REPUBLIC OF KENYA

COMPETENCY BASED CURRICULUM

FOR

AQUACULTURE 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 sustainable development.

PRINCIPAL SECRETARY
VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION

PREFACE

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

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need 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. Micro Enterprises Support Programme Trust (MESPT) have reviewed this curriculum and incorporated Food Safety

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

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.

COUNCIL SECRETARY/CEO
TVET CDACC

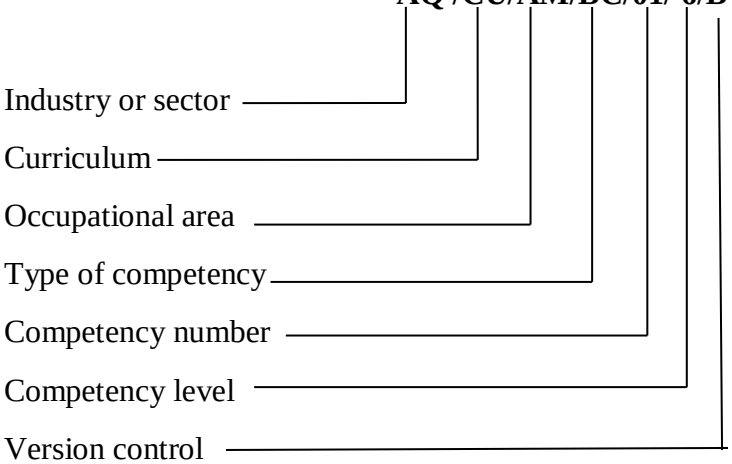
TABLE OF CONTENTS

ABBREVIATIONS AND 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
FAO	Food and Agricultural Organization
HACCP	Hazard Analysis Critical Control Point
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualifications Authority
MESPT	Micro Enterprises Support Programme Trust
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
RAS	Re-Circulating Aquaculture System
SSAC	Sector Skills Advisory Committee
TVET	Technical and Vocational Education and Training

KEY TO UNIT CODE

AQ /CU/AM/BC/01/ 6/B



COURSE OVERVIEW

Aquaculture Management level 6 qualification consists of Units of Competency that an individual must achieve to set up fish farm, produce fish feeds, operate fish hatchery, produce grow out fish, handle harvested fish, set up small scale fish hatchery unit, set up recirculating aquaculture system (RAS) and manage a fish cage farm.

The Units of Learning comprising Aquaculture Technician level 6 qualification include the following:

Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
AQ/CU/AM/BC/01/6/B	Communication Skills	40	4
AQ/CU/AM/BC/02/6/B	Numeracy Skills	60	6
AQ/CU/AM/BC/03/6/B	Digital Literacy	60	6
AQ/CU/AM/BC/04/6/B	Entrepreneurial Skills	100	10
AQ/CU/AM/BC/05/6/B	Employability Skills	80	8
AQ/CU/AM/BC/06/6/B	Environmental Literacy	40	4
AQ/CU/AM/BC/07/6/B	Occupational Safety and Health Practices	40	4
Total		**420**	**42**

Core Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
AQ/CU/AM/CR/01/6/B	Setting Up Fish Farm	200	20
AQ/CU/AM/CR/02/6/B	Fish Feed Production	210	21
AQ/CU/AM/CR/03/6/B	Fish Hatchery Management	250	25
AQ/CU/AM/CR/04/6/B	Grow Out Fish Production	300	30
AQ/CU/AM/CR/05/6/B	Post-Harvest Handling of Fish	260	26
AQ/CU/AM/CR/06/6/B	Setting Up Small-Scale Fish Hatchery Unit	300	30
AQ/CU/AM/CR/07/6/B	Setting Up Re-Circulating Aquaculture System (RAS)	300	30
AQ/CU/AM/CR/08/6/B	Fish Cage Farm Management	350	35
SUB TOTAL		**2170**	**217**
	Industrial Attachment	480	48
Total		**2650**	**265**

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 240 hours. 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.

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

a) Kenya Certificate of Secondary Education (KCSE) mean grade C- (minus)

Or

b) Craft Certificate in Aquaculture Management Level 5

Or

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

Trainer Qualification
A trainer for this course should have a higher qualification than level 6.

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
A candidate will be issued with a Certificate of Competency on demonstration of competence in a Unit of Competency. To attain the National Aquaculture Management Certificate Level 6, the candidate must demonstrate competence in all the Units of Competency as given in qualification pack.

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

BASIC UNITS OF LEARNING

COMMUNICATION SKILLS

UNIT CODE: AQ/CU/AM/BC/01/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Communication Skills

Duration of Unit: 40 hours

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

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Meet communication needs of clients and colleagues	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Organizational policies • Organization requirements for written and electronic communication methods	• Interview • Written texts

	• 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	
2. Develop communication strategies	• Dynamics of groups • Styles of group leadership • Openness and flexibility in communication • Communication skills relevant to client groups	• Interview • Written texts
3. Establish and maintain communication pathways	• Types of communication pathways	• Interview • Written texts
4. Promote use of communication strategies	• Application of elements of communication strategies • Effective communication techniques	• Interview • Written texts
5. Conduct interview	• Types of interview • Establishing rapport • Facilitating resolution of issues • Developing action plans	• Interview • Written texts
6. Facilitate group discussion	• Identification of communication needs • Dynamics of groups	• Interview • Written texts

	• Styles of group leadership • Presentation of information • Encouraging group members participation • Evaluating group communication strategies	
7. Represent the organization	• Presentation techniques • Development of a presentation • Multi-media utilization in presentation • Communication skills relevant to client groups	• Interview • Written texts

Suggested Methods of Instruction

- Discussion
- Role playing
- Simulation
- Direct instruction

Recommended Resources

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

NUMERACY SKILLS

UNIT CODE: AQ/CU/AM/BC/02/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Numeracy Skills.

