**AEN 2101 Farm Power and Machinery**

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**Course Type**: **CORE (B.Sc. Agric, Hort, LUM, AGM, EE)**

**Course Credits (CU)**: **3 CU i.e. 45 Contact Hours per semester**

**Course Duration**: **15 weeks (45 hours) i.e. 30 LH, 30 PH**

**1. Course Description**:

This course involves the use, maintenance, adjustment, calibration, and repair of the equipment. Emphasis on primary and secondary tillage, planting, chemical application, and harvesting equipment. The selection and operation of both machinery and tractors will be practiced. Safety will be stressed throughout

**2. Course Objectives:**

* Know the different power sources on a farm
* Learn the principles of operation of farm equipment
* Safely operate wheel and track type tractors and attached implements, and self-propelled equipment
* Select the proper equipment for a job and evaluate its performance
* know how to Calibrate equipment
* Make operator level repairs to tractors and equipment
* Appreciate the importance of safety rules and equipment
* Understand the economics of mechanized agriculture
* know safety, maintenance, and operational checks of tractors and equipment
* Select and acquire proper parts for equipment maintenance and repair

**3. Course Evaluation**

Two Continuous Assessment Tests 30%

Practical 10%

End of semester Exam 60%

**4. REFERENCE:**

* R.N Kaul, 1985, Introduction to Agricultural Mechanization. 1st Edition. Macmillan Publishers
* Brian Bell, Farm Machinery. 3rd Edition. Farming press
* Archie A. Stone, Machines for Power Farming. 2nd Edition. Wiley. Inc

**5. COURSE OUTLINE:**

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| Topic | content | Method of instruction | Tools/equipment needed |
| **Lecture 1**  Introduction to Farm Machinery: | History ,Variety of equipment, Basic safety procedures and Careers and opportunities | * 2hours interactive lecture covering theory | * LCD/screen, BB/chalk |
| **Lecture 2**  Principles of Power : | Elements of force, work, and power, animal, wind, biomass, solar and human as power sources**:** | * 2 hours of interactive lecture covering theory * 3 hours of practical covering the application and use of the equipment | * LCD/screen, BB/chalk * Maize bran, rope, two oxen, yoke, transport (over 100 seater) |
| **Lecture 3.** Principles of Power : | Petrol and diesel engines | * 2hours of interactive lecture covering theory * 3hours of practical covering application and use of the equipment | * LCD/screen, BB/chalk * Petrol and diesel engines, fully fledged tool box transport (0ver 100 seater) |
| **Lecture 4:**  Power Transmission: | Belts, Chains, PTO drives and Hitching and implement compatibility | * 2hours interactive lecture covering theory * 3hours of practical covering application and use of the equipment | * LCD/screen, BB/chalk * Tractor, transport (over 100 seater) |
| **Lecture 5:**  Maintenance: | Preventative maintenance, Lubrication, Daily service, and Operator level problem diagnosis | 2hours of interactive lecture covering theory | LCD/screen, BB/chalk |
| **Lecture 6**  **Test 1** |  | * 2 hours test | * Printing paper, printer |
| **Lecture 7:** Primary tillage: | Mould board plough, Chisel plough, Disc plough and Sub-soilers | * 2hours of interactive lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * All primary implements, pair of oxen, maize bran, tractor, fuel, engine oil, hydraulic oil, transport (over 100 seater) |
| **Lecture 8** Secondary tillage: | Disc harrow, Spike and tine harrow, Rollers and rotary cultivators | * 2hours of interactive lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * All primary implements, tractor, fuel, engine oil, hydraulic oil, transport (over 100 seater) |
| **Lecture 9:** Planting and plant weeding: | Drills, Broadcast seeders and Row crop planters and weeders | * 2hours interactive lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * Precision planter, broadcaster, maize seed weeders, tractor, hydraulic oil, engine oil, fuel and transport (over 100 seater) |
| **Lecture 10** Pest control equipment | Dry application equipment, Field sprayers, Air blast sprayers | * 2hours of interactive lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * Boom sprayer, knapsack sprayer transport (over 100 seater) |
| **Lecture 11**  **Test 2** |  | * 2 hours test | * Printing paper, printer |
| **Lecture 12:** fertilizer applicators | spreaders and broadcaster use | * 2hours lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * Manure spreaders, row fertilizer applicator, fertilizer, tractor, fuel, engine oil, hydraulic oil and transport (over 100 seater) |
| **Lecture 13**: Harvesting equipment: | Hay, Grain, Forage and ensilage harvesters | * 2hours lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * Combine harvester, foliage harvester, tractor, fuel, engine oil, hydraulic oil and transport (over 100 seater) |
| **Lecture 14**: Harvesting equipment: | Nut, root tuber and fruit crop harvesters | * 2hours interactive lecture covering theory * 3hours of demonstration and use of the equipment | * LCD/screen, BB/chalk * Root tuber digger, tractor, fuel, engine oil, hydraulic oil and transport (over 100 seater) |
| **Lecture 15**:  Field Performance of Machines | Field capacity, Field efficiency and Material capacity of machines | 2hours of interactive lecture | BB/chalk, flip charts/ markers |

**6. SUMMARY OF TIME NEEDED**

Interactive lectures covering theory 26 hrs

Field based demonstrations 21 hrs

Workshop practicals 09 hrs

Evaluation 04 hrs