

AEN 2208 POST HARVEST ENGINEERING

Credit Units : 3 Credit Units

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 Type : CORE (BSC Agric Engineering II)

Lecturer : Mr. John Bosco Kawongolo B.Sc. (Mech.) Engineering, (MUK), M.Sc. (Agric. Eng.) Agriculture (MUK), PhD Student (University of Kassel – Germany). Senior Lecturer, Dept of Agric Engineering.

1. Course Description

Introduction to Agricultural processing Engineering in general (Postharvest Engineering, Agricultural Process Engineering, Design of Agricultural Processing Engineering and Food Engineering); Overview of Postharvest Technologies (Cleaning, drying and storage); Application of Heat and mass transfer as applied to food and crop processing (Modes of heat transfer, governing equation and boundary conditions of heat transfer; Heat and mass balances, Heat exchangers); Air properties and psychrometry; Moisture content, equilibrium moisture content and moisture sorption isotherms; Drying principles for agricultural produce (batch, counter flow, cross flow and mixed flow driers); Storage principles for agricultural produce (traditional/ improved and modern storage structures); Principles of Solar dryers. Refrigeration cycle

2. Course Objectives

The **main objective** of the course is to equip students with an understanding of the scope and key concepts in the processing engineering produce to enable them to understand the operations postharvest engineering operations

The **specific objectives** are to:

- i) Equip students with knowledge and skills in postharvest engineering operations.
- ii) Equip students with competency of how postharvest technologies are operated and managed.
- iii) Equip students with skills of using and managing various postharvest unit operations.

3. Recommended Texts

1. Asim K. Datta (2002): Biological and Bioenvironmental heat and Mass transfer. Marcel Dekker, Inc. publishers. ISBN: 0-8247-0775-3
2. Donald B. Brooker et al (): Drying and Storage of Grains and Oil Seeds
- 3.

4. Course Content, Methods Of Instruction, Tools And Equipment Required

TOPIC	CONTENT	METHOD OF INSTRUCTION / Time allocated	TOOLS / EQUIPMENT NEEDED
LECTURE 1.	Introduction to Agricultural processing Engineering in general	Interactive lectures (2 hrs)	Chalk / BB LCD and computer
LECTURE 2	Overview of Postharvest Technologies a. Cleaning of Agricultural Materials i. Dry cleaning, winnowing, threshing ii. Wet cleaning	Interactive lectures (2 hrs) Field trip I (4 hrs) (Coffee Industry)	Chalk / BB LCD and computer Transport
LECTURE 3	Overview of Postharvest Technologies b. Drying methods: i. Hot air drying ii. Freeze drying	Interactive lectures (2 hrs) Practical Osmotic	Chalk / BB LCD and computer

	<ul style="list-style-type: none"> iii. Osmotic drying iv. Solar drying 	drying (4 hrs)	Sugar solutions, refractometer
LECTURE 4	<p>Overview of Postharvest Technologies</p> <ul style="list-style-type: none"> c. Storage <ul style="list-style-type: none"> i. Cold food storage; refrigeration ii. Frozen storage iii. Ambient storage, air conditioning 	<p>Interactive lectures (2 hrs)</p> <p>Field trip 2 (4 hrs) (NARO Kawanda)</p>	<p>Chalk / BB LCD and computer</p> <p>Transport</p>
LECTURE 5	<p>Application of Heat and mass transfer as applied to food and crop processing:</p> <ul style="list-style-type: none"> a. Modes of heat transfer, 	Interactive lectures (2 hr)	Chalk / BB LCD and computer
LECTURE 6	<p>Application of Heat and mass transfer as applied to food and crop processing:</p> <ul style="list-style-type: none"> b. Heat and mass balances, 	Interactive lectures (2hr)	Chalk / BB LCD and computer
LECTURE 7	<p>Application of Heat and mass transfer as applied to food and crop processing:</p> <ul style="list-style-type: none"> c. Heat exchangers. 	<p>Interactive lectures (2 hr)</p> <p>Field trip 3 (4 hrs) (Dairy Co. Ltd)</p>	Chalk / BB LCD and computer
LECTURE 8	Continuous Assessment Test I	1 hr	
LECTURE 9	Air properties and Psychrometry	<p>Interactive lectures (2hrs)</p> <p>Field trip 4 (4 hrs) (MUARIK-MET)</p>	Chalk / BB LCD and computer
LECTURE 10	Moisture content, equilibrium moisture content and moisture sorption isotherms	<p>Interactive lectures (3 hr)</p> <p>MC determination Practical (4 hrs)</p>	Chalk / BB LCD and computer Oven, scales, samples
LECTURE 11	Drying principles for agricultural produce (batch, counter flow, cross flow and mixed flow driers)	Interactive lectures (3 hrs)	Chalk / BB LCD and computer
LECTURE 12	Principles of Solar dryers.	Interactive lectures (3hrs)	Chalk / BB LCD and computer
LECTURE 13	Refrigeration cycle	Interactive lectures (3hrs)	Chalk / BB LCD and computer
LECTURE 14	Continuous Assessment Test II	2 hr	
LECTURE 15	Final Exams	3 hrs	

5. SUMMARY OF TIME NEEDED

Interactive lectures	30 hrs
Tutorials practicals, field trip	24 hrs
Evaluation (tests)	06 hrs

6. OVERALL COURSE EVALUATION

Continuous Assessment Test	20%
Class practicals, Assignments & Field reports	20%
Final examination	60%