****

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**APIARY ATTENDANCE**

**LEVEL 4**



TVET CDACC

P.O. BOX 15745-00100

NAIROBI

First published 2019

© 2019, TVET CDACC

All rights reserved. No part of this curriculum may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods without the prior written permission of the TVET CDACC, except in the case of brief quotations embodied in critical reviews and certain other non-commercial uses permitted by copyright law. For permission requests, write to the Council Secretary/CEO, at the address below:

**Council Secretary/CEO**

**TVET Curriculum Development, Assessment and Certification Council**

**P.O. Box 15745–00100**

**Nairobi, Kenya**

**Email: info@tvetcdacc,go.ke**

# 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 of Kenya’s development blueprint 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 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 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 to reform 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 Sector Skills Advisory Committee (SSAC) and Ministry of livestock 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

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

**CHAIRPERSON,**

**TVET CDACC**

# ACKNOWLEDGMENT

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 Apiculture Sector Skills Advisory Committee (SSAC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Apiculture 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 Apiculture Sector acquire competencies that will enable them to perform their work more efficiently.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

Contents

[FOREWORD iv](#_Toc29811425)

[PREFACE v](#_Toc29811426)

[ACKNOWLEDGMENT vi](#_Toc29811427)

[KEY TO UNIT CODE viii](#_Toc29811428)

[COURSE OVERVIEW 1](#_Toc29811429)

[COMMUNICATION SKILLS 4](#_Toc29811430)

[NUMERACY SKILLS 6](#_Toc29811431)

[DIGITAL LITERACY 9](#_Toc29811432)

[ENTREPRENEURIAL SKILLS 11](#_Toc29811433)

[EMPLOYABILITY SKILLS 15](#_Toc29811434)

[ENVIRONMENTAL LITERACY 18](#_Toc29811435)

[OCCUPATIONAL SAFETY AND HEALTH PRACTICES 21](#_Toc29811436)

[CORE UNITS OF LEARNING 23](#_Toc29811437)

[BEE BIOLOGY AND BEHAVIOUR 24](#_Toc29811438)

[APIARY ESTABLISHMENT AND MANAGEMENT 27](#_Toc29811439)

[BEE FORAGE RESOURCES AND MANAGEMENT 30](#_Toc29811440)

[HONEY BEE SWARM MANAGEMENT 33](#_Toc29811441)

[HONEY BEE COLONY MANAGEMENT 35](#_Toc29811442)

[HONEY BEE PESTS AND DISEASE CONTROL 37](#_Toc29811443)

[BEE PRODUCTS HARVESTING 39](#_Toc29811444)

ACRONYMS AND ABBREVIATIONS

BC Basic Competency

CDACC Curriculum Development Assessment and Certification Council

CU Curriculum

CC Core Competency

CO Common Units

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Authority

OSHA Occupation Safety and Health Act

PPE Personal Protective Equipment

SSAC Sector Skills Advisory Committee

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE

**AGR / CU/API/ BC/CO/ CC /01/ 4/A**

Industry or sector

Curriculum

Occupational area

Type of competency

Type of competency

Type of competency

Competency number

Competence level

Version control

# COURSE OVERVIEW

The Apiary Attendance Level Four (4) qualification consists of competencies that a person must achieve to demonstrate bee biology and behaviour, establish an apiary, manage bee forage resources, manage honey bee swarms, manage honey bee colony, control honey bee pests and diseases and harvest bee products within the institution’s/organizations acceptable standard operating procedures (SOPs).

**Units of Learning**

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

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| AGR/CU/API/BC/01/4/A | Communication skills | 20 | 2 |
| AGR/CU/API/BC/02/4/A | Numeracy skills | 25 | 2.5 |
| AGR/CU/API/BC/03/4/A | Digital literacy | 35 | 3.5 |
| AGR/CU/API/BC/04/4/A | Entrepreneurial skills | 60 | 6 |
| AGR/CU/API/BC/05/4/A | Employability skills | 30 | 3 |
| AGR/CU/API/BC/06/4/A | Environmental literacy | 20 | 2 |
| AGR/CU/API/BC/07/4/A | Occupational safety and health practices | 20 | 2 |
| **Total** |  | **210** | **21** |

