

**THE REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**SOIL MANAGEMENT**

**LEVEL 6**



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 Soil 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 Soil 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, Soil SSAC, expert workers and all those who participated in the development of this curriculum.

**.**

**CHAIRPERSON**

**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 the 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 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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# A**CRONYMNS AND ABREVIATION**

BC Basic competency

CA conservation agriculture

CBET Competency Based Education and Training

CDACC Curriculum Development Assessment and Certification Council

DACUM Develop a Curriculum

DoA Department of Agriculture

EMCA environmental management and co-ordination Act

GAP Good agricultural practices

IPM integrated pest management

ISFM integrated soil fertility management

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Authority

MoEST Ministry of Education Science and Technology

NEMA National Environmental Management Authority

NGO Non-Governmental Organization

NOS National Occupation Standard

OS Occupational Standard

OSHA Occupation Safety and Health Act

PPE Personal Protective Equipment

RPL Recognition of Prior Learning

SL Soil

SM Soil Management

SSAC Sector Skills Advisory Committee

TVETA Technical and Vocational Education and Training Authority

UPS Uninterrupted Power Supply

# 

# KEY TO UNIT CODE

**SL/ CU/ SM/ BC /01 /6/ 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 for soil fertility management, conservation agriculture, agroforestry, water catchment protection, agricultural pests, diseases and weed management and soil and water conservation

The course consists of basic and core units of learning as indicated below:

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **CREDIT FACTORS** |
| SL/CU/SM/BC/01/6/A | Communication Skills | 40 | 4 |
| SL/CU/SM/BC/02/6/A | Numeracy skills | 60 | 6 |
| SL/CU/SM/BC/03/6/A | Digital Literacy | 60 | 6 |
| SL/CU/SM/BC/04/6/A | Entrepreneurial Skills | 100 | 10 |
| SL/CU/SM/BC/05/6/A | Employability Skills | 80 | 8 |
| SL/CU/SM/BC/06/6/A | Environmental Literacy | 40 | 4 |
| SL/CU/SM/BC/07/6/A | Occupational Safety and Health Practices | 40 | 4 |
|  | **Total** | **420** | **42** |

**Common Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in hrs** | **CREDIT FACTORS** |
| SL/CU/SM/CC/01/6/A | Principles of Agriculture | 300 | 30 |
|  | **Total** | **300** | **30** |

**Core units of learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **CREDIT FACTORS** |
| SL/CU/SM/CR/01/6/A | Soil fertility management | 300 | 30 |
| SL/CU/SM/CR/02/6/A | Conservation Agriculture | 80 | 8 |
| SL/CU/SM/CR/03/6/A | Agroforestry | 200 | 20 |
| SL/CU/SM/CR/04/6/A | Water catchment protection | 180 | 18 |
| SL/CU/SM/CR/05/6/A | Agricultural pests, diseases and weed management | 80 | 8 |
| SL/CU/SM/CR/06/6/A | Soil and water conservation | 360 | 36 |
|  | Industrial attachment | 480 | 48 |
|  | **Total** | 1680 | 168 |
| **GRAND TOTAL** | | **2400** | **240** |

The core units of learning are independent of each other and may be taken independently.

The total duration for this course **is 2400** hours including industrial attachment.

**Industrial attachment**

It is envisaged that the trainee will have undergone an industrial training and assessment with a recognised industry as a prerequisite for completion of this training course.

An individual enrolled in this course will be required to undergo will be required to undergo a three-month industrial attachment.

**Entry Requirements**

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

1. Kenya Certificate of Secondary Education (K.C.S.E.) with a minimum mean grade of C- (minus)

**Or**

1. Soil Management Technician Level 5 certificate

**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 the level of this course

**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 Competence on demonstration of competence in a unit of competency. To attain the qualification Soil Management Level 6, 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:** SL/CU/SM/BC/01/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required to demonstrate communication skills .It involves, meeting communication needs of clients and colleagues; developing communication strategies, establishing and maintaining communication pathways, conducting interviews, facilitating group discussion and representing the organization.

**Summary of Learning Outcomes**

1. Meet communication needs of clients and colleagues
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Meet communication needs of clients and colleagues | * Communication process * Modes of communication * Medium of communication * Effective communication * Barriers to communication * Flow of communication * Sources of information * Organizational policies * Organization requirements for written and electronic communication methods * Report writing * Effective questioning techniques (clarifying and probing) * Workplace etiquette * Ethical work practices in handling communication * Active listening * Feedback * Interpretation * Flexibility in communication * Types of communication strategies * Elements of communication strategy | * Interview * Written texts |
| 1. Develop communication strategies | * Dynamics of groups * Styles of group leadership * Openness and flexibility in communication * Communication skills relevant to client groups | * Interview * Written texts |
| 1. Establish and maintain communication pathways | * Types of communication pathways | * Interview * Written texts |
| 1. Promote use of communication strategies | * Application of elements of communication strategies * Effective communication techniques | * Interview * Written texts |
| 1. Conduct interview | * Types of interview * Establishing rapport * Facilitating resolution of issues * Developing action plans | * Interview * Written texts |
| 1. Facilitate group discussion | * Identification of communication needs * Dynamics of groups * Styles of group leadership * Presentation of information * Encouraging group members participation * Evaluating group communication strategies | * Interview * Written texts |
| 1. Represent the organization | * Presentation techniques * Development of a presentation * Multi-media utilization in presentation * Communication skills relevant to client groups | * Interview * Written texts |

