****

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**APICULTURE MANAGEMENT**

**LEVEL 6**



TVET CDACC

P.O. BOX 15745-00100

NAIROBI

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# FOREWORD

The provision of quality education and training is fundamental to the Government’s overall strategy for social economic development. Quality education and training will contribute to achievement 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 also recognize the support of the Netherlands’ funded NICHE project “Integrated Capacity Development for Sustainable Agriculture and Rural Development” which is jointly implemented by Baraka Agricultural College in Kenya and CINOP Global in the Netherlands.

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 AND ABBREVIATIONS

BC Basic Competency

CC Core Competency

CO Common Units

CDACC Curriculum Development Assessment and Certification Council

CU Curriculum

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



# COURSE OVERVIEW

Description of the Course

The Apiculture management level six (6) 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, apply bee microscopic techniques, conduct research in apiculture and provide apiculture 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 of Learning Code** | **Unit of Learning Title** | **Duration in Hours** | **Credit Factor** |
| **AGR/CU/API/BC/01/6/A** | Communication skills | **40** | **4** |
| **AGR/CU/API/BC/02/6/A** | Numeracy skills | **60** | **6** |
| **AGR/CU/API/BC/03/6/A** | Digital literacy | **60** | **6** |
| **AGR/CU/API/BC/04/6/A** | Entrepreneurial skills | **100** | **10** |
| **AGR/CU/API/BC/05/6/A** | Employability skills | **80** | **8** |
| **AGR/CU/API/BC/06/6/A** | Environmental literacy | **40** | 4 |
| **AGR/CU/API/BC/07/6/A** | Occupational safety and health practices | **40** | **4** |
| **Total** |  | **420** | **42** |

**Core units of learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit of Learning Code** | **Unit of Learning Title** | **Duration in Hours** | **Credit Factor** |
| **AGR/CU/API/CR/01/6/A** | Bee biology and behaviour | **125** | **12.5** |
| **AGR/CU/API/CR/02/6/A** | Apiary establishment | **140** | **14** |
| **AGR/CU/API/CR/03/6/A** | Bee hives and bee equipment construction | **160** | **16** |
| **AGR/CU/API/CR/04/6/A** | Bee facilities, tools and equipment management | **145** | **14.5** |
| **AGR/CU/API/CR/05/6/A** | Bee forage resources management | **110** | **11** |
| **AGR/CU/API/CR/06/6/A** | Honey bee swarms management | **130** | **13** |
| **AGR/CU/API/CR/07/6/A** | Honey bee colony management | **120** | 12 |
| **AGR/CU/API/CR/08/6/A** | Honey bee pests and disease control | **90** | **9** |
| **AGR/CU/API/CR/09/6/A** | Bee products harvesting | **110** | **11** |
| **AGR/CU/API/CR/10/6/A** | Bee products processing | **180** | **18** |
| **AGR/CU/API/CR/11/6/A** | Bee quality management | **130** | **13** |
| **AGR/CU/API/CR/12/6/A** | Bee product value addition | **120** | **12** |
| **AGR/CU/API/CR/13/6/A** | Bee microscopic techniques | **90** | **9** |
| **AGR/CU/API/CR/14/6/A** | Research in apiculture | **120** | **12** |
| **AGR/CU/API/CR/15/6/A** | Apiculture training and extension services | **130** | **13** |
| **AGR/CU/API/CR/16/6/A** | Industrial attachment | **480** | **48** |
| **Total** |  | **2380** | **238** |
| **Grand Total** |  | **2800** | **280** |

The total duration of the course is **2800** hours.

**Entry Requirements**

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

1. Apiculture Craft Certificate Level 5

**Or**

1. Kenya Certificate of Secondary Education (KCSE C-)

**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 Record of Achievement for each Unit of Competency. To attain the qualification National Diploma Level 6 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/01/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate communication skills

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required in meeting communication needs of clients and colleagues and developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interview, facilitating group discussion and representing the organization in various forums.