**Core units of learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| AGR/CU/API/CR/01/4/A | Bee biology and behaviour | 30 | 3 |
| AGR/CU/API/CR/02/4/A | Apiary establishment | 50 | 5 |
| AGR/CU/API/CR/03/4/A | Bee forage resources management | 40 | 4 |
| AGR/CU/API/CR/04/4/A | Honey bee swarm’s management | 60 | 6 |
| AGR/CU/API/CR/05/4/A | Honey bee colony management | 60 | 6 |
| AGR/CU/API/CR/06/4/A | Honey bee pests and disease control | 70 | 7 |
| AGR/CU/API/CR/07/4/A | Bee products harvesting | 30 | 3 |
|  | Industrial attachment | 300 | 30 |
| **Total** |  | **640** | **64** |
| **Grand Total** |  | **850** | **85** |

The total duration of the course is 850 hours.

**Entry Requirements**

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

1. Apiculture certificate Level 3

**Or**

1. Kenya Certificate of Secondary Education (KCSE) E

**Or**

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

**Trainers 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 accredited internal verifier while external assessment is the responsibility of TVET CDACC.

**Certification**

A candidate will be issued with a Certificate of Competency for each Unit of Competency. To attain the qualification National certificate Level 4 Apiary attendance, 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:** AGR/CU/API/BC/01/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 20 Hours

**Unit Description**

This unit covers the competencies required demonstrate communication skills. It involves obtaining and conveying workplace information, completing relevant work-related documents, communicating information about workplace processes, leading workplace discussion and communicating workplace issues.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Complete relevant work-related documents
3. Communicate information about workplace processes
4. Lead workplace discussions
5. Identify and communicate issues arising in the workplace

**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 | * Interview * Third party reports |
| 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 | * Interview * Third party reports |
| 1. Communicate information about workplace processes | * 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 | * Interview * Portfolio |
| 1. Lead workplace discussion | * Methods of discussion e.g.   + Coordination meetings   + Toolbox discussion   + Peer-to-peer discussion * Solicitation of response | * Interview * Third party reports |
| 1. Identify and communicate issues arising in the workplace | * Identification of problems and issues * Organizing information on problems and issues * Relating problems and issues * Communication barriers affecting workplace discussions | * Interview * Portfolio |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstration
* Practice assignment
* Discussion
* Role play
* Brainstorming

**Recommended Resources**

* Desktop computers/laptops
* Internet connection
* Projectors
* Telephone
* Report writing templates

**NUMERACY SKILLS**

**UNIT CODE:** AGR/CU/API/BC/02/4/A

**Relationship to Occupational Standards:**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 25hours

**Unit Description**

This unit covers the competencies required to demonstrate numeracy skills. It involves identifying and using whole numbers and simple fractions, decimals and percentages for work, identifying, measuring and estimating familiar quantities for work, reading and using familiar maps, plans and diagrams for work, identifying and describing common 2D and some 3D shapes for work, constructing simple tables and graphs for work using familiar data and identifying and interpreting information in familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Identify and use whole numbers and simple fractions, decimals and percentages for work
2. Identify, measure and estimate familiar quantities for work
3. Read and use familiar maps, plans and diagrams for work
4. Identify and describe common 2D and some 3D shapes for work
5. Construct simple tables and graphs for work using familiar data
6. Identify and interpret information in familiar tables, graphs and charts for work

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify and use whole numbers and simple fractions, decimals and percentages for work | * Whole numbers * Simple fractions * Decimals * Percentages * Sizes * Problem solving methods * Calculations using the 4 operations * Recording and communicating numerical information | * Written * Practice assignments |
| 2. Identify, measure and estimate familiar quantities for work | * Measurement information * Units of measurement * Estimate familiar and simple amounts * Selection of appropriate measuring equipment * Calculate using familiar units of measurement * Check measurements and results against estimates * Using informal and some formal mathematical and general language * Record or report results | * Written * Practice assignments |
| 3. Read and use familiar maps, plans and diagrams for work | * Maps, plans and diagrams * Locate items and places in familiar maps, plans and diagrams * Recognize common symbols and keys in familiar maps, plans and diagrams * Direction and location of objects, or route or places * Use of informal and some formal oral mathematical language and symbols | * Practical test * Written |
| 4. Identify and describe common 2D and some 3D shapes for work | * Common 2D shapes and 3D shapes * Classification of common 2D shapes and designs * Description of Use informal and some formal language to describe common two-dimensional shapes and some common three-dimensional shapes * Construction of common 2D shapes * Match common 3D shapes to their 2D sketches or nets | * Written * Practical test |
| 5. Construct simple tables and graphs for work using familiar data | * Types of graphs * Determination of data to be collected * Selection of data collection method * Collection of data * Determination of variables from the data collected * Order and collate data * Construct a table and enter data * Construct a graph using data from table * Check results * Report or discuss graph information related to work using informal and some formal mathematical and general language | * Written * Practical test |
| 6. Identify and interpret information in familiar tables, graphs and charts for work | * Tables construction and labeling * i.e. title, headings, rows and columns * Interpreting information and data in simple tables * Relaying information of relevant workplace tasks on/in a table * Identify familiar graphs and charts in familiar texts and contexts * Locate title, labels, axes, scale and key from familiar graphs and charts * Identify and interpret information and data in familiar graphs and charts * Relate information to relevant workplace tasks | * Written * Practical test |

