



REPUBLIC OF KENYA

COMPETENCY BASED CURRICULUM

FOR

AQUACULTURE MANAGEMENT

LEVEL 4



TVET CDACC
P.O. BOX 15745-00100
NAIROBI

First published 2019
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Council Secretary/CEO
TVET Curriculum Development, Assessment and Certification Council
P.O. Box 15745–00100
Nairobi, Kenya
Email: cdacc.tvet@gmail.com

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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 (Sessional Paper No. 4 of 2016). 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 sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION**

PREFACE

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

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order 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 Aquaculture Sector Skills Advisory Committee (SSAC), German International Cooperation and Ministry of Agriculture, Livestock and Fisheries have developed this curriculum. TVET CDACC in conjunction with Micro Enterprises Support Programme Trust (MESPT) have reviewed this curriculum and incorporated Food Safety.

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, Aquaculture and Food safety SSAC, expert workers and all those who participated in the development and review of this curriculum.

**Prof. CHARLES M. M. ONDIEKI, PhD, FIET (K), Con. EngTech.
CHAIRMAN, 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 organisations.

I appreciate NEPAD Planning and Coordinating Agency (NPCA) of the Africa Union Commission and German Ministry of Economic Cooperation and Development (BMZ) through its implementing agency German International Cooperation (GIZ) GmbH which enabled the development of this curriculum through the CAADP ATVET project. I also appreciate the office of the National Coordinator of GIZ CAADP ATVET Project which was instrumental in the cooperation between the project team, Ministry of Agriculture, Livestock and Fisheries (MoALF) and Ministry of Education.

Much gratitude goes to Micro Enterprises Support Program Trust (MESPT) who initiated the review process and the incorporation of Food Safety in the Curriculum. I acknowledge the Danish International Development Agency (DANIDA) and the European Union (EU) who sponsored the review process.

I recognize with appreciation the role of the Aquaculture 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 Agriculture sector for their valuable input and all those who participated in the process of developing this curriculum.

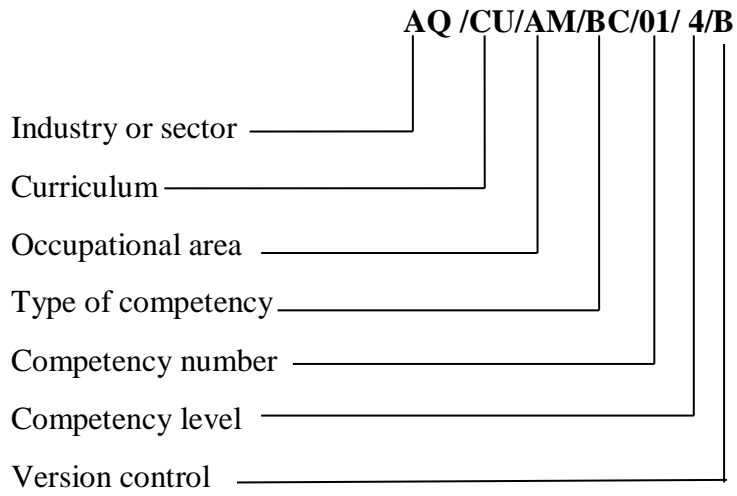
I am convinced that this curriculum will go a long way in ensuring that workers in Aquaculture Management acquire competencies that will enable them to perform their work more efficiently.

Dr. LAWRENCE GUANTAI M'ITONGA, PhD
COUNCIL SECRETARY/CEO
TVET CDACC

ACRONYMS

AM	Aquaculture Management
AQ	Aquaculture
ATVET	Agricultural Technical and Vocational Education and Training
BC	Basic Competency
CAADP	Comprehensive Africa Agricultural Development Programme
CDACC	Curriculum Development, Assessment and Certification Council
CR	Core Competency
CU	Curriculum
DANIDA	Danish International Development Agency
KCPE	Kenya Certificate of Primary Education
KNQA	Kenya National Qualifications Authority
KCSE	Kenya Certificate of Secondary Education
MESPT	Micro Enterprises Support Programme Trust
PPE	Personal Protective Equipment
SSAC	Sector Skills Advisory Committee
TVET	Technical and Vocational Education and Training

KEY TO UNIT CODE



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COURSE OVERVIEW

This course is designed to equip an individual with competencies for selecting suitable sites for constructing fish ponds, producing on-farm formulated fish feeds as well as promoting growth of natural foods in ponds and tanks. It further aims at equipping the individual with competencies for stocking the ponds and tanks with fingerlings and raising these to market size under optimum conditions. Additionally, the course is designed to impart the individual with competencies to operate a small-scale fish hatchery. The course is also designed to equip an individual with competencies for fish harvesting, handling and processing.

This course consists of the following basic and core units of learning:

Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
AQ/CU/AM/BC/01/4/B	Communication skills	20	3
AQ/CU/AM/BC/02/4/B	Numeracy skills	25	3
AQ/CU/AM/BC/03/4/B	Digital literacy	35	3
AQ/CU/AM/BC/04/4/B	Entrepreneurial skills	60	4
AQ/CU/AM/BC/05/4/B	Employability skills	30	3
AQ/CU/AM/BC/06/4/B	Environmental literacy	20	3
AQ/CU/AM/BC/07/4/B	Occupational safety and health practices	20	3
	Total	210	21

Core Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
AQ/CU/AM/CR/01/4/B	Fish pond construction	100	10
AQ/CU/AM/CR/02/4/B	Fish feed production	100	10
AQ/CU/AM/CR/03/4/B	Fish hatchery operation	160	16
AQ/CU/AM/CR/04/4/B	Grow out fish production	100	10

AQ/CU/AM/CR/05/4/B	Post-harvest fish handling	120	12
Industrial attachment		260	26
Total		840	84
		1050	105

The total duration of the course for an average trainee is 790 hours which is equivalent to 26 weeks at 30 hours of learning per week plus 260 hours of industrial attachment.

