



LANDMARK UNIVERSITY, OMU-ARAN

COURSE COMPACT TEMPLATE

COLLEGE: Science and Engineering

DEPARTMENT: Agricultural and Biosystems Engineering

PROGRAMME: Agricultural Engineering

COURSE COMPACT for: Farm Structures and Environmental Control (ABE 414)

Course

Course code: ABE 414

Course title: Farm Structures and Environmental Control

Credit unit: 3

Course status: Compulsory

Lecturers' Data

(1) Name of the lecturer: Engr. AKINYEMI, Banjo A

Qualifications obtained: B.Eng, MSc, Regd Engr COREN

Department: Agricultural and Biosystems Engineering

College: Science and Engineering

E-mail: akinyemi.banjo@lmu.edu.ng

Office Location: A 211, New College Building

(2) Name of the lecturer: Dr. Okunola A.A.

Qualifications obtained: B.Eng, MSc, Ph.D., Regd Engr COREN

Department: Agricultural and Biosystems Engineering

College: Science and Engineering

E-mail: okunola.abiodun@lmu.edu.ng

Office Location: A 215, New College Building

Consultation Hours: Mondays (10am-3pm), Tuesday (10am-3pm) and Friday (11am-1pm)

INTRODUCTION TO THE COURSE

Course Description: This course would enable the students to have general knowledge about farm structures and the environment in which they are found. As a discipline, farm structures which can also be referred to as farm structures and environment or farm structures and conveniences, is the branch of agricultural engineering that deals with the provision and maintenance of built-up facilities within and occasionally outside the farm environment. A farm structures engineer is a specialist in the fields of agricultural and civil engineering whose interests, education, training and experience have developed the knowledge of scientific principles, construction materials, construction procedures and economics necessary to direct the design, construction, utilization and maintenance of farm houses, barns, sheds, silos and related structures. Farm structures are shelters for farm animals or crops. It could also be a shelter for processing or storing products of farm animals or crops, or for storing or repairing farm implements.

Course Justification: Farm structures and environment is a branch of agricultural engineering that seems to be subsumed with respect to the other more prominent specialties in the area. However, this is at a great deal of loss to most graduate students from the discipline because a vast majority of them know next to nothing about farm buildings and its environment. Such buildings are also the core of most operation that is being performed on any farm ranging from crop production, animal production and human shelter to processing of harvested crops, livestock shelters and their processing centers. Therefore the course would expose students to all areas of agricultural buildings and their environment.

Course Objectives: At the end of this course, students would be able to:

- (i) Direct the design, construction, utilization and maintenance of farm houses, barns, sheds, silos and related structures.
- (ii) Provide and maintain built-up facilities within and occasionally outside the farm environment.
- (iii) Develop procedures and economics necessary for the design of farm buildings and its environment

Course Content: Introduction To Farm Structures, Structural Analysis And Basic Mechanics, Classification Of Loads, Design Of Structural Members (Beams And Columns), Trusses, Building Materials, Sundry Farm Buildings (Greenhouse, C)

Course Expectations:

S/N	GRADING	SCORE(%)
1.	Continuous Assessments	
	• C.AI	7%
	• C.All (Mid-Semester Test)	15%
	• C.AIII	8%
2.	Assignment	10%
3.	Practical (Laboratory work)/ Case Studies	
4.	Final Examination	60%
5.	Total	100

Course Delivery Strategies: Lecturing method complimented with visual images of some designed structures and the various structural parts such as beams, columns, trusses would be analysed. Assignments would be given to students to solve some calculations based on some designs. Rabbit house, Cow pen house with milk section, fish pond house, Grass-cutter house plans would be provided for students as instructional materials for practical classes. Practical class would also be conducted on moulding of bricks from aggregate materials and slump tests would be done prior to the brick production.

Course Duration: 3 hours weekly interjected with practical sessions

LECTURE CONTENT

Module 1

Week 1: Introduction to farm structures

Objectives: The students at the end of the lectures for the week should be able to define what they understand by agricultural structures as a discipline, characteristics of any structure and functions of farm structures.

Description

First hour:

Agricultural structures as a discipline, functions of structures

Second hour

Characteristics of structures

Study Question: 1. What do you understand by farm structures
2. Itemise some characteristics of structures.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.

Module 2

Week 2: Classification of farm structures

Objectives: The students at the end of the lectures for the week should be able to classify the different types of farm structures, their functions and specific examples. Farm houses, buildings for crop production, buildings for processing agricultural produce, crop storage structures, livestock structures and other miscellaneous structures should be known by the students at the end of the week.

Description

First hour:

Crop processing structures, crop storage structures

Second hour

Farm houses,

Study Question: 1. What do you understand by miscellaneous structures

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 3

Week 3: Farm Stead Planning

Objectives: The students at the end of the lectures for the week should understand that planning is the first and most important step in designing a farm stead and that an ill-conceived arrangement of buildings can diminish profits on a long term basis. Basic planning to be done include site selection which comprises of other factors such as drainage, waste management, water, orientation, utilities and services etc, building arrangement and flexibility of design to accommodate future expansion.

Description

First hour:

Planning of farm stead

Second hour

Building arrangement

Study Question: 1. Sketch a farmstead plan for a piggery farm.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 4

Week 4: Structural analysis and basic mechanics

Objectives: The students at the end of the lectures for the week should be able to design for compressive stress, strain, shearing force and bending moments. Resolve forces, couples, reaction in structures having rollers, pin-support and built in support and be able to include factor of safety in their designs.

Description

First hour:

Compressive stress, shearing force, bending moments

Second hour

Types of support,, reactions, couples

Study Question:

1. The students should resolve sample problems on moments of forces, resultant of parallel forces and reactions.
2. Shearing force and bending moment's calculations would be given the students.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 5

Week 5: Classifications of loads

Objectives: The students at the end of the lectures for the week should be able to classify loads into dead load, live load, snow load and wind load.