**Suggested Methods of Instruction**

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

**Recommended Resources**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. LCD projectors

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Projectors
* Writing boards
* Mathematical tables

**DIGITAL LITERACY**

**UNIT CODE:** AGR/CU/API/BC/03/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 35 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 task sand applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer software and hardware
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 | * Meaning of a computer * Functions of a computer * Components of a computer * Classification of computers | * Written tests * Oral * Observation |
| 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 * Observation * Projects |
| 1. Apply computer software in solving tasks | * Operating system * Word processing * Spread sheets * Data base | * Oral questioning * Observation * Project |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Observation * Oral presentation * Written report |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. Practical assignment
4. Viewing of related videos
5. Project
6. Group discussions

**Recommended Resources**

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

**ENTREPRENEURIAL SKILLS**

**UNIT CODE:** AGR/CU/API/BC/04/4/A

**Relationship to occupational standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 60 hours

**Unit description**

This unit covers the competencies required for creating and maintaining small scale business, establishing small business customer base, managing and growing a micro/small-scale business.

**Summary of Learning Outcomes**

1. Create and maintain small scale business
2. Establish small scale business customer base
3. Manage small scale business
4. Grow/expand small scale business

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Create and maintain small scale business | * Starting a small business * Legal regulatory requirements in starting a small business * SWOT/ PESTEL analysis * Conducting market/industry survey * Generation and evaluation of business ideas * Matching competencies with business opportunities * Forms of business ownership * Location of a small business * Legal and regulatory requirement * Resources required to start a small business * Common terminologies in entrepreneurship * Entrepreneurship in national development * Self-employment * Formal and informal employment * Entrepreneurial culture * Myths associated with entrepreneurship * Types, characteristics, qualities & role of entrepreneurs * History, development and importance of entrepreneurship * Theories of entrepreneurship * Quality assurance for small businesses * Policies and procedures on occupational safety and health and environmental concerns | * Individual/group assignments * projects * Written * Oral |
| 1. Establish small scale business customer base | * Good staff/workers and customer relations * Marketing strategy * Identifying and maintain new customers and markets * Product/ service promotions * Products / services diversification * SWOT / PESTEL analysis * Conducting a business survey * Generating Business ideas * Business opportunities | * Individual/group assignments * projects * Written * Oral |
| 1. Manage small scale business | * Organization of a small business * Small business’ business plan * Marketing for small businesses * Managing finances for small business * Production/ operation process for goods/services * Small business records management * Book keeping and auditing for small businesses * Business support services * Small business resources mobilization and utilization * Basic business social responsibility * Management of small business * Word processing concepts in small business management * Computer application software * Monitoring and controlling business operations | * Oral * Individual/group assignments * projects * Written |
| 1. Grow/expand small scale business | * Methods of growing small business * Resources for growing small business * Small business growth plan * Computer software in business development * ICT and business growth | * Individual/group assignments * projects * Written |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. Practice by trainee
4. Role play
5. Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan templates
* Lap top/ desk top computer
* Internet
* Telephone
* Writing materials

