Sher-e-Bangla Agricultural University
Dhaka, Bangladesh

Course Layout

Department of Agricultural Engineering
Faculty of Agriculture
Course Title: Farm Mechanization and Food Technology
Course Code: AGEN 151 (Theory) / AGEN 152 (Practical)

Farm Mechanization and Food Technology, AGEN 151 (Theory)
Credit Hour: 2, Level 1 Semester 2
Bachelor of Business Administration in Agribusiness / BBA in Agribusiness

Rationale:

This course is designed to develop knowledge on important technologies for mechanized the Agricultural operations and Food Processing systems.

Course Learning Outcomes:

- Acquire knowledge about modem farm technologies and machineries.
- Describe about the current status, needs and opportunities of mechanized farming.
- Develop knowledge on crop water requirement and efficient irrigation technologies.
- Acquire knowledge about modem techniques of food preservation.
- Explain the current status, needs and opportunities in food processing industries.
- Gather knowledge on post-harvest losses, storage and processing and preservation technologies of food products.

Assessment and Grading Procedures:

Attendance	: 10
Two Quizzes	: 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.	**Farm Mechanization:** Introduction to farm mechanization, benefits and drawbacks of farm mechanization, factors influencing mechanization, mechanization and poverty alleviation, mechanization and national economy, prospects of farm mechanization in Bangladesh.	Lecture Visual Presentation Discussion	QUIZ/MCQ Short answer Essay type answer
• Describe the type of engine and their working principles. • Differentiate between petrol and diesel engines. • Describe about RM of engines. • 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 Power and Machinery Management:** Engines, engine parts, different types of engine and their working principles. Fuel system, cooling system and power transmission system of tractor and power tiller, precision and protected farming, drones and robots. Use of solar energy, machinery for tillage, seeding and planting, harvesting and threshing operations, determination of annual operating costs, cost parameters, depreciation and machine life, break-even analysis.	Lecture Visual Presentation Discussion Assignment	Quiz/MCQ Short answer Essay type answer Report
• Describe the methods of irrigation. • Estimate the irrigation requirements. • Compare various irrigation technologies. Estimate the power requirement of pumping and cost of power. • Illustrate about RM of irrigation pumps.	**Irrigation and Drainage:** Importance and scope of irrigation, development of irrigation in Bangladesh, methods of irrigation and water requirement of crops, irrigation pumps and wells; their classification, uses, maintenance and trouble shooting, drainage and its importance in agriculture in Bangladesh.	Lecture Visual Presentation Interactive discussion Assignment	Quiz/MCQ Short answer Essay type answer Report
• Categorize and criticize I the food and food related issues. • Predict the shelf-life of agricultural products. • Mention calorific values of food stuffs • Describe the roles of food scientists and food technologists	**Food Science and Technology:** Definition of foods, food science and food technology, food composition and their functions, classification of foods based of origin, functions, PH / acidity, perish ability, calorific values of food stuffs, causes of spoilage, areas of food science and food technology, roles of food scientists and food technologists.	Lecture Visual Presentation Discussion	QUIZ/MCQ Short answer Essay type answer

• Explain the techniques of preservation. • Describe the types of microorganism • Relate the relation between MO and food • Discuss the effects of MO in human health. • Illustrate different thermal treatments food. • Describe the problems Mated to long term preservation of food. • Explain the methods of food processing.	**Food Processing and Preservation:** Importance of microorganisms in foods, bacterial growth curve, combined effects of factors (pH, water activity, temperature, etc.) affecting microbial growth, food poisoning, infections, intoxications and food borne diseases. Principles of sterilization, pasteurization, irradiation and blanching operations and their methods, principle of chilling, refrigeration, freezing and thawing operations and their methods, canning of foods, types of dryers and evaporators.	Lecture Visual Presentation Discussion Assignment	Quiz/MCQ Short answer Essay type answer Report
• Select and evaluate the quality parameters of food. • Develop knowledge about adulteration and misbranding. • Determine the critical control point of food processing line.	**Manufacturing and Quality Control of Foods:** Manufacturing and processing of soft drinks, baked products, fermented foods, tea-coffee, chocolate and ice-cream products, definition of quality, quality control and assurance, adulteration and misbranding, quality attributes of food products, HACCP and determination of CCPS, food regulations and compliance.	Lecture Visual Presentation Discussion Assignment	Quiz/MCQ Short answer Essay type answer 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. *Donnell Hunt, David Wilson. Fancy Power and Machinery Management, Eleventh Edition, Iowa State University press, Ames, Iowa 50014, USA.*
5. *A. M Michael. S.D Khepar, and S.K. Sondhi. Water Wells and Pumps, 2nd Edition Published by Tata McGraw — Hill, India.*
6. *Amalendu Chalcraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, 2003, Published by CRC Press. England.*
7. *Potter, Norman N., Hotchkiss, Joseph .Food Science, 5th Edition, 1998, Aspen Publishers, Inc. Gaithersburg, Maryland.*
8. *R. Paul Singh., Dennis R. Heldman. Introduction to Food Engineering, 5th Edition, 2014, Academic Press, ELSEVIER Inc.*
9. *William C Frazier Dennis C Westhoff. Food Microbiology, 4th Edition, 1978, Tata McGraw-Hill Publishing Company, New Delhi. India.*
10. *Heldman, Dennis R. and R. Paul Singh. Food Process Engineering, 2nd Edition, 1981, AVI Publishers Co., New York. USA*

