Dairy Foods Extension

2018 Course Catalogue

Providing cutting edge research and support to New York State’s dairy industry
The Cornell Dairy Foods Extension Certificate program offers comprehensive training for dairy processors of all sizes within New York State and beyond. In New York State alone, dairy processing represents 18% of manufacturing jobs within 350 regulated plants. Together with dairy farmers that represents nearly 20,000 employees—and employees need to be trained.

Our Dairy Extension program provides training and certificates in four areas including:

- The Science of Yogurt and Fermented Dairy Products (Basic and Advanced)
- Fluid Milk Processing for Quality and Safety
- Membrane, Evaporation and Drying Technology (Basic and Advanced)
- The Science of Cheese Making (Basic and Advanced)

Courses aim to provide comprehensive basic training to dairy processors in vital topics such as milk quality and safety, basic dairy microbiology, Good Manufacturing Practices, unit operations, cleaning and sanitizing, food safety plans, audits, and state and federal regulations.

Processing courses such as The Science of Cheese, The Science of Yogurt, and Fluid Milk Processing combine science with hands-on in-plant experiences utilizing equipment found in actual plant environments. Each participant receives a reference manual on the subject matter for later use.

To increase the amount of time dedicate to these hands-on experiences, several of the courses taught by the Cornell Dairy Foods Extension Program are taught in a hybridized style: readings and lectures are on-line and self-paced prior to an on-campus hands-on session. This innovative system allows employees to do courses work at a time that is convenient to their schedule and reduces the number of hours away from the plant.

Both our Dairy Science and Sanitation and Food Safety Plans/HACCP are also available as site-specific in-plant trainings and our team will occasionally offer or host stand-alone classes or courses at Cornell that are not part of our certificate program and that cannot be used towards the certificates we offer.

While our mission is to provide information and training programs to the dairy production and processing sectors, consumer questions and concerns are addressed as well. The Dairy Foods Extension team is available to assist Cornell Cooperative Extension (CCE) in their training and outreach needs at the county level.
Meet the Team

Sam Alcaine
Assistant Professor of Dairy Fermentations
E-mail: sda23@cornell.edu
Areas of Expertise: Dairy cultures and fermentation, Antibiotic Resistance in Salmonella; Good Manufacturing Practices, FSMA Preventive Controls for Human Food.

Dave Barbano
Professor of Food Science
E-mail: dmb37@cornell.edu
Areas of Expertise: Dairy processing technologies, cheese chemistry and functionality, chemical and infrared analysis of milk and dairy products, farm management technologies and milk quality, milk synthesis metabolism.

Carmela Beliciu
Extension Aide
Phone: (607) 255–2912
E-mail: clb352@cornell.edu
Areas of Expertise: Working with business owners to facilitate their use of FPDL facilities, small-scale dairy production, specialty cheese instruction and manufacture, Good Manufacturing Practices.

Kimberly Bukowski
Extension Professional
Phone: (607) 254–3313
E-mail: krb14@cornell.edu
Appointment: Extension
Areas of Expertise: Dairy plant auditing; food safety systems; GFSI-Safe Quality Foods; Good Manufacturing Practices; dairy manufacturing; ice cream; FSMA Preventive Controls for Human Food.

Louise M. Felker
Extension Support Specialist
Phone: (607) 255–7098
E-mail: lmf226@cornell.edu
Areas of Expertise: Workshop/short course organization and planning, food safety systems, Good Manufacturing Practices, social media/web development.

Nicole Martin
Associate Director
Milk Quality Improvement Program
E-mail: nhw6@cornell.edu
Areas of Expertise: The transmission, control and detection of dairy associated spoilage microorganisms and pathogens.

Robert D. Ralyea
Sr. Extension Associate
Phone: (607) 255–7643
E-mail: rdr10@cornell.edu
Areas of Expertise: Dairy systems environmental microbiology, product processing and regulations; small-scale dairy production, general food security & risk assessment; FSMA Preventive Controls for Human Food.

