Sher-e-Bangla Agricultural University
Dhaka, Bangladesh

Course Layout

Department of Agricultural Engineering
Faculty of Agriculture
Course Title: Agricultural Mechanization
Course Code: AGEN 159 (Theory) / AGEN 160 (Practical)

Agricultural Mechanization, AGEN 159 (Theory)
Credit Hour: 03, Level 1 Semester 2
Bachelor of Science in Agriculture (Honours) / B.Sc. Ag. (Hons.)

Rationale:

This course is designed to develop knowledge on important technologies used in the field of Agricultural Engineering for mechanized and modern Agricultural operations.

Course Learning Outcomes:

- Acquire knowledge about modem farm technologies and machineries.
- Know about the current status, needs and opportunities of mechanized farming.
- Develop knowledge on crop water requirement and efficient irrigation technologies.
- Become familiar with farm structure design and construction materials for farm structure.
- Gather knowledge on post-harvest losses, storage and processing and preservation technologies of grain crops and food products.

Assessment and Grading Procedures:

Attendance	: 10
Three (Quizzes/Assignment)	: 10
Two Class Tests	: 30
Final (Quiz and Written)	: 20+30

Numerical Grade	Letter Grade	Grade Point	Numerical Grade	Letter Grade	Grade Point
80% or above	A+	4.00	55 to < 60%	B-	2.75
75 to < 80%	A	3.75	50 to < 55%	C+	2.50
70 to < 75%	A-	3.50	45 to < 50%	C	2.25
65 to < 70%	B+	3.25	40 to < 45%	D	2.00
60 to < 65%	B	3.00	Less than 40%	F	0.00

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Content**	**Teaching-Learning Strategies**	**Assessment Strategies**
• Categorize and criticize the level of Mechanization of Bangladesh.	**Agricultural Mechanization:** Status of Agricultural Mechanization in Bangladesh; its scope, importance, application, trends, advantages-disadvantages and sources of agricultural power and its applications.	Lecture Visual Presentation Interactive discussion	QUIZ MCQ Short answer Essay type answer
• Know the type of engine and their working principles. • Compare between two and four stroke engine • Differentiate between petrol and diesel engines. • Develop knowledge of RM of engines.	**Engines and its Internal Systems:** Definition, classification of engines, engine parts, two and four stroke engines, petrol and diesel engines and their working principle and different internal systems in tractors and power tiller engines, repairs and maintenance of engines, estimation of power, energy and efficiencies of engines.	Lecture Visual Presentation Discussion Assignment	Quiz MCQ Short answer Essay type answer Report
• Classify the type of tillage implements and machineries. • Describe tillage implements, sprayers and harvesters and their uses. • Explain the uses of solar energy. • Estimate the power, energy and efficiencies of agricultural machineries.	**Farm Implements and Machinery:** Primary and secondary tillage implements; ploughs, harrows, rotavator, rakes, leveler, seeding, machines and transplanters, fertilizer applicator, weeders, mulching machine. Sprayers, reapers, threshers, combine harvesters, potato-maize and sugarcane harvesters, uses of solar energy, calculation of soil implement relation forces, analysis of forces, estimation of power, energy and efficiencies of machines.	Lecture Visual Presentation Discussion Assignment	Quiz MCQ Short answer Essay type answer Report
• Predict the shelf-life of agricultural products. • Compare between different processing preservation and drying technologies. • Acquire knowledge of processing and preservation technologies. • Estimate moisture content and drying time for mechanical dryers.	**Post-Harvest Technology:** Importance of grain drying and storage of agricultural products, perishable and semi-perishable products, shelf-life of products, moisture content of grains, EMC, EH, ERH, factors affecting grain drying, methods of drying, dryer types, methods of preservation and storage of agricultural products, milling (processing) of cereal grains, vegetable oil extraction machines, calculation of moisture contents and drying time for mechanical dryers.	Lecture Visual Presentation Discussion Assignment	QUIZ MCQ Short answer Essay type Report

• Describe the methods of irrigation. • Estimate the irrigation requirements and efficiencies. • Compare various irrigation technologies. • Estimate the power requirement of pumping and cost of power. • Determine the water requirements for different crops. • Develop knowledge about RM of irrigation pumps. • Develop knowledge about discharge of water through different controlling structures.	**Irrigation and Drainage:** Importance, methods of irrigation, determinations of irrigation efficiencies, irrigation pumps and tube wells and their classification, Low Lift Pump (LLP), working principle of centrifugal pumps, repair-maintenance and troubleshooting of centrifugal pump. Introduction to water controlling and measuring structures, principle of discharge through them and related problems, solutions, simple irrigation canal design, determination of water requirement for different crops and related problem solutions. Calculation of pumping power, motor sizes and cost of pumping.	Lecture Visual Presentation Interactive discussion Assignment	Quiz MCQ Short answer Essay type Report
• Select and evaluate the quality of construction materials. • Estimate the amount of engineering materials required for construction. • Estimate the cost of engineering construction and earthwork. • Analyze the engineering materials in the laboratories.	**Common Engineering Materials:** Bricks, cement, sand and timber and their constituents, classification and uses, manufacturing processes and their field and laboratory tests, estimation of common engineering materials – brick, sand, cement, khoa, timber, steel etc. estimation of earthworks and canal lining materials.	Lecture Visual Presentation Discussion Assignment	Quiz MCQ Short answer Essay type Report

