1. FST 2101 FOOD ENGINEERING I

2. COURSE INSTRUCTOR(S)
   - Associate Prof W. Kyamuhangire
   - Mr. Robert Mugabi

3. COURSE TYPE:

Core course for Year II BSc. Food Science & Technology

4. COURSE STRUCTURE

   Course is 3 credit units (3 CU): 2 lecture hours and 2 practical hours per week for 15 study weeks; [i.e. 30 lecture hours & 30 practical hours equivalent to 45 contact hours].

5. COURSE DESCRIPTION

Basic concepts of food process engineering; First and second law of thermodynamics; Heat and mass balance; Heat transfer; The flow of fluids; Physical properties of foods: optical, thermal, electrical, mechanical, geometrical and rheology of food (integrated within the different topics).

6. COURSE OBJECTIVES

1. Develop their problem solving skills.
2. Be able of evaluating material and energy balance in processing industry.
3. Acquire a fundamental understanding of heat transfer mechanisms.
4. Increase the basic understanding of selected unit operations in food processing.

7. RECOMMENEDED REFERENCES

1. R.P. Singh, and D.R. Heldman. (1993). Introduction to Food Engineering, 2nd Ed., Academic Press.
2. P.G. Smith. (2003). Introduction to Food Engineering, Kluwer Academic/Plenum Publishers

8. COURSE CONTENT, METHODS OF INSTRUCTION, TOOLS AND EQUIPMENT

TOPIC	CONTENT	METHOD OF INSTRUCTION/ Time allocation (i.e. contact hours)	TOOLS/ Equipment needed
1. Basic Principles of Food Process Engineering	• Conservation of mass and energy; overall view of engineering process • Dimensions and Units; units, dimensions, dimensionless ratios, dimensional consistency & unit conversion	-Interactive lectures (5 hrs) -Take home assignments - Tutorials (3 hrs)	LCD projector/ BB/ White boards / Flip charts
2. Material and Energy Balances	• Material Balances; basis & units, types of process situations (continuous & batch processes) • Energy balances	-Interactive lectures (9 hrs) -Take home assignments - Tutorials (6 hrs)	LCD projector/ BB/ White boards / Flip charts/ Materials
3. First and Second Law	• First law of thermodynamics	-Interactive lectures	LCD projector/ BB/

of Thermodynamics	• Second law of thermodynamics • Law of conservation	(4 hrs)	White boards / Flip charts/ Materials
4.	Mid semester Evaluation	- Mid semester test (2 hrs) - Revision of test (2 hrs)	
5. Fluid flow theory	• Fluid statics • Fluid dynamics; mass & energy balances, Bernoulli's equation • Viscosity; Newtonian & Non-Newtonian fluids • Laminar & turbulent flow • Energy losses in flow; friction in pipes, losses in bends & fittings, pressure drop through equipments, equivalent length of pipes	- Interactive lecture (9 hrs) - Tutorials (6 hrs)	LCD projector/ BB/ White boards / Flip charts
6. Heat transfer theory	• Heat conduction • Surface heat transfer • Unsteady-state heat transfer • Radiation heat transfer • Convection heat transfer; natural & forced • Overall heat transfer coefficients • Steam tables	-Interactive lectures (6 hrs) -Take home assignments -Tutorials (4 hrs)	LCD projector/ BB/ White boards / Flip charts/ Materials
7. Heat transfer applications	• Heat exchangers; continuous-flow heat exchangers, scraped surface heat exchangers, plate heat exchangers • Thermal processing; thermal death, equivalent killing power at other temperatures	- Interactive lectures (9 hrs) -Take home assignments -Tutorials & revision (6 hrs)	LCD projector/ BB/ White boards / Flip charts/ Materials
8.	End of semester Evaluation	- End of semester test (2 hrs) -Revision of test (2 hrs)	

9. SUMMARY OF TIME NEEDED
   - Lecture hours 30 hr
   - Tutorial hours 30 hr

10. OVERALL COURSE EVALUATION

- Individual assignments and test 40%
- Final exam 60%