**Suggested Methods of Instruction**

* Discussion
* Role playing
* Simulation
* Direct instruction

**Recommended Resources**

* Desktop computers/laptops
* Internet connection
* Projectors
* Telephone

**NUMERACY SKILLS**

**UNIT CODE:** SL/CU/SM/BC/02/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills.

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes the competencies required to demonstrate numeracy skills. It involves applying a wide range of mathematical calculations for work; applying ratios, rates and proportions to solve problems; estimating, measuring and calculating measurement for work; using detailed maps to plan travel routes for work; using geometry to draw and construct 2D and 3D shapes for work; collecting, organizing and interpreting statistical data; using routine formula and algebraic expressions for work and using common functions of a scientific calculator.

**Summary of Learning Outcomes**

1. Apply a wide range of mathematical calculations for work
2. Apply ratios, rates and proportions to solve problems
3. Estimate, measure and calculate measurement for work
4. Use detailed maps to plan travel routes for work
5. Use geometry to draw and construct 2D and 3D shapes for work
6. Collect, organize and interpret statistical data
7. Use routine formula and algebraic expressions for work
8. Use common functions of a scientific calculator

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply a wide range of mathematical calculations for work | * Fundamentals of mathematics * Addition, subtraction, multiplication and division of positive and negative numbers * Algebraic expressions manipulation * Forms of fractions, decimals and percentages * Expression of numbers as powers and roots | * Written tests * Assignments * Supervised exercises |
| 1. Apply ratios, rates and proportions to solve problems | * Rates, ratios and proportions * Meaning * Conversions into percentages * Direct and inverse proportions determination * Performing calculations * Construction of graphs, charts and tables * Recording of information | * Written tests * Assignments * Supervised exercises |
| 1. Estimate, measure and calculate measurement for work | * Units of measurements and their symbols * Identification and selection of measuring equipment * Conversion of units of measurement * Perimeters of regular figures * Areas of regular figures * Volumes of regular figures * Carrying out measurements * Recording of information | * Assignments * Supervised exercises * Written tests |
| 1. Use detailed maps to plan travel routes for work | * Identification of features in routine maps and plans * Symbols and keys used in routine maps and plans * Identification and interpretation of orientation of map to North * Demonstrate understanding of direction and location * Apply simple scale to estimate length of objects, or distance to location or object * Give and receive directions using both formal and informal language * Planning of routes * Calculation of distance, speed and time | * Written * Practical test |
| 1. Use geometry to draw and construct 2D and 3D shapes for work | * Identify two dimensional shapes and routine three dimensional shapes in everyday objects and in different orientations * Explain the use and application of shapes * Use formal and informal mathematical language and symbols to describe and compare the features of two dimensional shapes and routine three dimensional shapes * Identify common angles * Estimate common angles in everyday objects * Evaluation of unknown angles * Use formal and informal mathematical language to describe and compare common angles * Symmetry and similarity * Use common geometric instruments to draw two dimensional shapes * Construct routine three dimensional objects from given nets |  |
| 1. Collect, organize and interpret statistical data | * + Classification of data * Grouped data * Ungrouped data   + Data collection * Observation * Recording   + Distinguishing between sampling and census   + Importance of sampling   + Errors in sampling   + Types of sampling and their limitations e.g. * Stratified random * Cluster * Judgmental   + Tabulation of data * Class intervals * Class boundaries * Frequency tables * Cumulative frequency   + Diagrammatic and graphical presentation of data e.g. * Histograms * Frequency polygons * Bar charts * Pie charts * Cumulative frequency curves * Interpretation of data | * Assignments * Supervised exercises * Written tests |
| 1. Use routine formula and algebraic expressions for work | * + Solving linear equations   + Linear graphs * Plotting * Interpretation * Applications of linear graphs * Curves of first and second degree * Plotting * Interpretation | * Assignments * Supervised exercises * Written tests |
| 8. Use common functions of a scientific calculator | * Identify and use keys for common functions on a calculator * Calculate using whole numbers, money and routine decimals and percentages * Calculate with routine fractions and percentages * Apply order of operations to solve multi-step calculations * Interpret display and record result | * Written * Practical test |

**Suggested Methods of Instruction**

* Group discussions
* Demonstration by trainer
* Practical work by trainee
* Exercises

**Recommended Resources**

* Calculators
* Rulers, pencils, erasers
* Charts with presentations of data
* Graph books
* Dice

**DIGITAL LITERACY**

**UNIT CODE:** SL/CU/SM/BC/03/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes competencies required to demonstrate digital literacy. It involves in identifying computer software and hardware, applying security measures to data, hardware, software in automated environment, computer software in solving task, internet and email in communication at workplace, desktop publishing in official assignments and preparing presentation packages.