**Summary of Learning Outcomes**

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

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

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

**Suggested Delivery Methods**

* Discussion
* Role playing
* Simulation
* Direct instruction
* Practice by trainee

**Recommended Resources**

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

# NUMERACY SKILLS

**UNIT CODE: AGR/CU/API/BC/02/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate numeracy skills

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes the competencies required by a worker in order to apply a wide range of mathematical calculations for work; apply ratios, rates and proportions to solve problems; estimate, measure and calculate measurement for work; Use detailed maps to plan travel routes for work; Use geometry to draw and construct 2D and 3D shapes for work; Collect, organize and interpret statistical data; Use routine formula and algebraic expressions for work and use common functions of a scientific calculator

**Summary of Learning Outcomes**

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

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply a wide range of mathematical calculations for work | * Fundamentals of mathematics * Addition, subtraction, multiplication and division of positive and negative numbers * Algebraic expressions manipulation * Forms of fractions, decimals and percentages * Expression of numbers as powers and roots | * Written tests * Assignments * Supervised exercises |
| 1. Apply ratios, rates and proportions to solve problems | * Rates, ratios and proportions * Meaning * Conversions into percentages * Direct and inverse proportions determination * Performing calculations * Construction of graphs, charts and tables * Recording of information | * Written tests * Oral questioning * Assignments * Supervised exercises |
| 1. Estimate, measure and calculate measurement for work | * Units of measurements and their symbols * Identification and selection of measuring equipment * Conversion of units of measurement * Perimeters of regular figures * Areas of regular figures * Volumes of regular figures * Carrying out measurements * Recording of information | * Assignments * Supervised exercises * Written tests |
| 1. Use detailed maps to plan travel routes for work | * Identification of features in routine maps and plans * Symbols and keys used in routine maps and plans * Identification and interpretation of orientation of map to North * Demonstrate understanding of direction and location * Apply simple scale to estimate length of objects, or distance to location or object * Give and receive directions using both formal and informal language * Planning of routes * Calculation of distance, speed and time | * Oral * Written * Practical test * Observation |
| 1. Use geometry to draw and construct 2D and 3D shapes for work | * Identify two dimensional shapes and routine three dimensional shapes in everyday objects and in different orientations * Explain the use and application of shapes * Use formal and informal mathematical language and symbols to describe and compare the features of two dimensional shapes and routine three dimensional shapes * Identify common angles * Estimate common angles in everyday objects * Evaluation of unknown angles * Use formal and informal mathematical language to describe and compare common angles * Symmetry and similarity * Use common geometric instruments to draw two dimensional shapes * Construct routine three dimensional objects from given nets |  |
| 1. Collect, organize and interpret statistical data | * + Classification of data * Grouped data * Ungrouped data   + Data collection * Observation * Recording   + Distinguishing between sampling and census   + Importance of sampling   + Errors in sampling   + Types of sampling and their limitations e.g. * Stratified random * Cluster * Judgmental   + Tabulation of data * Class intervals * Class boundaries * Frequency tables * Cumulative frequency   + Diagrammatic and graphical presentation of data e.g. * Histograms * Frequency polygons * Bar charts * Pie charts * Cumulative frequency curves * Interpretation of data | * Assignments * Supervised exercises * Written tests |
| 1. Use routine formula and algebraic expressions for work | * + Solving linear equations   + Linear graphs * Plotting * Interpretation   + Applications of linear graphs * Curves of first and second degree * Plotting * Interpretation | * Assignments * Supervised exercises * Written tests |
| 8. Use common functions of a scientific calculator | * Identify and use keys for common functions on a calculator * Calculate using whole numbers, money and routine decimals and percentages * Calculate with routine fractions and percentages * Apply order of operations to solve multi-step calculations * Interpret display and record result | * 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/03/6/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate digital literacy

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes competencies required to 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/04/6/A**

Relationship to occupational standards

This unit addresses the unit of competency: Demonstrate understanding of entrepreneurship