Duration of Unit: 60 hours

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

Summary of Learning Outcomes

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply a wide range of mathematical calculations for work	• Fundamentals of mathematics
	  • Addition, subtraction, multiplication and division of positive and negative numbers
	  • Algebraic expressions manipulation
	• Forms of fractions, decimals and percentages
		• Written tests
		• Assignments
		• Supervised exercises

	• Expression of numbers as powers and roots	

2. Apply ratios, rates and proportions to solve problems	• Rates, ratios and proportions
	  • Meaning
	  • Conversions into percentages
	  • Direct and inverse proportions determination
	  • Performing calculations
	  • Construction of graphs, charts and tables
	  • Recording of information
		• Written tests
		• Assignments
		• Supervised exercises

3. 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
4. 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	• Written • Practical test

	• Calculation of distance, speed and time	
5. 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	

6. Collect, organize and interpret statistical data	• Classification of data
	  • Grouped data
	  • Ungrouped data
	• Data collection
	  • Observation
	  • Recording
	• Distinguishing between sampling and census
		• Assignments
		• Supervised exercises
		• Written tests

	• 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	

7. 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	• • Written • Practical test

	• Apply order of operations to solve multi-step calculations • Interpret display and record result	

Suggested Methods of Instruction

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

Recommended Resources

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

DIGITAL LITERACY

UNIT CODE: AQ/CU/AM/BC/03/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate Digital Literacy

Duration of Unit: 60 hours

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

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Concepts of ICT • Functions of ICT • History of computers • Components of a computer • Classification of computers	• Written tests • Oral presentation
2. Apply security measures to data, hardware, software in automated environment	• Data security and control • Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes	• Written tests • Oral presentation • Project

	• Laws governing protection of ICT	
3. Apply computer software in solving tasks	• Operating system • Word processing • Spread sheets • Data base design and manipulation • Data manipulation, storage and retrieval	• Oral questioning • Project
4. Apply internet and email in communication at workplace	• Computer networks • Network configurations • Uses of internet • Electronic mail (e-mail) concept	• Oral questioning • Written report
5. Apply desktop publishing in official assignments	• Concept of desktop publishing • Opening publication window • Identifying different tools and tool bars • Determining page layout • Opening, saving and closing files • Drawing various shapes using DTP • Using colour pellets to enhance a document • Inserting text frames • Importing and exporting text • Object linking and embedding • Designing of various publications • Printing of various publications	• Oral questioning • Written report • Project
6. Prepare presentation packages	• Types of presentation packages • Procedure of creating slides • Formatting slides • Presentation of slides • Procedure for editing objects	• Oral questioning • Written report • Project

Suggested Methods of Instruction

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

Recommended Resources

- Computers
- Printers
- Storage devices
- Internet access

ENTREPRENEURIAL SKILLS

UNIT CODE: AQ/CU/AM/BC/04/6/B

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	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report

2. Identify entrepreneurship opportunities	• Business ideas and opportunities • Sources of business ideas • Business life cycle • Legal aspects of business • Assessment of product demand • Business environment • Factors to consider when evaluating business environment • Technology in business	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
3. Create entrepreneurial awareness	• Forms of businesses • Sources of business finance • Factors in selecting source of business finance • Governing policies on Small Scale Enterprises (SSEs) • Problems of starting and operating SSEs	• Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
4. Apply entrepreneurial motivation	• Internal and external motivation • Motivational theories • Self-assessment • Entrepreneurial orientation • Effective communications in entrepreneurship • Principles of communication • Entrepreneurial motivation	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews

5. Develop business innovative strategies	• Innovation in business • Small business Strategic Plan • Creativity in business development • Linkages with other entrepreneurs • ICT in business growth and development	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews
6. Develop Business Plan	• Business description • Marketing plan • Organizational/Management • plan • Production/operation plan • Financial plan • Executive summary • Presentation of Business Plan	• Case studies • Individual/group assignments • Projects • Written tests • Oral questions • Third party report • Interviews

Suggested Methods of Instruction

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

Recommended Resources

- Case studies
- Business plan templates
- Computers
- Overhead projectors
- Internet

- Mobile phone
- Video clips
- Films
- Newspapers and Handouts
- Business Journals
- Writing materials

EMPLOYABILITY SKILLS

UNIT CODE: AQ/CU/AM/BC/05/6/B

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	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

	• 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	
2. Demonstrate interpersonal communication	• Meaning of interpersonal communication • Listening skills • Types of audience • Public speaking • Writing skills • Negotiation skills • Reading skills • Meaning of empathy • Understanding customers' needs • Establishing communication networks • Assertiveness • Sharing information	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

3. Demonstrate critical safe work habits	• Stress and stress management • Time concept • Punctuality and time consciousness • Leisure • Integrating personal objectives into organizational objectives • Resources mobilization • Resources utilization • Setting work priorities • Developing healthy relationships • HIV and AIDS • Drug and substance abuse • Managing emerging issues	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
4. Lead a workplace team	• Leadership qualities • Power and authority • Team building • Determination of team roles and objectives • Team parameters and relationships • Individual responsibilities in a team • Forms of communication • Complementing team activities • Gender and gender mainstreaming • Human rights • Developing healthy relationships • Maintaining relationships • Conflicts and conflict resolution • Coaching and mentoring skills	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
5. Plan and organize work	• Functions of management • Planning	• Written tests • Oral questioning

	• 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	• Interviewing • Portfolio of evidence • Third party report
6. Maintain professional growth and development	• Avenues for professional growth • Training and career opportunities • Assessing training needs • Mobilizing training resources • Licenses and certifications for professional growth and development • Pursuing personal and organizational goals • Managing work priorities and commitments • Recognizing career advancement	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
7. Demonstrate workplace learning	• Managing own learning • Mentoring • Coaching	• Written tests • Oral questioning • Interviewing

	• 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	• Portfolio of evidence • Third party report
8. Demonstrate problem solving skills	• Critical thinking process • Data analysis tools • Decision making • Creative thinking • Development of creative, innovative and practical solutions • Independence in identifying and solving problems • Solving problems in teams • Application of problem-solving strategies • Testing assumptions • Resolving customer concerns	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report
9. Manage ethical performance	• Meaning of ethics • Ethical perspectives • Principles of ethics • Ethical standards • Organization code of ethics • Common ethical dilemmas • Organization culture	• Written tests • Oral questioning • Interviewing • Portfolio of evidence • Third party report

	• 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	

Suggested Methods of Instruction

- Demonstrations
- Simulation/Role play
- Group Discussion
- Presentations
- Assignments
- Q&A

Recommended Resources

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

ENVIRONMENTAL LITERACY

UNIT CODE: AQ/CU/AM/BC/06/6/B

Relationship to Occupational Standards:
This unit addresses the Unit of Competency : Demonstrate Environmental Literacy

Duration of Unit: 40 hours

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

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

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999 • Storage methods for environmentally hazardous materials	• Written questions • Oral questions