**EMPLOYABILITY SKILLS**

**UNIT CODE:** AGR/CU/API/BC/05/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 30 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 | 1. Self-awareness 2. Formulating personal vision, mission and goals 3. Strategies for overcoming life challenges 4. Emotional intelligence 5. Assertiveness 6. Expressing personal thoughts, feelings and beliefs 7. Developing and maintaining high self-esteem 8. Developing and maintaining positive self-image 9. Articulating ideas and aspirations 10. Accountability and responsibility 11. Good work habits 12. Self-awareness 13. Self-development 14. Financial literacy 15. Healthy lifestyle practices | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate critical safe work habits | 1. Stress and stress management 2. Punctuality and time consciousness 3. Interpersonal communication 4. Sharing information 5. Leisure 6. Integratingpersonal objectives into organizational objectives 7. Resources utilization 8. Setting work priorities 9. HIV and AIDS 10. Drug and substance abuse 11. Handling emerging issues | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace learning | 1. Personal training needs identification and assessment 2. Managing own learning 3. Contributing to the learning community at the workplace 4. Cultural aspects of work 5. Variety of learning context 6. Application of learning 7. Safe use of technology 8. Identifying opportunities 9. Workplace innovation 10. Performance improvement 11. Handling emerging issues 12. Future trends and concerns in learning | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace ethics | 1. Meaning of ethics 2. Ethical perspectives 3. Principles of ethics 4. Values and beliefs 5. Ethical standards 6. Organization code of ethics 7. Common ethical dilemmas 8. Organization culture 9. Corruption, bribery and conflict of interest 10. Privacy and data protection 11. Diversity, harassment and mutual respect 12. Financial responsibility/accountability 13. Etiquette 14. Personal and professional integrity 15. Commitment to jurisdictional laws 16. Emerging issues in ethics | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |

**Suggested Methods of Instruction**

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

**Recommended Resources**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. Radio sets
7. TV sets
8. LCD projectors

**ENVIRONMENTAL LITERACY**

**UNIT CODE:** AGR/CU/API/BC/06/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 20hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, demonstrating sustainable resource use and evaluating current practices in relation to resource usage.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental pollution
3. Demonstrate sustainable use of resources
4. Evaluate current practices in relation to resource usage

**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 * Purposes and content of Solid Waste Act * 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 tests * Oral questions * Observation of work procedures |
| 1. Control environmental Pollution | * 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 tests * Oral questions * Observation of work procedures * 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 tests * Oral questions * Observation of work procedures |
| 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 tests * Oral questions * Observation of work procedures |
| 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 tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

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

**Recommended Resources**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. Radio sets
7. TV sets
8. LCD projectors

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)

**OCCUPATIONAL SAFETY AND HEALTH PRACTICES**

**UNIT CODE:** AGR/CU/API/BC/07/4/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 20 hours

**Unit Description**

This unit specifies the competencies required to practice safety and health and comply with OSH requirements relevant to work. It involves adhering to workplace procedures for hazards and risk prevention and participating in arrangements for workplace safety and health maintenance.

**Summary of Learning Outcomes**

1. Adhere to workplace procedures for hazards and risk prevention
2. Participate in arrangements for workplace safety and health maintenance

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment**  **Methods** |
| 1. Adhere to workplace procedures for hazards and risk prevention | * Arrangement of work area and items in accordance with Company housekeeping procedures * Adherence to work standards and procedures * Application of preventive and control measures, including use of safety gears/PPE * Study and apply standards and procedures for incidents and emergencies. | * Oral questions * Written tests * Portfolio of evidence * Third party report |
| 1. Participate in arrangements for workplace safety and health maintenance | * Participating in orientations on OSH requirements/regulations of tasks * Providing feedback on health, safety, and security concerns to appropriate personnel as required in a sufficiently detailed manner * Practice workplace procedures for reporting hazards, incidents, injuries and sickness * OSH requirements/ regulations and workplace safety and hazard control procedures are reviewed, and compliance reported to appropriate personnel * Identification of needed OSH-related trainings are proposed to appropriate personnel | * 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**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. Radio sets
7. TV sets
8. LCD projectors

* 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 bootsn
* 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

# CORE UNITS OF LEARNING

# BEE BIOLOGY AND BEHAVIOUR

**UNIT CODE:** AGR/CU/API/CR/01/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: demonstrate understanding of bee biology and behaviour

**Duration of Unit:**  30 hours

**Unit Description**

This unit specifies the competencies required to demonstrate bee biology and behavior. It involves identifying bee races, demonstrating understanding of bee lifecycle and caste, demonstrating understanding of the physiological system of bees, determining bee nutrition and demonstrating the understanding of bee behavior.