**Duration of unit:** 100 hours

Unit Description

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

**Summary of Learning Outcomes**

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

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

**Suggested Methods of instruction:**

1. Direct instruction
2. Project
3. Case studies
4. Field trips
5. Discussions
6. Demonstration
7. Question and answer
8. Problem solving
9. Experiential
10. Internship
11. Team training
12. Guest speakers

Recommended Resources

1. Case studies
2. Business plan templates
3. Computers
4. Overhead projectors
5. Internet
6. Mobile phone
7. Video clips
8. Films
9. Newspapers and Handouts
10. Business Journals
11. Writing materials

# EMPLOYABILITY SKILLS

**UNIT CODE:**  **AGR/CU/API/BC/05/6/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate employability skills

**Duration of Unit:** 80 hours

**Unit Description**

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

**Summary of Learning Outcomes**

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

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

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

**Suggested Methods of Delivery**

* 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/06/6/A**

**Relationship to Occupational Standards**:

This unit addresses the unit standard: **Demonstrate environmental literacy**

**Duration of Unit:** 40 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, monitor activities on environmental protection/programs, analyze resource use and develop resource conservation plans.

**Summary of Learning Outcomes**

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

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Purposes and content of Environmental Management and Coordination Act 1999 * Storage methods for environmentally hazardous materials * Disposal methods of hazardous wastes * Types and uses of PPE in line with environmental regulations * Occupational Safety and Health Standards (OSHS) | * Written questions * Oral questions * 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 * 5s 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 * Analyzing data gathered * Documentation of recommendations and submission * Setting of management support systems to sustain and enhance the program * Monitoring and reporting of environmental incidents to concerned /proper authorities | * Oral questions * Written tests * Practical test * Observation |
| 1. Analyze resource use | * Identification of resource consuming processes * Determination of quantity and nature of resource consumed * Analysis of resource flow through different parts of the process. * Classification of wastes for possible source of resources. | * Written tests * Oral questions * Practical test * Observation |
| 1. Develop resource Conservation plans | * Determination of efficiency of use/conversion of resources * Causes of low efficiency of use of resources * Plans for increasing the efficiency of resource use | * Written tests * Oral questions * Practical test * Observation |

**Suggested Delivery Methods**

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

**Recommended Resources**

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

# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:**  **AGR/CU/API/BC/07/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 40 hours

**Unit Description**

This unit 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 * Gathering of OSH issues and/or concerns | * 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 e.g. use of PPE * Contingency measures | * Oral questions * Written tests * Practical tests * Observation of implementation of control measures |
| 1. Implement OSH   programs, procedures  and policies/guidelines | * Company OSH program, procedures and policies/guidelines * 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/01/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 125 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** | **Methods of Assessment** |
| --- | --- | --- |
| 1. Overview of honey bee biology | * Meaning of terms apiculture, apiculture, honey bees, traditional apiculture, and improved apiculture, bee house * Historical background of apiculture * Economic importance of apiculture * Bee species at global regional and local levels * Apiculture production systems * Current status of the keeping industry * Institutional and legal aspects in apiculture | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Identify honey bee races | * + Materials and equipment for identification of honey bee races   + Components/parts of a microscope   + Bee parts/external morphology/bee anatomy   + Bee taxonomy | * 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   + Temporal polytheism in bees(change in behaviour with time)   + Roles drones, workers, queen bees   + Lifespan of different bee castes | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Demonstrate understanding of the physiological system of bees | * Meaning of terms respiration, excretion, and glandular system. * Alimentary system in bees * Circulatory system in bees * Respiratory system * Nervous system * Glandular system * Reproductive system in bees | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate understanding of bee nutrition | * Importance of nectar, pollen and water in honey bee nutrition * Types of feed for bees * Feeding methods * Feeding equipment * Feed quality * Types of supplements * Artificial feeding in bees | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Demonstrate the understanding of bee behaviour | * Meaning of term honey bee behaviour * Communication among honey bees * Aspects of bee behaviours * Factors affecting bee behaviour * Methods of controlling bee behaviour | * 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**