Entry Requirements

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

- a) Kenya Certificate of Secondary Education (KCSE) mean grade E
- Or**
- b) National skills certificate in Aquaculture Management Level 3
- Or**
- c) Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

Industrial attachment

An individual enrolled in this course will be required to undergo two (2) industrial attachments; one in a hatchery facility and the other in a fish farm, each for a period of two (2) months. An individual enrolled in one of the core units of learning will be required to undergo a one-month attachment either in a hatchery facility or in a fish farm as the case may be.

Assessment

The course will be assessed at two levels:

- a) **Internal assessment:** conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier
- b) **External assessment:** conducted by an accredited external assessor who is monitored by an accredited external verifier

The assessor and verifiers are accredited by TVET CDACC which also coordinates external assessment.

Certification

An individual candidate will be awarded a Record of Achievement on demonstration of competence in a unit of competency. To be awarded Certificate in Aquaculture Management Level 4, an individual must demonstrate competence in all the units of competency.

These certificates will be awarded by TVET CDACC in conjunction with the training provider.

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BASIC UNITS OF LEARNING

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COMMUNICATION SKILLS

UNIT CODE: AQ/CU/AM/BC/01/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate communication skills

Duration of Unit: 20 Hours

Unit Description

This unit describes the competencies required to lead in the dissemination and discussion of ideas, information and issues in the workplace.

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Obtain and convey workplace information	<ul style="list-style-type: none">• Communication process• Modes of communication• Medium of communication• Effective communication• Barriers to communication• Flow of communication• Sources of information• Types of questions• Organizational policies• Workplace etiquette• Ethical work practices in handling communication	<ul style="list-style-type: none">• Observation• Interview• Third party reports
2. Complete relevant work-related documents	<ul style="list-style-type: none">• Types and purposes of workplace documents and forms	<ul style="list-style-type: none">• Observation• Interview• Third party reports

	<ul style="list-style-type: none"> • Methods used in filling forms and documents • Recording workplace data • Process of distributing workplace forms and documents • Report writing • Types of workplace reports 	
3. Communicate information about workplace processes	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Observation • Interview • Portfolio
4. Lead workplace discussion	<ul style="list-style-type: none"> • Methods of discussion e.g. <ul style="list-style-type: none"> ✓ Coordination meetings ✓ Toolbox discussion ✓ Peer-to-peer discussion • Solicitation of response 	<ul style="list-style-type: none"> • Observation • Interview • Third party reports
5. Identify and communicate issues arising in the workplace	<ul style="list-style-type: none"> • Identification of problems and issues • Organizing information on problems and issues • Relating problems and issues • Communication barriers affecting workplace discussions 	<ul style="list-style-type: none"> • Observation • Interview • Portfolio

Suggested Delivery Methods

- Discussion
- Role play
- Brainstorming

Recommended Resources

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

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NUMERACY SKILLS

UNIT CODE: AQ/CU/AM/BC/02/4/B

Relationship to Occupational Standards:

This unit addresses the unit of competency: Demonstrate numeracy skills

Duration of Unit: 25 hours

Unit Description

This unit describes the competencies required by a worker in order to competently Identify and use whole numbers and simple fractions, decimals and percentages; Identify, measure and estimate familiar quantities for work, Read and use familiar maps, plans and diagrams for work, Identify and describe common 2D and some 3D shapes for work, Construct simple tables and graphs for work using familiar data, Identify and interpret information in familiar tables, graphs and charts for work.

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify and use whole numbers and simple fractions, decimals and percentages for work	<ul style="list-style-type: none">• Whole numbers• Simple fractions• Decimals• Percentages• Sizes• Problem solving methods• calculations using the 4 operations	<ul style="list-style-type: none">• Oral• Written• Practical test• Observation

	<ul style="list-style-type: none"> Recording and communicating numerical information 	
2. Identify, measure and estimate familiar quantities for work	<ul style="list-style-type: none"> Measurement information Units of measurement Estimate familiar and simple amounts Selection of appropriate measuring equipment Calculate using familiar units of measurement Check measurements and results against estimates Using informal and some formal mathematical and general language Record or report results 	<ul style="list-style-type: none"> Oral Written Practical test Observation
3. Read and use familiar maps, plans and diagrams for work	<ul style="list-style-type: none"> Maps, plans and diagrams Locate items and places in familiar maps, plans and diagrams Recognize common symbols and keys in familiar maps, plans and diagrams Direction and location of objects, or route or places Use of informal and some formal oral mathematical language and symbols 	<ul style="list-style-type: none"> Oral Written Practical test Observation
4. Identify and describe common 2D and some 3D shapes for work	<ul style="list-style-type: none"> Common 2D shapes and 3D shapes Classification of common 2D shapes and designs Description of Use informal and some formal language to describe common two-dimensional shapes and some 	<ul style="list-style-type: none"> Oral Written Practical test Observation

	<p>common three-dimensional shapes</p> <ul style="list-style-type: none"> • Construction of common 2D shapes • Match common 3D shapes to their 2D sketches or nets 	
5. Construct simple tables and graphs for work using familiar data	<ul style="list-style-type: none"> • Types of graphs • Determination of data to be collected • Selection of data collection method • Collection of data • Determination of variables from the data collected • Order and collate data • Construct a table and enter data • Construct a graph using data from table • Check results • Report or discuss graph information related to work using informal and some formal mathematical and general language 	<ul style="list-style-type: none"> • Oral • Written • Practical test • Observation
6. Identify and interpret information in familiar tables, graphs and charts for work	<ul style="list-style-type: none"> • Tables construction and labeling • i.e. title, headings, rows and columns • Interpreting information and data in simple tables • Relaying information of relevant workplace tasks on/in a table • Identify familiar graphs and charts in familiar texts and contexts 	<ul style="list-style-type: none"> • Oral • Written • Practical test • Observation

