

AEN 3105 FARM POWER

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COURSE TYPE: CORE (BSC. AGRICULTURAL ENGINEERING)

1. COURSE DESCRIPTION

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

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

COURSE DESCRIPTION

Sources of farm power and their characteristics. Definition of agricultural mechanization and its importance in agricultural production. Internal combustion engine: systems of fuel, ignition, lubrication, cooling. Speed governing and power transmission. Tractor hydraulic systems and controls, weight transfer and mechanics of tractor chassis. Care and maintenance trouble-shooting for diesel and petrol engines. Environmental considerations during power units operations.

2. COURSE OBJECTIVES

The overall objective of this course is to introduce students to sources and utilisation of farm power units for agricultural field operations. From this course, students will acquire:

- Fundamental understanding of the principles of farm power units.
- Knowledge and skills to operate, service and maintain various farm power units.

The specific objectives:

- To provide students with a general overview of fuel energy conversion into mechanical energy in various power units.
- To provide students with knowledge of how power is transmitted from the power unit to the point of use.
- To equip students with competences of operating and maintaining various power units.

3. RECOMMENDED REFERENCES FOR READING

1. Carroll E. Goering. 1992. Engine and tractor power. 3rd Edition. ASAE. St. Joseph, Michigan, USA.
2. Kaul, R.N. and C.O.Egbo. Introduction to Agricultural Mechanization. McMillan Publishers Ltd. London, UK.
3. Donnell Hunt. 2001. Farm power and machinery management. Iowa State Press.
4. Internet

4. COURSE CONTENT, METHODS OF INSTRUCTION, TOOLS AND EQUIPMENT REQUIRED

TOPIC	CONTENT	METHOD OF INSTRUCTION / Time allocated	TOOLS / EQUIPMENT NEEDED
1.Introduction	<ul style="list-style-type: none">• Sources of farm power and their characteristics• Definition of agricultural mechanization and its importance in agricultural production	Interactive lectures (3 hrs) Practical (6 hrs)	Chalk / BB or LCD projector & laptop/draft animals & ergonomics

			equipment
2. Internal combustion (IC) engine	<ul style="list-style-type: none"> • Thermodynamics of IC engines • Practical engine cycle and timing • Power efficiencies • Engine balancing 	Interactive lectures (6 hrs) Practical (6 hrs)	Chalk / BB or LCD projector & laptop/IC engine model
3. IC engine accessories systems	<ul style="list-style-type: none"> • Fuel systems including turbochargers, governor and performance of governed engines • Ignition system • Engine cooling systems • Engine lubrication system 	Interactive lectures (6 hrs) Practical (6 hrs)	Chalk / BB or LCD projector & laptop/ IC engine model & farm tractor
4. Power transmission systems	<ul style="list-style-type: none"> • Power train • Power shift transmissions • Hydrostatic transmissions 	Interactive lectures (6 hrs) Practical (6 hrs)	Chalk / BB or LCD projector & laptop/ transmission model/tractor
5. Farm tractor hydraulic system	<ul style="list-style-type: none"> • JIC symbols • Open-centre hydraulic system • Pressure-compensated hydraulic system • Pressure-flow-compensated hydraulic system 	Interactive lectures (4 hrs) Practical (6 hrs)	Chalk / BB or LCD projector & laptop /hydraulic model /tractor
6. Mechanics of tractor chassis and weight transfer	<ul style="list-style-type: none"> • Definition of mechanics of tractor chassis • Centre of gravity; its longitudinal and vertical location • Weight transfer and instability 	Interactive lectures (3 hrs)	Chalk / BB or LCD projector & laptop
7. Environmental issues when using farm power units	<ul style="list-style-type: none"> • Disposal of used lubricants • Noise pollution • Effect of engine exhaust gases to the atmosphere • Soil compaction 	Interactive lectures (2 hr)	Chalk / BB or LCD projector & laptop

5. OVERALL COURSE EVALUATION

Continuous Assessment Test	25%
Practical and assignments	15%
Final examination	60%