**Summary of Learning Outcomes**

1. Identify bee races
2. Demonstrate understanding of bee lifecycle and caste
3. Demonstrate understanding of the physiological system of bees
4. Determine bee nutrition
5. Demonstrate the understanding of bee behaviour

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Demonstrate understanding pf bee keeping industry in Kenya | * Meaning of terms apiculture, bee keeping, honey bees, traditional bee keeping and improved bee keeping * Historical background of bee keeping * Economic importance of bee keeping * Bee keeping production systems * Status of the bee keeping industry * Institutional and legal aspects in bee keeping | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Identify bee races | * + Materials and equipment for identification of bee species   + Bee parts/external morphology/bee anatomy   + Bee races | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate understanding of bee lifecycle and caste | * + Meaning of terms drone, worker, queen bees   + Caste determination   + Development stages of different castes   + Roles of drones, workers, queen bees   + Lifespan of different bee castes | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Demonstrate understanding of the physiology and anatomy of honey bees | * Meaning of terms morphology * External features of queen bee * External features of drone * External features of worker bee * Internal features of queen bee * Internal features of drone * Internal features of worker bee * Glandular system * Reproductive system | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate the understanding of bee behaviour | * Meaning of terms swarming, absconding, migration and Supercedure, robbing activity, foraging behaviour * Types of swarming * Communication among honey bees * Colony defence * Mating behaviour in bees * Factors affecting bee behaviour * Methods of controlling bee behaviour | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate understanding of bee nutrition | * Nutrition requirements for bees * Types of feed and supplements for bees * Feed quality * Feeding methods * Feeding equipment * Artificial feeding procedure in bees | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of instructions**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Hand lens
* Feeder box
* Catcher box
* Observation hive
* Supplement and substitutes ingredients

# APIARY ESTABLISHMENT AND MANAGEMENT

**UNIT CODE:** AGR/CU/API/CR/02/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: establish an apiary

**Duration of Unit:** 50 hours

**Unit Description**

This unit specifies the competencies required to establish an apiary. It involves selecting apiary site, clearing the apiary site, fencing apiary site, preparing bee hives, installing bee hive, constructing bee house and Managing apiary facilities

**Summary of Learning Outcomes**

1. Select apiary site
2. Clear apiary site
3. Fence apiary site
4. Prepare bee hives
5. Install bee hives
6. Construct bee house
7. Manage apiary facilities

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Select apiary site | * + Meaning of terms-apiary   + Types of apiaries   + Key factors to consider when selecting an apiary site   + Designing and setting up an apiary | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Clear apiary site | * + Materials, tools and equipment for clearing the apiary site , their use and maintenance   + Types of materials and objects to be cleared from an apiary site.   + Methods of disposal of waste material cleared from the apiary sites. | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Fence apiary site | * Importance of fencing an apiary site * Materials, tools and equipment for fencing the apiary site , their use and maintenance * Demarcation/mapping of apiary sites * Fencing methods * Procedure for fencing an apiary site | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Prepare bee hives | * Types of bee hives * Materials, tools and equipment used to prepare hives * Procedure for cleaning the hive * Types of baits * Importance of labelling hives * Hive labelling methods | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Construct bee house | * Meaning of a bee house * Types of bee houses * Importance of a bee house * Limitations of a bee house * Materials, tools and equipment for constructing the bee house, their use and maintenance * Factors to consider when selecting bee house site * Procedure of bee house construction * Post construction activities | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Install bee hives | * Factors to consider when installing bee hives * Hive hanging and placement methods and patterns | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Manage bee forage resources | * Types of bee forage * Establishment and management bee forage and water resources * Floral density assessment * Preparation of a floral calendar * Different ecological zones | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Manage apiary facilities | * Routine apiary management * Pest control measures * Repair and maintenance of apiary facilities * Types of apiary records | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of instructions**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Bee hives
* Colonies
* Platforms and hanging posts
* Bee house
* Hive hanging wires
* Bees forage and water resources
* Farm tools
* PPE
* Posts
* Roofing materials
* Rafters
* Timber
* Chain link

# BEE FORAGE RESOURCES AND MANAGEMENT

**UNIT CODE:** AGR/CU/API/CR/03/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: manage bee forage resources

**Duration of Unit:** 40 hours

**Unit Description**

This unit specifies the competencies required manage bee forage resources. It involves identifying suitable bee forage, establishing forage resources, conserving forage resources, developing a beekeeping flowering calendar and Providing water for bees

**Summary of Learning Outcomes**

1. Identify suitable bee forage
2. Establish bee forage resources
3. Develop a beekeeping floral calendar
4. Conserve bee forage resources
5. Honey bee pollination