	<ul style="list-style-type: none"> • Locate title, labels, axes, scale and key from familiar graphs and charts • Identify and interpret information and data in familiar graphs and charts • Relate information to relevant workplace tasks 	
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Suggested Delivery Methods

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

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Mathematical tables

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DIGITAL LITERACY

UNIT CODE: AQ/CU/AM/BC/03/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate digital literacy

Duration of Unit: 35 hours

Unit Description

This unit covers the competencies required to effectively demonstrate digital literacy in a working environment. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop PCs for purposes of communication and performing work related tasks at the work place.

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	<ul style="list-style-type: none">• Meaning of a computer• Functions of a computer• Components of a computer• Classification of computers	<ul style="list-style-type: none">• Written• Oral• Observation
2. Apply security measures to data, hardware and software	<ul style="list-style-type: none">• Data security and control• Security threats and control measures• Types of computer crimes• Detection and protection against computer crimes	<ul style="list-style-type: none">• Written tests• Oral presentation• Observation• Projects
3. Apply computer software in solving tasks	<ul style="list-style-type: none">• Operating system• Word processing• Spread sheets• Data base	<ul style="list-style-type: none">• Oral questioning• Observation• Project

4. Apply internet and email in communication at workplace	<ul style="list-style-type: none"> • Computer networks • Uses of internet • Electronic mail (e-mail) concept 	<ul style="list-style-type: none"> • Oral questioning • Observation • Oral presentation • Written report
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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

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ENTREPRENEURIAL SKILLS

UNIT CODE: AQ/CU/AM/BC/04/4/B

Relationship to occupational standards

This unit addresses the unit of competency: Demonstrate entrepreneurial skills

Duration of unit: 60 hours

Unit description

This unit describes the competencies critical to demonstration of entrepreneurial skills. It includes creating and maintaining small scale business, establishing small scale business customer base, managing and growing a small business.

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Create and maintain small scale business	<ul style="list-style-type: none">• Starting a small business• Legal regulatory requirements in starting a small business• SWOT/ PESTEL analysis• Conducting market/industry survey• Generation and evaluation of business ideas• Matching competencies with business opportunities• Forms of business ownership• Location of a small business• Legal and regulatory requirement• Resources required to start a small business	<ul style="list-style-type: none">• Observation• Case studies• Individual/group assignments• projects• Written• Oral

	<ul style="list-style-type: none"> • Common terminologies in entrepreneurship • Entrepreneurship in national development • Self-employment • Formal and informal employment • Entrepreneurial culture • Myths associated with entrepreneurship • Types, characteristics, qualities & role of entrepreneurs • History, development and importance of entrepreneurship • Theories of entrepreneurship • Quality assurance for small businesses • Policies and procedures on occupational safety and health and environmental concerns 	
<p>2. Establish small scale business customer base</p>	<ul style="list-style-type: none"> • Good staff/workers and customer relations • Marketing strategy • Identifying and maintain new customers and markets • Product/ service promotions • Products / services diversification • SWOT / PESTEL analysis • Conducting a business survey • Generating Business ideas • Business opportunities 	<ul style="list-style-type: none"> • Observation • Case studies • Individual/group assignments • projects • Written • Oral

<p>3. Manage small scale business</p>	<ul style="list-style-type: none"> • Organization of a small business • Small business' business plan • Marketing for small businesses • Managing finances for small business • Production/ operation process for goods/services • Small business records management • Book keeping and auditing for small businesses • Business support services • Small business resources mobilization and utilization • Basic business social responsibility • Management of small business • Word processing concepts in small business management • Computer application software • Monitoring and controlling business operations 	<ul style="list-style-type: none"> • Oral • Observation • Case studies • Individual/group assignments • projects • Written
<p>4. Grow/expand small scale business</p>	<ul style="list-style-type: none"> • Methods of growing small business • Resources for growing small business • Small business growth plan • Computer software in business development • ICT and business growth 	<ul style="list-style-type: none"> • Observation • Case studies • Individual/group assignments • projects • Written

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
- Lap top/ desk top computer
- Internet
- Telephone
- Writing materials

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EMPLOYABILITY SKILLS

UNIT CODE: AQ/CU/AM/BC/05/4/B

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate employability skills

Duration of Unit: 30 hours

Unit Description

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

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Conduct self-management	<ul style="list-style-type: none">• Self-awareness• Formulating personal vision, mission and goals• Strategies for overcoming life challenges• Emotional intelligence• Assertiveness• 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	<ul style="list-style-type: none">• Observation• Written• Oral interview• Third party report

	<ul style="list-style-type: none"> • Good work habits • Self-awareness • Self-development • Financial literacy • Healthy lifestyle practices 	
2. Demonstrate critical safe work habits	<ul style="list-style-type: none"> • Stress and stress management • Punctuality and time consciousness • Interpersonal communication • Sharing information • Leisure • Integrating personal objectives into organizational objectives • Resources utilization • Setting work priorities • HIV and AIDS • Drug and substance abuse • Handling emerging issues 	<ul style="list-style-type: none"> • Observation • Written • Oral interview • Third party report
3. Demonstrate workplace learning	<ul style="list-style-type: none"> • Personal training needs identification and assessment • 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 • Workplace innovation • Performance improvement • Handling emerging issues • Future trends and concerns in learning 	<ul style="list-style-type: none"> • Observation • Oral interview • Written • Third party report
4. Demonstrate workplace ethics	<ul style="list-style-type: none"> • Meaning of ethics • Ethical perspectives • Principles of ethics • Values and beliefs 	<ul style="list-style-type: none"> • Observation • Oral interview • Written • Third party report

	<ul style="list-style-type: none"> • 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 	
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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: AQ/CU/AM/BC/06/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate environmental literacy

Duration of Unit: 20 hours

Unit Description

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use and evaluate current practices in relation to resource usage.