Book Reference:

1. *R. A. Kepner, Roy Baincr and E. L. Barger. Principles of farm machinery, 3rd Edition, 1987, CBS Publishers & Distributors, New Delhi 110032. India.*
2. *A M. Michael. Irrigation: Theory and Practice, Reprint Edition, 1997, Vikas publishing house Pvt. Ltd. New Delhi, India.*
3. *S. K. Garg, Irrigation Engineering and Hydraulic Structures. 7th Edition, New Delhi: Khanna Publishers.*
4. *Dr. M. A. Aziz. Engineering Materials, Revised Edition, 1995. Published by Kazi Mahfuzur Rahman, available at Hafiz book center, new market, Dhaka-1205, Bangladesh.*
5. *S. P. Mahajan and Sanjay Mahajan. Civil Estimating and Costing, 2nd edition, 1990. Satya Prakasthan, New Delhi 11005, India.*
6. *Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, 2003, Published by CRC Press. England.*
7. *Donnell Hunt, David Wilson. Fancy Power and Machinery Management, Eleventh Edition, Iowa State University press, Ames, Iowa 50014, USA.*
8. *A. M Michael. S.D Khepar, and S.K. Sondhi. Water Wells and Pumps, 2nd Edition Published by Tata McGraw — Hill, India.*

Agricultural Mechanization, AGEN 160 (Practical)
Credit Hour: 02, Level 1 Semester 2
Bachelor of Science in Agriculture (Honours) / B.Sc. Ag. (Hons.)

Rationale:

This course is designed to provide students the practical experience of using available machinery or to provide a closer overview of important technologies used in the domain of Agricultural Engineering for mechanized and modern Agricultural Operations.

Course Learning Outcomes:

- Acquire knowledge on selection of best suited machines or engines and to do proper management and maintenance in practical situations.
- Know the technique and methods of determining the exact irrigation requirement.
- Became familiar with various construction materials for farm structure.
- Acquaint with post-harvest care, losses and crop processing technologies.

Assessment and Grading Procedures:

Attendance	: 10
First Practical Exam	: 45
Final Practical Exam	: 45

[45 Mark Distribution: Practical Note Book-05, Identification-05, Job/Expt.-05, Written-15, Viva-voce-15]

Intended Learning Outcomes (ILOs) The students will be able to-	**Course Content**	**Teaching-Learning Strategies**	**Assessment Strategies**
• Identify and use common hand tools.	Common hand tools.	Lecture Discussion Demonstration Group work	Quiz Short answer Identification Viva-voce Practical note book
• Explain the functions of different parts of engines • Use farm equipment's.	Different parts of engines and farm equipment's.	Lecture Discussion Demonstration Group work	Quiz Short answer Identification Viva-voce Practical note book
• Differentiate the engines and criticize their working principles.	Two and four stroke cycle engines, diesel and petrol engines.	Lecture Discussion Visual presentation	Quiz Short answer Viva-voce Practical note book
• Know the technique of starting different types of engine.	Starting different types of internal combustion engine.	Lecture Discussion Demonstration Group work	Demonstration performance

• Explain the different engine systems of tractor and power tiller.	Fuel system of diesel and petrol engine, cooling system, ignition systems, lubrication system of engines, power transmission systems of tractor and power tiller.	Lecture Discussion Visual presentation	Quiz Short answer Viva-voce Practical note book
• Explain and identify the functional components of power tiller and tractor. • Describe the suitability of machines in various types of agricultural operations.	Moldboard plow, disc plow, harrows, tines for wet and dry land, seed drills, transplanters, sprayers, irrigation pumps, reapers, threshers, harvesting machinery and dryers.	Lecture Discussion Visual Presentation	Quiz Short answer Identification Viva-voce Practical note book
• Operate and determine the capacity of centrifugal pump	Experiment on determination of centrifugal pump capacity.	Lecture Demonstration Group work	Demonstration performance
• Estimate the crop (grain) yield by using measuring tools.	Measurement of crop yield (grain).	Lecture Demonstration Group work	Demonstration performance
• Operate the power tiller and tractor.	Tractor and power tiller driving.	Lecture Demonstration Group work	Demonstration performance
• Justify the field of farm machinery available for agricultural operations. • Observe modern agricultural machineries using in agricultural field.	Visit to ideal agricultural engineering farms, research institutes (BARI, BRRI and BADC) and farm machinery manufacturing industries.	Visiting the related organization	Report writing

Book References:

1. *J. M. Shippen, C. R. Ellin and C. H. Clover. Basic Farm Machinery, 3rd Edition, 1980, Published by Pergamon Press Oxford, UK*
2. *A. M. Michael. Irrigation: Theory and Practice, Reprint Edition, 1997, Vikas publishing house PA. Ltd. New Delhi. India.*
3. *"খামার যন্ত্রপাতি ম্যানুয়াল", 1988. Published by Department of Agricultural Extension, Ministry of Agriculture, Bangladesh*
4. *Study Guide, Lecture sheets and leaflets.*
5. *www.youtube.com/TheAutoPartsShop*