The Science of Ice Cream and Frozen Desserts Training Course

Professional Development Training Course Outline

Category	Food processing and Technology	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The Science of Ice Cream and Frozen Desserts Training Course delivers an industry-focused exploration of the chemistry, physics, and sensory science behind premium frozen desserts. This program emphasizes formulation science, ingredient functionality, emulsification, aeration, and freezing dynamics to create stable, great-tasting products that meet modern demands for healthier, plant-based, and clean-label options.

Through hands-on labs, pilot-scale processing, sensory panels, and market-driven case studies, participants learn to design, test, and optimize dairy and non-dairy frozen desserts. The curriculum integrates quality assurance, cold chain logistics, sustainability, and regulatory compliance to prepare professionals for R&D, production, and product-launch roles in the frozen dessert industry.

Programme Curriculum

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production, and product-launch roles in the frozen dessert industry.

Course Objectives

1. Understand the scientific principles of ice cream and frozen dessert formulation.
2. Analyze ingredient interactions and their effects on texture and stability.
3. Apply emulsification, aeration, and overrun control techniques.
4. Explore freezing technologies and cryogenic processes for product quality.
5. Master fat and sugar reduction and replacement strategies.
6. Examine microstructure, ice crystallization, and rheological behavior.
7. Identify appropriate stabilizers, emulsifiers, and functional additives.
8. Integrate flavor chemistry and sensory evaluation into product design.
9. Implement GMP, HACCP, and sanitation protocols in frozen dessert production.
10. Optimize packaging and cold chain management for extended shelf life.
11. Develop plant-based and allergen-managed frozen dessert formulations.
12. Use market trend analysis to inform product innovation and positioning.
13. Conduct case-based research projects on sustainable production methods.

Organizational Benefits

?? Enhance product quality, repeatability, and consumer satisfaction.

?? Reduce product recalls and strengthen food safety compliance.

?? Accelerate R&D timelines with structured formulation workflows.

?? Expand product lines into plant-based and functional dessert markets.

?? Lower production costs through ingredient optimization and waste reduction.

?? Improve packaging and cold chain efficiencies for longer shelf life.

?? Build internal sensory and analytical testing capabilities.

?? Increase brand value through scientifically backed product claims.

?? Support sustainability goals via energy- and resource-efficient processes.

?? Upskill staff for higher productivity and innovation capacity.

Target Audiences

1. Food technologists and product developers
2. Dairy and non-dairy production managers

3. Culinary professionals, pastry chefs, and gelato makers
4. Quality assurance, HACCP, and R&D teams
5. Nutritionists and food scientists
6. Ice cream entrepreneurs, startups, and small-batch producers
7. Packaging and cold chain logistics personnel
8. Hospitality and catering product managers

Course Duration: 10 days

Course Modules

Module 1: Fundamentals of Ice Cream Science

?? Composition and structure of ice cream and frozen desserts

?? Role and functionality of fat, sugar, and milk solids

?? Crystallization kinetics and air incorporation principles

?? Temperature effects on texture and melting behavior

?? Key formulation control points for consistent quality

?? Case Study: Influence of fat type and level on texture and melting

Module 2: Ingredients and Functional Additives

?? Dairy and non-dairy base ingredients and their functionality

?? Selection and mechanism of stabilizers and emulsifiers

?? Sweeteners, bulking agents, and sugar-reduction strategies

?? Natural flavors, inclusions, and color stabilizers

?? Nutritional fortification (protein, fiber, probiotics) approaches

?? Case Study: Formulating a sugar-reduced frozen dessert using polyols and natural sweeteners