Alex Solla
Extension Aide
Phone: (607) 255-3459
E-mail: ahs24@cornell.edu
Areas of Expertise: Course coordination and data management.

Martin Wiedmann
Gellert Family Professor in Food Safety,
Institute for Food Safety
Phone: (607) 254–2838
E-mail: mw16@cornell.edu
Areas of Expertise: Listeria monocytogenes, pre-harvest food safety, molecular pathogenesis, microbial ecology and epidemiology.

Anika Zuber
Regional Dairy Processing and Marketing Specialist,
Cornell Cooperative Extension (CCE), Harvest, NY, Northern New York
Phone: (585) 813–3539
E-mail: adz8@cornell.edu
Areas of Expertise: Working with regulatory agencies, workforce development agencies and suppliers to help members of the dairy foods manufacturing community reach their goals.
**Registration and Confirmation**

Please visit the Cornell Dairy Foods Extension website to register for courses: dairyextension.foodscience.cornell.edu.

Upon receipt of registration, you will receive an automatic e-mail confirming that your registration form has been received. This email will include a link for credit card payment. Once you receive the payment link, fill out all required information and click “submit.” You should receive a receipt of payment by e-mail within minutes. Once payment is received, confirmation of attendance will be sent by Cornell Staff via e-mail. Attendance will not be confirmed until payment is received; unpaid spots will be released to others.

Please contact Louise Felker at: lmf226@cornell.edu with any special payment circumstances prior to registering.

**Cancellation Policy**

Registration must be canceled by the close of business on the Friday two weeks prior to the start of the course in order to receive a full refund. Substitute registrations from the same company will be accepted at any time prior to the start of the course.

No refunds will be given to individuals that fail to show up to their scheduled course.

**Required Materials**

All required course materials will be provided by Cornell University Dairy Foods Extension. Participants will be notified if the course requires use of a personal laptop computer during the hands-on sessions.

Courses that include an online, self-paced portion require that the online materials be completed prior to the start of the hands-on workshop.

**Certificate of Achievement**

Attendees must sign in at the beginning of the workshop and attend all days of the workshop to qualify to receive a certificate of achievement. Attendees must also score a 70 or higher on the course post-test to pass the course and receive their certificate. One retake of the post-test is allowed per attendee.

The certificate of achievement and the graded post-test will be mailed to each attendee after completion of the course.

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The Cornell University Dairy Foods Extension team, with the Department of Food Science in the College of Agriculture and Life Sciences, is a diverse group of faculty and staff with extensive knowledge that spans nearly all aspects of dairy science and technology.
Successful completion of Core Courses and appropriate Specialized Course required for Certification. Certificate valid for 3 years, requires 8 CEUs for renewal.

### Core Courses
- **101** Dairy Science and Sanitation
- **201** Food Safety Systems and HACCP for Dairy
- **202** Preventive Controls Qualified Individual

### Specialized Courses
- **301** The Science of Cheese (Basic Level)
- **302** The Science of Yogurt and Fermented Dairy Products (Basic Level)
- **303** Fluid Milk Processing for Quality and Safety
- **304** Membrane, Evaporation, and Drying Technology

### Pasteurization Courses:
- **203** HTST/NYS Broken Seal Program
- **204** Vat Pasteurization

### Advanced Courses
- **401** The Science of Cheese (Advanced Level)
- **402** The Science of Yogurt and Fermented Dairy Products (Advanced Level)
- **403** Fluid Milk Processing for Quality and Safety (Advanced Level)

Certification as an Advanced Cheese Maker and/or Advanced Yogurt Maker requires related specialized certification, completion of the Course, completion of an oral exam, and more than 3 years experience in respective field (supported by 2 references). Certificate is valid for 3 years, requires 16 CEUs for renewal.
Course Information

Core Courses

These courses are required to complete any chosen track for the specialized Certificate Programs.