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Identify suitable bee forage | * + Meaning of bee forage   + Types/classes of bee forage plants   + Uses of bee forage resources   + Geographical distribution of bee forage resources   + Ecological requirements for bee forage resources   + The floral calendar   + Gaps in the floral cycle   + Bee forage gap identification   + Types of documented bee forage manuals | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Establish bee forage resources | * + Site selection for the establishment of bee forage resources   + Tools and equipment for establishing bee forage resources   + Preparation of the site for bee forage resource establishment   + Propagation and husbandry methods.   + Propagation materials   + Procedure for propagating forage species   + Types of post- forage establishment activities | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Develop a beekeeping floral calendar | * Types of bee forage species * Geographical distribution/coverage * Factors affecting flowering cycles * Flowering seasons/patterns for different plant species | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Conserve bee forage resources | * Meaning of conservation * Conservation methods * Plant genetic materials * Api-agroforestry programmes * Re-afforestation * Community-based conservation * Vegetation surveys * Community reserve areas * Woodlots * Multipurpose plant species * Effects of climate change on bee forage resources * Land degradation * Mitigation measures for the effects of human activities | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Honey bee pollination | * Meaning of pollination * Types of pollination * Agents of pollination * Benefits of bee pollination * Conservation of bees for pollination * Pollination services * Safe pesticide use   + Protection of bees from pesticide poisoning   + Mode of action of pesticides on bees   + Registration of pesticides   + Species specific pesticides   + Integrated pest management | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of Delivery**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Tree nurseries
* Land
* Water
* Manure/fertilizer
* Planting materials
* Propagation tool and equipment
* Human resource

# HONEY BEE SWARM MANAGEMENT

**UNIT CODE:** AGR/CU/API/CR/04/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: manage honey bee swarms

**Duration of Unit:** 60 hours

**Unit Description**

This unit specifies the competencies required to manage honey bee swarms. It involves preparing to catch/trap a swarm of honey bees, catching/trapping a swarm of honey bees and performing post-trapping activities colony

**Summary of Learning Outcomes**

1. Prepare to catch/trap a swarm of honey bees
2. Catch/trap a swarm of honey bees
3. Perform post-trapping activities

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Prepare to catch/trap a swarm of honey bees | * + Meaning of a honey bee swarm   + Materials and equipment for catching /trapping a swarm of honey bees   + Swarming seasons   + Trapping sites/bee migratory routes   + PPE in catching /trapping a swarm of honey bees   + Occupational safety and health in catching /trapping a swarm of honey bees | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Catch/trap a swarm of honey bees | * + Trapping sites   + Catcher box/brood box baiting   + Types of baits   + Baiting techniques   + Reasons for catching /trapping a swarm of honey bees   + Method of catching /trapping a swarm of honey bees   + Procedure for catching /trapping a swarm of honey bees   + Swarm transportation methods and procedure | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Perform post-trapping activities | * Meaning of post-trapping * Hive stocking techniques * Regular colony monitoring * Types of colony management measures * Procedure for removing a swarm from unwanted nesting sites * Artificial feeding in honey bee swarms | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of Delivery**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Catcher box
* Bee swarms
* Smoker
* Rope
* Ladder
* Swarm catcher
* Bees wax
* Propolis
* Plants based baits.

# HONEY BEE COLONY MANAGEMENT

**UNIT CODE:** AGR/CU/API/CR/05/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: manage honey bee colony

**Duration of Unit:** 60 hours

**Unit Description**

This unit specifies the competencies required to manage honey bee colony. It involves preparing for honey bee colony manipulation, handling honey bee combs, handling honey bee colony, raising queen bees and performing post-manipulation practices.

**Summary of Learning Outcomes**

1. Prepare for honey bee colony manipulation
2. Handle honey bee combs
3. Handle honey bee colony
4. Rear queen bees
5. Perform post-manipulation practices

