**I. Course Title : Dairy Product Processing**

**II. Course Code : PFE 515**

**III. Credit Hours : 2+1**

**IV. Aim of the course**

To acquaint and equip the students with the various dairy products, processing methods and related equipment.

**V. Theory**

**Unit I**

Procurement, transportation and processing of market milk, cleaning and sanitization of dairy equipment. Special milks such as flavoured, sterilized, recombined and reconstituted toned and double toned.

**Unit II**

Condensed milk: Methods of manufacture and related equipment, evaluation of condensed and evaporated milk. Dried milk: Definition, methods of manufacture of skim and whole milk powder, instantiation, physiochemical properties, evaluation, defects in dried milk powder. Cream: Cream separation, neutralization, sterilization, pasteurization and cooling of cream, defects in cream, Butter: methods of manufacture, defects in butter.

**Unit III**

Ice cream: Methods of manufacture and related equipment, defects in ice cream, technology of softy manufacture. Cheese: Methods of manufacture, cheddar, Gouda, cottage and processed cheese, defects in cheese.

**Unit IV**

Indigenous milk products: Method of manufacture of *yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rosogolla, srikhand, chhana, paneer, ghee, lassi*etc.Probiotic milk product.

**VI. Practical**

Estimation and fat and SNF in milk.Operation of LTLT and HTST Pasteurization. Preparation of special milks.Cream separation and standardization of milk. Preparation and evaluation of table butter, ice-cream, cheese and indigenous milk product such as *khoa, chhana, paneer, ghee, rosogolla, gulabjamun, shrikhand, lassi, burfi,* etc. Visit to dairy plants.

**VII. Learning outcome**

Student's capability to mechanize processing operations in dairy industries for manufacturing of dairy products.

**VIII. Lecture Schedule**

| S.No. | Topic | No. of Lectures |
|---|---|---|
| 1. | Collection and transportation of milk; Practices for collection of milk, preservation at farm, refrigeration, natural microbial inhibitors, lactoperoxidase system. | 1 |
| 2. | Reception and treatment of milk: Reception, chilling, clarification and storage. General practices. Homogenization: pretreatments, theories, synchronization of homogenizer with operation of pasteurizer (HTST), | |

| S.No. | Topic | No. of Practicals |
|---|---|---|
| | effect of homogenization on physical properties of milk. Bactofugation: Theory and microbiology. | **3** |
| 3. | Principles of thermal processing; kinetics of microbial destruction, thermal death curve, arrhenius equation, D value, Z value, F0 value, Q10 value. Factors affecting thermal destruction of micro organisms. Definition and description of processes; Pasteurization, thermisation, sterilization, UHT Processing. | **2** |
| 4. | Cleaning and sanitization of dairy equipment | **1** |
| 5. | Manufacture of special milks: flavoured, sterilized milk, recombined and reconstituted toned and doubled toned. | **2** |
| 6. | Condensed milk, sweetened condensed milk and evaporated milk. Manufacture of evaporated milk, sweetened condensed milk and Recombined sweetened condensed milk and related equipment | **2** |
| 7. | Physico chemical changes taking place during manufacture of condensed milk, Heat stability of milk and condensed milk, Physico chemical properties of condensed milk, Chemical defects in condensed milk, their causes and prevention. | **2** |
| 8. | Dried Milks; Definition, grading and quality of raw milk for dried milks, Manufacture of skim milk powder (SMP), whole milk powders and heat classified powders, | **2** |
| 9. | Physico chemical changes taking place during manufacture of dried milks, Physical properties of dried milks, Defects in dried milk during manufacture and storage, their causes and prevention. | **2** |
| 10. | Cream: Definition, Efficiency of cream separation and factors affecting it; Neutralization, standardization, pasteurization and cooling of cream; Defects in cream | **2** |
| 11. | Butter; Definition, Introduction to the butter making process; theory of churning, Technology of Butter manufacture, Batch and continuous methods, Defects in butter. | **2** |
| 12. | History of ice cream industry, composition of ice cream, stabilizers and emulsifiers, properties and role in quality of ice cream Ice cream: | **1** |
| 13. | Manufacturing, Ice cream plant components, Types of freezers, refrigeration control/ instrumentation, Technology of softy manufacture. | **2** |
| 14. | Defects in ice cream, their causes and prevention | **1** |
| 15. | Cheese; Manufacture of different varieties of cheese; Cheddar, Gouda, Cottage and processed cheese. Microbiological defects in cheese; their causes and prevention. | **3** |
| 17. | Indigenous milk products: Product description, methods of manufacture of *yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rosogolla, srikhand, chhana, paneer, ghee, lassi*etc. Probiotic milk product. | **2** |
| | **Total** | **30** |