Dairy Science and Sanitation

(On-line Lectures/1.5 Days Hands-On, 2 CEUs)

The Dairy Science and Sanitation Workshop is tailored to dairy processing personnel and is designed to help participants understand the basic principles of dairy science and safety, as well as emphasize dairy processing establishment needs related to dairy sanitation to ensure that proper programs are conducted in their establishments.

The course consists of on-line lecture sessions that will cover basic dairy science, including composition of milk, dairy microbiology, and dairy food safety, as well as an overview of dairy regulations. Participants will also learn the basics of cleaning and sanitizing principles, unit operations—both raw milk production and receiving, and dairy processing, plant equipment and design, general control of pathogenic and spoilage microorganisms, in depth information on cleaning and sanitizing chemicals, their properties and applications, and a discussion on CIP and COP systems and common errors seen in the industry. The course also provides hands-on sessions where both CIP and COP principles will be applied.

The Dairy Science & Sanitation Workshop is the integral/central component of the Dairy Foods Certificate Program being offered at Cornell University. Individuals may register for the workshop and enroll in the Dairy Foods Certificate Program, or register for the course as a stand-alone program. This course is also available as on-site training.

Learning Outcomes

- Basic Dairy Microbiology/Food Safety Overview
- Good Manufacturing Practices/ Dairy Sanitation
- Milk Composition & Unit Processing Operations
- Dairy Regulations/Food Safety Modernization Act

HACCP/Food Safety Plans

(On-line Lectures/1.5 Days Hands-On, 2 CEUs)

This workshop is designed to provide comprehensive instruction on the development of HACCP based food safety programs for dairy operations. It will provide practical information, forms and exercises designed to enhance HACCP and other food safety systems.

The course begins with an on-line lecture component, followed by 1.5 days of hands-on sessions on-campus.

Throughout the course, the relationship of traditional HACCP concepts with the Preventive Controls rule under FDA’s Food Safety Modernization Act (FSMA) will be discussed as interpretation of the proposed rule implies that companies will be required to have food safety programs in place that are in-line with traditional HACCP concepts.

For Grade “A” Dairy processors, this course will meet the core training requirements of the NCIMS Voluntary HACCP Program for dairy plants. FDA Juice HACCP compliance requirements applicable to dairy operations that process juice will also be covered. Successful completion of this workshop should provide attendees with the tools necessary to build new or update outdated HACCP/Food Safety Pro-
grams that will meet NCIMS and FDA Juice HACCP requirements. It should also serve as a foundation for the Global Food Safety Initiative’s 3rd party certification schemes such as SQF, BRC & FSSC 22000. SQF examples will be provided.

Learning Outcomes

- Hazards associated with dairy foods processing
- Prerequisite Programs and Good Manufacturing Practices
- HACCP plan development
- HACCP-based regulations

UHT/High Temperature Short Time (HTST) Pasteurizer Operator Workshop

*(3 Day Course, 3 CEUs)*

This workshop is designed for pasteurizer operators, but should be beneficial to all involved with milk pasteurization, including production, QA/QC & maintenance personnel. The course is instructed by industry experts and representatives from NYS Agriculture & Markets and provides an overview of the design, operation, cleaning and maintenance of HTST systems. All required regulatory tests for HTST pasteurizers will be discussed and/or presented in a hands-on format to meet the training requirements for performing HTST system testing under the NY State Broken Seal Policy. Information on HHST/UHT systems will be covered. Background in dairy microbiology, product safety & quality will also be provided.

Learning Outcomes

- HTST & UHT Operation Components
- Regulatory requirements for HTST Operation
- Cleaning & Sanitizing HTST Programs
- Requirement as part of NYS Broken Seal Program

Specialized Courses

The Science of Cheese (Basic Level) and Vat Pasteurization

*(On-line Lectures/2 Days Hands-On, 2 CEUs)*

This workshop is designed for cheese manufacturers or others interested in the basic concepts of cheese making and is a required part of the Dairy Extension Basic Cheese Making Certificate Program. The course may also be taken as a stand-alone Basic Cheese Making training.