Module 3: Processing and Manufacturing Techniques

?? Batch vs continuous freezing systems and process selection

?? Pasteurization, homogenization, and their effects on structure

?? Air incorporation methods and overrun management techniques

?? Process control, instrumentation, and critical control points

?? Energy-efficient processing and scaling-from-lab-to-line considerations

?? Case Study: Improving overrun consistency on a continuous freezer line

Module 4: Microstructure and Rheology

?? Ice crystal formation, growth control, and measurement methods

?? Emulsion microstructure and fat globule behavior

?? Rheological properties: viscosity, yield stress, and flow curves

?? Impact of freezing rate and storage conditions on microstructure

?? Linking microstructure metrics to sensory texture attributes

?? Case Study: Rheological comparison of dairy vs oat-based ice cream

Module 5: Sensory Evaluation and Consumer Testing

?? Sensory panel design, training, and testing protocols

?? Sensory descriptors for texture, flavor, and appearance

?? Statistical analysis of sensory data and preference mapping

?? Consumer acceptance testing and target-market segmentation

?? Using sensory data to refine formulation and positioning

?? Case Study: Sensory-driven reformulation of an artisanal gelato flavor

Module 6: Quality Control and Food Safety

?? GMP implementation and HACCP plan development for frozen desserts

?? Sanitation, microbiological testing, and shelf-life challenge studies

?? Temperature monitoring, cold chain verification, and traceability systems

?? Allergen control, labeling compliance, and regulatory recordkeeping

?? Quality auditing, sampling plans, and corrective action procedures

?? Case Study: Root-cause analysis and corrective plan for a spoilage event

Module 7: Product Innovation and Trend Response

?? Clean-label, functional, and nutrient-enhanced product concepts

?? Low-sugar, high-protein, and reduced-fat innovations

?? Flavor trend scouting and seasonal limited-edition strategies

?? Incorporating superfoods, probiotics, and functional inclusions

?? Rapid prototyping and go-to-market testing frameworks

?? Case Study: Launching a high-protein frozen dessert line for fitness consumers

Module 8: Packaging and Cold Chain Management

?? Packaging material selection and barriers to moisture/oxygen

?? Sustainable packaging options and lifecycle considerations

?? Labeling, regulatory claims, and nutritional panel requirements

?? Cold chain design, monitoring technologies, and logistics partners

?? Packaging impact on shelf life, merchandising, and consumer use

?? Case Study: Reducing temperature abuse in transit for export shipments

Module 9: Flavor Chemistry and Formulation Design

?? Flavor compound classes and interactions with fats and sugars

?? Flavor encapsulation, controlled release, and stability techniques

?? Balancing sweetness, acidity, and aromatic profiles in frozen matrices

?? Inclusion design: texture, distribution, and melting interactions

?? Developing signature flavor systems and line extensions

?? Case Study: Creating a stable fruit-flavored sorbet with authentic aroma

Module 10: Nutritional and Health Perspectives

?? Strategies for sugar and fat reduction without sacrificing texture

?? Use of protein, fiber, and polyols for nutritional improvements

?? Allergen-free formulation approaches and clean-label considerations

?? Claims substantiation and regulatory compliance for health claims

?? Designing products for specific demographics (children, seniors, athletes)

?? Case Study: Formulating a low-GI frozen dessert for diabetic-friendly positioning

Module 11: Frozen Yogurt, Gelato, and Specialty Formats

?? Technical differences among ice cream, gelato, frozen yogurt, and sorbet

?? Gelato-specific texture control and overrun approaches

?? Fermentation, culture selection, and stabilization for frozen yogurt

?? Specialty formats: bars, novelties, and portion-controlled systems

?? Positioning and pricing strategies for artisanal vs mass-market formats

?? Case Study: Reformulating a frozen yogurt to improve creaminess and shelf stability

Module 12: Non-Dairy and Plant-Based Formulations

?? Comparing plant-based bases: oat, soy, almond, coconut, and combinations

?? Fat mimetics, stabilizer strategies, and mouthfeel enhancement

?? Protein fortification and emulsification challenges in vegan systems

?? Flavor masking and clean-label stabilizer selection for plants bases

?? Nutritional balancing and fortification (vitamins/minerals) in vegan products

?? Case Study: Developing an oat-milk ice cream with comparable sensory profile to dairy

Module 13: Sustainability and Resource Efficiency

?? Energy-efficient freezing and refrigeration technologies

?? Waste minimization, by-product valorization, and circular approaches

?? Sustainable sourcing of dairy and non-dairy raw materials

?? Water footprint reduction and onsite conservation strategies

?? Carbon footprint measurement and reduction roadmaps

?? Case Study: Transitioning to a low-waste ice cream production model

Module 14: Marketing, Branding, and Go-To-Market

?? Market research, target consumer profiling, and competitive analysis

?? Brand storytelling, packaging design, and in-store merchandising tactics

?? Pricing models, distribution channels, and retail vs foodservice strategies

?? Digital marketing, influencer collaboration, and social media launches

?? Post-launch feedback loops and iterative product enhancement

?? Case Study: Market entry strategy for a premium, plant-based ice cream line

Module 15: Capstone Project and Industry Case Analysis

?? Project brief development and hypothesis-driven formulation goals

?? Pilot-scale prototyping, shelf-life testing, and sensory validation

?? Data analysis, cost modeling, and scalability assessment

?? Final product presentation, commercial feasibility, and launch plan

?? Expert panel critique and suggested commercialization steps

?? Case Study: End-to-end development and launch plan for a functional frozen dessert

Training Methodology

?? Interactive classroom lectures with applied food science focus

?? Pilot-scale lab sessions and hands-on formulation workshops

?? Sensory panel sessions, consumer tests, and data-driven iteration

?? Industry case studies, root-cause exercises, and simulation drills

?? Group project work, prototyping, and expert feedback presentations

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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