	• Disposal methods of hazardous wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	
2. Control environmental Pollution control	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution • Methods for minimizing noise pollution	• Written questions • Oral questions • Role play
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written questions • Oral questions • Role play
4. 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	• Written questions • Oral questions • Role play

	• Identification of areas for improvement	
5. 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
6. Implement specific environmental programs	• Community needs and expectations • Resource availability • 5s of good housekeeping • Identification of programs/Activities • Setting of individual roles /responsibilities • Resolving problems /constraints encountered • Consultation with stakeholders	• Written questions • Oral questions • Role play
7. 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

8. 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
9. Develop resource Conservation plans	• Determination of efficiency of use/conversion of resources • Causes of low efficiency of use of resources • Plans for increasing the efficiency of resource use	• Written tests • Oral questions • Practical test

Suggested Methods of Instruction

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

Recommended Resources

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

OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: AQ/CU/AM/BC/07/6/B

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate occupational safety and health practices

Duration of Unit: 40 hours

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

Summary of Learning Outcomes
1. Identify workplace hazards and risk
2. Control OSH hazards
3. Implement OSH programs

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify workplace hazards and risks	• Identification of hazards in the workplace and/or the indicators of their presence • Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace • Gathering of OSH issues and/or concerns	• Oral questions • Written tests • Portfolio of evidence • Third party report
2. Control OSH hazards	• Prevention and control measures e.g. use of PPE • Risk assessment • Contingency measures	• Oral questions • Written tests • Portfolio of evidence • Third party report

3. Implement OSH programs	• Company OSH program, evaluation and review • Implementation of OSH programs • Training of team members and advice on OSH standards and procedures • Implementation of procedures for maintaining OSH-related records	• Oral questions • Written tests • Portfolio of evidence • Third party report

Suggested Methods of instruction

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

Recommended Resources

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

CORE UNITS OF LEARNING

SETTING UP FISH FARM

UNIT CODE: AQ/CU/AM/CR/01/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Set Up Fish Farm

Duration of Unit: 200 hours

Unit Description
This unit specifies the competencies required to setting up fish farm. It involves applying food safety measures in setting up a fish farm, selecting an ideal site for fish farming, designing a fish farm layout, constructing fish ponds and supporting structures and integrating fish farming with livestock husbandry.

Summary of Learning Outcomes
1. Apply food safety measures in setting up a fish farm
2. Design fish farm layout
3. Construct fish ponds and ancillary farm structures
4. Test run the pond
5. Set up integrated fish culture facilities
6. Exit fish farm project sites

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in setting up a fish farm	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for setting up fish farm
	• Hazard analysis in setting up fish farm
	  • Enterprise description
	  • Product description
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests
		• Portfolio of Evidence

	• Layout of premises and surrounding environment • Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for setting up fish farm • Identification of critical control points • Procedures for setting up critical control limits • Establishment of monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures • Standards and legislations in food safety on setting up fish farm	
2. Design a fish farm layout	• Site selection • Importance • Factors affecting site selection • Types of fish culture systems • Cage culture • Pond systems • Integrated fish culture • Recirculating Aquaculture systems (RAS) • Components of a fish farm • Grow-out facilities • Broodstock rearing facilities • Fry nursing facilities	• Written • Oral • Observation • Portfolio of Evidence

	• Quarantine facilities • Ancillary structures • Factors to consider when designing a fish farm • Basic fish farm layout designs - examples • How to draw a perfect farm layout plan • Factors to consider • Equipment and materials required • Details to be included in the designed plan	
3. Construct fish ponds and ancillary farm structures	• Types of ponds • Based on construction materials e.g. earthen, concrete, liner, paddy, wooden • Based on Pond use e.g. nursery, breeding, production, quarantine • How to calculate pond construction costs • Pond construction equipment and materials • Steps in pond construction • Site clearance • Pegging • Core trenching • Excavation • Compaction and shaping of dykes • Sloping of the pond bottom • Fitting inlets and outlets • Trenching of supply and drainage channels • Construction and installation of ancillary farm structures • Planting grass • Fencing off the pond area • Factors to consider during pond construction • Dyke dimensions	• Written tests • Oral questioning • Observation • Projects • Portfolio of Evidence

	• Bottom slopes
	• Freeboard
	• Inlet, outlets
	• Drainage and
	• Spacing between ponds
	• Safety measures
	  • Use of PPEs in pond construction
	  • Carrying out basic first aid-cuts, blisters, CPR, fractures	

4. Test run newly constructed ponds	• Major defects associated with new ponds
	• Critical areas to consider when test-running a newly constructed pond
	• Detection and repair of defects on new ponds
	  • Leaking dykes
	  • Falling dykes
	  • Leaking inlets and outlets
	  • Broken pipes
	  • Uneven pond bottoms and dyke tops
	  • Poor drainage
		• Oral questioning
		• Observation
		• Project

5. Set up integrated fish culture facilities	• Types of integrated fish culture systems
	  • Fish-Poultry integration
	  • Fish – Livestock integration
	  • Fish – paddy integration
	  • Aquaponics
	• Factors to consider when selecting an ideal integration system
	• Common designs of integrated fish culture systems
	• Setting up a simple aquaponic system
		• Written tests
		• Oral questioning
		• Observation
		• Projects
		• Portfolio of Evidence

6. Exit fish farm site	• Storage procedures for recyclable materials and supplies • Disposal methods for non-recyclable materials • Cleaning and storage of tools and equipment	• Oral questioning • Observation • Written report • Portfolio of Evidence

	• Completion report writing • Handing over procedure	

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Viewing of related videos
- Project
- Group discussions
- Case studies

Recommended Resources

Reference materials

- Statutory Requirements And Standards
- Codes of practice
- Manual of standard operating procedures
- Permits
- Good agricultural practices manual
- Manufacturer's instructions
- Environmental protection regulations

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

FISH FEED PRODUCTION

UNIT CODE: AQ/CU/AM/CR/02/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Produce Fish Feeds

Duration of Unit: 210 hours

Unit Description
This unit describes the knowledge, skills and attitudes required to produce fish feeds. It requires competencies to apply food safety measures in producing fish feeds, sustain a ponds natural productivity and ensure the production of quality 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. Produce natural fish foods
3. Produce on-farm formulated fish feeds
4. Evaluate fish feed performance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in producing fish feeds	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for fish feed production
	• Hazard analysis in fish feeds production
	  • Enterprise description
	  • Product description
	  • Layout of premises and surrounding environment
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests
		• Portfolio of Evidence

	• Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for fish feed production • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations in food safety on fish feeds production.	
2. Produce natural fish foods	• Types of fish feeds • Natural feeds • Artificial feeds • Nutritional requirement of commonly cultured fish species at different stages • Use of PPEs in production of natural fish foods • Tools and materials for natural fish production • Production of natural feeds • Types of plankton • Benthic fauna • Types of fertilizers • Methods of fertilization • Frequency of fertilization	• Written tests • Oral questioning • Practical tests • Portfolio of Evidence

	• Measuring productivity in ponds	

3. Produce on-farm formulated fish feeds	• 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
	  • Feed ingredients and their properties
	  • Proximate analysis of feed ingredients
	  • Importance and uses of feed premixes
	  • Feed formulation methods using Pearson's square and computer software
	  • Anti-nutritional factors in feed ingredients
	  • Factors affecting mixing
	  • Procedure of mixing
	  • Pelletizing process
	  • Drying methods
	  • Types of packaging materials
	  • Packaging methods
	  • Labelling information
	  • Fish feed handling and storage
	  • Stores management
	  • Fish feeds price determination
		• Written tests
		• Oral questioning
		• Oral presentation
		• Practical tests
		• Projects
		• Portfolio of Evidence

4. Evaluate fish feed performance	• Proximate analysis of feeds
	• Measurement of fish feeds physical parameters
	• Fish nutrition
	• Fish feeding methods
	• Fish feeding habits and behaviour
	• Fish sampling procedure
	  • Types and uses of sampling gears
	  • Handling of fish samples
	  • Sample size determination (5-10%)
		• Oral questioning
		• Practical tests
		• Written tests
		• Projects
		• Portfolio of Evidence

	• Calculation and interpretation of feed conversion ratio (FCR)	

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Viewing of related videos
- Projects
- Group discussions
- Case studies

Recommended Resources

Reference materials

- Kenya Fish Feed Standards
- Standard Operating Procedures
- Statutory Requirements And Standards

Tools and equipment

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

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 MANAGEMENT

UNIT CODE: AQ/CU/AM/CR/03/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Manage Fish Hatchery

Duration of Unit: 250 hours

Unit Description

This unit specifies the competencies required to manage fish hatchery. It involves ability to apply food safety measures in fish hatchery management, select and manage broodstock as well as breed, nurse and harvest fingerlings. It also involves producing both live and hormone-treated fish feeds, packaging fingerlings and supervising maintenance of the hatchery facility.

Summary of Learning Outcomes
1. Apply food safety measures in fish hatchery management
2. Prepare hatchery for stocking
3. Manage Broodstock
4. Produce fingerlings
5. Maintain hatchery facility

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in fish hatchery management	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for fish hatchery management
	• Hazard analysis for fish hatchery management
	  • Enterprise description
	  • Product description
		• Written tests
		• Oral questioning
		• Observation
		• Portfolio of Evidence
		• Third Party reports
		• Project
		• Practical tests

	• Layout of premises and surrounding environment • Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for fish hatchery management • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations of food safety on fish hatchery management	
2. Prepare a hatchery to receive new stock	• Safety measures • Use of PPEs in broodstock management • Carrying out basic first aid-cuts, CPR, fractures • Handling and use of tools, equipment and materials • Types of fish holding facilities in a hatchery • Preparation of facilities • Draining to dryness • Liming • Filling with water • Cleaning and disinfection	• Written tests • Oral questioning • Practical tests • Oral presentations

3. Manage broodstock	• Broodstock selection
	  • Criteria
	  • Sources of broodstock
	• Acclimatization, quarantine and
	• Sorting
	  • Quality
	  • Size
	  • Readiness for breeding
	• Stocking
	  • Procedures
	  • Considerations – species, maturity stage, densities, water quality
	• Management of broodstock
	  • Feeding –conditions, rations, timings,
	  • Health status monitoring – signs of stress and infections
	  • Replacement – due to age and productivity levels
	• Water quality management
	  • Parameters -Temperatures, Dissolved Oxygen, Ammonia, pH, Nitrite, Alkalinity
	  • Monitoring
	  • Corrective actions
	• Cleaning and disinfection of fish culture units
		• Written tests
		• Oral questioning
		• Practical tests
		• Oral presentations
		• Projects

4. Produce fingerlings	• Cleaning of breeding facilities
	  • Tanks, breeding jars, happa nets,
	  • Tables,
	• Selection of ripe broodstock
	• Types of breeding
	  • Artificial propagation
	  • Stripping
	  • Fertilization
	  • Incubation of eggs
	• Monosex tilapia production
	  • Preparation of hormone treated feed
	  • Stage of hatchlings at first feeding
		• Written tests
		• Oral questioning
		• Oral presentations
		• Practical tests
		• Projects

	• Duration of feeding
	• Live feeds culture
	  • Algae
	  • Artemia
	  • Rotifers
	  • Copepods
	• Nursing fry
	  • Feeding
	  • Grading	

5. Maintain hatchery facility	• Plumbing works
	  • Piping, leakages
	  • Water flow rates
	• Cleaning schedule
	  • Cleaning and disinfection agents
	  • Cleaning and disinfection procedures
	  • Waste disposal
	  • Developing a schedule
	• Water quality monitoring
	  • Water quality testing
	  • Corrective actions
	• Maintenance and repairs of hatchery components
		• Oral questioning
		• Practical tests
		• Oral presentations
		• Written reports

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Viewing of related videos
- Projects
- Group discussions
- Case studies

Recommended Resources

Reference Materials

- Fish Codes Of Practice And Standards
- Standard Operating Procedures
- Statutory Requirements
- Food Safety Standards

Tools and equipment

Dissecting kit, weighing balance, pair of pincers, pestle and mortar, needle and syringe, measuring cylinders, , hatching jars, larval rearing trays, perforators, basins, harvesting gear, happa nets, buckets, scoop nets, water test kits, refrigerators,

Materials and supplies

Salt, towel, egg substrates, warm water, anaesthesia, 17-α Methyl Testosterone, feeds, fertilizers, ethanol, acetone, vials, cotton wool, assorted bowls

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/04/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Produce Grow Out Fish

Duration of Unit: 300 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 culture units, stock them with fingerlings, as well as feed and manage fish health in these units. It also involves the competencies required to control predators, harvest fish and integrate fish farming with livestock and poultry, and maintain the fish culture facilities in good condition.