The course begins with an on-line lecture component covering the key areas related to vat pasteurization and basic cheese making techniques, cheese culture basics, milk defects, cheese defects and cheese marketing. The course will also include 2 days of hands-on pasteurization and cheese making activities.

Learning Outcomes

- Foodborne pathogens resulting from unpasteurized milk
- Components of vat pasteurization
- Thermometer requirements
- Chart recorders and chart requirements
- Milk quality which impacts cheese making
- Cheese culture and chemistry and microbiology
- Cheese-making unit operations and techniques and hands-on cheese making
- Cheese marketing for small scale producers & key performance indicators for large scale producers
The Science of Cheese (Advanced Level)
(2 Day Course, 2 CEUs)
This workshop is designed for advanced level cheese manufacturers or others interested in the advanced concepts of cheese and is a required part of the Dairy Extension Advanced Cheese Certificate Program. The course may also be taken as a stand-alone Advanced Cheese training.

The workshop will provide attendees with a review of information in key areas related to the complex chemistry of cheese, cheese styles and standards of identity, advanced microbiology, advanced cheese problems and defects, and food safety challenges in the cheese industry. It is expected that the attendee has a variety of applied experience as this course is designed to test overall knowledge and problem-solving as it relates to cheese. This course assumes the attendee understands applied concepts and science as it relates to cheese before arrival.

Learning Outcomes
- Milk components and advanced chemistry of cheese
- Cheese styles and standards of identity
- Cheese defects during process and affinage

The Science of Yogurt and Fermented Dairy Products (Basic Level)
(On-line lectures/1.5 Days Hands-On, 2 CEUs)
This workshop is designed for yogurt and fermented dairy product manufacturers and is a required part of the Dairy Extension Basic Yogurt and Fermented Dairy Products Certificate Program. The course may also be taken as a stand-alone Science of Yogurt and Fermented Dairy products training.

The course begins with an on-line lecture component and is followed by hands-on sessions on-campus. The workshop will provide attendees with information in key areas related to milk quality and its impact on finished dairy products, product evaluation and defects, ingredients in cultured dairy products, and product processing and formulation.

Learning Outcomes
- Milk quality and impact on cultured dairy products
- Culture microbiology and hands-on cultured dairy making
- Unit operations and sanitation in cultured dairy production
- Formulation utilizing different ingredients

The Science of Yogurt and Fermented Dairy Products (Advanced Level)
(2 Day Course, 2 CEUs)
This workshop is designed for advanced level yogurt and fermented dairy product manufacturers and is a required part of the Dairy Extension Advanced Yogurt and Fermented Dairy Products Certificate Program. The course may also be taken as a stand-alone Advanced Science of Yogurt and Fermented Dairy products training.

The workshop will provide attendees with information in key areas related to advanced microbiology, chemistry in fermented milk and dairy product production, along with advanced sensory product evaluation, safety and quality assurance.

Learning Outcomes
- Milk components and advanced chemistry of cultured-dairy making
- Innovations in cultured dairy production
- Advanced sensory characteristics
Fluid Milk Processing/Testing for Quality and Safety Workshop
(Online Course, 2 CEUs)
This workshop is designed for those involved and interested in fluid milk processing and testing with the intent of providing the tools to support and improve on quality assurance/control and food safety programs for bottled milks. While the course design assumes participants have some prior knowledge of dairy microbiology & processing (e.g., Dairy Science & Sanitation Course), critical concepts will be reviewed and expanded on for those who do not. This course can be taken as a stand-alone program, but it also fulfills the core training requirement of a Cornell Dairy Foods Certificate for Fluid Milk Processing for Quality and Safety after all required prerequisite courses have been taken (e.g., Dairy Science & Sanitation, HACCP, HTST).

