervised exercises |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory.
* Practical demonstration of tasks by trainer
* Role play
* Discussion
* Demonstration by trainees and comments and corrections by trainers

**Recommended Resources**

* Common 2D shapes objects
* Calculator
* Basic measuring instruments
* Mathematical tables

# DIGITAL LITERACY

**UNIT CODE:** AG/CU/SM/BC/03/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving tasks and applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software | * Definition of a computer * Functions of a computer * Components of a computer * Classification of computers * Computer software | * Written tests * Practice assignments |
| 1. Apply security measures to data, hardware and software | * Data security and control * Security threats and control measures * Types of computer crimes * Detection and protection against computer crimes | * Written tests * Oral presentation |
| 1. Apply computer software in solving tasks | * Operating systems * Word processing * Spread sheets * Data base | * Oral questioning * Practical |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Oral presentation * Written test |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Assignments
* Viewing of related videos
* Group discussions

**Recommended Resources**

* Desk top computers
* Laptop computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

# ENTREPRENEURIAL SKILLS

**UNIT CODE:** AG/CU/SM/BC/04/3/A

**Relationship to occupational standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 40 hours

**Unit description**

This unit describes the competencies required to demonstrate entrepreneurial competencies. It involves, developing entrepreneurial culture, identifying entrepreneurial opportunities, starting, operating and growing a small business.

**Summary of Learning Outcomes**

1. Develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Operate a small business
5. Grow a small business

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Develop entrepreneurial culture | * Definition of entrepreneur * Importance of entrepreneurship * Common terminologies in entrepreneurship * Entrepreneurship and employment creation * Formal and informal employment * Habits that promote entrepreneurial development * Cultural factors that inhibit entrepreneurship | * Individual/group assignments * Written tests * Oral |
| 1. Identify entrepreneurial opportunities | * Types, characteristics, qualities & role of entrepreneurs * SWOT analysis * Generating Business ideas * Business opportunities * Evaluation of business opportunities | * Individual/group assignments * Written tests * Oral questioning * Oral presentation |
| 1. Start a small business | * Factors to consider when starting a small business * Legal requirement for starting a small business * Procedure of starting a small business * The dos and don’ts of starting a small business * Challenges faced when starting a small business and mitigating factors * Launch of a small business | * Oral questioning * Individual/group assignments * Written tests |
| 1. Operate a small business | * Organizational structure of a small business * Managing small business finances * Book keeping * Business support services * Marketing for small businesses * Basic IT application in small business | * Individual/group assignments * Written tests |
| 1. Grow a small business | * Methods of growing/expanding a small business * Resources for growing small business * Small business growth plan * ICT and business growth | * Individual/group assignments * Written tests |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* assignments
* Role play
* Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan template
* Laptop/ desktop computer
* Internet
* Telephone
* Writing materials

# EMPLOYABILITY SKILLS

**UNIT CODE:** AG/CU/SM/BC/05/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management | * Self-awareness * Formulating personal vision, mission and goals * Strategies for overcoming life challenges * Emotional intelligence * Assertiveness * Developing and maintaining high self-esteem * Developing and maintaining positive self-image * Accountability and responsibility * Good work habits * Self-awareness * Financial literacy * Healthy lifestyle practices | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate critical safe work habits | * Stress and stress management * Punctuality and time consciousness * Interpersonal communication * Sharing information * Resources utilization * HIV and AIDS * Drug and substance abuse * Handling emerging issues | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace learning | * Personal training needs identification and assessment * Cultural aspects of work * Application of learning * Safe use of technology * Identifying opportunities * Workplace innovation * Handling emerging issues * Future trends and concerns in learning | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace ethics | * Meaning of ethics * Ethical perspectives * Values and beliefs * Organization code of ethics * Common ethical dilemmas * Organization culture * Corruption, bribery and conflict of interest * Privacy and data protection * Harassment and mutual respect * Financial responsibility/accountability * Etiquette * Emerging issues in ethics | * Written tests * Oral questioning * Portfolio of evidence * Third party report |

**Suggested Methods of Instruction**

* Simulation/Role play
* Group Discussion
* Presentations
* Q&A
* Case studies
* Assignments

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors

# ENVIRONMENTAL LITERACY

**UNIT CODE**: AG/CU/SM/BC/06/3/A

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard ,controlling environmental pollution and demonstrating sustainable resource use.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Environmental Management and Coordination Act 1999 * Solid Waste Act * Storage of environmentally hazardous materials * Disposal of hazardous wastes * Types and uses of PPEs in line with environmental regulations * Occupational Safety and Health Act 2007 | * Written tests * Oral questions * Observation of work procedures |
| 1. Control environmental pollution | * Types of pollution * Environmental pollution control and management * Procedures for waste management | * Written tests * Oral questions * Observation of work procedures |
| 1. Demonstrate sustainable use of resource | * Types of resources * Sustainable resource use and management * Principles of 3Rs (Reduce, Reuse, Recycle) | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Instructor led facilitation theory
* Discussion
* Demonstration by trainer
* Assignments
* Field trip

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Solid Waste Act
* Environmental Management and Coordination Act 1999
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)

# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** AG/CU/SM/BC/07/3/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate safety and health practices

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to practice and promote safety and health at work. It entails preparing to practice safety and health at work and complying and promoting compliance of workers to organization’s occupational safety and health instructions and requirements.