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	<ul style="list-style-type: none">• 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)	<ul style="list-style-type: none">• Written questions• Oral questions• Observation of work procedures

<p>2. Control environmental Pollution control</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Written questions • Oral questions • Observation of work procedures • Role play
<p>3. Demonstrate sustainable resource use</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Written questions • Oral questions • Observation of work procedures • Role play
<p>4. Evaluate current practices in relation to resource usage</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Written questions • Oral questions • Observation of work procedures • Role play
<p>5. Identify Environmental legislations/conventions for environmental concerns</p>	<ul style="list-style-type: none"> • Environmental issues/concerns • Environmental legislations /conventions and local ordinances • Industrial standard /environmental practices 	<ul style="list-style-type: none"> • Written questions • Oral questions • Observation of work procedures

	<ul style="list-style-type: none">• International Environmental Protocols (Montreal, Kyoto)• Features of an environmental strategy	
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Suggested Delivery Methods

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

Recommended Resources

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

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OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: AQ/CU/AM/BC/07/4/B

Relationship to Occupational Standards

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

Duration of Unit: 20 hours

Unit Description

This unit describes the competencies required to practice safety and health, and comply with OSH requirements relevant to work.

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Observe workplace procedures for hazards and risk prevention	<ul style="list-style-type: none">• Arrangement of work area and items in accordance with Company housekeeping procedures• Adherence to work standards and procedures• Application of preventive and control measures, including use of safety gears/PPE• Study and apply standards and procedures for incidents and emergencies.	<ul style="list-style-type: none">• Oral questions• Written questions• Observation of work procedures
2. Participate in arrangements for workplace safety and health maintenance	<ul style="list-style-type: none">• Participating in orientations on OSH requirements/regulations of tasks• Providing feedback on health, safety, and security concerns to appropriate personnel as required in a sufficiently detailed manner	<ul style="list-style-type: none">• Oral questions• Written tests• Practical test• Observation of practical work by trainees

	<ul style="list-style-type: none"> • Practice workplace procedures for reporting hazards, incidents, injuries and sickness • OSH requirements/ regulations and workplace safety and hazard control procedures are reviewed, and compliance reported to appropriate personnel • Identification of needed OSH-related trainings are proposed to appropriate personnel 	
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Suggested Delivery Methods

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

Recommended Resources

- 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

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FISH POND CONSTRUCTION

UNIT CODE: AQ/CU/AM/CR/01/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Construct a fish pond

Duration of Unit: 120 hours

Unit Description

This unit specifies the competencies required to construct a fish pond. It involves ability to apply food safety measures in constructing a fish pond, select and prepare a fish pond construction site, excavate the pond, protect and test the completed pond

Summary of Learning Outcomes

1. Apply food safety measures in constructing a fish pond
2. Select fish farming site
3. Prepare pond construction site
4. Excavate fish pond
5. Complete pond construction

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures in constructing a fish pond	<ul style="list-style-type: none">• Meaning of food safety• Importance of food safety• Principles of food safety• Prerequisite programmes<ul style="list-style-type: none">○ Meaning and importance of prerequisite programmes○ Relevant programmes in fish pond construction• Hazard analysis for fish pond construction<ul style="list-style-type: none">○ Types and sources of hazards○ Significance of hazards○ Methods of hazard control• Components of HACCP plan for fish pond construction	<ul style="list-style-type: none">• Written tests• Oral questioning• Observation• Practical

	<ul style="list-style-type: none"> ○ Critical control points ○ Critical control limits ○ Monitoring procedures on the control limits ○ Corrective actions ○ Verification and validation ○ Record keeping ● Standards and legislations in food safety on constructing a fish pond 	
2. Select fish farming site	<ul style="list-style-type: none"> ● Basic pond and farm layout designs ● Design interpretations ● Types of fish ponds ● Simple pond drainage systems ● Site selection criteria for fish ponds <ul style="list-style-type: none"> ○ Topography ○ Water ○ Soil type ○ Space ○ Vegetation type ○ Accessibility ○ Statutory requirements ● Site specific measurements for <ul style="list-style-type: none"> ○ Fish ponds ○ Drainage ○ Working space ○ Farm layout ● Tools and equipment used during site selection 	<ul style="list-style-type: none"> ● Written ● Oral ● Observation
3. Prepare pond construction site	<ul style="list-style-type: none"> ● Factors to consider before starting <ul style="list-style-type: none"> ○ Availability of extra labour ○ Equipment and materials required ○ Site related factors ● Wetlands <ul style="list-style-type: none"> ○ Types of wetlands ○ Types of soil found in wetlands ○ Types of wetland vegetation ○ Roots and root systems 	<ul style="list-style-type: none"> ● Written tests ● Oral presentation ● Observation ● Projects