Summary of Learning Outcomes
1. Apply food safety measures in producing grow out fish
2. Develop fish stocking and harvesting plan
3. Prepare grow out culture units
4. Stock grow out culture units
5. Manage fish feeding
6. Manage fish stock health
7. Control weeds, predators and intrusive animals
8. Harvest fish stock
9. Maintain grow out culture units
10. Integrate fish farming with livestock and poultry

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in producing grow out fish	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for grow-out fish production
		• Written tests
		• Oral questioning
		• Observation
		• Portfolio of Evidence
		• Third Party reports
		• Project
		• Practical tests

	• Hazard analysis for grow-out fish production
	  • Enterprise description
	  • Product description
	  • Layout of premises and surrounding environment
	  • Development of flow diagram
	  • Identification of hazards at each step of the flow diagram
	  • Describing the hazard
	  • Significance of hazards
	• Establishment of the HACCP plan for grow-out fish production
	  • Identification of critical control points
	  • Procedures for setting up critical control limits
	  • Establishment monitoring procedures on the control limits
	  • Establishment of corrective actions
	  • Verification procedures
	  • Record keeping
	  • Validation procedures
	Standards and legislations of food safety on grow out fish production	

2. Develop fish stocking and harvesting plan	• Definition of fish stocking plan
	• Contents of a fish stocking plan
	• Preparation of stocking plan
	  • Source of fingerlings
	  • Species of fish
	  • Stocking density
	  • Stocking schedule
	• Factors to consider when developing a fish stocking plan
		• Written tests
		• Oral questioning
		• Practical tests
		• Portfolio of Evidence

	• Factors to consider when developing a fish harvesting plan • Advantages of stocking and harvesting plans	

3. Prepare grow out culture units	• Use of PPEs in production of grow out fish
	• Pond preparation equipment, materials, and tools
	• Pond preparation procedures
	  • Repairs of inlets, outlets, and drainage systems
	  • Pond draining
	  • Pond repairs
	  • Desiltation
	  • Sun-drying
	  • Lime application
	  • Pond filling
	• Pond Fertilization and rates of application
	• Methods of lime and fertilizer application
	• Cleaning and disinfection of concrete and plastic fish tanks
		• Written tests
		• Oral questioning
		• Oral presentations
		• Practical tests
		• Portfolio of Evidence

4. Stock grow out culture units	• Types of fish species commonly cultured in Kenya
	• Sources of fry and fingerlings in Kenya
	• Factors affecting survival of fry and fingerlings
	• Practical handling and care of fish
	• Fish packaging and Transportation
	  • Size sorting of fish and fingerlings
	  • Transportation of live fish
	  • Packing of fry and fingerlings
	  • Packing of large fish
	  • Acclimatization and stocking of fish and fingerlings
	• Post stocking monitoring
	  • Behaviour
	  • Handling mortalities
		• Oral questioning
		• Written tests
		• Practical tests
		• Portfolio of Evidence

5. Manage fish feeds and feeding	• Nutritional requirements of commonly farmed fish • Types of fish feeds • Floating, sinking • Pellets, mash, flakes • Natural feeds, artificial/commercial feeds • Natural feeds • Water quality management • Pond liming and fertilization • Measurement of natural productivity • Fish feeding methods • Hand feeding (broadcasting) • Automatic feeders • Demand feeders • Feeding rates, frequency and timing • Feed conversion efficiency and calculations (FCR) • On-farm feed handling and storage • Fish sampling methods • Maintenance of fish feed and feeding records • Fish waste management	• Oral questioning • Practical tests • Written tests • Portfolio of Evidence

6. Manage fish stock	• Fish sampling techniques
	• Water quality management
	  • Physico-chemical parameters
	  • Monitoring of water parameters
	  • Pond fertilization
	  • Corrective actions
	• Fish Diseases
	• Definition of disease
	• Common fish diseases in ponds
	• Methods of disease transmission
	• Clinical symptoms of stress and disease in cultured fish
	• Common fish parasites
	  • Ectoparasites
	  • Endoparasites
	• Mechanical and Biological control of parasites
		• Oral questioning
		• Practical tests
		• Written tests
		• Portfolio of Evidence

	• Common bacterial and viral diseases in cultured fish. • Approved drugs in Aquaculture • Application methods • Bio-security procedures in a fish farm facility	

7. Control weeds, predators and intrusive animals	• Types of weeds found in ponds
	  • Submerged plants
	  • Emergent plants
	  • Floating plants
	  • Algal blooms
	• Methods of weed control in ponds
	• Fish predators and intrusive animals
	  • Difference between predators and intrusive animals
	  • Types of predators and their behaviour
	  • Types and behaviour of intrusive animals
	• Methods of controlling predators on fish farms
		• Oral questioning
		• Practical tests
		• Written tests
		• Project
		• Portfolio of Evidence

8. Harvest fish stock	• Factors to consider before harvesting fish
	• Tools, equipment and materials used during fish harvests
	• Handling and storage of equipment, drugs and chemicals
	• Steps involved during fish harvests
	  • Starving of fish
	  • Reducing water levels
	• Harvesting methods
	• Handling of harvested fish
	  • Sorting and grading of fish
	  • Stress minimization
	  • Keeping of harvesting records
	• Cleaning, packing and transportation of harvested fish
		• Oral questioning
		• Practical tests
		• Written tests
		• Portfolio of Evidence
		• Third party report

9. Maintain grow out culture units	• Tools, equipment and materials required during maintenance of fish culture units • Water quality management	• Oral questioning • Practical tests • Written tests

	• Physio-chemical parameters • Monitoring of water parameters • Pond fertilization and liming • Corrective actions • Clearing and repair of pond dikes, channels and piping • Maintenance of water channels and flood control structures • Identification and repairs of leakages • Maintenance and repairs of ancillary farm structures • Trimming of grass around compound • Fences repairs • Trimming tree branches • How to repair lined ponds, wooden and concrete tanks, plumbing system • Maintenance records and record keeping	• Portfolio of Evidence
10. Integrate fish farming with livestock and poultry	• Managing integrated systems • Fish-Poultry integration • Fish – Livestock integration • Fish – paddy integration • Aquaponics • Factors to consider when selecting an ideal animals and plants for an integrated system • Common designs of integrated fish culture systems • Animal stocking densities in integrated facilities • Feeding and feed management of integrated farm animals • Management and disease control in integrated animals • Records and record keeping	• Oral questioning • Practical tests • Written tests • Portfolio of Evidence

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer

- Practical work by trainee
- Viewing of related videos
- Group discussions

Recommended Resources

Reference materials

- standard operating procedures.
- statutory requirements and standards
- OSHA
- stocking plan
- Feed manufacturer's instructions.
- FAO Technical Guidelines for Responsible Fisheries- Aquaculture
- HACCP plan.