**Summary of Learning Outcomes**

1. Prepare to apply workplace safety and health practices
2. Compliance with occupational safety and health Act

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to apply workplace safety and health practices | * Awareness of legislation that outlines the minimum standards for occupational safety and health requirements/ regulations * Benefits of implementing an occupational safety and health program * Safety requirements/ regulations of own work and of other workers * Workplace standards and procedures for incidents and emergencies * Prevention and Control Measures for accidents, injuries and sickness | * Oral tests * Written questions * Observation of work procedures |
| 2. Compliance with occupational safety and health Act | * Safety instructions and safety signs * Safe handling of tools, equipment and materials * Use of safe guards and safety devices * Reporting of hazards, incidents, injuries and sickness in the workplace | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Assigments
* Discussion
* Q&A
* Role play
* Viewing of related videos

**Recommended Resources**

* Occupational safety and health standards
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Client/supplier instructions
* Organizational or external personnel
* Machine/equipment manufacturer’s specifications and instructions
* Quality standards

# COMMON UNITS OF LEARNING

## PRINCIPLES OF AGRICULTURE

**UNIT CODE:** AG/CU/SM/CC/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Apply Principles of Agriculture.

**Duration of Unit:**  40 hours

**Unit Description**

This unit describes the competencies required to apply principles of agriculture. It involves utilizing weather information, managing livestock, managing crops, and keeping agricultural records.

**Summary of Learning Outcomes**

* + - 1. Utilize weather information
      2. Manage livestock
      3. Manage crops
      4. Keep agricultural records

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| * 1. Utilize weather information | * Meaning and purpose of weather and weather information * Sources of weather information * Development of cropping calendar * Early warning signs * Coping with climate change | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage livestock | * Purpose of livestock management * Types of livestock * Methods of livestock keeping   + free range   + intensive   + semi intensive * Livestock feeds and fodder * Disease and pest management * Livestock productivity * Management of livestock manure | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage crops | * Types of crops * Importance of plants on soil fertility * Importance of soil testing * Establishment and management of crops * Crop diseases and pests   + Management * Crop harvesting and post-harvest handling | * Observation * Oral questioning * Written tests * Projects |
| * 1. Keep agricultural records | * Purpose of record keeping * Types of records * Storage of records | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of Instruction**

* Direct instruction
* Group discussions
* Demonstration by trainer
* Field trips
* Projects
* Assignments

**Recommended Resources**

* Farm tools and equipment
* Demo plots
* Agrochemicals
* Surveying tools
* Weather information systems
* Weather instruments
* Farm structures
* Cabinets
* Transport
* Public address systems
* Media
* Calculators
* Stationery
* Computers with internet connection
* farm plan
* Food and Agriculture Organization (FAO) guidelines
* maturity indices chart

## CORE UNITS OF LEARNING

## MANAGEMENT OF SOIL FERTILITY

**UNIT CODE:** AG/CU/SM/CR/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Manage Soil Fertility

**Duration of Unit:**  40 hours

**Unit Description**

This unit describes the competencies required to manage soil fertility. It involves managing on-farm residues, preparing organic manure, applying inorganic fertilizer, carrying out Integrated Soil Fertility Management (ISFM) and practising agroforestry.

**Summary of Learning Outcomes**

* + 1. Manage on-farm residues
    2. Prepare organic manure
    3. Apply inorganic fertilizer
    4. Carry out Integrated Soil Fertility Management
    5. Practice agroforestry

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

|  |  |  |
| --- | --- | --- |
| * **Learning Outcome** | * **Content** | * **Suggested Assessment Methods** |
| * 1. Manage on-farm residues | * Types of on-farm residues * Uses of on farm residues * Preparation of farm residues for livestock feeds * Meaning of animal manure   + Types   + Management | * Observation * Oral questioning * Written tests * Projects |
| * 1. Prepare organic manure | * Meaning and importance of organic manure * Types of organic manure   + Compost manure   + Farmyard manure   + Liquid organic manure   + Green manure   + Vermi-compost * Preparation of organic manure * Management of organic manure * Application of organic manure | * Observation * Oral questioning * Written tests * Projects |
| * 1. Apply inorganic fertilizer | * Meaning of fertilizers * Purpose of fertilizers * Types of fertilizers * Fertilizer application   + Methods of fertilizer application   + Time of application   + Application rates * Effects of fertilizers on the environment. * Causes of deterioration of fertilizer quality * Safe handling of fertilizers   + Transportation   + Application   + Storage   + Disposal | * Observation * Oral questioning * Written tests * Projects |
| * 1. Carry out integrated soil fertility management (ISFM) | * Meaning of ISFM * Merits and demerits of organic manures/inorganic fertilizers * Methods of application | * Observation * Oral questioning * Written tests * Projects |
| * 1. Practice agroforestry | * Meaning of agroforestry * Purpose of agroforestry * Types of agroforestry systems * Selection of compatible agroforestry trees and crops * Seed harvesting * Seedling production | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of Instruction**