	<ul style="list-style-type: none"> ○ Wetland animals and their behaviour ● Site clearing <ul style="list-style-type: none"> ○ Importance of site clearing ○ Site clearing techniques ○ Risks associated with site clearing ● Methods of disposing cleared vegetation 	
4. Excavate fish pond	<ul style="list-style-type: none"> ● Types of fish ponds ● Parts of a fish pond <ul style="list-style-type: none"> ○ Dykes ○ Inlets ○ Outlets ○ Freeboard ○ Bottom slope ○ Core trench ○ Harvesting basin ● Pond construction tools and equipment ● Pond measuring and pegging techniques ● Factors affecting design of pond dykes ● Construction, compacting and shaping of dykes ● Setting up of pond slopes and harvesting basins ● Common mistakes in pond construction ● Safety measures <ul style="list-style-type: none"> ○ Use of PPEs in pond construction ● Basic first aid techniques 	<ul style="list-style-type: none"> ● Oral questioning ● Observation ● Project
5. Complete pond construction	<ul style="list-style-type: none"> ● Fitting simple inlet and outlet systems <ul style="list-style-type: none"> ○ Types of inlet and outlet systems ○ Pipe joining and assembly ○ Alignment and fixing ● Pegging and trenching of supply and drainage channels <ul style="list-style-type: none"> ○ Factors to consider 	<ul style="list-style-type: none"> ● Written tests ● Oral presentation ● Observation ● Projects

	<ul style="list-style-type: none"> ○ Equipment required ○ Identification of ideal water intake point ○ Pegging techniques for water channels ○ Excavation and levelling ● Installation of screening and water control devices in pipes and channels ● Test running and repairing of newly constructed ponds drainage systems ● Dike protection and planting of grass <ul style="list-style-type: none"> ○ Types of grass ○ Planting techniques ○ Care of newly planted grass ● Control of floods and runoff ● Common defects in new ponds 	
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Suggested Delivery Methods

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

Recommended Resources

Tools and equipment

- Tape measure, spirit level, string level, jembes, spades, pangas, pick axe, rake, slashers, hacksaw
- Compactors and rollers, wheelbarrows

Materials and supplies

Strings and ropes, liners, pegs, PVC pipes and joints, adhesives, screens, lime, cement, sand, ballast, timber, nails, roofing material, chicken feeders and drinkers

Personal protective equipment (PPEs)

- Gloves
- Goggles
- Helmets
- Gum boots
- Overalls
- First aid kits

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FISH FEED PRODUCTION

UNIT CODE: AQ/CU/AM/CR/02/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Produce fish feeds

Duration of Unit: 120 hours

Unit Description

This unit describes the knowledge, skills and attitudes required to produce fish feeds. It involves ability to apply food safety measures in producing fish feeds, promote growth of natural fish foods and produce on-farm formulated feeds. It also involves trial of the fish feeds to evaluate their performance.

Summary of Learning Outcomes

1. Apply food safety measures in producing fish feeds
2. Culture natural fish foods
3. Produce on-farm formulated fish feeds
4. Package and store fish feeds
5. Carry out record keeping

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures in producing fish feeds	<ul style="list-style-type: none">• Introduction to food safety<ul style="list-style-type: none">○ Meaning of food safety○ Importance of food safety○ Principles of food safety• Prerequisite programmes<ul style="list-style-type: none">○ Meaning and importance of prerequisite programmes○ Relevant programmes in fish feed production• Hazard analysis for fish feed production<ul style="list-style-type: none">○ Types and sources of hazards○ Significance of hazards○ Methods of hazard control	<ul style="list-style-type: none">• Written tests• Oral questioning• Observation

	<ul style="list-style-type: none"> • Components of HACCP plan for fish feed production <ul style="list-style-type: none"> ○ Critical control points ○ Critical control limits ○ Monitoring procedures on the control limits ○ Corrective actions ○ Verification and validation ○ Record keeping • Standards and legislations in food safety on producing fish feeds 	
2. Culture natural fish foods	<ul style="list-style-type: none"> • Types of fish feeds <ul style="list-style-type: none"> ○ Natural feeds ○ Artificial feeds • Nutritional requirement of commonly cultured fish species • Use of PPEs in production of natural fish foods • Tools and materials for natural fish food production • Production of natural feeds <ul style="list-style-type: none"> ○ Types of plankton ○ Types of fertilizers ○ Methods of fertilization ○ Frequency of fertilization ○ Measuring productivity in ponds 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Practical tests
3. Produce on-farm formulated fish feeds	<ul style="list-style-type: none"> • Use of PPEs in production of fish feeds • Safety measures to be observed • Uses of fish feed production materials, supplies, tools and equipment • Production of artificial feeds <ul style="list-style-type: none"> ○ Feed ingredients and their properties ○ Pearson's square method ○ Anti-nutritional factors in feed ingredients ○ Factors affecting mixing of particles ○ Procedure of mixing 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Oral presentation • Practical tests • Projects

	<ul style="list-style-type: none"> ○ Pelletizing process ○ Drying methods 	
4. Package and store fish feeds	<ul style="list-style-type: none"> ○ Types of packaging materials ○ Packaging methods ○ Labelling information ○ Fish feed handling and storage 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Oral presentation ● Written tests
5. Perform record keeping.	<ul style="list-style-type: none"> ● Fish feeding trials ● Fish sampling procedure <ul style="list-style-type: none"> ○ Types and uses of sampling gears ○ Handling of fish samples ● Fish feeding records 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Written tests ● Projects

Suggested Delivery Methods

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

Recommended Resources

Tools and equipment

- Meat mincers, blenders, grinders, weighing scales, dryer, mixers, containers, bag sealers, ovens, burners, drying racks.