* Dissecting and compound micro scopes
* Hand lens
* Dissecting kits
* Taxonomic charts
* Observation hive
* PPE

# APIARY ESTABLISHMENT

**UNIT CODE: AGR/CU/API/CR/02/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: establish an apiary

**Duration of Unit:** 140 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 hives, 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 facility

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

| **Learning Outcome** | **Content** | **Methods of Assessment** |
| --- | --- | --- |
| 1. Select apiary site | * + Meaning of terms-apiary, mobile apiary   + Types of apiaries   + Key factors to consider when selecting an apiary   + Designing and setting up an apiary   + Code of practise in apiculture | * 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 | * Materials, tools and equipment for fencing the apiary site , their use and maintenance * Demarcation of apiary sites * Fencing measurements * Importance of fencing an apiary site. | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Prepare bee hives | * Types of honey bee hives * Types of other bees hives * Materials, tools and equipment used to prepare hives * Procedure for cleaning the hive * Types of baits * Importance of labelling * 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 * Types of bee houses * Factors to consider when selecting bee house site * Procedure of bee house construction * Post construction activities * Maintenance of a bee house | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Install bee hives | * Hive hanging and placement methods * Factors to consider when installing bee hives | * 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 * Elementary use of the first aid kit * Different ecological zones * Routine apiary management * Pest control measures * Repair and maintenance of apiary facilities |  |

**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 BEE EQUIPMENT CONSTRUCTION

**UNIT CODE: AGR/CU/API/CR/03/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 160 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 bee equipment
2. Construct beehives and bee equipment
3. Complete construction of hives and bee equipment

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

| **Learning Outcome** | **Content** | **Methods of assessment** |
| --- | --- | --- |
| 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 hives   + 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. Complete construction of hives and bee equipment | * Proper storage of hives and bee equipment * Waste management methods | * 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**

* Flat metal bar
* File for sharpening
* Nails, hammers
* Wood plainer
* Joinery equipment
* Tape measure
* Iron sheets
* Galvanized aluminum sheets and wire
* Drilling machine
* Pliers
* Cotton material
* Goose net
* Coffee wire
* Leather/Rexene gloves
* Sewing machine
* Tailoring scissors
* Tin sip
* Zips and elastic material
* Timber
* First aid kit
* Fire extinguisher
* Grass / makutti
* Plant materials

# BEE FACILITIES, TOOLS AND EQUIPMENT MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/04/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 145 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, equipment and tools routine inspection
3. Maintain and repair bee facilities, equipment and tools
4. Disinfect bee facilities, equipment and tools
5. Store bee facilities, equipment and tools
6. Dispose bee facilities, equipment and tools

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 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, equipment and tools 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, equipment and tools | * 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, equipment and tools | * 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 facilities, equipment and tools | * 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 | * Identification procedure for facilities, 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 instructions**

* Projects
* Demonstration by trainer
* Practice by the trainee
* Discussions
* Direct instruction
* Field /benchmarking visits
* Audio-visuals and e-learning

**Recommended Resources**

* Stores
* Computers with internet
* Tool kits
* Disinfectants
* Coolers
* Air conditioner
* Fridges
* Freezers
* Shelves
* Fire proof cabinets
* Cold rooms
* Knapsack sprayers
* Calibration tools
* Weighing scales

# BEE FORAGE RESOURCES AND MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/05/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 110 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 flowering calendar
4. Conserve forage resources

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Identify suitable bee forage | * + Meaning of bee forage   + Types/classes of bee forage plants   + Uses of bee forage resources   + Different ecological zones   + Ecological requirements   + The floral calendar   + Bee forage gap identification   + Types of documented apiculture manuals | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Establish bee forage resources | * + Site selection for the establishment of bee forage resources   + Preparation of the site for bee forage resource establishment   + Propagation materials   + Methods of propagation   + Tools and equipment for establishing bee forage resources   + Procedure for planting forage species   + Types of post- forage establishment activities   + Husbandry methods | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Develop a beekeeping flowering calendar | * Use of mobile apiaries to manage forage resources * Types of bee forage species * Geographical distribution/coverage * Factors affecting flowering | * 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 |