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, microscope

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 HANDLING OF FISH

UNIT CODE: AQ/CU/AM/CR/05/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Handle Harvested Fish

Duration of Unit: 260 hours

Unit Description
This unit describes the knowledge, skills and attitudes required to apply food safety measures handling harvested fish, maintain the quality of fresh fish by employing preservation and processing techniques that result into readily marketable products and by-products. The processing and preservation is carried out in an environmentally friendly manner by ensuring proper disposal of wastes.

Summary of Learning Outcomes
1. Apply food safety measures 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 wastes

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in handling harvested fish	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for post-harvest fish handling
	• Hazard analysis for post-harvest fish handling
	  • Enterprise description
	  • Product description
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests

	• Layout of premises and surrounding environment • Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for post-harvest fish handling • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations of food safety on handling harvested fish	
2. Prepare harvested fish for preservation	• Use of PPEs in preserving harvested fish • Safety measures to be observed • Use of fish handling materials, tools and equipment • Fish handling procedures • Grading • Cleaning • Scaling • Gutting	• Written tests • Oral questioning • Practical tests • Portfolio of Evidence
3. Preserve harvested fish	• Use of fish preservation materials, supplies, tools and equipment • Designs of fish preservation equipment	• Written tests • Oral questioning • Practical tests • Projects

	• Fish preservation methods
	  • Icing
	  • Smoking
	  • Sun-drying
	  • Salting
	  • Freezing	

4. Process harvested fish	• Use of PPEs in processing harvested fish
	• Safety measures to be observed
	• Use of fish processing materials, supplies, tools and equipment
	• Designs of fish processing equipment
	• Types of processed fish products
	• Processing methods
	  • Frying
	  • Smoking
	  • Salting
	  • Marinating
	  • Filleting
	  • Fermentation
	• Fish by-product processing
	  • Oils
	  • Frames
	  • Skins
	• Packaging and labelling
	  • Packaging tools and equipment
	  • Packaging materials
	  • Labelling information
	• Products storage
	• Quality control during processing and storage
		• Written tests
		• Oral questioning
		• Practical tests
		• Projects
		• Portfolio of Evidence

5. Market fish, fish products and by-products	• Fish market dynamics • Price determination • Distribution channels • Selling methods • Observation of hygiene	• Oral questioning • Written tests • Observation • Portfolio of Evidence
6. Manage waste from fish processing	• Use of tools, materials and equipment in disposal of fish processing wastes	• Oral questioning • Practical tests • Written tests

	• Environmental regulations for disposal of fish processing wastes • Types of fish processing wastes • Disposal methods of fish processing wastes	• Portfolio of Evidence

Suggested Methods of Instruction

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

Recommended Resources

Reference materials

- Hazards manual of standard operating procedures
- Food safety statutory requirements and standards
- HACCP plan

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

SETTING UP SMALL-SCALE FISH HATCHERY UNIT

UNIT CODE: AQ/CU/AM/CR/06/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Set Up Small-Scale Fish Hatchery Unit

Duration of Unit: 300 hours

Unit Description

This unit specifies the competencies required to apply food safety measures in setting up small scale fish hatchery unit, manage a small-scale fish hatchery. It involves designing a simple fish hatchery as well as interpreting already existing designs, select ideal hatchery construction sites and prepare cost estimates for hatchery construction. It also involves supervision of hatchery construction and designing and installation of bio-security measures.

Summary of Learning Outcomes
1. Apply food safety measures in setting up small scale fish hatchery unit
2. Prepare to set up a fish hatchery
3. Manage fish hatchery construction
4. Install hatchery biosecurity and safety measures

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in setting up small scale fish hatchery unit	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for setting up fish hatchery unit
	• Hazard analysis for setting up fish hatchery
	  • Enterprise description
	  • Product description
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests

	• Layout of premises and surrounding environment • Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for setting up fish hatchery • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations in food safety on setting up small scale fish hatchery unit	
2. Prepare to set up a fish hatchery unit.	• Factors to consider in hatchery site selection • Physical factors • Statutory requirements • Economic factors • Basic hatchery designs • Components of a fish hatchery unit • Factors considered in designing a hatchery • Hatchery shade designs • Validation of hatchery design done on-site	• Written tests • Oral questioning • Practical tests • Portfolio of Evidence

	• Costing of hatchery construction • Statutory requirements for setting up a hatchery • EMCA, WARMA	

3. Manage fish hatchery construction	• Use of PPEs in hatchery construction
	• Safety measures to be observed
	• Use of materials, supplies, tools and equipment in hatchery construction
	• Construction of a shed
	  • Site clearing
	  • Construct shade
	  • Installation of indoor hatchery facilities
	  • Sorting tables
	  • Packaging tables
	  • Incubation units
	  • Plumbing works
	• Construction of outdoor culture units
	  • Ponds – earthen, liner
	  • Tanks – plastic, concrete
	  • Collapsible fish ponds
	• Installation and testing of outdoor hatchery facilities
	  • Water intake structures
	  • Piping
	  • Overhead tanks
	  • Drainage systems
		• Written tests
		• Oral questioning
		• Oral presentation
		• Practical tests
		• Portfolio of Evidence

4. Install fish hatchery bio-security and safety measures	• Foot baths
	  • Purpose
	  • Designs
	  • Disinfectants used,
	  • Preparation of stock solutions
	• Hand wash and sanitizers
	  • Types
	  • Siting
	  • Operation
	• Filtration systems for incoming water
		• Oral questioning
		• Written tests
		• Practical tests
		• Projects
		• Portfolio of Evidence

	• Construction of fences and quarantine facilities • Intruder control facilities and devices e.g. nets, meshes, screens, cover nets	

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- Case studies
- Viewing of related videos
- Group discussions
- project

Recommended Resources

Reference Materials

- Manual of standard operating procedures for risk management
- Statutory requirements and standards for hatchery establishment

Tools and equipment

- Tape measure, spirit level, jembes, spades, pangas, plumbing tools, masonry tools,
- Compactors and rollers, wheelbarrows, aeration equipment, filtration
- Water testing kits and equipment, beakers,

Materials and supplies

Ropes and strings, liners, nets, screens, gates, cover nets, meshes, pegs, plumbing materials, lime, cement, sand, roofing materials, fencing wire, fittings, assorted screens, netting materials, disinfectants, chlorine, water storage tanks, fish culture tanks, aeration systems, filtration systems, water flow structures, cement, sand

Personal protective equipment (PPEs)

Safety goggles, gum boots, helmets, gloves, overalls, first aid kits, mouth piece

SETTING UP RECIRCULATING AQUACULTURE SYSTEM (RAS) UNIT

UNIT CODE: AQ/CU/AM/CR/07/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Set Up Small-Scale Aquaculture Re-Circulating System (RAS) Unit

Duration of Unit: 300 hours

Unit Description

This unit specifies the competencies required to apply food safety measures in setting up RAS, design and cost a small-scale re-circulating Aquaculture System, supervise construction and installation works, and manage operations of a RAS facility.