Materials and supplies

- Fertilizers, secchi disks,
- Buckets , gunny bags, sticks, stakes
- Packaging bags, drying canvas/ polythene

Personal protective equipment (PPEs)

- Safety goggles
- Gum boots
- Helmets
- Gloves
- Dust coats
- First aid kits
- Mouth piece

FISH HATCHERY OPERATION

UNIT CODE: AQ/CU/AM/CR/03/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Operate fish hatchery

Duration of Unit:220 hours

Unit Description

This unit describes the knowledge, skills and attitudes required to operate fish hatchery. It involves ability to apply food safety measures in fish hatchery operation, prepare fish hatchery for stocking, stock and feed broodstock. It also involves harvesting, packaging and transporting fish fry and fingerlings. It further involves maintenance of fish hatchery.

Summary of Learning Outcomes

1. Apply food safety measures in fish hatchery operation
2. Stock hatchery with broodstock
3. Feed broodstock
4. Harvest and package fingerlings

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures in fish hatchery operation	<ul style="list-style-type: none">• Introduction to food safety<ul style="list-style-type: none">○ Meaning of food safety○ Importance of food safety○ Principles of food safety• Prerequisite programmes<ul style="list-style-type: none">○ Meaning and importance of prerequisite programmes○ Relevant programmes in fish hatchery operation• Hazard analysis for fish hatchery operation<ul style="list-style-type: none">○ Types and sources of hazards○ Significance of hazards○ Methods of hazard control	<ul style="list-style-type: none">• Written tests• Oral questioning• Observation

	<ul style="list-style-type: none"> • Components of HACCP plan for fish hatchery operation <ul style="list-style-type: none"> ○ Critical control points ○ Critical control limits ○ Monitoring procedures on the control limits ○ Corrective actions ○ Verification and validation ○ Record keeping • Standards and legislations in food safety on fish hatchery operation 	
2. Prepare broodstock facilities	<ul style="list-style-type: none"> • Safety measures <ul style="list-style-type: none"> ○ Use of PPEs in hatchery operations ○ Carrying out basic first aid-cuts, CPR, fractures • Handling and use of tools, equipment and materials • Types of broodstock facilities • Fish pond preparation – <ul style="list-style-type: none"> ○ Filling with water ○ Pond fertilization ○ Happa net preparation and setting ○ Water flow within the system 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Practical tests • Oral presentations • Projects
3. Stock hatchery with broodstock	<ul style="list-style-type: none"> • Broodstock selection • Broodstock acclimatization <ul style="list-style-type: none"> ○ Transfer and stocking 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Oral presentations • Practical tests • Projects
4. Feed broodstock	<ul style="list-style-type: none"> ○ Feeding schedules <ul style="list-style-type: none"> ○ Interpret schedule ○ Weighing feed rations ○ Feeding methods ○ Feeding behaviour ○ Record keeping 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Oral presentations • Practical tests
5. Natural fish propagation	<ul style="list-style-type: none"> ○ Broodstock – males and females ○ Stocking density ○ Checking for fry after 2 weeks ○ Harvesting fry ○ Sorting fry ○ Packaging fry 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Oral presentations • Practical tests • Projects

6. Maintain hatchery facility	<ul style="list-style-type: none"> ○ Sanitation of hatchery and related components <ul style="list-style-type: none"> ○ Cleaning and disinfection ○ Waste disposal ○ Water flow rates 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Oral presentations ● Written reports
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Suggested Delivery Methods

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

Recommended Resources

Tools and equipment

Weighing balance, measuring cylinders, harvesting gear, happa nets, buckets, refrigerators,

Materials and supplies

Feeds, fertilizers, assorted bowls, scoops, perforators, basins, packaging materials, sieves, wading suits.

Personal protective equipment (PPEs)

- Safety goggles
- Gum boots
- Wading suit
- Gloves
- Dust coats
- First aid kits
- Life ring
- Life jacket

GROW OUT FISH PRODUCTION

UNIT CODE: AQ/CU/AM/CR/04/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Produce grow out fish

Duration of Unit: 100 hours

Unit Description

This unit specifies the competencies required to produce grow-out fish. It involves ability to apply food safety measures in producing grow out fish, prepare fish grow out culture units in readiness for stocking, as well as stock and feed the fish while monitoring and controlling disease occurrences. It also involves the competencies required to maintain farm cleanliness, manage other livestock that is integrated with fish farming, and harvest fish upon maturity.

Summary of Learning Outcomes

1. Apply food safety measures in producing grow out fish
2. Prepare grow out culture units
3. Stock grow out culture units
4. Feed and maintain fish in the grow out culture units
5. Maintain fish farm
6. Maintain fish culture units
7. Control disease, parasites and predators
8. Harvest fish
9. Maintain integrated livestock on fish farm

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures in producing grow out fish	<ul style="list-style-type: none">• Introduction to food safety<ul style="list-style-type: none">○ Meaning of food safety○ Importance of food safety○ Principles of food safety• Prerequisite programmes<ul style="list-style-type: none">○ Meaning and importance of prerequisite programmes○ Relevant programmes for grow-out fish production	<ul style="list-style-type: none">• Written tests• Oral questioning• Observation

	<ul style="list-style-type: none"> • Hazard analysis for grow-out fish production <ul style="list-style-type: none"> ○ Types and sources of hazards ○ Significance of hazards ○ Methods of hazard control • Components of HACCP plan for grow-out fish production <ul style="list-style-type: none"> ○ Critical control points ○ Critical control limits ○ Monitoring procedures on the control limits ○ Corrective actions ○ Verification and validation ○ Record keeping • Standards and legislations of food safety on grow-out fish production 	
<p>2. Prepare grow out culture units</p>	<ul style="list-style-type: none"> • Types of grow-out units <ul style="list-style-type: none"> ○ Earthen ponds ○ Lined ponds ○ Tanks ○ Cages • Preparation of ponds <ul style="list-style-type: none"> ○ Tools and equipment used in pond preparation ○ Pond drainage and drying procedures ○ Dredging and cleaning of earthen ponds ○ Minor repair of dikes and water-flow systems ○ Cleaning and repair of lined ponds • Liming of fish ponds <ul style="list-style-type: none"> ○ Types of lime and their properties ○ Application rates ○ Methods of application • Fertilization of fish ponds <ul style="list-style-type: none"> ○ Types of fertilizers 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Practical tests

