Microbiological Criteria and Predictive Modeling in Food 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

Microbiological Criteria and Predictive Modeling in Food Training Course is designed to equip participants with essential knowledge and practical expertise in modern food safety management. With increasing global demand for safe, high-quality food products, industries must embrace predictive microbiology, hazard assessment, and microbiological standards that align with international food safety regulations. This course introduces advanced concepts such as microbial risk assessment, statistical modeling, and regulatory microbiological criteria that ensure compliance with Codex Alimentarius, ISO, FDA, and EFSA frameworks. Participants will explore the intersection of predictive microbiology and food quality management systems to strengthen their capacity in anticipating microbial behavior in various food environments.

In addition, the program emphasizes the role of predictive modeling in food supply chain optimization, contamination control, and shelf-life determination. By integrating case studies and real-world applications, learners will gain skills in data interpretation, microbial growth simulation, and decision-making for food safety interventions. The course leverages trending tools, including AI-based predictive models, big data analytics, and digital food safety monitoring systems, preparing professionals to navigate complex food production and regulatory environments. Through this approach, participants will become proficient in applying microbiological criteria and predictive modeling to enhance food quality, compliance, and consumer protection.

Programme Curriculum

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Course Objectives

1. Understand microbiological criteria and predictive microbiology principles in food safety.
2. Apply international standards and guidelines in food microbiology.
3. Utilize predictive modeling techniques for food contamination control.
4. Assess microbial risks in food supply chains using data-driven approaches.
5. Integrate predictive microbiology with HACCP and ISO systems.
6. Analyze microbial growth kinetics for food quality assurance.
7. Implement shelf-life determination using predictive models.
8. Apply big data and AI in predictive food microbiology.
9. Evaluate case studies on microbial contamination incidents.
10. Enhance decision-making in food safety management.
11. Strengthen compliance with Codex, FDA, EFSA, and ISO standards.
12. Advance knowledge in statistical tools for microbiological data analysis.
13. Improve organizational resilience in food safety risk management.

Organizational Benefits

1. Improved compliance with global food safety standards.
2. Enhanced ability to predict and prevent foodborne risks.
3. Strengthened food safety management systems.
4. Increased consumer trust through quality assurance.
5. Optimized supply chain monitoring and efficiency.
6. Better preparedness for audits and inspections.
7. Reduced costs related to product recalls.
8. Improved shelf-life prediction for product innovation.
9. Increased staff competence in food safety decision-making.
10. Alignment with digital transformation in food safety.

Target Audiences

1. Food safety managers
2. Quality assurance professionals
3. Regulatory compliance officers
4. Food technologists
5. Microbiologists
6. Supply chain managers
7. R&D specialists in food industries
8. Academic researchers in food science

Course Duration: 10 days

Course Modules

Module 1: Introduction to Microbiological Criteria in Food Safety

- Principles of microbiological criteria
- Historical development of microbiological standards
- International regulatory frameworks
- Applications in food processing and manufacturing
- Emerging trends in microbiological criteria
- Case study: Microbiological criteria in dairy production

Module 2: Predictive Microbiology Fundamentals

- Basic concepts of predictive microbiology
- Growth kinetics of foodborne pathogens
- Factors influencing microbial behavior
- Predictive modeling software tools
- Applications in shelf-life testing
- Case study: Predictive modeling for Salmonella in poultry

Module 3: International Standards and Regulations

- Codex Alimentarius microbiological guidelines
- FDA and EFSA requirements
- ISO 22000 and HACCP integration
- Global food safety standardization
- Auditing and inspection requirements
- Case study: EFSA microbiological risk assessment reports

Module 4: Foodborne Pathogens and Indicators

- Overview of common foodborne pathogens
- Microbiological indicator organisms
- Public health significance
- Detection and monitoring methods
- Impact on food safety systems
- Case study: E. coli O157:H7 outbreaks

Module 5: Predictive Models in Shelf-Life Determination

- Mathematical modeling in shelf-life studies
- Primary and secondary predictive models
- Shelf-life prediction under variable storage conditions
- Integration with packaging technologies
- Data analysis in shelf-life modeling
- Case study: Shelf-life modeling in fresh produce

Module 6: Microbial Risk Assessment in Food Supply Chains

- Principles of microbial risk assessment
- Risk analysis frameworks
- Supply chain vulnerability mapping
- Application of predictive tools
- Quantitative microbial risk assessment (QMRA)
- Case study: Risk assessment in seafood supply chains

Module 7: Statistical Tools for Microbiological Data

- Basics of statistical analysis in microbiology
- Regression and correlation in microbial data
- Software for statistical modeling
- Data validation techniques
- Advanced analytics in microbiological studies
- Case study: Statistical analysis of Listeria monocytogenes data

Module 8: Big Data and AI in Predictive Microbiology

- Role of big data in food microbiology
- AI algorithms for microbial prediction
- Machine learning applications in food safety
- Data integration from multiple sources
- Predictive analytics for outbreak prevention
- Case study: AI-driven predictive modeling in ready-to-eat foods

Module 9: HACCP Integration with Predictive Modeling

- Principles of HACCP in predictive microbiology
- Critical control point identification
- Predictive models in hazard analysis
- Practical implementation challenges
- Verification and validation techniques
- Case study: HACCP and predictive models in beverage production

Module 10: Contamination Control Strategies

- Environmental monitoring programs
- Control of microbial contamination in processing facilities
- Sanitation and hygiene practices
- Predictive tools for contamination management
- Role of predictive modeling in recall prevention
- Case study: Contamination control in meat processing plants

Module 11: Simulation of Microbial Growth

- Software tools for microbial simulation
- Growth modeling under different conditions
- Environmental and intrinsic factors
- Model calibration and validation
- Applications in predictive microbiology research
- Case study: Simulation of microbial growth in bakery products

Module 12: Digital Food Safety Monitoring Systems

- Internet of Things (IoT) in food safety
- Real-time microbial monitoring systems
- Integration with predictive tools
- Blockchain for food safety traceability
- Cloud-based food safety solutions
- Case study: IoT-enabled predictive monitoring in dairy industries

Module 13: Food Safety Auditing and Predictive Systems

- Role of audits in food microbiology
- Predictive tools in audit planning
- International auditing frameworks

- Gap analysis using predictive models
- Continuous improvement approaches
- Case study: Predictive modeling in third-party audits

Module 14: Innovations in Predictive Food Microbiology

- Recent advancements in predictive models
- Integration with biotechnology and genomics
- Nanotechnology in microbial detection
- Digital twins in food microbiology
- Future directions in predictive food safety
- Case study: Genomics and predictive microbiology in fermented foods

Module 15: Case Study Applications and Capstone Project

- Integrated predictive modeling applications
- Real-world contamination incident analysis
- Development of predictive models for industry scenarios
- Team-based project presentations
- Industry best practice recommendations
- Case study: Capstone predictive modeling project

Training Methodology

- Interactive lectures with multimedia presentations
- Case study discussions and real-world applications
- Practical exercises with predictive modeling software
- Group projects and collaborative learning activities
- Assessments through quizzes, presentations, and final capstone project

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
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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