Summary of Learning Outcomes
1. Apply food safety measures in setting up RAS
2. Design a small-scale re-circulating aquaculture system
3. Supervise construction of RAS facility
4. Set up biosecurity measures
5. Manage RAS facility

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in setting up RAS	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for setting up RAS
	• Hazard analysis for setting up RAS
	  • Enterprise description
	  • Product description
	  • Layout of premises and surrounding environment
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests
		• Portfolio of Evidence

	• Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for setting up RAS • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations in food safety on setting up RAS	
2. Design a small-scale RAS	• Recirculating Aquaculture System • Definition • Types • Factors to consider in siting a RAS • Power supply • Piped water • Transport network • Internet connectivity • Components of a fish hatchery unit • Culture units • Plumbing works • Water treatment – biofilters • Layout of the RAS • Factors to consider – components, space, surrounding land gradient, ,	• Written tests • Oral questioning • Practical tests • Projects • Portfolio of Evidence

	waste disposal, biofilters, water flow either by pump or gradient • Costing of hatchery construction • Relevant statutory requirements - EMCA, WARMA	

3. Supervise construction of RAS facility	• Use of PPEs in hatchery construction
	• Safety measures to be observed
	• Use of materials, supplies, tools and equipment in hatchery construction
	• Construction of a RAS shed
	  • Site clearing
	  • Construct a shade
	• Installation of RAS components
	  • Culture tanks
	  • Sorting tables
	  • Packaging tables
	  • Incubation units
	  • Plumbing works
	• Construction of outdoor culture units
	  • Ponds – earthen, liner
	  • Tanks – plastic, concrete
	• Installation of waste disposal system
	  • Types of wastes
	  • Disposal facilities
	  • Waste recycling
	• Basic civil works
	  • Landscaping
	  • Walkways
	  • Gate installation
	  • Parking area
	  • Perimeter fencing
	  • Access roads
	• Installation and testing of RAS components
	  • Water intake structures
	  • Piping
	  • Overhead tanks
	  • Drainage systems
		• Written tests
		• Oral questioning
		• Oral presentation
		• Practical tests
		• Projects

4. Install bio-security and safety measures	• Foot baths
	  • Purpose
	  • Designs
	  • Disinfectants used,
	  • Preparation of stock solutions
	• Hand wash and sanitizers
	  • Types
	  • Siting
	  • Operation
	• Filtration systems for incoming water
	• Construction of fences and quarantine facilities
	• Intruder control facilities and devices e.g. nets, meshes, screens, cover nets
		• Oral questioning
		• Written tests
		• Practical tests
		• Projects
		• Portfolio of Evidence

5. Exit project site	• Cleaning e.g. tools and equipment • Storage of materials e.g. recyclable, supplies • Disposal of non-recyclable materials • Project report prepared and disseminated • Financial accounts settled	• Written tests • Oral questioning • Practical tests

6. Maintain RAS facility	• Maintenance procedures
	  • Water flow rates
	  • Cleaning
	  • Disinfection
	  • Water quality maintenance
	  • Waste disposal
		• Written tests
		• Oral questioning
		• Practical tests
		• Portfolio of Evidence

Suggested Methods of Instruction

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

Recommended Resources

Reference Materials

- RAS is assessed and established as per manual standard operating standards

- Statutory requirements and standards for installing RAS

Tools and equipment

- Tape measure, spirit level, jembes, spades, pangas, plumbing tools, masonry tools,
- Compactors and rollers, wheelbarrows, aeration equipment, filtration
- Water testing kits and equipment, beakers, water circulation pumps,water flow structures, power back up, generator

Materials and supplies

Ropes and strings, liners, pegs, nets, meshes, screens, cover nets, gates,plumbing materials, lime, cement, sand, roofing materials, fencing wire, fittings, assorted screens, netting materials, disinfectants, chlorine, water storage tanks, fish culture tanks, , cement, sand, fish growing tanks,

Personal protective equipment (PPEs)

Safety goggles, gum boots, helmets, gloves, overalls, first aid kits, mouth piece

FISH CAGE FARM MANAGEMENT

UNIT CODE: AQ/CU/AM/CR/08/6/B

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Manage Fish Cage Farm

Duration of Unit: 350 hours

Unit Description
This unit specifies the competencies required to apply food safety measures in managing fish cage farm, select a suitable cage farm site, set up the cages and stock them with fingerlings. It also involves managing the stocked fish and maintaining the cages in the lake.

Summary of Learning Outcomes
1. Apply food safety measures in managing fish cage farm
2. Design cage farm layout
3. Set up and configure cages in a water body
4. Stock cages with fish
5. Manage fish feeds and feeding
6. Manage fish stock health
7. Control theft and vandalism, predators and intrusive animals
8. Harvest fish stock
9. Maintain cages and prevent escapes
10. Maintain records

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Apply food safety measures in managing fish cage farm	• Meaning of food safety
	• Importance of food safety
	• Principles of food safety
	• Prerequisite programmes
	  • Meaning, importance, categories and establishment of prerequisite programmes
	  • Relevant programmes for fish cage farm management
	• Hazard analysis for fish cage farm
	  • Enterprise description
		• Written tests
		• Oral questioning
		• Observation
		• Third Party reports
		• Project
		• Practical tests