**Suggested Methods of instructions**

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

**Recommended Resources**

* Plant species, gene banks, propagation equipment and chemicals
* Tree nurseries
* Land
* Water
* Manure
* Human resource

# HONEY BEE SWARMS MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/06/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 130 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

**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 instrucions** |
| --- | --- | --- |
| 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 sites/bee migratory routes   + Swarming seasons   + 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 | * + 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 * Regular colony monitoring * Types of colony management measures * Hive stocking techniques * Artificial feeding in honey bee swarms | * 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**

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

# HONEY BEE COLONY MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/07/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 120 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
2. Handle honey bee combs
3. Handle honey bee colony
4. Raise queen bees
5. Perform post-manipulation practices bee colony manipulation

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Prepare for honey bee colony manipulation | * + Meaning of apiary records, honey bee colony manipulation, colony health   + Ascertain the colony health   + Preparation of the management schedule   + Types of apiary records   + 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 | * Meaning of the term brood nest, selection and propagation * 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 and drones | * Meaning of the term breeder colonies * Tools and equipment for queen rearing * De-queening and re-queening procedure * Artificial insemination techniques * Queen bee rearing techniques * Drone 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 in bee manipulation * Colony performance monitoring * Waste disposal | * 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 colonies
* PPE kit
* Catcher box
* Smoker
* Hives
* Artificial insemination kit
* Queen cups and frames
* Queen cages
* Marker
* Grease
* Chloroform/ carbon dioxide

# HONEY BEE PESTS, DISEASES AND THEIR CONTROL

**UNIT CODE: AGR/CU/API/CR/08/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 240 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 instrucions** |
| --- | --- | --- |
| 1. Prepare to inspect the bee colony and the apiary | * + Meaning of terms pests, diseases, predators   + Overview of honey bee pest and diseases   + Materials, tools and equipment for inspecting the bee colony and the apiary   + Approaching a colony   + Procedures for opening a bee hive   + Types pests and predators and their effects   + Impact of bee pests and diseases on production and trade   + Types 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 diseases   + Pest identification   + Presence or absence of pests   + Sample collection and preservation   + Bee brood inspection records | * + Written test   + 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 * Pest identification * Sample collection and preservation * Presence or absence of pests * Colony health records | * Written test * 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 managing infected colonies * Manipulation of drone population(Varroa mite control) * Maintaining hygiene in the apiary | * 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**

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

# BEE PRODUCTS HARVESTING

**UNIT CODE: AGR/CU/API/CR/09/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: harvest bee products

**Duration of Unit:** 110 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 instrucions** |
| --- | --- | --- |
| 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   + 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   + Bee venom 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 instructions**

* 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
* Weighing scale
* Royal jelly spatula and syringe

# BEE PRODUCTS PROCESSING

**UNIT CODE: AGR/CU/API/CR/10/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: process bee products

**Duration of Unit:** 180 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** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Prepare bee products for processing | * + Types of bee products   + Characteristics of bee products   + Sorting procedure for bee products   + Processing methods   + Processing materials   + Processing procedure   + Sources of energy / fuel for processing | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Prepare processing equipment | * + Types of processing equipment   + State/condition of processing equipment   + Food grade materials   + Phytosanitary procedures   + Processing equipment maintenance and storage.   + Uses of different processing equipment | * + 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 * Phytosanitary procedures * Procedure for propolis processing * Materials 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) * PPE for handling bee venom * Methods of bee venom processing * Phytosanitary procedures * Uses of bee venom * Procedure for bee venom processing * Storage conditions for bee venom * Handling of bee venom * Preservation of bee venom | * 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**