	<ul style="list-style-type: none"> ○ Application rates ○ Methods of applying organic and inorganic fertilizers ● Preparation of fish tanks <ul style="list-style-type: none"> ○ Drainage and cleaning ○ Detection and repair of cracks, leakages and other structural damages ○ Chemicals approved for use in disinfecting aquaculture facilities ● Preparation of cage culture units <ul style="list-style-type: none"> ○ Cleaning and repair of cage nets, framework, and floating devices ○ Disinfection and drying of cage nets ○ Assembly and set-up of cages in water ● Basic record keeping and maintenance 	
<p>3. Stock grow out culture units</p>	<ul style="list-style-type: none"> ● Sources of fry and fingerlings in Kenya ● Practical handling and care of fish and fingerlings ● Fingerling packaging and transportation methods ● Factors to consider when stocking ponds with fingerlings ● Procedure for stocking fish in: <ul style="list-style-type: none"> ○ Ponds ○ Tanks ○ Cages ● Post-harvest monitoring of stocked fish <ul style="list-style-type: none"> ○ Handling fingerling mortalities ● Signs of stress in newly stocked fish ● Effects of water quality and other physic-chemical factors on fingerling survival 	<ul style="list-style-type: none"> ● Written tests ● Oral questioning ● Oral presentations ● Practical tests

<p>4. Feed fish in the grow out culture units</p>	<ul style="list-style-type: none"> • Introduction to fish nutrition <ul style="list-style-type: none"> ○ Important nutrients in fish diets ○ Feeding in fish • Types of fish feeds <ul style="list-style-type: none"> ○ Natural food (live feeds) ○ Compounded feeds <ul style="list-style-type: none"> ○ Home-made feeds ○ Commercial feeds • Fish feeding methods <ul style="list-style-type: none"> ○ Hand feeding (broadcasting) ○ Automatic feeders ○ Demand feeders • Fish feeding habits behaviour • Feeding rates, frequency and timing • Fish sampling and calculation of feed ration adjustments • On-farm feed handling and storage • Maintenance of feeding records 	<ul style="list-style-type: none"> • Oral questioning • Written tests • Practical tests
<p>5. Maintain fish farm</p>	<ul style="list-style-type: none"> • Tools and equipment used required during farm maintenance • Design of farm maintenance checklists <ul style="list-style-type: none"> ○ Daily activities ○ Weekly activities ○ Monthly activities • Types of grass suitable for fish farms • Types of screening devices and their maintenance • Weed control in water channels • Cleaning and repair of water intake structures • Maintenance of cage facilities • Common defects on farm facilities <ul style="list-style-type: none"> ○ Pond breakages and leakages ○ Supply and drainage channels 	<ul style="list-style-type: none"> • Oral questioning • Practical tests • Written tests • Oral presentations

	<ul style="list-style-type: none"> ○ Inlets and outlets ○ Predator control structures ● Control of water quality in ponds 	
6. Maintain fish culture units	<ul style="list-style-type: none"> ● Water quality management <ul style="list-style-type: none"> ○ Physio-chemical parameters ○ Monitoring of water parameters ○ Pond fertilization ○ Corrective actions ● Identification and repairs of leakages in ponds ● Types of inlets and outlets commonly used in fish culture units ● How to repair lined ponds, wooden and concrete tanks, plumbing system ● Types of screening devices ● Water flow control and management ● Troubleshooting of common structural defects in fish culture units ● Pond weeds and their control ● Maintenance of indoor fish culture units ● Care and maintenance of fish cages 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Written tests ● Oral presentations
7. Control disease, parasites and predators	<ul style="list-style-type: none"> ● Critical water quality parameters <ul style="list-style-type: none"> ○ Dissolved oxygen ○ pH ○ Temperature ○ Turbidity ● Monitoring and management of water quality parameters ● Common signs of stress in cultured fish ● Fish stress control measures in ponds and tanks ● Common diseases in fish <ul style="list-style-type: none"> ○ Signs of diseases ○ Causes ○ Control measures 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Written tests ● Oral presentations

	<ul style="list-style-type: none"> • Common fish parasites in ponds <ul style="list-style-type: none"> ○ Types ○ Control measures • Mechanical and Biological control of parasites • Fish predators and intrusive animals <ul style="list-style-type: none"> ○ Types of predators and their behaviour ○ Types and behaviour of intrusive animals ○ Methods of controlling fish predators • Maintenance of biosecurity installations on a fish farm 	
8. Harvest fish	<ul style="list-style-type: none"> • Tools, equipment and materials used during fish harvests • Types of fish harvests <ul style="list-style-type: none"> ○ Partial and complete harvests ○ Synchronized and single harvests • Deciding when to harvest • Factors to consider before harvesting fish • Fish harvesting gears and methods • Care and handling of harvested fish • Cleaning, packing and transportation of harvested fish • Marketing of harvested fish • Maintenance of harvesting and marketing methods 	<ul style="list-style-type: none"> • Oral questioning • Practical tests • Written tests • Oral presentations
9. Maintain integrated livestock on fish farm	<ul style="list-style-type: none"> • Maintenance and cleaning of housing structures <ul style="list-style-type: none"> ○ Fish-Poultry integration ○ Fish – sheep integration • Factors to consider when selecting and livestock for an integrated system • Handling and care of integrated livestock 	<ul style="list-style-type: none"> • Oral questioning • Practical tests • Written tests • Oral presentations