**Summary of Learning Outcomes**

1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software | * Concepts of ICT * Functions of ICT * History of computers * Components of a computer * Classification of computers | * Written tests * Oral presentation |
| 1. Apply security measures to data, hardware, software in automated environment | * Data security and control * Security threats and control measures * Types of computer crimes * Detection and protection against computer crimes * Laws governing protection of ICT | * Written tests * Oral presentation * Project |
| 1. Apply computer software in solving tasks | * Operating system * Word processing * Spread sheets * Data base design and manipulation * Data manipulation, storage and retrieval | * Oral questioning * Project |
| 1. Apply internet and email in communication at workplace | * Computer networks * Network configurations * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Written report |
| 1. Apply desktop publishing in official assignments | * Concept of desktop publishing * Opening publication window * Identifying different tools and tool bars * Determining page layout * Opening, saving and closing files * Drawing various shapes using DTP * Using colour pellets to enhance a document * Inserting text frames * Importing and exporting text * Object linking and embedding * Designing of various publications * Printing of various publications | * Oral questioning * Written report * Project |
| 1. Prepare presentation packages | * Types of presentation packages * Procedure of creating slides * Formatting slides * Presentation of slides * Procedure for editing objects | * Oral questioning * Written report * Project |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Project
* Group discussions

**Recommended Resources**

* Computers
* Printers
* Storage devices
* Internet access

**ENTREPRENEURIAL SKILLS**

**UNIT CODE:** SL/CU/SM/BC/04/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 100 hours

**Unit Description**

This unit covers the competencies required to demonstrate understanding of entrepreneurship. It involves demonstrating understanding of an entrepreneur, entrepreneurship and self-employment. It also involves identifying entrepreneurship opportunities, creating entrepreneurial awareness, applying entrepreneurial motivation and developing business innovative strategies.

**Summary of Learning Outcomes**

* 1. Demonstrate understanding of who an entrepreneur
  2. Demonstrate knowledge of entrepreneurship and self-employment
  3. Identify entrepreneurship opportunities
  4. Create entrepreneurial awareness
  5. Apply entrepreneurial motivation
  6. Develop business innovative strategies
  7. Develop Business plan

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Demonstrate knowledge of entrepreneurship and self-employment | * Importance of self-employment * Requirements for entry into self-employment * Role of an Entrepreneur in business * Contributions of Entrepreneurs to National development * Entrepreneurship culture in Kenya * Born or made entrepreneurs | * Individual/group assignments * Projects * Written tests * Oral questions * Third party report |
| 1. Identify entrepreneurship opportunities | * Business ideas and opportunities * Sources of business ideas * Business life cycle * Legal aspects of business * Assessment of product demand * Business environment * Factors to consider when evaluating business environment * Technology in business | * Individual/group assignments * Projects * Written tests * Oral questions * Third party report * Interviews |
| 1. Create entrepreneurial awareness | * Forms of businesses * Sources of business finance * Factors in selecting source of business finance * Governing policies on Small Scale Enterprises (SSEs) * Problems of starting and operating SSEs | * Individual/group assignments * Projects * Written tests * Oral questions * Third party report * Interviews |
| 1. Apply entrepreneurial motivation | * Internal and external motivation * Motivational theories * Self-assessment * Entrepreneurial orientation * Effective communications in entrepreneurship * Principles of communication * Entrepreneurial motivation | * Case studies * Individual/group assignments * Projects * Written tests * Oral questions * Third party report * Interviews |
| 1. Develop business innovative strategies | * Innovation in business * Small business Strategic Plan * Creativity in business development * Linkages with other entrepreneurs * ICT in business growth and development | * Case studies * Individual/group assignments * Projects * Written tests * Oral questions * Third party report * Interviews |
| 6. Develop Business Plan | * Business description * Marketing plan * Organizational/Management * plan * Production/operation plan * Financial plan * Executive summary * Presentation of Business Plan | * Case studies * Individual/group assignments * Projects * Written tests * Oral questions * Third party report * Interviews |

**Suggested Methods of Instruction**

* Direct instruction
* Project
* Case studies
* Field trips
* Discussions
* Demonstration
* Question and answer
* Problem solving
* Experiential
* Team training

**Recommended Resources**

* Case studies
* Business plan templates
* Computers
* Overhead projectors
* Internet
* Mobile phone
* Video clips
* Films
* Newspapers and Handouts
* Business Journals
* Writing materials

**EMPLOYABILITY SKILLS**

**UNIT CODE:** SL/CU/SM/BC/05/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 80 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading a workplace team, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and managing ethical performance.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate interpersonal communication
3. Demonstrate critical safe work habits
4. Lead a workplace team
5. Plan and organize work
6. Maintain professional growth and development
7. Demonstrate workplace learning
8. Demonstrate problem solving skills
9. Manage ethical performance

