****

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**APICULTURE MANAGEMENT**

**LEVEL 5**



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 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 Apiculture 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 Apiculture 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, Apiculture 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**

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ACRONYMS

CDACC : Curriculum Development Assessment and Certification Council

CU : Curriculum

BC : Basic Competency

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/ CR /01/ 5/A**

Industry or sector

Curriculum

Occupational area

Type of competency

Type of competency

Type of competency

Competency number

Competence level

**Version control**

# COURSE OVERVIEW

**Description of the Course**

The **Apiculture management level Five (5) qualification** consists of competencies that a person must achieve to demonstrate bee biology and behaviour, establish an apiary, construct bee hives and bee equipment, manage bee facilities, tools and equipment, manage bee forage resources, manage honey bee swarms, manage honey bee colony, control honey bee pests and diseases, harvest bee products, process bee products, manage quality of bee products, perform bee product value addition and provide bee keeping training and extension services 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/01/5/A** | Communication skills | **25** | **2.5** |
| **AGR/CU/API/BC/02/5/A** | Numeracy skills | **40** | **4** |
| **AGR/CU/API/BC/03/5/A** | Digital literacy | **45** | **4.5** |
| **AGR/CU/API/BC/04/5/A** | Entrepreneurial skills | **70** | **7** |
| **AGR/CU/API/BC/05/5/A** | Employability skills | **50** | **5** |
| **AGR/CU/API/BC/06/5/A** | Environmental literacy | **25** | **2.5** |
| **AGR/CU/API/BC/07/5/A** | Occupational safety and health practices | **25** | **2.5** |
| **Total** |  | **280** | **21** |

**Core units of learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| **AGR/CU/API/CR/01/5/A** | Bee biology and behaviour | **70** | **7** |
| **AGR/CU/API/CR/02/5/A** | Apiary establishment | **75** | **7.5** |
| **AGR/CU/API/CR/03/5/A** | Bee hives and bee equipment construction | **80** | **8** |
| **AGR/CU/API/CR/04/5/A** | Bee facilities, tools and equipment management | **70** | **7** |
| **AGR/CU/API/CR/05/5/A** | Bee forage resources management | **70** | **7** |
| **AGR/CU/API/CR/06/5/A** | Honey bee swarms management | **75** | **7.5** |
| **AGR/CU/API/CR/07/5/A** | Honey bee colony management | **80** | **8** |
| **AGR/CU/API/CR/08/5/A** | Honey bee pests and disease control | **75** | **7.5** |
| **AGR/CU/API/CR/09/5/A** | Bee products harvesting | **70** | **7** |
| **AGR/CU/API/CR/10/5/A** | Bee products processing | **85** | **8.5** |
| **AGR/CU/API/CR/11/5/A** | Bee quality management | **60** | **6** |
| **AGR/CU/API/CR/12/5/A** | Bee product value addition | **80** | **8** |
|  | Industrial attachment | **360** | **36** |
| **Total** |  | **1250** | **125** |
| **Grand total** |  | **1530** | **153** |

The total duration of the course is **1530** hours.

**Entry Requirements**

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

1. Apiculture Artisan Certificate Level 4

**Or**

1. Kenya Certificate of Secondary Education (KCSE D plain)

**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 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 conducted by accredited external assessors appointed by TVET CDACC

**Certification**

A candidate will be issued with a Record of Achievement for each Unit of Competency. To attain the qualification National Certificate Level 5 Apiculture management, 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/01/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate communication skills

**Duration of Unit:** 25hours

**Unit Description**

This unit describes the competencies required to use specialized communication skills to meet specific needs of internal and external clients, conduct interviews, facilitate discussion with groups and contribute to the development of communication strategies.

**Summary of Learning Outcomes**

1. Meet communication needs of clients and colleagues
2. Contribute to the development of communication strategies
3. Conduct interviews
4. Facilitate group discussions
5. 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 | * Observation * Oral |
| 1. Contribute to the development of communication strategies | * Dynamics of groups * Styles of group leadership * Openness and flexibility in communication * Communication skills relevant to client groups | * Written * Observation |
| 1. Conduct interviews | * Types of interview * Establishing rapport * Facilitating resolution of issues * Developing action plans | * Written * Observation |
| 1. Facilitate group discussions | * Identification of communication needs * Dynamics of groups * Styles of group leadership * Presentation of information * Encouraging group members participation * Evaluating group communication strategies | * Written * Observation |
| 1. Represent the organization | * Presentation techniques * Development of a presentation * Multi-media utilization in presentation * Communication skills relevant to client groups | * Observation * Written |