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Prepare for honey bee colony manipulation | * + Meaning of apiary records, honey bee colony manipulation   + Types of apiary records   + Preparation of the management schedule   + Materials and equipment for manipulation of honey bees   + Contents of PPE kit | * Written * Observation * Third party report * Oral questioning * Interviews |
| 1. Handle honey bee combs | * + Procedure for opening a bee hive   + Procedure for handling combs   + Types of combs   + The concept of bee space   + Comb construction pattern   + Comb sequence in a colony | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Handle honey bee colony | * Tools and equipment for colony manipulation * Desirable colony traits * Colony division procedure * Optimum conditions that should prevail in the brood nest * Colony transfer procedure * Merging bee colonies * Feeding bee colonies * Types of colony records | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Rear queen bees | * Meaning of the term selection and propagation * Desirable colony traits * Tools and equipment for selection and propagation * De-queening and re-queening procedure * Queen bee rearing techniques   + Artificial insemination techniques * Queen bee packaging and transportation | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Perform post-colony manipulation practices | * Types of manipulation records and their preparation * Phytosanitary measures * Colony performance monitoring * Waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods instructions**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Bee colonies
* PPE kit
* Catcher box
* Smoker
* Hives
* Queen cages
* Grease

# HONEY BEE PESTS AND DISEASE CONTROL

**UNIT CODE:** AGR/CU/API/CR/06/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: control honey bee pests and diseases

**Duration of Unit:** 70 hours

**Unit Description**

This unit specifies the competencies required to control pests and disease within a honey bee colony. It involves inspecting the bee colony, assessing health and condition of bee brood, assessing health and condition of adult bees and managing bee pests and diseases.

**Summary of Learning Outcomes**

1. Prepare to inspect the bee colony/apiary
2. Assess health and condition of bee brood
3. Assess health and condition of adult bees
4. Manage bee pests and diseases

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Prepare to inspect the bee colony and the apiary | * + Meaning of terms pests, predators, brood diseases   + Materials, tools and equipment for inspecting the bee colony and the apiary   + Procedures for opening a bee hive   + Types of pests and predators and their effects   + Types of diseases and their effects | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Assess health and condition of bee brood | * + Types of brood   + Types of bee brood diseases   + Pest identification   + Signs and symptoms of brood pest infestation and diseases   + Sample collection and testing   + Bee brood inspection records | * + Written   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Assess health and condition of adult bees | * Types of adult bee diseases * Signs and symptoms of adult bees diseases * Sample collection and testing * Adult bees inspection records | * Written * Observation * Third party report * Oral questioning * Interviews |
| 1. Manage bee pests and diseases | * Affected colony identification * Remedial measures in managing bee pests and diseases * Integrated pest management * Safe pesticides/herbicides use * Pest and disease surveillance * Methods of strengthening bee colonies * Methods of infected colony destruction | * Written * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of instructions**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Bee colonies
* Smoker
* PPE
* Bee hives
* Feed supplements
* Feeding tools and materials

# BEE PRODUCTS HARVESTING

**UNIT CODE:** AGR/CU/API/CR/07/4/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: harvest bee products

**Duration of Unit:** 30 hours

**Unit Description**

This unit specifies the competencies required to harvest bee products. It involves preparing to harvest bee products, conducting bee product harvesting, extracting bee products and performing post-harvest practices.

**Summary of Learning Outcomes**

1. Prepare to harvest bee products
2. Conduct bee product Harvesting
3. Extract bee products
4. Perform post-harvest practices

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 1. Prepare to harvest bee products | * + Meaning of terms honey, propolis, bees wax, royal jelly, bee venom, bee brood, pollen, bee bread   + Uses of bee products   + Materials, tools and equipment for harvesting bee products   + Bee harvest timing and weather conditions   + Occupational health and safety procedures in bee products harvesting   + Smoker lighting and types of smoker fuel   + Protective dressing for bee products harvesting | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Conduct bee product harvesting | * + Procedure for hive opening   + Characteristics of ripe honey   + Handling honey and brood combs   + Honey harvesting techniques   + Propolis harvesting techniques   + Procedure for harvesting royal jelly   + Pollen harvesting techniques | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Extract bee products | * + Materials and tools for extracting bee products i.e. honey, propolis, bees wax, royal jelly, bee venom, bee brood, pollen   + Procedure for extracting bee products i.e. honey, propolis, bees wax, royal jelly, bee venom, bee brood, pollen * Hygienic handling harvested bee products * Occupational health and safety procedures in bee products extraction | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Perform post-harvest practices | * Weighing and grading equipment * Types of bee production records and their preparation * Transportation methods for bee products * Bee products storage equipment and conditions | * Written test * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of instruction**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction

**Recommended Resources**

* Propolis collector
* Pollen trap
* Honey extractor
* Venom collector
* Harvesting containers
* Smokers
* PPE kit
* Bees wax extractor
* Bee brush
* Bee escape
* Food grade storage equipment