Description

First hour:

Types of load in structures

Second hour

Analysis of loads

Study Question:

Solve some problems relating to loading on farm structures such as platforms for drying and storing grains.

Reading List :

- Farm Structures in Tropical Climates by Lennart P. and Bengtsson James H. Whitaker
- Rural Structures in The Tropics : Design and Development. FAO Publication

Module 6

Week 6: Introduction to the design of structural members (beams)

Objectives: The students at the end of the lectures for the week should be able to define beams as a structural member which is subjected to loads that are primarily perpendicular to the long axis and be able to point out beams in a given structure.

Description

First hour:

Simple design calculations involving beams

Second hour

Beam design calculations

Study Question:

Identify the beams located within the classroom structure.

Reading List :

- Farm Structures in Tropical Climates by Lennart P. and Bengtsson James H. Whitaker
- Rural Structures in The Tropics : Design and Development. FAO Publication

Module 7

Week 7: MID SEMESTER EXAMINATION

Module 8

Week 8: Design and calculations of structural beam members

Objectives: The students at the end of the lectures for the week should be able to select wooden member sizes of rectangular, circular or square sections to be used in the design for bending stress, shear stress, deflection, bearing supports and finally the lateral stability of the beam in the structure. They should be able to use the FAO standard table for selection of beam sizes.

Description

First hour:

Selection of wooden members for beam design

Second hour

Calculations involving circular, rectangular and square sizes

Study Question:

Several practical questions based on the procedure for calculating beams of rectangular, circular or square sections would be given to the students.

Reading List :

- Farm Structures in Tropical Climates by Lennart P. and Bengtsson James H. Whitaker
- Rural Structures in The Tropics : Design and Development. FAO Publication

Module 9

Week 9: Introduction to the design of structural members (columns)

Objectives: The students at the end of the lectures for the week should be able to define column as a structural member which is subjected to loads that are primarily parallel to the long axis and be able to point out columns in a given structure.

Description

First hour:

Introduction of column members

Second hour

Identification of column members in use within the classroom

Study Question:

Identify the columns located within the classroom structure.

Reading List :

- Farm Structures in Tropical Climates by Lennart P. and Bengtsson James H. Whitaker
- Rural Structures in The Tropics : Design and Development. FAO Publication

Module 10

Week 10: Design and calculations of structural column members

Objectives: The students at the end of the lectures for the week should be able to select wooden member sizes of rectangular, circular or square sections and classify them into short, long or intermediate columns to be used in the design for structures using equations such as Madison Approach, FAO method and Euler's formula. They should be able to use the FAO standard table for selection of column sizes.

Description

- **First hour:**

Madison approach to solving column problems

- **Second hour**

FAO and Euler's method of solving column problems

Study Question:

Several practical questions based on the procedure for calculating columns of rectangular, circular or square sections would be given to the students.

Reading List :

- Farm Structures in Tropical Climates by Lennart P. and Bengtsson James H. Whitaker
- Rural Structures in The Tropics : Design and Development. FAO Publication

Module 11

Week 11: Introduction of member forces and reactions in trusses

Objectives: The students at the end of the lectures for the week should be able to draw and identify different types of trusses design for roof and identify the different reactions in them.

Description

- **First hour:**
Identification of types of trusses
- **Second hour**
Member forces and reactions in trusses

Study Question:

Assignment would be given to students on the different truss design of roofs and some reactions would be drawn on the board for them to identify the type of force in it.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition
 - Rural Structures in The Tropics : Design and Development. FAO Publication

Module 12

Week 12: Design and calculations of member forces and reactions in trusses

Objectives: The students at the end of the lectures for the week should be able to draw force diagram of any given truss structure, identify the reactions and calculate the member and reaction forces using any of graphical approach, section method and method of joints.

Description

- **First hour:**
Design of member forces and reaction in trusses
- **Second hour**
Calculation of member forces and reaction in trusses

Study Question:

Sample questions on using section and joint methods would be given to the students to draw their force diagram and calculate the reactions and member forces in them.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 13

Week 13: Building Materials

Objectives: The students at the end of the lectures for the week should be able to identify the wide ranges of building materials that are available for rural building construction. The students would also be made to understand that proper selection of materials to be used in a particular building can influence the original cost, maintenance, ease of cleaning, durability and of course, appearance.

Description

- **First hour:**
Identification of different building materials for rural construction
- **Second hour**
Selection criteria of materials for rural constructions

Study Question:

Questions on other local building materials not discussed in the class would be asked the students.

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 14

Week 14: Sundry farm buildings (buildings for crop production)

Objectives: The students at the end of the lectures for the week should be able to define and itemize the functions of some selected crop production structures. However, emphasis would be placed on greenhouse structures with their components, accessories, materials of construction, design and location considerations and their advantages and disadvantages.

Description

- First hour:
Definition of building for crop production
- Second hour
Functions of buildings for crop productions

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

Module 15

Week 15: Sundry farm buildings (livestock structures)

Objectives: The students at the end of the lectures for the week should be able to identify the various livestock structures on the farm. These include battery cages, cattle paddock and pen and swine house, deep litter systems and hutches etc.

Description

- First hour:
Identification of livestock structures
- Second hour
Functions of livestock structures

Reading List :

- Farm Structures by Yahaya Mijinyawa, Ibadan University Press, Second Edition.
- The Design of Farm Structures by Yahaya Mijinyawa, Ibadan University Press, First Edition

HOD's COMMENTS:-----

Course Compact is adequate

Name:-----

Dr A. N. Okunle

Signature:-----

A. N. Okunle

Date:-----

24/8/2017