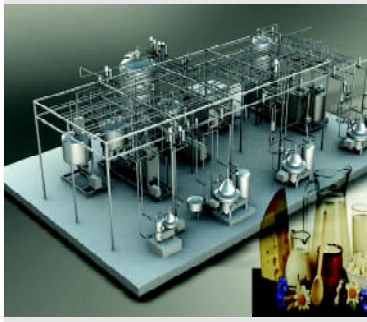
16AG306 DAIRY AND FOOD ENGINEERING



Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P
30	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
4	40	2	8	-	2

Course Description and Objectives:

This course explains the basics of dairy as well as food industry. In addition it covers the process flow of milk and milk based products, plant layout of any food industry and their utilities requirement. The objective of this course is to enable the students to understand vaious causes of food deterioration and improvement of food quality by applying different thermal as well as non-thermal processing techniques.

Course Outcomes:

The student will be able to:

- gain knowledge about milk source, its composition and properties.
- understand thermal treatments during various dairy products manufacture.
- gain hands-on skills in manufacturing selected dairy products in a pilot plant setting.
- understand the safety and quality factors that determine the acceptability of the dairy products by consumers.

SKILLS:

- ✓ *Apply the unit operations in food processing and its principles.*
- ✓ *Prepare layouts of various dairy plants.*
- ✓ *Identify the causes of food deterioration and its measures.*
- ✓ *Apply various food preservation techniques.*
- ✓ *Identify various losses of food material during processing.*

ACTIVITIES:

- *Development of various dairy products such as paneer, cheese, butter, buttermilk, sweets etc. on lab scale.*
- *Preparation of layout of a dairy plant for local area in accordance with milk collection.*
- *Design of cold storage according to milk collection.*
- *Identification of accelerated shelf life of lab scale developed products.*
- *Design of various dryers (spray dryer, rotary dryer) for milk powder preparation.*

UNIT - 1 **L- 06**

MILK AND MILK PROCESSING: Dairy development in India, Engineering, thermal and chemical properties of milk and milk products, Unit operations of various dairy and food processing systems.

UNIT - 2 **L- 06**

THERMAL TREATMENTS: Process flow charts for product manufacture, Working principles-Equipment for receiving, Pasteurization, Sterilization, Homogenization, Filling and packaging, Butter manufacture.

UNIT - 3 **L- 06**

FOOD PRESERVATION: Dairy plant design and layout, Composition and proximate analysis of food products, Deterioration in products and their controls, Physical, chemical and biological methods of food preservation.

UNIT - 4 **L- 06**

FOOD PROCESSING: Changes undergone by the food components during processing, evaporation, drying, freezing and chilling.

UNIT - 5 **L- 06**

PROCESSING TECHNIQUES: Behavior of food products in extraction, leaching, crystallization, filtration, membrane separation, thermal processing, Plant utilities requirement.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **Total hours: 30**

1. Study of a composite pilot milk processing plant & equipment.
2. Pasteurizers.
3. Sterilizers.
4. Homogenizers.
5. Separators.
6. Evaporators.
7. Milk dryers.
8. Design of food processing plants and preparation of layout.
9. Determination of physical properties of food products.
10. Estimation of steam requirements.
11. Estimation of refrigeration requirements in dairy and food plant.
12. Visit to dairy and food industry.

TEXT BOOKS:

1. R. P. Singh and D. R. Heldman, “Introduction to Food Engineering”, 5th edition, Academic Press, 2013.
2. Ahamed Tuffail, “Dairy Plant Engineering & Management”, 6th edition, Kitab Mahal Publishers, 2013.

REFERENCE BOOKS:

1. L. Chander, “Text Book of Dairy Plant Layout and Design”, ICAR, New Delhi, 2001.
2. W. L. McCabe and J. C. Smith, “Unit Operations of Chemical Engineering”, 7th edition, McGraw Hill, Tokyo, Japan, 2005.
3. Sukumar De., “Outlines of Dairy Technology”, 2nd edition, Oxford University Press, Delhi, 2001.

WEB LINK:

1. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04