

COURSE CODE:	<i>AGE 502</i>
COURSE TITLE:	<i>Farm Machinery II</i>
NUMBER OF UNITS:	<i>3 Units</i>
COURSE DURATION:	<i>Three hours per week</i>

COURSE DETAILS:

Course Coordinator:	Dr. Alex Folami Adisa
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Office Location:	College of Engineering Building
Other Lecturers:	Dr A. A. Aderinlewo

COURSE CONTENT:

Principle of design, construction, testing and operation of machines used for land clearing, tillage, seeding, planting, fertilizing, weed control, thinning, spraying, dusting, stalk cutting, forage harvesting, harvesting of field crops and fruits. Machinery used in major farm operations and their applicability to Nigeria. Class project.

COURSE REQUIREMENTS:

This is a compulsory course for agricultural Engineering students. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination.

READING LIST:

1. Kurmi, R. S. and Gupta, J. K. Theory of Machines. Eurasia publishing house (PVT.) Ltd. New Delhi. 2008.
2. Krutz, G., Thompson, L. and Claar, P. Design of Agricultural Machinery. John Wiley and Sons. New York. 1984.
3. Claude, C. Farm Machinery. ELBS, London, 10& 11 edition. 1981
4. Kepner, R.A., Bainer, R. and Barger, E. L. Principles of Farm Machinery. CBS Publishing & Distributors, 3 edition. New Delhi. 2005.

LECTURE NOTES

1. MACHINE DESIGN PROCESSES, PROCEDURES AND MATERIALS FOR CONSTRUCTION

- Formulating a design procedure
- Three types of design
 - Original design
 - Transitional design
 - Extensional design
- Typical organisation of a design process
- Making the right engineering decision
- Communicating ideas
- Fundamental principle of professional engineering practice
- Factors of safety (safety index)
- Standards

2. SELECTION, STRENGTH AND PROPERTIES, STRESS ANALYSIS COSTING OF MATERIALS FOR MACHINERY DESIGNS.

- Hardness

Elasticity: stress and strain

- Elastic limit
- Modulus of elasticity
- Ultimate strength
- Shear modulus
- Bulk modulus

3. ANALYSIS OF STRUCTURES

(a) Bending

- Shearing force and bending moment
- Bending stress
- Slope and deflection of beams

(b) Torsion

Typical design example:

- Shaft size design of a rubber roller machine

4. OPERATION OF AGRICULTURAL MACHINERY

(a) Plows:

- Mouldboard plow
- Chisel plow
- Disk plow

(b) Equipment for sowing, planting and transplanting

- Crop establishment
- Planting methods/machines
- Types of materials for planting
- Hand planting

- Planting in intensive agricultural systems
- Basic components of planting equipment
- Planting patterns:
 - o Drilling – random and precision drilling
 - o Planting
 - o Broadcasting

5. MACHINES AND IMPLEMENTS FOR FERTILIZER APPLICATION

- Handling and distribution of fertilizer and manures
- Artificial fertilizer
- Agronomic requirement
- Disadvantages of non uniform application
- Crop sensitivity to inaccurate fertilizer application
- Methods of application
- Mechanisms

6. CROP PROTECTION MACHINERY

- Crop spraying
- Spraying equipment
 - Carrier and power input
 - Sprayer droplets or drops population generation
 - Centrifugal mechanism
 - Selective herbicide
 - Operation of sprayer
- Layout of basic field crop sprayer

Mechanical weeders for:

- Shallow weeds
- Deep rooted weeds
- Perennial rhizomater weeds

7. HARVESTING PRACTICES AND EQUIPMENT

- Harvesting system interms of usage
- Cereal harvesting
- Operations involved in harvesting
- Mechanized system – Combine harvester and operational components:
 - Pickup mechanism
 - Cutting and gathering
 - Threshing unit
 - Separating unit
 - Cleaning unit

8. ROOT CROP HARVESTING

- Principles of harvesting operation
- Cultivation operation required

- Separation operations
 - Shredding - Destroy
- aerial growth chemically.

9. PRINCIPLE AND PRACTICE OF TESTING AND OPERATING OF AGRICULTURAL MACHINERY

- Purposes of agricultural machinery testing
 - improve the products
 - protect the customer
 - inform the customer
- Information categories
- User information
- Testing methods
 - comparative testings
 - Accelerated testings

10. ENGINE / MACHINERY PARTS PRODUCTION

- * Moulding
- * Sand and shell moulding
- * Production and heat treatment of iron & steel
- * Forging
- * Drop forging
- * Rolling
- * Extrusion
- * Rolling, wire drawing, extrusion, tube making and deep drawing
- * Heat treatment
- * Fabrication
- * Welding
- * Pressing
- * Machining
- * Milling machines