**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 * Managing emotions * Emotional intelligence * Assertiveness versus aggressiveness * Expressing personal thoughts, feelings and beliefs * Developing and maintaining high self-esteem * Developing and maintaining positive self-image * Setting performance targets * Monitoring and evaluating performance * Articulating ideas and aspirations * Accountability and responsibility * Good work habits * Self-awareness * Values and beliefs * Self-development * Financial literacy * Healthy lifestyle practices * Adopting safety practices | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Demonstrate interpersonal communication | * Meaning of interpersonal communication * Listening skills * Types of audience * Public speaking * Writing skills * Negotiation skills * Reading skills * Meaning of empathy * Understanding customers’ needs * Establishing communication networks * Assertiveness * Sharing information | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Demonstrate critical safe work habits | * Stress and stress management * Time concept * Punctuality and time consciousness * Leisure * Integratingpersonal objectives into organizational objectives * Resources mobilization * Resources utilization * Setting work priorities * Developing healthy relationships * HIV and AIDS * Drug and substance abuse * Managing emerging issues | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Lead a workplace team | * Leadership qualities * Power and authority * Team building * Determination of team roles and objectives * Team parameters and relationships * Individual responsibilities in a team * Forms of communication * Complementing team activities * Gender and gender mainstreaming * Human rights * Developing healthy relationships * Maintaining relationships * Conflicts and conflict resolution * Coaching and mentoring skills | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Plan and organize work | * Functions of management * Planning * Organizing * Time management * Decision making concept * Task allocation * Developing work plans * Developing work goals/objectives and deliverables * Monitoring work activities * Evaluating work activities * Resource mobilization * Resource allocation * Resource utilization * Proactive planning * Risk evaluation * Problem solving * Collecting, analysing and organising information * Negotiation | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Maintain professional growth and development | * Avenues for professional growth * Training and career opportunities * Assessing training needs * Mobilizing training resources * Licenses and certifications for professional growth and development * Pursuing personal and organizational goals * Managing work priorities and commitments * Recognizing career advancement | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace learning | * Managing own learning * Mentoring * Coaching * Contributing to the learning community at the workplace * Cultural aspects of work * Networking * Variety of learning context * Application of learning * Safe use of technology * Taking initiative/proactivity * Flexibility * Identifying opportunities * Generating new ideas * Workplace innovation * Performance improvement * Managing emerging issues * Future trends and concerns in learning | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Demonstrate problem solving skills | * Critical thinking process * Data analysis tools * Decision making * Creative thinking * Development of creative, innovative and practical solutions * Independence in identifying and solving problems * Solving problems in teams * Application of problem-solving strategies * Testing assumptions * Resolving customer concerns | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |
| 1. Manage ethical performance | * Meaning of ethics * Ethical perspectives * Principles of ethics * Ethical standards * Organization code of ethics * Common ethical dilemmas * Organization culture * Corruption, bribery and conflict of interest * Privacy and data protection * Diversity, harassment and mutual respect * Financial responsibility/accountability * Etiquette * Personal and professional integrity * Commitment to jurisdictional laws * Emerging issues in ethics | * Written tests * Oral questioning * Interviewing * Portfolio of evidence * Third party report |

**Suggested Methods of Instruction**

1. Demonstrations
2. Simulation/Role play
3. Group Discussion
4. Presentations
5. Assignments
6. Q&A

**Recommended Resources**

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

**ENVIRONMENTAL LITERACY**

**UNIT CODE**:SL/CU/SM/BC/06/6/A

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency : Demonstrate Environmental Literacy

**Duration of Unit:** 40 hours

**Unit Description**

This unit describes the competencies required demonstrate environmental literacy.it involves controlling environmental hazard, controlling environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs, monitoring activities on environmental protection/programs, analysing resource use and developing resource conservation plans.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs
8. Analyze resource use
9. Develop resource conservation plans

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Purposes and content of Environmental Management and Coordination Act 1999 * Storage methods for environmentally hazardous materials * Disposal methods of hazardous wastes * Types and uses of PPE in line with environmental regulations * Occupational Safety and Health Standards (OSHS) | * Written questions * Oral questions |
| 1. Control environmental Pollution control | * Types of pollution * Environmental pollution control measures * Types of solid wastes * Procedures for solid waste management * Different types of noise pollution * Methods for minimizing noise pollution | * Written questions * Oral questions * Role play |
| 1. Demonstrate sustainable resource use | * Types of resources * Techniques in measuring current usage of resources * Calculating current usage of resources * Methods for minimizing wastage * Waste management procedures * Principles of 3Rs (Reduce, Reuse, Recycle) * Methods for economizing or reducing resource consumption | * Written questions * Oral questions * Role play |
| 1. Evaluate current practices in relation to resource usage | * Collection of information on environmental and resource efficiency systems and procedures, * Measurement and recording of current resource usage * Analysis and recording of current purchasing strategies. * Analysis of current work processes to access information and data * Identification of areas for improvement | * Written questions * Oral questions * Role play |
| 1. Identify Environmental legislations/conventions for environmental concerns | * Environmental issues/concerns * Environmental legislations /conventions and local ordinances * Industrial standard /environmental practices * International Environmental Protocols (Montreal, Kyoto) * Features of an environmental strategy | * Written questions * Oral questions |
| 1. Implement specific environmental programs | * Community needs and expectations * Resource availability * 5s of good housekeeping * Identification of programs/Activities * Setting of individual roles /responsibilities * Resolving problems /constraints encountered * Consultation with stakeholders | * Written questions * Oral questions * Role play |
| 1. Monitor activities on Environmental protection/Programs | * Periodic monitoring and Evaluation of activities * Gathering feedback from stakeholders * Analyzing data gathered * Documentation of recommendations and submission * Setting of management support systems to sustain and enhance the program * Monitoring and reporting of environmental incidents to concerned /proper authorities | * Oral questions * Written tests * Practical test |
| 1. Analyze resource use | * Identification of resource consuming processes * Determination of quantity and nature of resource consumed * Analysis of resource flow through different parts of the process. * Classification of wastes for possible source of resources. | * Written tests * Oral questions * Practical test |
| 1. Develop resource Conservation plans | * Determination of efficiency of use/conversion of resources * Causes of low efficiency of use of resources * Plans for increasing the efficiency of resource use | * Written tests * Oral questions * Practical test |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations and comments and corrections by trainers