* Honey warmers
* Honey extractors
* Settling tanks
* Sieves
* Straining tanks
* Straining nets
* Buckets
* Bottles
* Jars
* Drums
* Refractometer
* Strings or rubber band
* Uncapping knives
* Honey press
* Uncapping tray
* Honey blender
* Weighing scale
* Wax smelter
* Wax press
* Wax straining bag
* Pots
* Pollen traps
* Spatula
* Driers
* Packaging containers
* Venom screen/ collector
* Fridges
* Vials
* PPE
* First aid kit(anti-bee venom)
* Framed cages

# BEE PRODUCT QUALITY MANAGEMENT

**UNIT CODE: AGR/CU/API/CR/11/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 130 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** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Establish bee products safety and quality systems | * Food technology * Legal requirements 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. Manage quality operations | * Identification and mobilization of operational resources * Development of work schedules for quality operations * Resource levelling and control * Organization and coordination of quality operations * Monitoring and evaluation of quality operations * Development of quality/safety management system * Plant maintenance * Integrated pest and rodent management * Staff public health requirement/ staff medical certificate * Phytosanitary measures * laboratory waste management and disposal * Emerging trends in food quality and inspection * Internal quality auditing systems | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Prepare bee product analyses | * Bee product analyses tools and equipment * Food technology * Laboratory code of practice * Food laboratory standards * Development of laboratory standards * Methods of sample collection * Sampling procedures * Development of laboratory manuals * Development of laboratory standard operating procedures | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Carry out bee products analyses | * Food microbiology and analysis * Bee product chemistry * 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 instructions**

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

**Recommended Resources**

* Samples
* Equipment
* Reagents

# BEE PRODUCTS VALUE ADDITION

**UNIT CODE: AGR/CU/API/CR/12/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 120 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** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Prepare the equipment, materials and supplies for value addition | * + Meaning of terms value addition.   + Equipment’s and materials used for value addition   + Types of products 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)   + Properties of wax-based value-added products   + Methods of processing wax-based value-added products   + Processing 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) * Properties 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 * Properties propolis based value added products * Methods of processing propolis based value added products * Processing 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 * Properties of royal jelly-based value-added products * Methods of processing royal jelly-based value-added products * Processing waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Process pollen-based value-added products | * Types of pollen-based value-added products * Benefits of bee venom-based value-added products * Methods of processing pollen-based value-added products | * 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 * Properties of bee venom-based value-added products * Methods of processing bee venom-based value-added products * Processing waste disposal | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Package and store value added bee products | * Types of packaging materials * Storage conditions * Storage tools and equipment * Procedure for packaging and storing value added products * Branding * Marketing | * 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 products
* Packaging equipment
* Honey extractor
* Uncapping knife
* Processing, straining and settling tanks
* Packaging materials
* Bottles and jars
* Labels
* Weighing scales
* Perfumes
* Buckets
* Medicinal plants and herbs
* Vegetable oils

# MICROSCOPIC TECHNIQUES

**UNIT CODE: AGR/CU/API/CR/13/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: apply bee microscopic techniques

**Duration of Unit:** 90 hours

**Unit Description**

This unit specifies the competencies required to apply bee microscopic techniques. It involves performing bee microscopy, operating bee microscopy equipment and tools, maintaining and protecting equipment and tools

**Summary of Learning Outcomes**

1. Prepare bee microscopy equipment and tools
2. Perform bee microscopy
3. Maintain and protect bee microscopy tools and equipment.

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Prepare bee microscopy equipment and tools | * + Meaning of terms microscope, slide , stain, cotton, tongs, surgical blade ,first aid kit, PPE, cleaning agents , sensitive balances   + Types microscopy equipment and tools and their uses | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Perform bee microscopy | * + Specimen preparation   + Specimen preservation   + Laboratory procedures and technique   + Dissection   + Bee morphology /bee parts   + Specimen disposal | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Maintain and protect bee microscopy tools and equipment. | * Handling microscopy tools and equipment. * State of microscopy tools and equipment. * Phytosanitary in bee microscopy * Storage of microscopic tools and equipment * Routine maintenance * Periodical inspection | * 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**

* Insect dissection kits
* Microscope
* Slide
* Stain
* Cotton
* Tongs
* Surgical blade
* first aid kit
* Reagents
* PPE
* Cleaning agents
* Sensitive balances
* Lab procedure manuals
* Fire extinguishers

# RESEARCH IN APICULTURE

**UNIT CODE: AGR/CU/API/CR/14/6/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: conduct research in apiculture

**Duration of Unit:** 120 hours

**Unit Description**

This unit specifies the competencies required to conduct research in apiculture. It involves identifying a research problem, formulating hypothesis or research questions, conducting literature review, developing research design and methodology, conducting data collection, conducting data analysis and presentation, preparing research proposal and preparing research report.