**Suggested Delivery Methods**

* Interview
* Role playing
* Observation
* Viewing of related videos

**Recommended Resources**

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

# NUMERACY SKILLS

**UNIT CODE:** **AGR/CU/API/BC/02/5/A**

**Relationship to Occupational Standards:**

This unit addresses the unit of competency: Demonstrate numeracy skills

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required to perform numerical functions. The person who is competent in this unit shall be able to: Calculate with whole numbers and familiar fractions, decimals and percentages for work; Estimate, measure, and calculate with routine metric measurements for work; Use routine maps and plans for work; Interpret, draw and construct 2D and 3D shapes for work; Interpret routine tables, graphs and charts for work; Collect data and construct routine tables and graphs for work; and Use basic functions of calculator

**Summary of Learning Outcomes**

1. Calculate with whole numbers and familiar fractions, decimals and percentages for work
2. Estimate, measure and calculate with routine metric measurements for work
3. Use routine maps and plans for work
4. Interpret, draw and construct 2D and 3D shapes for work
5. Interpret routine tables, graphs and charts for work
6. Collect data and construct routine tables and graphs for work
7. Use basic functions of calculator

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

|  |  |  |
| --- | --- | --- |
| Learning Outcome | Content | Suggested Assessment Methods |
| 1. Calculate with whole numbers and familiar fractions, decimals and percentages for work | * + Interpretation of whole numbers, fractions, decimals, percentages and rates   + Calculations involving several steps   + Calculation with whole numbers and routine or familiar fractions, decimals and percentages   + Conversion between equivalent forms of fractions, decimals and percentages   + Application of order of operations to solve multi-step calculations   + Application of problem solving strategies   + Making estimations to check reasonableness of problem solving process, outcome and its appropriateness to the context and task   + Use of formal and informal mathematical language and symbolism to communicate the result of a task | * Oral * Written * Practical test * Observation |
| 2. Estimate, measure and calculate with routine metric measurements for work | * Selection and interpretation of measurement information in workplace tasks and texts * Identification and selection of routine measuring equipment * Estimation and making measurements using correct units * Estimation and calculation using routine measurements * Performing conversions between routinely used metric units * Using problem solving processes to undertake tasks * Recording information using mathematical language and symbols | * Oral * Written * Practical test * Observation |
| 3. Use routine maps and plans 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 | * Oral * Written * Practical test * Observation |
| 4. Interpret, 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 * Use formal and informal mathematical language to describe and compare common angles * Use common geometric instruments to draw two dimensional shapes * Construct routine three dimensional objects from given nets |  |
| 5. Interpret routine tables, graphs and charts for work | * Identify routine tables, graphs and charts in predominately familiar texts and contexts * Identify common types of graphs and their different uses * Identify features of tables, graphs and charts * Locate specific information * Perform calculations to interpret information * Explain how statistics can inform and persuade * Identify misleading statistical information * Discuss information relevant to the workplace | * Oral * Written * Practical test * Observation |
| 6. Collect data and construct routine tables and graphs for work | * Identify features of common tables and graphs * Identify uses of **different tables and graphs** * Determine data and variables to be collected * Determine audience * Select a method to collect data * Collect data * Collate information in a table * Determine suitable scale and axes * Draft and draw graph to present information * Check that data meets the expected results and context * Report or discuss information using formal and informal mathematical language | * Oral * Written * Practical test * Observation |
| 7. Use basic functions of calculator | * Identify and use keys for **basic 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 * Make estimations to check reasonableness of problem solving process, outcome and its appropriateness to the context and task * Use formal and informal mathematical language and appropriate symbolism and conventions to communicate the result of the task | * Oral * Written * Practical test * Observation |

**Suggested Delivery Methods**

* 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: AGR/CU/API/BC/03/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate digital literacy

**Duration of Unit:** 45 hours

**Unit Description**

This unit describes competencies required to use a computer and other digital devices for the purposes of communication, work performance and management at the workplace.

**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 * 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 * Laws governing protection of ICT | * Written tests * Oral presentation * Observation * 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 * Observation * Project |
| 1. Apply internet and email in communication at workplace | * Computer networks * Network configurations * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Observation * Oral presentation * 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 * Observation * Oral presentation * 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 * Observation * Oral presentation * Written report * Project |

**Suggested Delivery Methods**

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

**Recommended Resources**

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

# ENTREPRENEURIAL SKILLS

**UNIT CODE: AGR/CU/API/BC/04/5/A**

**Relationship to occupational standards**

This unit addresses the unit of competency: Demonstrate entrepreneurial skills

**Duration of unit:** 70 hours

**Unit description**

This unit describes the competencies critical to demonstration of entrepreneurial aptitudes. It involves, developing business innovation strategies, developing new markets, customer base, expanding employed capital and undertaking regional/county expansion while retaining motivated staff.