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Environmental Management and Coordination Act 1999
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)
* ISO standards
* Company environmental management systems (EMS)
* Montreal Protocol
* Kyoto Protocol

**OCCUPATIONAL SAFETY AND HEALTH PRACTICES**

**UNIT CODE:** SL/CU/SM/BC/07/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Occupational Safety and Health Practices

**Duration of Unit:** 40 hours

**Unit Description**

This unit specifies the competencies required to demonstrate occupational health and safety practices. It involves identifying workplace hazards and risk, identifying and implementing appropriate control measures to hazards and risks and implementing OSH programs, procedures and policies/guidelines.

**Summary of Learning Outcomes**

1. Identify workplace hazards and risk
2. Control OSH hazards
3. Implement OSH programs

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify workplace hazards and risks | * Identification of hazards in the workplace and/or the indicators of their presence * Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace * Gathering of OSH issues and/or concerns | * Oral questions * Written tests * Portfolio of evidence * Third party report |
| 1. Control OSH hazards | * Prevention and control measures e.g. use of PPE * Risk assessment * Contingency measures | * Oral questions * Written tests * Portfolio of evidence * Third party report |
| 1. Implement OSH   programs | * Company OSH program, evaluation and review * Implementation of OSH programs * Training of team members and advice on OSH standards and procedures * Implementation of procedures for maintaining OSH-related records | * Oral questions * Written tests * Portfolio of evidence * Third party report |

**Suggested Methods of Instruction**

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

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE) e.g.
* Mask
* Face mask/shield
* Safety boots
* Safety harness
* Arm/Hand guard, gloves
* Eye protection (goggles, shield)
* Hearing protection (ear muffs, ear plugs)
* Hair Net/cap/bonnet
* Hard hat
* Face protection (mask, shield)
* Apron/Gown/coverall/jump suit
* Anti-static suits
* High-visibility reflective vest

# COMMON UNITS OF LEARNING

## PRINCIPLES OF AGRICULTURE

**UNIT CODE:** SL/CU/SM/CC/01/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Apply principles of agriculture.

**Duration of Unit:**  300 hours

**Unit Description**

This unit describes the competencies required to apply principles of agriculture. It involves developing farm plans, utilizing weather information systems, performing enterprise cost benefit analysis, managing livestock, managing plants, keeping agricultural records and sensitizing community

**Summary of Learning Outcomes**

* + - 1. Develop farm plans
      2. Utilize weather information systems
      3. Perform enterprise cost benefit analysis
      4. Manage livestock
      5. Manage crops
      6. Keep agricultural records
      7. Sensitize community

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * 1. Develop farm plans | * Meaning of farm plan * Purpose of farm plan * Farm business plan * Selection of farm enterprises * Farm layout * Farm budget * Farm records | * Observation * Oral questioning * Written tests * Projects |
| * 1. Utilize weather information systems | * Meaning of weather information systems * Purpose of weather information systems * Sources of weather information * Development of cropping calendar * Early warning systems * Weather instruments * Adaptation to climate change. * Mitigation measures to climate change. | * Observation * Oral questioning * Written tests * Projects |
| * 1. Perform enterprise cost benefit analysis | * Meaning of cost benefit analysis * Purpose of cost benefit analysis * Types of costs * Types of benefits * Determination of gross margin * Cost benefit analysis report | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage livestock | * Purpose of livestock management * Types of livestock * Livestock management systems   + free range   + intensive   + semi intensive * Livestock breeds * Livestock feeds and fodder * Disease and pest management * Livestock productivity * Management of livestock manure | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage crops | * Plant varieties * Soil sampling * Soil analysis * Importance of plants on soil fertility * Plant nutrition * Establishment and management of plants * Management of plant diseases and pests * Plant harvesting and post-harvest handling | * Observation * Oral questioning * Written tests * Projects |
| * 1. Keep agricultural records | * Purpose of record keeping * Types of records * Development of record templates * Data entry and analysis * Storage of records | * Observation * Oral questioning * Written tests * Projects |
| * 1. Sensitize community | * Meaning of community * Types of community stakeholders * Purpose of community sensitization * Stakeholder analysis and selection * Community mobilization   + Media   + Invitation letters   + Road shows   + Barazas * Sensitization of community * Report preparation and dissemination | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of instruction**

