| Course Code | Course Name | Credits |
|---|---|---|
| 26CH102 | DAIRY CHEMISTRY | 04 |

**Course Objectives**

- To understand the composition, production, and processing of milk and dairy products.
- To explain the chemical properties of milk constituents and issues related to milk quality and adulteration.
- To develop knowledge of quality control, analytical techniques, and safety standards in dairy products.

**Learning Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

- Describe the composition of milk, identify the approximate content of individual types present, and describe physicochemical characteristics of the main components.
- Integrate their knowledge of food chemistry/engineering/microbiology and physical properties of foods to understand the processing of dairy products.
- Explain how dairy products (such as fluid milk, yogurt, butter, powder, cheese) are made and the key functions of the processing steps involved.
- Use their knowledge of the chemistry of dairy components (proteins, fats, lactose, salts) to evaluate the impact of processing conditions (e.g. heat, pH) on milk and dairy products.

**Unit 1 - Production and Utilization of Milk (12 Hrs.)**

Composition and Variability of Milk, Techniques Used to Study Milk Synthesis, Biosynthesis of Milk Constituents, Production and Utilization of Milk.

Lactose: Introduction, Chemical and Physical Properties of Lactose, Production of Lactose, Derivatives of Lactose, Lactose and the Maillard Reaction, Nutritional Aspects of Lactose

**Unit 2 – Milk Lipids (12 Hrs.)**

Introduction, Factors that Affect the Fat Content of Bovine Milk, Classes of Lipids in Milk, Fatty Acid Profile of Milk Lipids, Structure of Milk Lipids, Milk Fat as an Emulsion, Stability of the Milk Fat Emulsion.

Milk adulteration and detection methods, Measurement of BOD and COD in dairy waste.

**Unit 3 - Milk processing (12 Hrs.)**

Introduction, Pasteurization, Making different products from milk: Cream separation, milk standardization, Preparation of butter, ghees, yogurt, Cheese production.

**Unit 4 – Quality Management and Standards in Dairy Chemistry (12 Hrs.)**

Definition of quality, quality control and assurance. Standards, statutory and voluntary organization. PFA act, sampling, labelling, PFA and AGMARK, BIS, ISO9000 standards for milk products. Total quality management, sensory evaluation of milk and milk products. Calibration of glasswares used in Quality control laboratory, legal requirements of packaging material and product information, nutrition labelling

**Unit 5 - Analytical Techniques and Contaminant Detection in Dairy Products (12 Hrs.)**

Instrumentation in analysis of milk and milk products; detection of adulterants in milk and milk products; Quality of packaging material for dairy products, Chemical contaminants /residues: pesticides; antibiotics; heavy metals; radionuclides in dairy products.

**Reference Books:**


1. P. F. Fox, T. Uniacke- Lowe, P. L. H. McSweeney , J. A. O'Mahony, Dairy Chemistry and Biochemistry, 2015 Springer International Publishing Switzerland .
2. V. K. Chhazllani , Chemistry And Animal Nutrition, ManglamPublications, Delhi.
3. Maria Saarela , Functional dairy products, Woodhead Publishing limited, Cambridge, England.
4. A. Frank, A. Settle, Handbook of Instrumental Techniques for Analytical Chemistry., Prentice Hall, PTR, Upper Saddle River, NJ 07458.
5. S. Nielsen, Suzanne, Introduction to the Chemical Analysis of Foods, Jones and Barlett Publishers, Boston, London.


**Websites and eLearning Sources:**

1. http://www.digimat.in/nptel/courses/video/126105013/L37.html
2. https://www.youtube.com/watch?v=aYTYPOyFxtE

| COs and Bloom's Taxonomy Mapping – 26CH102 | | |
|---|---|---|
| **Course Outcomes** | **On completing U.G. program the students will be able to** | **BTL** |
| **CO1** | Understand and recall the concepts of Milk, their composition. | K1, K2 |
| **CO2** | Using the information, one can classified the milk lipid and their quality and can measure BOD and COD in dairy. | K3 |
| **CO3** | Separate and standardized milk contend and produce different milk product. | K4 |
| **CO4** | Justify and evaluate different nutrition contend of milk and can manage quality and safe consumption of diary product. | K5 |
| **CO5** | Carry out analysis of different packaging material using different sophisticated instrument and contamination of dairy products. | K6 |

**BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create**

| Relationship Matrix – 26CH102 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes** | **Programme Outcomes (POs)** | | | | | | **Programme Specific Outcomes (PSOs)** | | | | | | **Mean Score of Cos** |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** | |
| **CO1** | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1.5 |
| **CO2** | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1.9 |
| **CO3** | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1.9 |
| **CO4** | 3 | 3 | 3 | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 1 | 1 | 2.2 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 2.6 |
| | | | | | | | | | | | | **Total** | 2.02 |

Mean Score: 3- High, 2- Medium/Moderate, 1-Low