	<ul style="list-style-type: none"> • Feeding and feed management of integrated farm animals • Disease and parasite control in integrated animals • Types of records and record keeping 	
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Suggested Delivery Methods

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

Recommended Resources

Tools and equipment

Slashers, Measuring tape, weighing scale, machetes, wheelbarrow, digital water test meters, water test kits, secchi disc, jembes, spades, rakes. Lime, fertilizer, tampers, liner repair kit, **seine net, scoop net, basic masonry tools, graders,**

Materials and supplies

Gunny bags, buckets, laundry baskets, perforators, lime, fertilizer, ropes, cover nets, twines, screens, fencing materials, traps and scarecrows, perforators, writing material, cement, sand, transport containers, fish feeds,

Personal protective equipment (PPEs)

Safety goggles, gum boots, helmets, gloves, dust coats, first aid kits, industrial mouth piece, wading suits, life jackets,

POST HARVEST FISH HANDLING

UNIT CODE: AQ/CU/AM/CR/05/4/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Handle harvested fish

Duration of Unit: 150 hours

Unit Description

This unit describes the knowledge, skills and attitudes required to handle harvested fish. It involves the ability to apply food safety measures in handling harvested fish, hygienically handle, preserve, and process harvested fish. It includes marketing of fish, fish products and by-products. It also involves disposal of wastes from fish processing.

Summary of Learning Outcomes

1. Apply food safety measures in handling harvested fish
2. Prepare harvested fish for preservation
3. Preserve harvested fish
4. Process harvested fish
5. Market fish, fish products and by-products
6. Manage waste from fish processing

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures in handling harvested fish	<ul style="list-style-type: none">• Introduction to food safety<ul style="list-style-type: none">○ Meaning of food safety○ Importance of food safety○ Principles of food safety• Prerequisite programmes<ul style="list-style-type: none">○ Meaning and importance of prerequisite programmes○ Relevant programmes for post-harvest handling of fish• Hazard analysis for post-harvest handling of fish<ul style="list-style-type: none">○ Types and sources of hazards	<ul style="list-style-type: none">• Written tests• Oral questioning• Observation

	<ul style="list-style-type: none"> ○ Significance of hazards ○ Methods of hazard control ● Components of HACCP plan for post-harvest handling of fish <ul style="list-style-type: none"> ○ Critical control points ○ Critical control limits ○ Monitoring procedures on the control limits ○ Corrective actions ○ Verification and validation ○ Record keeping ● Standards and legislations of food safety on handling harvested fish 	
2. Prepare harvested fish for preservation	<ul style="list-style-type: none"> ● Use of PPEs in preserving harvested fish ● Safety measures to be observed ● Use of fish preservation materials, supplies, tools and equipment ● Fish handling procedures <ul style="list-style-type: none"> ○ Grading ○ Cleaning ○ Scaling ○ Gutting 	<ul style="list-style-type: none"> ● Written tests ● Oral questioning ● Practical tests
3. Preserve harvested fish	<ul style="list-style-type: none"> ● Fish spoilage ● Fish preservation methods <ul style="list-style-type: none"> ○ Icing ○ Smoking ○ Sun-drying ○ Salting ○ Freezing 	<ul style="list-style-type: none"> ● Written tests ● Oral questioning ● Practical tests ● Project
4. Process harvested fish	<ul style="list-style-type: none"> ● Use of PPEs in processing harvested fish ● Safety measures to be observed ● Use of fish processing materials, supplies, tools and equipment ● Types of processed fish products ● Processing methods <ul style="list-style-type: none"> ○ Frying ○ Smoking ○ Salting ○ Marinating ○ Filleting 	<ul style="list-style-type: none"> ● Written tests ● Oral questioning ● Oral presentation ● Practical tests ● Projects

	<ul style="list-style-type: none"> ○ Fermentation ● Packaging and labelling <ul style="list-style-type: none"> ○ Packaging tools and equipment ○ Packaging materials ○ Labelling information ● Products storage 	
5. Market fish, fish products and by-products	<ul style="list-style-type: none"> ○ Factors affecting marketing of fish and fish products ○ Price determination ○ Distribution channels ○ Selling methods ○ Observation of hygiene 	<ul style="list-style-type: none"> ● Oral questioning ● Written tests ● Observation
6. Manage waste from fish processing	<ul style="list-style-type: none"> ● Use of tools, materials and equipment in disposal of fish processing wastes ● Environmental regulations for disposal of fish processing wastes ● Types of fish processing wastes ● Disposal methods of fish processing wastes 	<ul style="list-style-type: none"> ● Oral questioning ● Practical tests ● Written tests ● Oral presentations

Suggested Delivery Methods

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Group discussions
- Role plays
- Field trips

Recommended Resources

Tools and equipment

Weighing balance, wheelbarrow, pallets, filleting tables, knives, waste disposal containers, ice box, smoking kiln, solar dryer, drying racks, drying mats or canvass, domestic freezers, cool boxes, meat mincer, blender, crockery, basins, buckets, hard brush, baskets, fire-fighting equipment

Materials and supplies

Ice, salt, frying oil, polybags, cartons, gunny bags, ice packs, sealing tape, labels

Personal protective equipment (PPEs)

Gum boots, head covers, gloves, dust coats, first aid kits, mouth pieces, aprons

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