Farm Mechanization and Food Technology, AGEN 152 (Practical)
Credit Hour: 1, Level 1 Semester 2
Bachelor of Business Administration in Agribusiness / BBA in Agribusiness

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 food presentation and processing operations

Course Learning Outcomes:

- Acquire knowledge on selection of best suited machine or engine and to do proper management and maintenance in practical situations.
- Acquire knowledge on selection of best suited technique in food processing.
- Apply and describe the technique and methods of food preservation.

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**
• Explain the functions of different parts of engines • Use farm equipment's.	Identification and functions of different parts of IC engines	Lecture Discussion Demonstration Group work	Quiz Short answer Identification Demonstration Performance Viva-voce Practical note book
• Differentiate the engines and criticize their working principles. • Know the technique of starting different types of engine.	Working principle of different engines and how do you start of an engine	Lecture Discussion Visual Presentation Demonstration Group Work	Quiz Short answer Identification Viva-voce Practical note book Demonstration performance
• Explain the different engine systems of tractor and power tiller.	Different engine systems of a tractor and a power tiller	Lecture Discussion Visual Presentation	Quiz Short answer Viva-voce Practical note book

• Explain and identify the farm implements, machineries, irrigation pumps, and dryers. • Describe the suitability of machines in various types of agricultural operations.	Identification and description of different farm implements in tillage, seeding, irrigation, harvesting and threshing operations	Lecture Discussion Visual Presentation	Quiz Short answer Identification Viva-voce Practical note book
• Operate and determine the capacity of centrifugal pump.	Experimental determination of pump capacity	Lecture Demonstration Group Work	Demonstration Performance
• Identify and use common processing machines.	Orientation with various machineries and equipment's used in food processing. preservation and analysis	Lecture Discussion Demonstration Group Work	Quiz Short answer Identification Demonstration Performance Viva-voce Practical note book
• Know the technique of Drying and Freezing.	Preservation of fruits and vegetables by drying and freezing	Lecture Discussion Visual Presentation	Quiz Short answer Viva-voce Practical note book
• Explain the processing technique jelly, Marmalade, Cordial and Squash	Preparations of jam, jelly, marmalade, cordial and squash from different fruits.	Lecture Discussion Visual Presentation	Quiz Short answer Viva-voce Practical note book
• Prepare Ketchup and Sauces	Preparation of ketchup and sauces from different vegetables and spices	Lecture Demonstration Group work	Demonstration Performance
• Know the technique of Baking.	Manufacture of bakery products: biscuits and cakes	Lecture Demonstration Group work	Demonstration Performance
• Justify the scope of food processing. • Observe modern Food Processing Industries	Visit to food industries, BARI, BRRI and BADC.	Visiting the related organization	Report

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. *Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, 2003, Published by CRC Press. England.*
4. *Potter, Norman N & Hotchkiss, Joseph, Food Science, 5th Edition, 1998, Aspen Publishers, Inc. Gaithersburg. Maryland.*
5. *"খামার যন্ত্রপাতি ম্যানুয়াল", 1988. Published by Department of Agricultural Extension, Ministry of Agriculture, Bangladesh*