Food Science Extension & Institute for Food Safety

2017 Course Catalogue

Assisting businesses in New York State and beyond to improve the quality, safety, nutrition, and marketability of their product.

Cornell University
The Department of Food Science at Cornell University is one of the premier programs worldwide for collaborative research and extension programming. Our faculty, staff, and students support cutting-edge research in chemistry, microbiology, engineering, biotechnology, nutrition, and physiology which has improved the nutritional value, safety, quality, affordability, and profitability of foods and beverages. These research initiatives are integrated with translational extension efforts that together help improve public health and stimulate business development.

The mission of the food science extension programs at Cornell is to assist businesses in New York State and beyond with the implementation of new technologies and production strategies which will improve the quality, safety, nutrition, and marketability of their product. Extension personnel, located at the Cornell University Campus in Ithaca, NY and at the NY State Agricultural Experiment Station (NYSAES) in Geneva, NY facilitate these activities through technology transfers, process validations, project incubation, piloting, crisis management support, workshops and web-based training, and consultation.

Through our work in research and extension, the food science extension programs have helped tens of thousands of food industry stakeholders. Measurable outcomes for these interactions have included bringing products to market, achieving regulatory compliance, reducing food safety risks, and adding value or extending product lines.

Visit us at: http://foodscience.cals.cornell.edu/
Institute for Food Safety at Cornell University

The Institute for Food Safety at Cornell University (IFS@CU) is unique in its comprehensive approach for addressing current and emerging food safety issues. Harnessing Cornell’s existing strengths across food production systems including fruits, vegetables, and dairy foods, the IFS@CU integrates outreach, training and applied research to prevent foodborne illness in innovative and pioneering ways, optimizing product quality and safety from farm-to-table.

As the pre-eminent source of information that helps growers and processors meet food safety challenges, such as complying with new demands in the U.S. Food and Drug Administration’s Food Safety Modernization Act (FSMA), the institute provides required trainings and certifications that will stimulate economic growth and create new market opportunities for the Empire State’s farmers, food processors, retailers, and food entrepreneurs.

Located at the College of Agriculture and Life Sciences’ New York State Agricultural Experiment Station (NYSAES) in Geneva, New York, the Institute will bring together diverse collaborators from across the fields of food science, horticulture, plant pathology, and entomology, as well as business development expertise from entrepreneurs at the Cornell Agriculture and Food Technology Park.

Meet the Team

Dr. Olga Padilla-Zakour
Managing Director, Professor and Department of Food Science Chair

Dr. Elizabeth Bihn
Executive Director, Director Produce Safety Alliance

Steering Committee
Dr. Susan Brown, Director, NYSAES
Dr. Carmen Moraru, Food Science Department
Julie Suarez, Associate Dean, CALS
Dr. Christopher Watkins, Director, CCE
Dr. Martin Wiedmann, Food Science Department
Dr. Randy Worobo, Food Science Department

Institute Staff
Kelly Coughlin, Interim Program Coordinator
Nancy Long, Administrative Coordinator
Robert Way, Communications Specialist
Food Science

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Training Delivery Types

**On-Campus Training** takes place at the Cornell University Stocking Hall Conference Center, unless otherwise noted. All courses listed are open to the public.

**On-Site Plant Training** these workshops can be offered off campus and at industry sites; courses at company sites can be limited to attendees from the hosting company. On-site courses are charged a flat fee (see page 15 for details).

**Online, Self-Paced Training** includes background material to review prior to the start of the workshops and self-assessment quizzes.

**Partnership Courses** are conducted in partnership with other organizations, including the New York State Department of Agriculture and Markets, Oregon State, Harvest, NY, Penn State, and Jasper Hill.

**Multi-modal Courses** are online and hands-on.
Course Information

Better Process Control School
(Low Acid—4 days; Acidified—2 days)
A training program for the processed food industry to prepare industry practitioners and help companies meet federal regulations. The course is beneficial to personnel in plants that pack and thermally process low-acid foods and acidified foods in hermetically sealed containers, including canned foods, aseptically processed and packaged foods, and pickled products. Cornell University is part of the network of universities that deliver the Better Process Control School in partnership with the GMA Science and Education Foundation (SEF) utilizing U.S. Food and Drug Administration (FDA) approved curriculum.