**Summary of Learning Outcomes**

1. Develop business innovation strategies
2. Develop new products/ markets
3. Expand customers and product lines
4. Motivate all staff/workers
5. Expand employed capital base
6. Undertake regional/county business expansion

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Develop business Innovation strategies | * Innovation in business * Business innovation strategies * Creativity for business development * New technologies in entrepreneurship * Linkages with other entrepreneurs * Setting strategic directions * New ideas and approaches * Entrepreneurial skills development * Market trends * Monitoring and anticipating market trends * Products and processes in entrepreneurship * Business conventions ad exhibitions * Business growth refocus | * Observation * Case studies * Individual/group assignments   Projects   * Written * Oral |
| 1. Develop new products/ markets | * Feasibility study for new products * Identifying new sources of raw material and resources * New target markets/customers * Increasing products and services * Marketing improvement * Intrapreneurship and business growth | * Observation * Case studies * Individual/group assignments * Projects * Written * Oral |
| 1. Expand customers and product lines | * Market demand * Regulatory environment * Creating product and services competitive advantages * Creating royal client base * Identifying and maintain new customers and markets * Advance product/ service promotions * Advance market expansion * Small business records management * Book keeping and auditing for small businesses * Computer application software and programmes * ICT in customer and product diversification | * Oral * Observation * Case studies * Individual/group assignments * Projects * Written |
| 1. Motivate staff/workers | * Motivation of workers   `Communication at workplace for motivation purpose   * Problem solving * Conflict resolution at place of work * Good staff/workers relation * Team building and team work * Staff development and enhancement * Culture of continuous improvement | * Observation * Case studies * Individual/group assignments * Projects * Written |
| 1. Expand employed capital base | * Employed capital in business * Business share holdings * Types of shares * Shares diversification * Role of shareholders * Entrepreneurship * Increasing products and services | * Observation * Case studies * Individual/group assignments * Projects * Written * Oral |
| 1. Undertake county/ regional business expansion | * Region/ county identification process * Regional/ county laws and regulation * Business regional/county expansion * Regional/ County business expansion * Innovation in business * Business expansion and diversification * Resources for regional/county expansion * Small business Strategic Plan * Computer software in business development * ICT and business growth | * Observation * Case studies * Individual/group assignments * Projects * Written * Oral |

**Suggested Delivery Methods**

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

**Recommended Resources**

* Case studies for small businesses
* Business plan templates
* Laptop/ desktop computers
* Internet
* Telephone
* Writing materials

# EMPLOYABILITY SKILLS

**UNIT CODE:** **AGR/CU/API/BC/05/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate employability skills

**Duration of Unit:** 50 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 small teams

5. Plan and organize work

6. Maintain professional growth and development

7. Demonstrate workplace learning

8. Demonstrate problem solving skills

9. Demonstrate workplace ethics

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management | * Self-awareness * Formulating personal vision, mission and goals * Strategies for overcoming life challenges * Emotional intelligence * Assertiveness versus aggressiveness * Expressing personal thoughts, feelings and beliefs * Developing and maintaining high self-esteem * Developing and maintaining positive self-image * Articulating ideas and aspirations * Accountability and responsibility * Good work habits * Self-awareness * Self-development * Financial literacy * Healthy lifestyle practices | * Observation * Written * Oral interview * Third party report |
| 1. Demonstrate interpersonal communication | * Meaning of interpersonal communication * Listening skills * Types of audience * Writing skills * Reading skills * Meaning of empathy * Understanding customers’ needs * Establishing communication networks * Sharing information | * Observation * Written * Oral interview * Third party report |
| 1. Demonstrate critical safe work habits | * Stress and stress management * Punctuality and time consciousness * Leisure * Integratingpersonal objectives into organizational objectives * Resources utilization * Setting work priorities * HIV and AIDS * Drug and substance abuse * Handling emerging issues | * Observation * Written * Oral interview * Third party report |
| 1. Lead a small team | * Leadership qualities * Team building * Determination of team roles and objectives * Team performance indicators * Responsibilities in a team * Forms of communication * Complementing team activities * Gender and gender mainstreaming * Human rights * Maintaining relationships * Conflicts and conflict resolution | * Observation * Oral interview * Written * Third party report |
| 1. Plan and organize work | * Functions of management * Planning * Organizing * Time management * Decision making process * Task allocation * Evaluating work activities * Resource utilization * Problem solving * Collecting and organising information | * Observation * Oral interview * Written * Third party report |
| 1. Maintain professional growth and development | * Opportunities for professional growth * Assessing training needs * Licenses and certifications for professional growth and development * Pursuing personal and organizational goals * Identifying work priorities * Recognizing career advancement | * Observation * Oral interview * Written * Third party report |
| 1. Demonstrate workplace learning | * Managing own learning * Contributing to the learning community at the workplace * Cultural aspects of work * Variety of learning context * Application of learning * Safe use of technology * Identifying opportunities * Generating new ideas * Workplace innovation * Performance improvement * Handling emerging issues * Future trends and concerns in learning | * Observation * Oral interview * Written * Third party report |
| 1. Demonstrate problem solving skills | * Problem identification * Problem solving * Application of problem-solving strategies * Resolving customer concerns | * Observation * Oral interview * Written * Third party report |
| 1. Demonstrate workplace ethics | * Meaning of ethics * Ethical perspectives * Principles of ethics * Values and beliefs * 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 | * Observation * Oral interview * Written * Third party report |

