

AGPC3002 DAIRY AND FOOD ENGINEERING (3-0-0)

Course Objectives

- Understand the mechanisms of food deterioration and apply physical, chemical, and biological preservation methods to enhance food safety and shelf life.
- Analyze the engineering and thermal properties of milk and milk products to optimize dairy processing operations.
- Evaluate the principles and equipment used in dairy processing, including pasteurization, homogenization, and membrane separation technologies.
- Design process flow charts for the production of dairy products such as cheese, butter, and ice cream, incorporating modern packaging techniques.
- Assess emerging technologies like nanotechnology in food packaging, considering their environmental, economic, and regulatory implications.

Module-I

Deterioration in food products and their controls; Physical, chemical and biological methods of food preservation; Dairy development in India; Engineering, thermal and chemical properties of milk and milk products;

Module-II

Process flow charts for preparation of product manufacture; Unit operation of various dairy and food processing systems; Principles and equipment related to receiving of milk, pasteurization, sterilization, homogenization, centrifugation and cream separation; Preparation methods and equipment for manufacture of cheese, paneer, butter and ice cream; Filling and packaging of milk and milk products;

Module-III

Dairy plant design and layout; Plant utilities; Principles of operation and equipment for thermal processing, canning, aseptic processing; Evaporation of food products: principle, types of evaporators, steam economy, multiple effect evaporation, vapour recompression; Drying of liquid and perishable foods: principles of drying, spray drying, drum drying, freeze drying;

Module-IV

Filtration: principle, types of filters and their working principles; Membrane separation, RO, Nano-filtration, Ultra filtration and Macro-filtration, equipment and applications; Non-thermal and other alternate thermal processing in Food processing; Nanotechnology: fundamental concepts, nano materials, tools and techniques; applications in food packaging and products; implications, the environmental impact of nano materials and their potential effects on global economics, regulation of nanotechnology.

Course Outcomes:

By the end of the course, students will be able to:

- CO1: Identify the causes of food spoilage and select appropriate preservation methods (e.g., thermal processing, chemical preservatives). (Remembering/Understanding)
- CO2: Explain the role of unit operations (e.g., centrifugation, evaporation) in dairy processing and their impact on product quality. (Understanding)
- CO3: Demonstrate the use of process flowcharts in the manufacture of dairy products like paneer and ice cream. (Applying)
- CO4: Compare different drying techniques (spray drying, freeze drying) and filtration methods (RO, ultrafiltration) for specific food applications. (Analyzing)
- CO5: Propose sustainable dairy plant designs and innovative food packaging solutions using nanotechnology. (Creating)