The FDA regulations in 21 CFR 108, 113, and 114 became effective May 15, 1979, requiring that each processor of low-acid or acidified foods operate with a certified supervisor on hand at all times during processing. These regulations are designed to prevent public health problems in low-acid and acidified canned foods. The BPCS course also meets U.S. Department of Agriculture’s (USDA) Food Safety and Inspection Service (FSIS) regulations 9 CFR 318.300 and 381.300 for thermally processed meat and poultry products implemented on June 19, 1987. The BPCS subject areas include thermal processing system operations, microbiological food safety, sanitation, container handling, record keeping, equipment operations, acidification, and container closure evaluation programs for low acid and acidified canned foods.

The BPCS program is an important and valuable educational opportunity for mid-level managers and employees of food processing plants that utilize thermal processing. The course is an excellent platform to improve food safety training for food safety and quality assurance personnel, individuals who work with canned, aseptic and flexible packaged food products, academia, and government auditors and inspectors.

Meet the Team

Olga Padilla-Zakour
Professor and Department of Food Science Chair,
Institute for Food Safety
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Expertise: Safety and stability of plant-based foods; formulation and processing of acid; acidified and water activity controlled-foods; juice technology; food entrepreneurship.

Randy Worobo
Professor,
Institute for Food Safety
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Areas of Expertise: Food safety; food microbiology; fruit and vegetable safety.

Bruno Xavier
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Areas of Expertise: Food Microbiology, formulation and safe manufacturing of acid; acidified and water activity controlled-foods; FSMA Preventive Controls for Human Food.

Calendar

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<td>Food Processing, Regulatory</td>
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Cider and Spirits

Course Information

Cider Production-A Foundation
(4 Days Hands-On)

The Cider Foundation course is designed to improve participants understanding of all aspects of cider. The focus of this course is to provide a basic understanding and appreciation of the main practices involved with cider and perry production and appreciation. The course consists of lectures, hands-on training and laboratory analysis, workshops, and cider tastings.

The lectures will focus on historical development of the cider industry, orcharding, legal requirements, business marketing, fermentation management, and detailed step-by-step production processes. Hands-on practical training will cover yeast handling and establishment of fermentation. Laboratory sessions will provide an introduction to juice composition as well as the chemistry and microbiology of cider. Participants will learn how to measure pH, titratable acidity, specific gravity, free and total sulfur dioxide. Workshops will guide participants through product development; from raw materials to finished product. Tasting sessions will offer training in cider sensory analysis and development of organoleptic assessment notes for personal product portfolios. Participants will also taste their finished ciders from the product development workshop and experience ciders from around the world.

This course is also designed for individuals who wish to gain a recognized industry qualification, The Foundation Certificate in Cider and Perry Production. Passing an exam on the fifth day of the course as well as completing a sensory analysis portfolio of six cider or perry products during the class can achieve this certificate.

Tuition for Cider Production-A Foundation is $1400.

Learning Outcomes

- Cider and Perry Production Methods
- Cider Quality / Sanitation
- Laboratory analysis
- Sensory analysis

Cider Production-Building Expertise
(4 Days Hands-On)

The Cider Building Expertise course is designed for individuals who have previously attended an introductory cider-making course, or those who have industry experience. The focus of this course is to provide an in depth look at cider production and control. The course consists of lectures, hands-on training and laboratory analysis, group workshops, and cider tastings.

The lectures will focus on production planning, fermentation, maturation, detailed step-by-step production processes, and production technology. Laboratory sessions will provide an introduction to
microorganisms associated with cider, potential problems and prevention. Participants will learn how to measure CO2 level, titratable acidity, alcohol by volume, free and total sulfur dioxide. The course will provide in-depth sensory analysis training through cider tastings including the use of flavor wheels, sensory faults, and consumer trials. This course will also provide an introduction to less common cider practices, including keeving, in-bottle fermentation, juice and vinegar production.

A key aspect of this course involves group cooperation during a new product development project. This project focuses on production planning, blending, recipe development, cost analysis and laboratory analysis of cider.

Tuition for Cider Production-Building Expertise is $1800.

**Learning Outcomes**
- Production planning and control
- Biotechnology of Cider Production
- Fermentation and Maturation
- Sensory Analysis
- Adding Value
- Quality Assurance/Quality Control

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**Distilling Workshop**
*(2 Days Hands-on)*

The Distilling workshop is tailored to those currently active, or contemplating entry into the distilled spirits industry, it addresses the basic principles of distilling production, marketing, and sensory analysis. The course consists of lectures, demonstrations, and spirit tasting sessions.