**Suggested Methods of Instruction**

* Instructor lead facilitation of theory
* Demonstrations
* Simulation/Role play
* Group Discussion
* Presentations
* Projects
* Case studies
* Assignments

**Recommended Resources**

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

# ENVIRONMENTAL LITERACY

**UNIT CODE:** **AGR/CU/API/BC/06/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate environmental literacy

**Duration of Unit:** 25 hours

**Unit Description**

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, identify environmental legislations/conventions for environmental concerns, implement specific environmental programs and monitor activities on environmental protection/programs.

**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

**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 questions * Oral questions * Observation of work procedures |
| 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 * 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 questions * Oral questions * Observation of work procedures * 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 * Observation of work procedures * 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 * Observation of work procedures |
| 1. Implement specific environmental programs | * Community needs and expectations * Resource availability * 5 s of good housekeeping * Identification of programs/Activities * Setting of individual roles /responsibilities * Resolving problems /constraints encountered * Consultation with stakeholders | * Written questions * Oral questions * Observation of work procedures * Role play |
| 1. Monitor activities on Environmental protection/Programs | * Periodic monitoring and Evaluation of activities * Gathering feedback from stakeholders * Analysing 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 * Observation |

**Suggested Delivery Methods**

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

**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
* Ccompany environmental management systems (EMS)
* Montreal Protocol
* Kyoto Protocol

# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** **AGR/CU/API/BC/07/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 25 hours

**Unit Description**

This unit describes the competencies required to comply with regulatory and organizational requirements for occupational safety and health.

**Summary of Learning Outcomes**

1. Identify workplace hazards and risk
2. Identify and implement appropriate control measures to hazards and risks
3. Implement OSH programs, procedures and policies/guidelines

**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 is conducted by * Authorized personnel or agency * Gathering of OHS issues and/or concerns raised | * Oral questions * Written tests * Observation of trainees identify hazards and risks |
| 1. Identify and implement appropriate control measure to hazards and risks | * Prevention and control measures, including use of PPE (personal protective equipment) for specific hazards are identified and implemented * Appropriate risk controls based on result of OSH hazard evaluation is recommended * Contingency measures, including emergency procedures during workplace incidents and emergencies are recognized and established in accordance with organization procedures | * Oral questions * Written tests * Practical test * Observation of implementation of control measures |
| 1. Implement OSH   programs, procedures  and policies/guidelines | * Providing information to work team about company OHS program, procedures and policies/guidelines * Participating in implementation of OSH procedures and policies/ guidelines * Training of team members and advice on OSH standards and procedures * Implementation of procedures for maintaining OSH-related records | * Oral questions * Written tests * Practical test * Observation |

**Suggested Delivery Methods**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* 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

# CORE UNITS OF LEARNING

# BEE BIOLOGY AND BEHAVIOUR

**UNIT CODE: AGR/CU/API/CR/01/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 70 hours

**Unit Description**

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

**Summary of Learning Outcomes**

1. Identify bee species
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** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Overview of bee keeping | * 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 * Current status of the keeping industry * Institutional and legal aspects in bee keeping | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Identify bee species | * + Materials and equipment for identification of bee species   + Bee parts/external morphology/bee anatomy   + Bee species   + 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 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 understanding of bee nutrition | * Types of feed for bees * Feeding methods * Feeding equipment * Feed quality * Types of supplements * Importance of nectar and pollen in bee nutrition * Artificial feeding procedure in bees | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate the understanding of bee behaviour | * Meaning of terms swarming, absconding, migration and Supercedure * Types of swarming * Communication among honey bees * Factors affecting bee behaviour * Methods of controlling bee behaviour | * 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**