* Group discussions
* Lectures
* Demonstration by trainer
* Field trips
* Industrial attachment
* Projects
* Practicals
* Exercises by trainee

**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

## CORE UNITS OF LEARNING

## SOIL FERTILITY MANAGEMENT

**UNIT CODE:** SL/CU/SM/CR/01/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Manage soil fertility

**Duration of Unit:**  300 hours

**Unit Description**

This unit describes the competencies required to manage soil fertility. It involves analyzing soil samples, plant tissue samples, managing on farm residues, applying inorganic fertilizer and amending soil pH.

**Summary of Learning Outcomes**

* + 1. Analyze soil samples
    2. Analyze plant tissue
    3. Manage on-farm residues
    4. Prepare organic manure
    5. Apply fertilizer
    6. Amend soil pH
    7. Apply ISFM

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * 1. Analyze soil samples | * Meaning of soil * Types of soils * Components of soil * Soil nutrients * Indicators of soil nutrient deficiency * Meaning and Purpose of soil analysis * Meaning and importance of soil fertility * Soil characterization * Soil sampling techniques * Soil sample processing * Instruments for soil analysis * Soil tests * Soil analysis reports   + Interpretation   + Recommendations | * Observation * Oral questioning * Written tests * Projects |
| * 1. Analyze plant tissue | * Meaning of plant tissue * Purpose of plant tissue analysis * Types of plant tissues * Sampling techniques * Instruments for plant tissue analysis * Sample processing * Plant tissue tests * Methods of plant tissue analysis * Analysis reports | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage on-farm residues | * Types of on-farm residues * Importance of on farm residues * Processing of farm residues for livestock feeds * Meaning of animal manure   + Types   + Management * Biogas slurry | * 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 grades and quality * Plant nutrient requirements * Fertilizer application   + Methods of fertilizer application   + Time of application   + Application rates * Fertilizer use efficiency * Effects of fertilizers on the environment. * Safe handling of fertilizers   + Transportation   + Application   + Storage   + Disposal * Mixing fertilizers | * Observation * Oral questioning * Written tests * Projects |
| * 1. Amend soil pH | * Meaning of soil pH * Soil pH range * Methods of soil pH testing * Factors that influence soil pH * Effects of soil pH on plant nutrients * Soil pH correction measures   + Management of acidic soils   + Management of alkaline soils | * Observation * Oral questioning * Written tests * Projects |
| * 1. Apply Integrated Soil Fertility Management (ISFM) | * Meaning of ISFM * Benefits of ISFM * Combination of organic and Inorganic fertilizers * Merits and demerits of organic manures/inorganic fertilizers * Methods of application * Evaluation of ISFM performance. | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of delivery**

* Group discussions
* Lectures
* Demonstration by trainer
* Field trips
* Industrial attachment
* Outreach programs
* Projects
* Practicals
* Exercises by trainee

**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

## CONSERVATION AGRICULTURE

**UNIT CODE:** SL/CU/SM/CR/02/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Apply conservation agriculture

**Duration of Unit:** 80 hours

**Unit Description**

This unit describes the competencies required to apply conservation agriculture. It involves performing conservation tillage, establishing permanent soil cover, performing crop rotation, conserving soil biodiversity, managing on-farm residues and conserving plant diversity.

**Summary of Learning Outcomes**

* + - 1. Perform conservation tillage
      2. Establish permanent soil cover
      3. Perform crop rotation
      4. Conserve soil biodiversity
      5. Manage on-farm residues
      6. Conserve plant diversity

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * 1. Perform conservation tillage | * 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 * 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 and varieties * Crop rotation plan * Implementation of crop rotation plan | * Observation * Oral questioning * Written tests * Projects |
| * 1. Conserve soil biodiversity | * Meaning of soil biodiversity * Importance of soil biodiversity * Types of soil biota * Factors affecting soil biodiversity   + Biotic factors   + Abiotic factors * Methods of conserving soil biodiversity * Safe and responsible use of agrochemicals * Role of technology in conserving soil biodiversity | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage on-farm residues | * Types of on-farm residues * Uses of on farm residues * Application of on farm residues as soil cover * Processing of farm residues for livestock feeds * Animal manure   + Types   + Collection   + Management * Use of farm residues for biogas preparation * Compost manure   + Preparation   + Application   + Management | * Observation * Oral questioning * Written tests * Projects |
| * 1. Conserve plant diversity | * Meaning of plant diversity * Purpose and importance of conservation of plant diversity * Methods of conserving plant diversity * Types of gene banks   + Indigenous germplasm   + Vegetative structures * Factors affecting plant diversity * Role of technology in conservation of plant diversity | * Observation * Oral questioning * Written tests   Projects |

**Suggested Methods of instruction**

* Group discussions
* Lectures
* Demonstration by trainer
* Field trips
* Industrial attachment
* Outreach programs
* 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

## AGROFORESTRY

**UNIT CODE:** SL/CU/SM/CR/03/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Apply agroforestry

**Duration of Unit: 200** hours

**Unit Description**

This unit describes the competencies required to apply agroforestry practicess. It involves managing tree seeds, establishing tree seed nursery, improving tree productivity, and establishing agroforestry system.