## IX. List of Practicals

| S.No. | Topic | No. of Practicals |
|---|---|---|
| 1. | Estimation of fat and SNF in milk. | 1 |
| 2. | Operation of LTLT and HTST Pasteurizer. | 1 |
| 3. | Standardization of milk. | 1 |
| 4. | Preparation of special milks. | 1 |
| 5. | Cream separation: parts of separator and the process. | 1 |
| 6. | Preparation of table butter using the power driven churn. | 1 |
| 7. | Preparation of plain and fruit flavoured ice cream. | 1 |

| S.No. | Topic | No. of Practicals |
|---|---|---|
| 8. | Preparation and analysis of *khoa* from cow and buffalo milk. | 1 |
| 9. | Preparation and analysis of *chhana* from cow and buffalo milk. | 1 |
| 10. | Preparation and analysis of *paneer* from cow and buffalo milk. | 1 |
| 11. | Preparation and analysis of*lassi*from cow and buffalo milk. | 1 |
| 12. | Preparation of *ghee* from cream and butter. | 1 |
| 13. | Preparation of *rosogolla* and *gulabjamun.* | 1 |
| 14. | Preparation of srikhand and burfi. | 1 |
| 15. | Visit to dairy plant. | 1 |
| | **Total** | **15** |

## X. Suggested Reading


- Adnan T. 2009. *Dairy Powders and Concentrated Products* (*Society of Dairy Technology*). Wiley-Blackwell.
- Adnan T. 2006. *Probiotic Dairy Products* (*Society of Dairy Technology series*). Wiley-Blackwell.
- Britz. 2008. *Advanced Dairy Science and Technology*. Blackwell Publisher: Blackwell Publisher Professional.
- De. 2001. *Outlines of Diary Technology*. Oxford.
- Hui YH. 1992. *Dairy Science and Technology Handbook*. Vol. I, II and III Wiley.
- Spreer E. 2017. *Milk and Dairy Product Technology*. Taylor and Francis.
- Walstra P, Jan TM, Wouters and Geurts TJ. 2006. *Dairy Science and Technology*. CRC, Taylor and Francis.


**I. Course Title : Processing of Meat, Poultry and Fish**

**II. Course Code : PFE 516**

**III. Credit Hours : 2+1**

## IV. Aim of the course

To acquaint and equip the students with processing of meat, fish and poultry and the design features of the equipment used for their processing.

## V. Theory

### Unit I

**Meat:** Genetic engineering of farm animals for better meat quality, automation for the modern slaughterhouse, hot-boning of meat, new spectroscopic techniques for online monitoring of meat quality, real-time PCR for the detection of pathogens in meat, new developments in decontaminating raw meat, automated meat processing, developments in chilling and freezing of meat, high pressure processing of meat, approaches for the development of functional meat products, new techniques for analyzing raw meat, modified atmosphere packaging, perspectives for the active packaging of meat products.

### Unit II

**Poultry:** Breeding and quality of poultry, stunning and slaughter of poultry, processing and packaging of poultry, new techniques of preservation of poultry, production of turkeys, geese, ducks and game birds, microbial hazards in poultry production and processing, latest trends in measuring quality of poultry and poultry products, treatment and disposal of poultry processing waste.