1. Hand lens
2. Feeder box
3. Catcher box
4. Observation hive
5. Supplement and substitutes ingredients

# APIARY ESTABLISHMENT AND MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/02/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: establish an apiary

**Duration of Unit:** 75 hours

**Unit Description**

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

**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** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Select apiary site | * + Meaning of terms-apiary   + Types of apiaries   + Key factors to consider when selecting an apiary   + 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   + 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 of apiary sites * Fencing measurements | * 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 * 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 * Types of bee houses * 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 apiary facilities | * Types of bee forage * Establishment and management bee forage and water resources * Floral density assessment * Different ecological zones * 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 Instruction**

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

**Recommended Resources**

1. Bee hives
2. Colonies
3. Platforms and hanging posts
4. Bee house
5. Hive hanging wires
6. Bees forage and water resources
7. Farm tools
8. PPE
9. Posts
10. Roofing materials
11. Rafters
12. Timber
13. Chain link

# BEE HIVES AND OTHER BEE EQUIPMENT CONSTRUCTION

**UNIT CODE: AGR/CU/API/CR/03/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: construct bee hives and bee equipment

**Duration of Unit:** 80 hours

**Unit Description**

This unit specifies the competencies required to construct bee hives and bee equipment. It involves preparing to construct bee hives and bee equipment, constructing beehives and bee equipment and completing construction of hives and bee equipment.

**Summary of Learning Outcomes**

1. Prepare to construct bee hives and other bee equipment
2. Construct beehives and bee equipment
3. Conduct post construction activities

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare to construct bee hives and bee equipment | * + Types of materials and equipment for construction and repair of hives   + Quality of construction materials | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Construct beehives and bee equipment | * + Meaning of the term hive tool, super, bee brush, observation hive, queen excluder, bee escape, smoker   + Types of hives and bee equipment   + Standard measurements on the various bee equipment   + Uses of bee equipment   + Procedure for construction of bee hives and bee equipment   + Standards specifications of hive and bee equipment   + Occupational health and safety measures during construction. | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Conduct post construction activities | * Proper storage of hives and bee equipment * Waste management methods | * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of Instruction**

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

**Recommended Resources**

1. Flat metal bar
2. File for sharpening
3. Nails, hammers
4. Wood plainer
5. Ply wood
6. Joinery equipment
7. Tape measure
8. Iron sheets
9. Galvanized aluminum sheets and wire
10. Drilling machine
11. Pliers
12. Cotton material
13. Goose net
14. Coffee wire
15. Leather/Rexene gloves
16. Sewing machine
17. Tailoring scissors
18. Tin sip
19. Zips and elastic material
20. Timber
21. First aid kit
22. Fire extinguisher

# BEE FACILITIES, TOOLS AND EQUIPMENT MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/04/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: manage bee facilities, tools and equipment

**Duration of Unit:** 80 hours

**Unit Description**

This unit specifies the competencies required to manage bee facilities, equipment and tools. It involves establishing a bee facility, equipment and tools identification system, performing bee facilities, equipment and tools routine inspection, maintaining the bee facilities, equipment and tools, disinfecting bee facilities, equipment and tools, storing bee facilities, equipment and tools and disposing bee facilities, equipment and tools.

**Summary of Learning Outcomes**

1. Establish an identification system for bee facility, equipment and tools
2. Perform bee facilities, tools and equipment routine inspection
3. Maintain and repair bee facilities, tools and equipment
4. Disinfect bee facilities, tools and equipment
5. Store bee tools and equipment
6. Maintain, repair/dispose bee tools and equipment

