



# THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

## *Department of Fisheries and Aquaculture Technology*

### **FAT 511 - Aquaculture Engineering**

#### **COURSE PARTICULARS**

**Course Code:** FAT 511

**Course Title:** Aquaculture Engineering

**No. of Units:** 3

**Course Duration:** Two hours of theory and three hours of practicals per week for 15 weeks.

**Status:** Compulsory

**Prerequisite:** NIL

#### **COURSE INSTRUCTORS**

**Professor O. T. Adebayo**

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#### **COURSE DESCRIPTION**

This course is designed mainly for students in Fisheries and Aquaculture. The course provides applied training on aquaculture engineering. This course will impart valuable skill to the students in order to enhance their hands-on fish farm engineering. Topics to be covered include. Hydrological information for design and operation of aquaculture systems. Soil engineering for designs of ponds, canals and dams. Design and construction of fish farms, hydraulic formulas used in designing fish farms, maintenance of aquafarms. Pond construction engineering, design and construction of fish cages, tanks, and other impounding structures, classification and design of different types of water pumps, types of aeration and filtration devices, their design and construction. Waste management techniques in aquaculture production, biofiltration system, type of aerators, degassing etc. Water Recirculating systems and aquaponics.

#### **COURSE OBJECTIVES**

The objectives of this course are to:

- Provide students with necessary skills for designing aquaculture system;
- Enable students to design, construct and maintain fish farms;
- Provide student with the requisite knowledge of pond construction engineering;
- Enable students to design water pumps for different aquaculture systems;
- Enable students to design and construct fish cages, tanks and other fish enclosure structures;
- Provide students with opportunities to develop fish farm construction skills;
- Provide students with skills to design aerators and filters for aquaculture systems
- Provide students with the skills to design and construct water recirculatory systems;
- Enable students to manage waste in aquaculture production systems.

## **COURSE LEARNING OUTCOMES / COMPETENCIES**

Upon successful completion of this course, the student will be able to:

*(Knowledge based)*

- Provide hydrological information for design and operation of aquaculture systems;
- Explain the various criteria for selection of site for fish farms;
- Survey and select site for fish ponds;
- Describe various types of fish farms and their characteristics;
- Know and used different hydraulic formulas in designing fish farms;
- Describe the different designs for fish farms and facilities;
- Describe the construction procedures for fish farms;
- Explain the different maintenance methods for Fish farms
- Describe different types of water pumps, aerators and filters;
- Highlight the functions of water pumps, aerators and filters.

## **GRADING SYSTEM FOR THE COURSE**

This course will be graded as follows:

Class Attendance	5%
Assignments	5%
Practicals	20
Test(s)	10%
<u>Final Examination</u>	<u>60%</u>
<b><u>TOTAL</u></b>	<b><u>100%</u></b>

## GENERAL INSTRUCTIONS

**Attendance:** In this course every student is expected to be in class five minutes before the start of lectures and also participate in all practical trainings. Attendance will be taken in all lectures and practical sessions. However, cases of illness or other unavoidable cause of absence must be communicated to the course lecturer stating the reason for the absence.

**Academic Integrity:** Flouting of academic integrity, including dishonesty in assignments, examinations, or other academic performances are forbidden. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

**Assignments and Group Work:** Students are expected to submit assignments as at when due. Failure to submit an assignment as scheduled will earn the student zero for that assignment. Late submission will only be allowed under justifying circumstances, for which the student has notified the lecturer.

**Code of Conduct in Lecture Rooms, Laboratories and Fish Farm:** Students are expected to attend lectures and practical sessions punctually. Silence must be observed in class. Students should turn off their cell phones during lectures and practical sessions. Food and drinks are not allowed in the laboratories.

## READING LIST

<sup>2</sup>Dela Cruz, C.R. 1983. Fishpond Engineering: A Technical Manual for Small - and Medium-Scale Coastal Fish Farms in Southeast Asia. South China Sea Fisheries Development and Coordinating Programme. Manila Philippines. 317p.

<sup>4</sup>Hutchinson, W., Jeffrey, M. and Sullivan, D. Recirculating Aquaculture Systems Minimum Standards for Designs, Construction and Management. 216pp.

<sup>2</sup>Laughlin, T.L.2008. Pond Construction for Freshwater Fish Culture. FAO Training series 1(20).

<sup>1,2,4</sup>Pillay, T.V.R. and Kutty, M.N. (2005). Aquaculture Principles and Practices. Second Edition. Blackwell Publishing Ltd. UK. 624p.

<sup>4</sup>Timmons, M.B. and Ebeling. J.M. 2002. Recirculating aquaculture Systems. 2nd Edition. Cayuga Aqua Ventures Ltd. 769pp.

### Journal

<sup>3</sup>Aquaculture Engineering . Official Journal of the Aquaculture Engineering Society (AES). Published by Elsevier. ISSN: 0144-8609

### Legend

- 1- Available in the University Library
- 2- Available on the Internet.
- 3- Available as Personal Collection
- 4- Available in local bookshops.

## COURSE OUTLINE

<b>Week</b>	<b>Topic</b>	<b>Remarks</b>
1	Hydrological information for design and operation of aquaculture systems.	Students will be introduced to the various hydrological information for the design and operation of aquaculture systems.
2	Soil engineering for designs of ponds, canals and dams.	This will involve survey of soil in FUTA environs using engineering models and concepts.
3 & 4	Design and construction of fish farms, hydraulic formulas used in designing fish farms, maintenance of aquafarms.	Practical exercise will involve design and construction of aquafarms using hydraulic formulas.
5 & 6	Pond construction engineering	This will involve explanation on basic engineering principles, models and concepts for pond construction.
7 & 8	Design and construction of fish cages, tanks, and other impounding structures	Students will be taught on the various designs for fish cages, tanks, pens and raceways. Practical demonstration of procedures for construction of fish cages and tanks by lecturer / Technologist.
<b>MID-SEMESTER TEST</b>		
9	Classification and design of different types of water pumps.	Practical demonstration will be carried out by the lecturer/Technologist.

10	Types of aeration, their design and construction.	Students will be taught the different types of aerators, their design and procedures for construction of aerators.
11	Types of filtration devices, their design and construction.	Students will be divided into groups and given assignment to design and construct simple filters for aquaculture system.
12	Waste management techniques in aquaculture production,	Students will be taught various disinfection devices
13	Water Recirculating systems	Students will be divided into groups and given assignment to design water recirculatory systems for fish production
14	Aquaponics	Practical demonstration will be carried out by the lecturer/Technologist.
15	REVISION	Assessment will be done to appraise how far the students' anticipations for the course have been met.