**Summary of Learning Outcomes**

* + - 1. Establish agroforestry system
      2. Manage tree seeds
      3. Establish tree nursery,
      4. Improve tree productivity

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * + - 1. Establish agroforestry system | * Meaning of agroforestry * Importance of agroforestry * Types of agroforestry systems * Farm layout * Tree and crop/animal selection * Management of agroforestry systems   + Agro-silviculture   + Agro-silvopastoralism   + Aqua-silviculture   + Apiculture with forestry   + Silvo-entomology * Utilization of agroforestry products * Value addition * Post-harvest handling of the agroforestry produces and products * Record keeping * Marketing | * Observation * Oral questioning * Written tests * Projects |
| 1. Manage tree seeds | * Types of seeds * Seed dormancy * Sources of seeds * Seed selection * Methods of seed collection and handling * Seed longevity * Processing of seeds   + Extraction   + Drying   + Cleaning   + Sorting   + Pretreatment   + Seed dressing * Storage of seeds | * Observation * Oral questioning * Written tests * Projects |
| 1. Establish tree nursery | * Meaning of tree nursery * Importance and purpose of tree nurseries * Certification of tree nursery * Tree species * Site selection * Preparation of potting media * Potting materials * Procedure of potting * Seed bed preparation * Types of seed beds * Seed dormancy * Seed viability * Seed sowing * Pricking out seedlings * Management of tree nursery   + Shading   + Watering   + Root pruning   + Weeding   + Hardening up   + Transplanting * Pest and disease management * Record keeping * Marketing | * Observation * Oral questioning * Written tests * Projects |
| 1. Improve tree productivity | * Meaning of tree productivity * Tree management aspects * Economics of agroforestry * Importance of tree productivity * Methods of improving tree productivity   + Grafting   + Budding   + Cloning   + Tissue Culture   + Top working   + Pruning   + Layering   + Pollarding   + Coppicing | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of instructions**

* Group discussions
* Lectures
* Demonstration by trainer
* Field trips
* Industrial attachment
* Projects
* Outreach programs
* Practicals
* Exercises by trainee

**Recommended Resources**

* Tree seeds
* Potting materials
* Nursery tools and equipment
* Agrochemicals
* Shade nets
* Greenhouses
* Water source
* Stationery
* Ladders
* Seed collection equipment

## WATER CATCHMENT PROTECTION

**UNIT CODE:** SL/CU/SM/CR/04/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Protect water catchment areas

**Duration of Unit:**  180 hours

**Unit Description**

This unit describes the competencies required to protect water catchment. It involves, conserving water catchment, rehabilitating degraded sites and conserving riparian lands

**Summary of Learning Outcomes**

* + - 1. Conserve water catchment
      2. Rehabilitate degraded sites
      3. Conserve riparian lands

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * + - 1. Conserve water catchment | * Meaning of water catchment * Importance of water catchment * Purpose of protecting water catchment * Characteristics of a good water catchment area * Causes of catchment degradation * Factors affecting water quality and quantity * Types of water catchments * Community mobilization * Catchment delineation * Catchment data collection * Catchment management plan * Community action plan * Methods of conserving water catchment areas. * Government regulations on water catchment conservation | * Observation * Oral questioning * Written tests * Projects |
| * + - 1. Rehabilitate degraded sites | * Meaning of land degradation * Causes of land degradation * Indicators of land degradation * Types of land degradation * Importance of land rehabilitation * Methods of land rehabilitation | * Observation * Oral questioning * Written tests * Projects |
| * + - 1. Conserve riparian lands | * Meaning of riparian lands * Importance of conservation of riparian lands * Causes of degradation of riparian lands * Methods of conservation of riparian lands   + Reclamation   + Restoration   + Rehabilitation   + Recreation   + Enhancement * Land regulations on conservation of riparian lands | * Observation * Oral questioning * Written tests * Projects |

**Suggested Delivery Methods**

* Group discussions
* Lectures
* Case studies
* Demonstration by trainer
* Field trips
* Industrial attachment
* Outreach programs
* Projects
* Practicals
* Exercises by trainee

**Recommended Resources**

* Seedlings
* Fencing material
* Farm tools
* Survey tools and equipment
* Protective gear
* Stationery
* Computers with internet connection

## AGRICULTURAL PESTS AND DISEASES MANAGEMENT

## 

**UNIT CODE:** SL/CU/SM/CR/05/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Manage agricultural pests diseases and weeds

**Duration of Unit: 80** hours

**Unit Description**

This unit describes the competencies required to manage agricultural pests, diseases and weeds. It involves, applying agro-chemicals safely, controlling pests, diseases and weeds