* Group discussions
* Direct instructions
* Demonstration by trainer
* Field trips
* Projects
* Exercises by trainee
* Field trips

**Recommended Resources**

* Well-equipped Laboratories
* Sampling tools and equipment
* Sampling area
* Fertilizers
* Protective gear
* Shredders
* Chaff cutters
* Scientific Calculators
* Rulers, pencils, erasers
* Charts with presentations of data
* Computers with internet connection
* GAP standards
* Department of Agriculture (DoA) guidelines (KS2290/2011)
* seed collection and handling handbook by KEFRI

## CONSERVATION AGRICULTURE

**UNIT CODE:** AG/CU/SM/CR/02/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Practice Conservation Agriculture

**Duration of Unit:** 30 hours

**Unit Description**

This unit describes the competencies required to practice conservation agriculture. It involves performing conservation tillage, establishing permanent soil cover, performing crop rotation and managing crop pests, diseases and weeds.

**Summary of Learning Outcomes**

* + - 1. Perform conservation tillage
      2. Establish permanent soil cover
      3. Perform crop rotation
      4. Manage pests and diseases

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| * 1. Perform conservation tillage | * Meaning of conservation agriculture * Principles of conservation agriculture * Difference between conservation agriculture and conventional agriculture   + Advantages and disadvantages * Meaning of conservation tillage * Purpose of conservation tillage * Conservation tillage practices   + Zero tillage   + Minimum tillage * Tools and equipment for conservation tillage | * Observation * Oral questioning * Written tests * Projects |
| * 1. Establish permanent soil cover | * Meaning of permanent soil cover * Purpose of soil cover * Types of soil cover   + Mulch   + Cover crops * Establishment and management of cover crops * Tools and equipment | * Observation * Oral questioning * Written tests * Projects |
| * 1. Perform crop rotation | * Meaning of crop rotation * Purpose of crop rotation * Crop types * Development of a crop rotation plan * Implementation of crop rotation plan | * Observation * Oral questioning * Written tests * Practicals |
| * 1. Manage pests and diseases | * Meaning of pests, diseases and weeds * Integrated pest management (IPM) * Safe use of agrochemicals | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of Instruction**

* Group discussions
* Direct instructions
* Demonstration by trainer
* Field trips
* Projects
* Practicals
* Exercises by trainee

**Recommended Resources**

* Assorted seeds
* Demo plots
* Farm tools and equipment
* Protective gear
* Cold rooms
* Stationery
* Botanical gardens
* Arboretum
* Computers with internet connection
* Food and Agriculture Organization (FAO) guidelines
* GAP standards
* Kenya Plant Health Inspectorate Services (KEPHIS) guidelines
* Agrochemicals Association of Kenya (AAK) guidelines

## SOIL AND WATER CONSERVATION

**UNIT CODE:** AG/CU/SM/CR/03/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Conserve Soil and Water

**Duration of Unit:**  50 hours

**Unit Description**

This unit describes the competencies required to conserve soil and water. It involves controlling soil erosion, establishing cross slope barriers and reinforcing embankments.

**Summary of Learning Outcomes**

* + - 1. Control soil erosion
      2. Establish cross slope barriers
      3. Reinforce embankments

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| * + - 1. Control soil erosion | * Meaning of soil erosion * Importance of soil erosion control * Types of soil erosion * Causes of soil erosion * Methods of controlling soil erosion | * Observation * Oral questioning * Written tests * Projects |
| * + - 1. Establish cross slope barriers | * Meaning of cross slope barriers * Purpose of cross slope barriers * Types of cross slope barriers * Laying of contours * Construction of cross slope barriers   + Terraces   + Trash lines   + Grass strips   + Stone lines   + Check dams   + Retention ditches   + Gabions   + Cut off drains * Maintenance of cross slope barriers * Reinforcement of embankments   + Types of embankments   + Purpose of reinforcing embankments   + Methods of reinforcing embankments | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of Instruction**

* Group discussions
* Direct instructions
* Case studies
* Demonstration by trainer
* Field trips
* Projects

* Exercises by trainee

**Recommended Resources**

* Farm tools
* Demo plots
* Protective gear
* Irrigation kits
* Water source
* Surveying tools and equipment
* Stationery
* Computers with internet connection
* ICRAF Technical Manual No. 24
* DoA guidelines