Lectures will provide information about distillery design evolution, traditions, and concepts, as well as different technologies for brandies, eau-de-vie, grappa, whiskey, and rum. Participants will also learn about fermentation principles, properties of barrel aging, and business start-up considerations. Practical demonstrations of commercial stills will display informative processes for producing quality spirits, high-proof distillation-rectification, treatment of distillate, and continuous distillation technology. Though sensory analysis participants will evaluate examples of head, heart, and tail cuts as well as discover spirit flavor chemistry.

Tuition for the Distilling Workshop is $650.

**Learning Outcomes**
- Basic distilling procedure
- Quality spirit production
- Spirit flavor chemistry

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<td>Cider Production: A Foundation</td>
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<td>Cider Production: Building Techniques</td>
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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 dedicated 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 Basic 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.

Nicole Martin
Associate Director
Milk Quality Improvement Program
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Areas of Expertise: The transmission, control and detection of dairy associated spoilage microorganisms and pathogens.

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.

Carl Moody
Regional Dairy Processing Specialist, Cornell Cooperative Extension (CCE), Harvest, NY, Western New York
Phone: (716) 515–8175
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Areas of Expertise: Dairy product quality, food safety, organic manufacturing, and employee training; FSMA Preventive Controls for Human Food.

Carmela Beliciu
Extension Aide
Phone: (607) 255–2912
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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.

Robert D. Ralyea
Sr. Extension Associate
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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.

Kimberly Bukowski
Extension Professional
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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.

Alex Solla
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Areas of Expertise: Course coordination and data management.

Louise M. Felker
Extension Support Specialist
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Martin Wiedmann
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Anika Zuber  
**Regional Dairy Processing and Marketing Specialist, Cornell Cooperative Extension (CCE), Harvest, NY, Northern New York**  
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**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.
Steps to Earning a Certificate

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

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

Pasteurization Courses:
- 203 HTST/NYS Broken Seal Program
  and/or
- 204 Vat Pasteurization

Successful completion of Core Courses and appropriate Specialized Course required for Certification. Certificate valid for 3 years, requires 8 CEUs for renewal.

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 Basic 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 in on-hands on sessions 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 Basic 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 that should apply to juice and other foods as well. 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 proposed 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 (please note – the rule is not yet final).

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-
programs 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

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**High Temperature Short Time (HTST) Pasteurizer Operator Workshop**

*(2.5 Day Course, 2 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/UP systems will be covered, as warranted. Background in dairy microbiology, product safety & quality will also be provided.

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

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**Specialized Courses**

**The Science of Cheese (Basic Level) and Vat Pasteurization**

*(On-line Lectures/1.5 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 1.5 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
(2.5 Day 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. This course is instructed by Cornell Dairy Foods Extension staff and industry experts. While the course design assumes participants have some prior knowledge of dairy microbiology & processing (e.g., Basic 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

Membrane Filtration, Concentration, and Separation Technology
(2.5 Day Course, 2.5 CEUs)
This workshop is designed for those involved and interested in the fractionation, separation, concentration, and drying of dairy products and ingredients. Quality, processing, food safety and cleaning are aspects of the courses. It will be instructed by Cornell Dairy Foods Extension staff and dairy and processing industry experts. While the course design assumes participants have some prior knowledge of dairy 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 Membrane Filtration, Concentration and Separation Technologies after all required prerequisite courses have been taken (e.g., Basic Dairy Science & Sanitation, HACCP, HTST). Course earns 2.5 CEUs.

Learning Outcomes
- Quality and food safety effects of operations on value-added dairy ingredients
- Current research topics in value-added dairy ingredients
- Unit operations in filtration, evaporation, and drying for dairy products
- Cleaning techniques for unit operations

Partner Programs
Accredited HACCP Training Course
Two-day course 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.
  Registration is $750 and includes all training materials and lunches.
Implementing SQF Systems Course
Two-day course that will 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.

Registration is $750 and includes all training materials and lunches. For participants that wish to take the online certification exam, a separate $75 fee payable to SQF is required—do not bring this fee to the course, it is paid on-line to SQF.

Regulatory

FSMA Preventive Controls Qualified Individual Training
(2.5 Day Course, 2.5 CEUs)
This 2.5 day course will fulfill FDA Requirements for FSMA Qualified Individual Training through Accreditation by the Food Safety Preventive Controls Alliance and AFDO. The course will include opportunities for participants to review the final rule and participate in classroom exercises to better understand the regulation. At the conclusion of the course, participants will receive a certificate certifying their training as a Preventive Controls Qualified Individual.