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Establish an identification system for bee facility, equipment and tools | * + Types of bee facility, equipment and tools   + Components of a bee facility   + Types of bee facility, equipment and tools identification system | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Perform bee facilities, tools and equipment routine inspection | * + Bee facilities, equipment and tools inventory records maintenance   + Preparation of routine inspection schedule   + Bee facilities, equipment and tools routine inspection procedure.   + Occupational health and safety procedures in bee facilities, equipment and tools routine inspection   + Procedure for routine inspection | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Maintain and repair bee facilities, tools and equipment | * Preparation of maintenance schedules * Types of resources for maintenance and repair. * Procedure for bee facilities, equipment and tools condition assessment * Procedure for bee facilities, equipment and tools maintenance and repair * Basic equipment maintenance and repair | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Disinfect bee facilities, tools and equipment | * Preparation of disinfection schedule * Types of pest/disease infestation * Materials , tools and equipment for disinfecting bee facilities, equipment and tools * Phytosanitary * Types of disinfectants * Procedure for disinfection | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Store bee tools and equipment | * Storage conditions for bee facilities, equipment and tools * Storage facilities for bee facilities, equipment and tools * Storage procedure for bee facilities, equipment and tools * Safety and security of storage facilities * Store records / types of store inventory * Occupational health * HACCP standards * Hygienic surveillance | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Maintain, repair/dispose bee tools and equipment | * Maintenance and repair bee facilities tools and equipment * Materials for disposal * Methods of bee tools and equipment disposal * Procedures for disposal of tools and equipment * Occupational safety and health. | * 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**

1. Stores
2. Computers with internet
3. Tool kits
4. Disinfectants
5. Fumigants
6. Insect repellents
7. Coolers
8. Air conditions
9. Fridges
10. Freezers
11. Shelves
12. Fire proof cabinets
13. Cold rooms
14. Knapsack sprayers
15. Calibration tools
16. Weighing scales

# BEE FORAGE RESOURCES AND MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/05/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 70 hours

**Unit Description**

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

**Summary of Learning Outcomes**

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

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Identify suitable bee forage | * + Meaning of bee forage   + Types/classes of bee forage plants   + Uses of bee forage resources   + Geographical distribution of forage resources   + Ecological requirements for 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   + Methods of propagation and husbandry   + 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 flowering 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 forage resources | * Meaning of conservation * Conservation methods * Plant genetic materials * Api-agroforest programs * Re afforestation * Community based conservation * Vegetation surveys * Community reserve areas * Woods lots * Multipurpose plant species * Effects of climate change on forage resources * Mitigation measures for the effects of human activities * Land degradation | * 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 | * 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**

1. Tree nurseries
2. Land
3. Water
4. Manure/fertilizer
5. Planting materials
6. Propagation tool and equipment
7. Human resource

# HONEY BEE SWARM MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/06/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit: 75** 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 managing swarming behaviour in a honey bee 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** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 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 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 | * + 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 * Artificial feeding in honey bee swarms | * 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**

1. Catcher box
2. Bee swarms
3. Smoker
4. Rope
5. Ladder
6. Swarm catcher
7. Bees wax
8. Propolis
9. Plants based baits.

# HONEY BEE COLONY MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/07/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit: 8**0 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 manipulation, raising queen bees and performing post-manipulation practices bee colony manipulation.

**Summary of Learning Outcomes**

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

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 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 | * + Types of combs   + Comb sequence in a colony   + Comb construction pattern   + The concept of bee space   + Procedure for opening a bee hive   + Procedure for handling combs | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Handle honey bee colony | * Desirable colony traits * Tools and equipment for colony manipulation * Colony division procedure * Optimum conditions that should prevail in the brood nest * Colony transfer procedure * Merging bee colonies * Feeding bee colonies * Strengthening bee colonies * Types of colony records | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Raise queen bees | * Meaning of the term selection and propagation * Tools and equipment for selection and propagation * De-queening and re-queening procedure * Artificial insemination techniques * Queen bee rearing techniques | * 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 of Instruction**

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

**Recommended Resources**

1. Bee colonies
2. PPE kit
3. Catcher box
4. Smoker
5. Hives
6. Queen cages
7. Grease

# HONEY BEE PESTS AND DISEASE CONTROL

**UNIT CODE: AGR/CU/API/CR/08/5/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 75 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** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 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   + Signs and symptoms of brood pest infestation and diseases   + Pest identification   + Sample collection   + Bee brood inspection records | * + Written   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Assess health and condition of adult bees | * Types of castes * Types of adult bee diseases * Signs and symptoms of adult bees diseases * Sample collection * 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 * Procedure for removing a swarm from unwanted nesting sites | * Written * Observation * Third party report * Oral questioning * Interviews |

**Suggested Methods of Instruction**

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

**Recommended Resources**

1. Bee colonies
2. Smoker
3. PPE
4. Bee hives
5. Feed supplements
6. Feeding tools and materials

# BEE PRODUCTS HARVESTING

**UNIT CODE: AGR/CU/API/CR/09/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: harvest bee products

**Duration of Unit:** 70 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** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare to harvest bee products | * + Meaning of terms honey, propolis, bees wax, royal jelly, bee venom, bee brood, pollen, bee bread   + Types of bee products   + 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   + 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**