**Summary of Learning Outcomes**

1. Apply agrochemicals safely
2. Manage pests and diseases
3. Manage weeds

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * 1. Apply agrochemicals safely | * Types of agrochemicals * Impacts of agrochemicals on the environment * PPEs * Handling agrochemicals   + Transportation   + Storage   + Application   + Disposal * Preparation of agrochemicals   + Application rates   + Calibration   + Compatibility * Safe and responsible use of pesticides * Safe and responsible handling of agrochemicals * User precautions | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage pests and diseases | * Meaning of pests and diseases * Importance of managing pests and diseases in relation to soil health * Types of pests and diseases * Predisposing factors * Integrated pests and disease management   + Identification of pests   + Scouting   + Methods of control | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage weeds | * Meaning of weeds * Economic importance of weeds * Types of weeds * Methods of weed management   + Cultural   + Mechanical   + Biological   + Chemical   + Integrated pest management (IPM) | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of instructions**

* Group discussions
* Lectures
* Case studies
* Demonstration by trainer
* Field trips
* Industrial attachment
* Outreach programs
* Projects
* Practicals
* Exercises by trainee

**Recommended Resources**

* Agrochemicals
* Farm tools and equipment
* Demo plots
* Protective gear
* Stationery
* Computers with internet connection

## SOIL AND WATER CONSERVATION

**UNIT CODE:** SL/CU/SM/CR/06/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Conserve soil and water

**Duration of Unit:**  360 hours

**Unit Description**

This unit describes the competencies required to conserve soil water. It involves, rehabilitating degraded lands, establishing cross slope barriers, reinforcing embankments, harvesting water, controlling soil erosion, establishing soil cover, and establishing irrigation and drainage systems

**Summary of Learning Outcomes**

* + - 1. Control soil erosion
      2. Establish cross slope barriers
      3. Reinforce embankments
      4. Establish soil cover
      5. Harvest water
      6. Establish irrigation systems
      7. Establish drainage systems
      8. Rehabilitate degraded lands
      9. Manage water Pollution

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment** |
| * 1. Control soil erosion | * Meaning of soil erosion * Purpose of controlling soil erosion * 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 * Design 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 | * Observation * Oral questioning * Written tests * Projects |
| * 1. Rehabilitate degraded lands | * Meaning of soil and water conservation * Importance of soil and water conservation * Meaning of land degradation * Causes of land degradation * Indicators of land degradation * Types of land degradation * Importance of land rehabilitation * Methods of land rehabilitation   + Regeneration of natural vegetation   + Controlled grazing   + Improve soil health * Manuring * Composting * Fallowing | * Observation * Oral questioning * Written tests * Projects |
| * 1. Reinforce embankments | * Meaning, purpose and types of embankments * Purpose of reinforcing embankments * Methods of reinforcing embankments | * Observation * Oral questioning * Written tests * Projects |
| * 1. Manage water pollution | * + - * Sources of soil pollution       * Determination of soil pollution level       * Treatment of polluted soil       * Soil pollution control measures * Environmental regulations (EMCA) | * Observation * Oral questioning * Written tests * Projects |
| * 1. Establish soil cover | * Meaning of soil cover * Purpose of soil cover * Types of soil cover * Establishment of soil cover   + Mulch   + Cover crops * Management of soil cover | * Observation * Oral questioning * Written tests * Projects |
| * 1. Harvest water | * Meaning of water harvesting * Purpose of water harvesting * Water harvesting techniques   + Roof catchments   + Rock catchments   + Mitre drains * Design of water harvesting structures * Types of water harvesting structures   + Earth dams   + Sand dams   + Water pans   + Farm ponds   + Tanks   + Cisterns   + Zai pits   + Trapezoidal bunds   + Semi-circular bunds   + Retention ditches   + Boreholes   + Wells * Construction of water harvesting structures * Maintenance of water harvesting structures. | * Observation * Oral questioning * Written tests * Projects |
| * 1. Establish irrigation systems | * Meaning of irrigation * Purpose of irrigation * Types of irrigation systems * Factors influencing choice of irrigation system and design * Crop water requirements * Irrigation system designs * Layout of irrigation systems * Installation of irrigation systems   + Drip   + Sprinkler   + Furrow   + Flood   + Basin * Maintenance of irrigation systems | * Observation * Oral questioning * Written tests * Projects |
| * 1. Establish drainage systems | * Meaning of drainage * Purpose of drainage * Types of drainage systems * Factors influencing choice of drainage system and design * Crop water requirements * Drainage system designs * Layout of drainage systems * Installation of drainage systems   + Surface   + Sub-surface * Maintenance of drainage systems | * Observation * Oral questioning * Written tests * Projects |

**Suggested Methods of instructions**

* Group discussions
* Lectures
* Case studies
* Demonstration by trainer
* Field trips
* Industrial attachment
* Outreach programs
* Projects
* Practicals
* Exercises by trainee

**Recommended Resources**

* Farm tools
* Demo plots
* Protective gear
* Irrigation kits
* Water source
* Surveying tools and equipment
* Stationery
* Computers with internet connection