**Summary of Learning Outcomes**

1. Identify a research problem
2. Formulate hypothesis or research questions
3. Conduct literature review
4. Develop research design and methodology
5. Prepare research proposal
6. Conduct data collection
7. Conduct data analysis and presentation
8. Prepare research report

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Identify a research problem | * + Meaning of the term research problem   + Types of research   + Identification/sources of a research problems   + Research title formulation | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Develop research proposal | * Components of a research proposals * Format of a research proposal * Approval of research proposals | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Formulate hypothesis or research questions | * + Types of hypothesis   + Hypothesis formulation   + Testing hypothesis | * + Written test   + Observation   + Third party report   + Oral questioning   + Interviews |
| 1. Conduct literature review | * Sources of information * Methods of citation and referencing * Documentation of relevant literature | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Develop research design and methodology | * Research methods, tools, materials and procedures. * Preparation of a research work schedule and budget * Choice of the locality of study * Types of research design * Sampling techniques * Data analysis techniques * Validity and reliability of research instruments | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Conduct data collection | * Types of data * Data collection tools * Methods of data collection * Sources of data * Sampling techniques | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Conduct data analysis and presentation | * Data cleaning and organizing * Methods of data analysis * Choice of data analysis techniques * Statistical packages * Equipment for data analysis * Limitations of data analysis methods * Presentation methods * Validation of results | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Prepare research report | * Components of a research report * Formats of research report * Dissemination methods * Result finding * Publishing | * 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**

* Stationary
* Cameras
* Mode of transport
* Human and financial resources
* Security
* Research permits
* Projectors
* Computers
* Laboratory
* PPE
* Experimental sites
* Survey maps of the site

# APICULTURE TRAINING AND EXTENSION SERVICES

**UNIT CODE: AGR/CU/API/CR/15/6/A**

**Relationship to Occupational Standards**

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

**Duration of Unit:** 130 hours

**Unit Description**

This unit specifies the competencies required to provide bee keeping training and extension services. It involves conducting community mobilization, forming community groups and leadership structures, creating awareness on bee keeping opportunities, developing extension packages, carrying out community training, developing community action plansand establishing research extension linkages

**Summary of Learning Outcomes**

1. Conduct community mobilization
2. Form community groups and leadership structures
3. Create awareness on apiculture opportunities
4. Develop extension packages
5. Carry out community training
6. Develop community action plans
7. Establish research extension linkages

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

| **Learning Outcome** | **Content** | **Methods of instrucions** |
| --- | --- | --- |
| 1. Conduct community mobilization | * + Training needs assessment/ identification of gaps for training   + Methods of community mobilization   + Resources for community mobilization   + Intervention development   + Monitoring and evaluation tools development   + 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 apiculture opportunities | * Types of apiculture stakeholders * Methods of creating awareness * Available apiculture opportunities * Trends in apiculture industry | * Written test * Observation * Third party report * Oral questioning * Interviews |
| 1. Develop extension packages | * Types of extension packages * Extension methods * Policy on extension * Role of stakeholders in extension * Resources and materials required for developing packages * Packaging and presentation of extension 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 * Project implementation * 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 |
| 1. Establish research extension linkages | * Research stakeholders identification * Types of research linkages * Public relations * Modes of communication in developing linkages | * 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**

* Extension packages
* Transport
* Computers with internet
* Training aids
* Venues
* Demonstration plots, apiaries
* Human resources