1. Propolis collector
2. Pollen trap
3. Honey extractor
4. Venom collector
5. Harvesting containers
6. Smokers
7. PPE kit
8. Bees wax extractor
9. Bee brush
10. Bee escape
11. Food grade storage equipment

# BEE PRODUCTS PROCESSING

**UNIT CODE: AGR/CU/API/CR/10/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: process bee products

**Duration of Unit: 85** hours

**Unit Description**

This unit specifies the competencies required to provide bee extension services. It involves separating different bee products, preparing processing equipment, processing bee honey and processing bee wax.

**Summary of Learning Outcomes**

1. Prepare bee products for processing
2. Prepare processing equipment
3. Process honey
4. Process bees wax
5. Process propolis
6. Process pollen
7. Process bee venom

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare bee products for processing | * + Types of bee products   + Characteristics of bee products   + Sorting procedure for bee products   + Processing methods   + Processing materials   + Sources of energy / fuel for processing   + Processing procedure | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Prepare processing equipment | * + Types of processing equipment   + Uses of different processing equipment   + State/condition of processing equipment   + Food grade materials   + Phytosanitary procedures   + Processing equipment maintenance and storage. | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Process honey | * Forms of honey * Handling of processing equipment * Methods of honey processing * Honey processing procedure * Duration of honey settling * Temperature requirements for honey processing * Storage conditions for honey | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process bees wax | * Methods of processing bees wax * Wax processing equipment * Phytosanitary procedures * Wax processing procedure * Temperatures for bees wax processing * Storage conditions for bees wax | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process propolis | * Meaning of the term propolis * Methods of processing propolis * Materials for propolis processing * Phytosanitary procedures * Procedure for propolis processing * Storage conditions for propolis | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process pollen | * Meaning of the term pollen * Characteristics of pollen * Methods of pollen extraction * Storage conditions for pollen | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process bee venom | * Meaning of the term bee venom * Characteristics of bee venom(allergies from bee stings) * Methods of bee venom processing * Phytosanitary procedures * Uses of bee venom * Procedure for bee venom processing * Procedure for processing bee venom * Storage conditions for bee venom * Preservation of bee venom | * 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**

1. Honey warmers
2. Honey extractors
3. Settling tanks
4. Sieves
5. Straining tanks
6. Straining nets
7. Buckets
8. Bottles
9. Jars
10. Drums
11. Refractometer
12. Strings or rubber band
13. Uncapping knives
14. Honey press
15. Uncapping tray
16. Honey blender
17. Weighing scale
18. Wax smelter
19. Wax press
20. Wax straining bag
21. Pots
22. Pollen traps
23. Spatula
24. Driers
25. Packaging containers
26. Venom screen/ collector
27. Fridges
28. Vials
29. PPE
30. First aid kit(anti-bee venom)
31. Framed cages

# BEE PRODUCT QUALITY MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/11/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: manage quality of food products

**Duration of Unit:** 60 hours

**Unit Description**

This unit specifies the competencies required to manage quality of food products. It involves establishing food safety and quality systems, managing quality operations, preparing for raw material and product analyses and carrying out raw material and product analyses.

**Summary of Learning Outcomes**

1. Establish bee products safety and quality systems
2. Manage quality operations
3. Prepare for raw material and product analyses
4. Carry out raw material, packaging materials and finished products analyses

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Establish bee products safety and quality systems | * Legal issues related to food handling * Bee products safety and quality systems * Designing and establishing bee product safety and quality systems * Setting up workplace Standard Operating Procedures (SOPs) * Documentation of food quality and safety procedures | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Participate in quality operations | * Identification and mobilization of operational resources * Development of work schedules for quality operations * Organization and coordination of quality operations * Staff welfare /personal public health * Phytosanitary measures * Monitoring and evaluation of quality operations * Development of quality/safety management system * Emerging trends in food quality and inspection * Plant maintenance * Integrated pest and rodent management * Laboratory waste management and disposal * Internal quality auditing systems | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Prepare bee product analyses | * Bee product analyses tools and equipment * Laboratory code of practice * Development of laboratory standards * Methods of sample collection * Sampling procedures * Development of laboratory standard operating procedures | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Carry out bee products analyses | * Physical and chemical properties of bee product * Types of bee product analysis * Sample preparation * Interpretation and reporting of analyses results * Making decisions based on outcomes and workplace standards * Rejected product disposal | * 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**

1. Bee products
2. Equipment
3. Reagents

# BEE PRODUCTS VALUE ADDITION

**UNIT CODE: AGR/CU/API/CR/12/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: perform bee product value addition

**Duration of Unit:** 75 hours

**Unit Description**

This unit specifies the competencies required to perform bee product value addition. It involves preparing the equipment, materials and supplies for value addition, processing wax-based value-added products, processing honey-based value-added products, processing propolis based value added products, processing royal jelly-based value-added products, processing bee venom-based value-added products, packaging, branding and marketing value added bee products.