	• Product description • Layout of premises and surrounding environment • Development of flow diagram • Identification of hazards at each step of the flow diagram • Describing the hazard • Significance of hazards • Establishment of the HACCP plan for fish cage farm management • Identification of critical control points • Procedures for setting up critical control limits • Establishment monitoring procedures on the control limits • Establishment of corrective actions • Verification procedures • Record keeping • Validation procedures Standards and legislations in food safety on managing fish cage farm	
2. Design cage farm layout	• Definition • Cage culture systems • Classification of cage culture systems • Types of fish cages • Fixed cages • Floating (or surface) cages • Submersible cages • Submerged cages • Parts of a floating fish cage • Catwalk (service system) • Cage bag/net • Mooring system	• Written • Oral • Observation • Portfolio of Evidence • Third party report

	• Anchoring • Floatation system • Ancillary structures • Common materials for pond construction • Wood (Wooden cages) • Steel (Steel made cages) • Plastic (Plastic made cages) • Factors to consider when designing a cage system • Frame • Shape • Size • Volume • materials • Basic cage farm layouts and designs – with examples • How to draw a basic cage farm layout plan • Factors to consider • Equipment and materials required • Details to be included in the designed plan • Advantages and disadvantages of cages	
3. Set up and configure cages in a water body	• Site selection • Importance • Factors affecting site selection • Site selection methods • Location and configuration of cages • How to calculate cage set-up costs • Cage set-up equipment and materials • Steps involved in setting up of fish cages • Factors to consider during cage and farm set-up • Safety measures	• Written tests • Oral presentation • Observation • Projects • Portfolio of Evidence • Third party report

	• Use of PPEs in pond construction • Carrying out basic first aid-cuts, blisters, CPR, fractures	

4. Stock cages with fish	• Selection of candidate fish species for cage culture
	• Fish stocking densities under different culture systems
	• Sources of fry and fingerlings in Kenya
	• Factors affecting survival of fry and fingerlings
	• Practical handling and care of fish
	• Fish packaging and Transportation
	  • Size sorting of fish and fingerlings
	  • Transportation of live fish
	  • Packing of fry and fingerlings
	  • Packing of large fish
	  • Acclimatization and stocking of fish and fingerlings
	• Post stocking monitoring
	  • Behaviour
	  • Handling mortalities
		• Oral questioning
		• Written tests
		• Practical tests
		• Projects
		• Portfolio of Evidence
		• Third party report

5. Manage fish feeds and feeding	• Nutritional requirements of commonly farmed fish • Types of fish feeds • Floating, sinking • Pellets, mash, flakes • Fish feeding methods • Hand feeding (broadcasting) • Automatic feeders • Demand feeders • Feeding rates, frequency and timing • Feed conversion efficiency and calculations (FCR) • Handling and feeding of caged fish • Fish sampling methods • Maintenance of fish feed and feeding records • Fish waste management	• Oral questioning • Written tests • Practical tests • Projects • Portfolio of Evidence • Third party report

	• Disposal of solid wastes and cage debris • Disposal of dead fish • Disposal of feed bags and other wastes	

6. Manage fish stock	• Water quality management
	  • Physico-chemical parameters
	  • Monitoring of water parameters
	• Fish sampling techniques
	• Disease problems in cage culture
	• Definition of disease
	• Common fish diseases in cages
	• Modes of disease transmission
	• Clinical symptoms of stress and disease in cultured fish
	• Common fish parasites
	  • Ectoparasites
	  • Endoparasites
	• Mechanical and Biological control of parasites
	• Common bacterial and viral diseases in cultured fish.
	• Approved drugs in Cage culture
	  • Application methods
	• Bio-security procedures in a cage farm
		• Written tests
		• Oral presentation
		• Observation
		• Projects
		• Portfolio of Evidence
		• Third party report

7. Control theft and vandalism, predators and intrusive animals	• Fish predators and intrusive animals
	  • Difference between predators and intrusive animals
	  • Types of predators and their behaviour
	  • Types and behaviour of intrusive animals
	• Methods of controlling predators and Intruders
	• Methods of preventing theft and vandalism
		• Written tests
		• Oral presentation
		• Observation
		• Projects
		• Portfolio of Evidence
		• Third party report

8. Harvest fish stock	• Factors to consider before harvesting fish
	• Tools, equipment and materials used during fish harvests
	• Fish sampling techniques
	• Harvesting procedures
	  • Starving of fish
	  • Fish crowding
	• Harvesting methods
	• Handling of harvested fish
	  • Sorting and grading of fish
	  • Stress minimization
	  • Maintenance of harvesting records
	• Cleaning, packing and transportation of harvested fish
	• Handling and storage of equipment, drugs and chemicals
		• Oral questioning
		• Written tests
		• Practical tests
		• Projects
		• Portfolio of Evidence
		• Third party report

9. Maintain cages and prevent escapes	• Preparation of cage management plans
	• Development of farm security plan
	  • Definition
	  • Contents of a farm security plan
	• Tools, equipment and materials required for cage maintenance
	• Cleaning of cages, catwalks and other structures
	• Prevention of waste build-up in cages
	• Common causes of cage damage
	  • Intruders and predators
	  • Vandalism
	  • Wave action
	  • Aquatic weeds – water hyacinth)
	  • Collisions with boats and floating debris
	• Identification and repairs of cages and other structures
		• Oral questioning
		• Written tests
		• Practical tests
		• Projects
		• Portfolio of Evidence
		• Third party report

10. Maintain records	• Types of records on a fish farm • Factors to consider when designing records • Record storage methods • Use of Counter books • Use of computer software	• Written • Oral • Observation • Portfolio of Evidence • Third party report

Suggested Methods of Instruction

- Instructor led facilitation of theory
- Demonstration by trainer
- assignment
- Viewing of related videos
- Group discussions
- Project

Recommended Resources

Reference Materials

- Manual standard operating procedures for risk management
- Statutory requirements and standards for establishment of fish cage farm
- Fish stocking plan
- Work place requirements
- FAO guidelines for Fish Management

Tools and equipment

Measuring tape, weighing scale, DO meter, pH meter, ammonia test kits, aeration equipment, dip nets, automatic feeders, demand feeders.
traps and scarecrows, cover net, predator nets, acoustic deterrence devices, visual deterrence devices, pressure washer, scrubbing brush, paint brush,

Materials and supplies

Ropes and strings, liners, pegs, plumbing materials, lime, cement, sand, roofing materials, fencing wire, fittings, assorted screens, netting materials, anti-corrosive paints, screens, containers, twines, disinfectants

Personal protective equipment (PPEs)

Safety goggles, gum boots, helmets, gloves, overalls, first aid kits, mouth piece, life jackets, life ring, dustcoat