Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-4

Subject: Processing Technology for Dairy Products – BETFT14307

Type of course: Professional Elective Courses

Prerequisite: Basic knowledge of processing Technologies for dairy products.

Rationale: This subject provides comprehensive knowledge of milk composition, quality assessment, and modern dairy processing techniques essential for producing safe, nutritious, and value-added dairy products. Students learn key operations such as pasteurization, homogenization, fermentation, and product standardization, along with emerging technologies and quality regulations. The course equips learners with practical skills and industry-relevant competencies required for employment, innovation, and problem-solving in the dairy and food processing sector.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs.	% Weightage
1	**Fundamentals of Milk and Dairy Chemistry:** Milk composition & properties: Water, fat, proteins (casein, whey), lactose, minerals, Physico-chemical characteristics: acidity, SNF, density, viscosity; Microbiology of milk: Common microorganisms: lactic acid bacteria, spoilage & pathogens, Microbial standards, hygiene practices; Milk collection & handling: Farm-level hygiene, Milk grading (A, B, C	11	25%

	grades), quality standards (FSSAI/Codex); Milk preservation techniques: Cooling, chilling, bactofugation, microfiltration		
2	**Fluid Milk Processing Technology:** Milk reception & preprocessing: Filtration, clarification, standardization of fat/SNF; Thermal processing: Pasteurization (LTLT, HTST), UHT sterilization, Effects of heat on milk quality; Homogenization: Principles, pressure ranges, impact on texture and stability; Packaging of milk: Aseptic packaging, pouch packaging, shelf-life maintenance; Quality control tests: Platform tests: clot-on-boiling, alcohol test, Analytical tests: fat %, SNF, acidity, MBRT	11	25%
3	**Processing of Major Dairy Products:** Fermented dairy products: Curd, yogurt, probiotic yogurt, buttermilk, Cultures, fermentation conditions, incubation; Butter & ghee: Cream separation, ripening, churning, Ghee production (creamery/butter methods), quality parameters; Cheese technology: Classification of cheeses, Rennet coagulation, curd handling, pressing, ripening, Process for cheddar, paneer, mozzarella; Dry dairy products: Milk powder (spray drying, roller drying), Whey powder, casein manufacture	11	25%
4	**Advanced Dairy Processing & Emerging Technologies:** Membrane processing: Ultrafiltration, microfiltration, RO in whey and milk processing, Applications in protein concentration & lactose reduction; Novel thermal & non-thermal technologies: Microwave heating, ohmic heating, High-pressure processing (HPP), pulsed electric fields (PEF); Automation and process control: CIP systems, dairy plant layout, PLC–SCADA in dairy industry; Quality assurance & regulations: HACCP, ISO standards, FSSAI regulations, Codex standards, export quality norms	11	25%

Continuous Assessment:

Sr. No.	Active Learning	Marks
1.	**Case based learning:** Students will analyze real dairy industry cases (e.g., pasteurization failure, cheese spoilage) and propose solutions. After that students will submit the report on GMIU Web Portal.	10
2.	**Concept Mapping:** Students create diagrams linking milk components, processing steps, and final product properties. After that students will submit the report on GMIU Web Portal.	10
3.	**Report preparation on pros and cons of dairy products:** Students will make a report on variety of dairy product's pros and cons and submit that on GMIU Web Portal.	10
Total		30

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

List of Practical

Sr. No	Title	Hours
1	**Determination of Fat Content in Milk (Gerber Method)**	4
2	Analysis of Acidity and pH of Milk	4
3	Estimation of SNF (Solids-Not-Fat) and Total Solids	4
4	Microbiological Examination of Raw Milk (MBRT Test)	2
5	Pasteurization of Milk (LTLT/HTST) and Quality Evaluation	4
6	Preparation of Curd/Yogurt and Measurement of Set Time & pH	2
7	Preparation of Paneer / Cheese and Determination of Yield	4
8	Preparation of Butter by Cream Churning	4
9	Demonstration of Membrane Filtration (UF/RO/MF) Using Model Setup	2
Total		30

Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the composition, properties, and quality parameters of milk and apply basic tests to assess milk quality.
CO2	Perform standardization, homogenization, and packaging operations for fluid milk.
CO3	Evaluate sensory and physicochemical properties of dairy products for quality assurance.
CO4	Apply concepts of CIP, automation, and process control in modern dairy plants.

Instructional Method:

The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by blackboard, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content, 10% of topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done based on the Active Learning Assignment

Reference Books:

[1] Processing Technologies for Milk and Milk Products: Methods, Applications, and Energy Usage by Ashok K. Agrawal & Megh R. Goyal
[2] Engineering Practices for Milk Products: Dairyceuticals, Novel Technologies, and Quality edited by Megh R. Goyal & Subrota Hati.
[3] Dairy Technology (2-volume set) by Shivashraya Singh
[4] Handbook of Dairy Processing (New Delhi Publishers)
[5] Processing and Technology of Dairy Products edited by Hilton Deeth, Phil Kelly