**Learning Outcomes**
- Basic Microbiology in relation to Milk Quality and Safety
- Influence of Raw Milk Quality on Pasteurized Milk Quality & Shelf-Life
- Fluid Milk Processing Parameters
- Tools for Assessing Milk Quality and Shelf-Life

**Partner Programs**

**Accredited HACCP Training Course**
(2 Day Course)
This workshop is designed for individuals who have responsibility for building, maintaining, and updating plant HACCP programs that will meet customer and third party requirements. This course is accredited under the International HACCP Alliance and is designed to meet the requirements set for GFAI, NCIMS, FSIS, and the FDA.

Delivered in partnership with Merieux NutriSciences.

**Implementing SQF Systems Course**
(2 Day Course)
This workshop is designed to give participants an understanding of the SQF Code, how to implement these requirements in a food processing plant, as well as food ingredient and food packaging plants to achieve or maintain SQF Certification. It is required that students have completed a HACCP Course of at least 16 hours prior to taking this course.

Delivered in partnership with Merieux NutriSciences.

**SQF Quality Management Systems for Food Manufacturing**
(2 day course)
This course is intended for quality, technical and managerial staff working in food manufacturing who seeks to understand and differentiate between food safety management and quality management, and who are intending to implement the SQF Quality Code.

Candidates must have successfully completed examinable HACCP training, and either Implementing SQF Systems training (minimum: edition 7), or Auditing SQF Systems/Lead SQF Auditor training (minimum: edition 7). Delivered in partnership with Merieux NutriSciences.
Artisan Dairy Food Safety Plan Coaching
(2 day course, 2 CEUs)
This coaching workshop is intended for Artisanal Cheese and Dairy Food Producers who are preparing to create, or are already developing, a FSMA compliant, preventive control (PC)-based, food safety plan for their facility. The goal of this workshop is to provide Food Safety Plan review and coaching sessions that guide attendees through each step in development process. PCQI lead trainers will be present to review topics and answer questions. Templates (digital and paper) will be provided to facilitate plan development, attendees are encouraged to bring their current or in-progress plans.

Note: This course is NOT intended to provide PCQI certification, it is strongly recommended that attendees complete an FSPCA PCQI certification course or similar program before attending this workshop. Attendees are also encouraged to enroll and complete the Food Safety for Artisan/Farmstead Cheesemakers prior to taking this workshop. The link to this online training will be provided upon registration.

Regulatory

FSMA Preventive Controls Qualified Individual Training
(2.5 Day Course, 2.5 CEUs)
The Current Good Manufacturing Practice, Hazard Analysis, and Risk-based Preventive Controls for Human Food regulation is intended to ensure safe manufacturing/processing, packing and holding of food products for human consumption in the United States. The regulation requires that certain activities must be completed by a “preventive controls qualified individual” who has “successfully completed training in the development and application of risk-based preventive controls”. This course developed by the FSPCA is the “standardized curriculum” recognized by FDA; successfully completing this course is one way to meet the requirements for a “preventive controls qualified individual.”

These courses are taught by Lead Instructors trained by the FSPCA, who have been instructed in how to teach the FDA-recognized standardized curriculum.
*Course description provided by the Food Safety Preventive Controls Alliance

Preventive Controls for Animal Food
(2.5 day course, 2.5 CEUs)
The Current Good Manufacturing Practice, Hazard Analysis, and Risk-based Preventive Controls for Animal Food regulation is intended to ensure safe manufacturing/processing, packing and holding of food products for animal consumption in the United States. The regulation requires that certain activities must be completed by a “preventive controls qualified individual” who has “successfully completed training in the development and application of risk-based preventive controls, or is otherwise qualified through job experience to develop and apply a food safety system”. This course developed by the FSPCA is the “standardized curriculum” recognized by FDA; successfully completing this course is one way to meet the requirements for a “preventive controls qualified individual.”