**Summary of Learning Outcomes**

1. Prepare the equipment, materials and supplies for value addition
2. Process wax-based value-added products
3. Process honey-based value-added products
4. Process propolis based value added products
5. Royal jelly-based value-added products
6. Process bee venom-based value-added products
7. Package and store value added bee products

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Prepare the equipment, materials and supplies for value addition | * + Meaning of terms value addition.   + Identification of bee products for value addition   + Equipment’s and materials used for value addition   + Procedure for setting up equipment’s and materials for value addition | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process wax-based value-added products | * + Types of wax-based value-added products and their uses.(candles, soap, body cream)   + Benefits of wax-based value-added products   + Methods of preparing wax-based value-added products   + Waste disposal | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Process honey-based value-added products | * Types of honey-based value-added products (vinegar, honey wine, cough syrup, body cream) * Benefits of honey-based value-added products * Methods of processing honey-based value-added products * Processing waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process propolis based value added products | * Types of propolis based value added products * Benefits of propolis based value added products * Methods of preparing propolis based value added products * Waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process royal jelly-based value-added products | * Types of royal jelly-based value-added products * Benefits of royal jelly-based value-added products * Methods of preparing royal jelly-based value-added products * Waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process bee venom-based value-added products | * Types of bee venom-based value-added products * Benefits of bee venom-based value-added products * Methods of preparing bee venom-based value-added products * Waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Package and store value added bee products | * Types of packaging materials * Proper packaging of value-added products * Labelling and branding * Storage conditions * Storage of tools and equipment | * 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**

1. Bee products
2. Packaging equipment
3. Honey extractor
4. Uncapping knife
5. Processing, straining and settling tanks
6. Packaging materials
7. Bottles and jars
8. Labels
9. Weighing scales
10. Perfumes
11. Buckets
12. Medicinal plants
13. Vegetable oils

# BEE KEEPING TRAINING AND EXTENSION SERVICES

**UNIT CODE: AGR/CU/API/CR/13/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: provide bee keeping training and extension services

**Duration of Unit: 65** hours

**Unit Description**

This unit specifies the competencies required to provide bee keeping training and extension services. It involves conducting community mobilization, carrying out surveys, forming community groups and leadership structures, building capacity to bee stakeholders, developing community action plans and creating awareness on bee keeping opportunities

**Summary of Learning Outcomes**

1. Conduct community mobilization
2. Form community groups and leadership structures
3. Create awareness on bee keeping opportunities
4. Develop training and extension materials
5. Carry out community training
6. Develop community action plans
7. Manage community projects

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

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Conduct community mobilization | * + Training needs assessment/ identification of gaps for training   + Methods of community mobilization   + Resources for community mobilization   + Monitoring and evaluation   + Resource mobilization | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Form community groups and leadership structures | * + Leadership structures and governance   + Group dynamics   + Formation of community groups and leadership structures | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Create awareness on bee keeping opportunities | * Identification of bee keeping stakeholders * Methods of creating awareness * Bee keeping business opportunities * Trends in bee keeping industry | * Written * Observation * Third party report * Oral questioning * Interviews |
| 1. Develop training and extension materials | * Types of training materials * Extension methods * Extension policy * Role of stakeholders in extension * Resources and materials required for developing training and extension materials * Packaging and presentation of technical information | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Carry out community training | * Materials and resources for community training * Preparation for community training   + Venue identification   + Logistics in community training * Methods of information dissemination * Training evaluation methods and tools | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Develop community action plans | * Meaning of an action plan * Components of an action plan * Procedure for developing action plans * Community involvement | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Manage community projects | * Project inception * Project design * Project implementation * Project financing * Project risks * Project monitoring and evaluation * Project audit and review * Project environmental management * Project closure | * 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**

1. Training and extension materials/aids
2. Transport
3. Computers
4. Venues
5. Demonstration plots, apiaries
6. Human resource