These courses are taught by Lead Instructors trained by the FSPCA and co-taught with Cooperative Feed Dealers, who have been instructed in how to teach the FDA-recognized standardized curriculum.
*Course description provided by the Food Safety Preventive Controls Alliance.

Dairy Processing Plant Superintendent (1 CEU)
Annual Update Provides dairy plant personnel with regulatory and extension updates. Offered at 4 locations each spring. Required update for all NY State Dairy Processing Plant Superintendents (PPS).

Dairy Foods
Dairy Laboratory Regional Workshops (1 CEU)
Provides dairy laboratory personnel with regulatory, procedural and scientific updates. Offered at 5 locations each spring.

Certified Milk Inspectors Training School (2.5 CEUs)
Provides detailed instruction of required dairy farm inspections and is a required course for Certified Milk Inspectors (CMI), those who inspect dairy farms. Offered once each summer.

Certified Milk Inspectors Annual Update
Provides regulatory and extension updates on farm inspection & milk quality. Offered at 4 locations each fall. Required update for licensed Certified Milk Inspectors (CMIs).

New York State Fair Dairy Judging and Awards Program
Provides dairy plants the opportunity to receive awards and recognition for product quality at New York State Fair. Coordination and judging of dairy products for state fair competition occurs each summer at Cornell.

Specialty Training Programs
In addition to our Regulatory and Certificate program Training Courses, we also offer a selection of specialty courses in both food safety topics and advanced level hands-on training programs.

Dairy Basics
Four hour in-plant training in Milk Chemistry, Dairy Science, and Dairy Sanitation.

Specialty Cheese Making
This course is an advanced level hands-on course. Participants will apply scientific principles to craft four varieties of cheese from pasteurization through curing. In addition to making cheese, the course will also focus on milk quality, affinage, and sensory evaluation of cheese. It is recommended that participants have experience in cheese making. Enrollment is limited to the first 20 participants.

Pathogen Environmental Monitoring
This course is will prepare participants to develop and implement an effective Pathogen Environmental Monitoring program that will achieve greater product safety and quality. The course will focus on pathogens of concern and the importance of environmental sampling programs. Potential sources of contamination will be identified and control steps outlined. Participants will work in small groups to develop an Environmental Monitoring Plan and discuss mitigation steps and corrective actions to control microbial contamination in a food processing facility.

   Enrollment is limited to the first 40 participants.
The Science of Artisanal Ice Cream

In this workshop, we will cover the art and science of ice cream. This is a multi-platform course that includes online and onsite components. The onsite portion will include lectures, hands on activities and one on one business consulting.

Learning Outcomes
- The composition of ice cream, and the origin of the ingredients within the food system.
- The physical and chemical changes that occur during ice cream production
- The equipment involved in making ice cream and product development
- The sensory properties of ice cream

Fees

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Fees: Specialized Courses—Basic

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For on-site training and audit rates, please contact Louise Felker at lmf226@cornell.edu.
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The Food Processing and Development Laboratory (FPDL)—Pilot Plant

Experienced full time staff professionals are able to assist in all aspects of food product development and processing.

You can visit our facilities and work collaboratively with our personnel, or the staff of the FPDL can process your product to your specifications and ship it to you overnight. Customized pilot plant product runs can be conducted with our established access to ingredients and raw materials.

Our 6,000 square foot main processing area is located adjacent to our fully licensed operating dairy plant. This combination allows for scaling up of production in order to provide a variety of products for customer demonstrations, food shows, and exhibitions.

Cornell University’s research and extension staff provides our clients a resource to find answers to tough research and development problems.

To learn more about the FPDL, contact:

  Robert D. Ralyea
  Sr. Extension Associate
  Phone: (607) 255–7643 • E-mail: rdr10@cornell.edu