Dairy Processing Plant Superintendent (1 CEU)
Annual Update Provides dairy plant personnel with regulatory and extension updates. Offered at 5 locations each spring. Required update for all NY State Dairy Processing Plant Superintendents (PPS).

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 six 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.

Fees

<table>
<thead>
<tr>
<th>Course</th>
<th>NYS Early Fee</th>
<th>Out of State Early Fee</th>
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Fees: Specialized Courses—Basic

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### Calendar

- **On-Campus**
- **On-Site**
- **Online**
- **Partnership**
- **Multi-modal**

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<tr>
<th>Topic</th>
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<th>Category</th>
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**Dairy Science and Sanitation**

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**Preventive Controls Qualified Individual Training**

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<td>Program, Core Course</td>
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<td>High Temperature Short Time (HTST) Pasteurizer Workshop</td>
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<td><strong>HACCP/Food Safety Plans</strong></td>
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<td><strong>Science of Cheese</strong></td>
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<td>Specialty Cheese Making Workshop</td>
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<td><strong>Science of Yogurt</strong></td>
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<td>The Science of Yogurt (Basic Level)</td>
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<td>Science of Yogurt &amp; Fermented Dairy Products (Basic Level)</td>
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<td>Science of Yogurt &amp; Fermented Dairy Products (Advanced Level)</td>
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<td><strong>One-time Course Offerings</strong></td>
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<td>Certified Milk Inspectors School</td>
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<td>Fluid Milk Quality and Safety</td>
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<td>Certificate Program, Food Processing</td>
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### Rates—Cornell Dairy Extension Services

#### Industry On-Site Workshops

<table>
<thead>
<tr>
<th>Workshop</th>
<th>New York State</th>
<th>Outside NY State</th>
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<tr>
<td>Dairy Science &amp; Sanitation (2.5 days)</td>
<td>$12,500 plus travel/ accommodation for 2 instructors as needed—up to 30 attendees</td>
<td>$15,000 plus travel/ accommodation for 2 instructors as needed—up to 30 attendees</td>
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<td>Internal Audit Training (1 day)</td>
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<td>$6,000 plus travel/ accommodation for 2 instructors as needed—up to 30 attendees</td>
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Juice Safety

Course Information

Juice HACCP Certification Course
(1.5 day course, 2 CEUs)

Under the federal Juice HACCP rule published in 2001, juice processors must comply with two requirements: (1) Subpart A of the rule requires use of HACCP principles and systems in their operations. (2) Subpart B of the rule requires that processors implement treatment(s) to reduce a theoretical population of “pertinent” microorganisms in the juice by 99.999% or 5-log cycles. The “pertinent” microorganism is defined as the most resistant microorganism of public health significance that is likely to occur in the juice.

Juice processors that meet the definition of “retail” establishments are not covered by the federal juice HACCP regulation but must comply with other federal and state rules that regulate juice production. Retail establishments are manufacturers that prepare and provide all of their juice production directly to consumers and do not sell or distribute (wholesale) juice to other businesses.

Juice HACCP commonly refers to the use of HACCP plans to minimize food safety risks in the juice processing, packaging, and transportation industries. HACCP stands for Hazard Analysis Critical Control Point. Significant hazards for a particular juice, puree, or concentrate are identified, based upon scientific information. The steps at which these hazards can be controlled within the process are identified, and the critical limits at each of the key process steps are set. Monitoring procedures are implemented to evaluate conformance with these critical limits. The HACCP plan relies on extensive verification and documentation to assure that food safety has not been compromised. Thus, HACCP provides a structure for assessing risks or what could go wrong, and for putting the controls in place to minimize such risks.

Juice HACCP Certification Course includes:
- Introduction to Food Safety and the HACCP System
- The Regulation
- Hazards
- Prerequisites to HACCP
- Commercial Processing Example
- Hazard Analysis & Preventative Measures (Principle 1)
- Identification of Critical Control Points (Principle 2)
- Establishment of Critical Limits (Principle 3)
- Critical Control Point Monitoring (Principle 4)

Meet the Team

Randy Worobo
Professor, Institute for Food Safety
E-mail: rww8@cornell.edu
Areas of Expertise: Food safety; food microbiology; fruit and vegetable safety.

Olga Padilla-Zakour
Professor and Department of Food Science Chair, Institute for Food Safety
E-mail: oip1@cornell.edu
Areas of Expertise: Safety and stability of plant-based foods; formulation and processing of acid; acidified and water activity controlled-foods; juice technology; food entrepreneurship.

Abby Snyder
E-mail: asnyder276@gmail.com
Areas of Expertise: Food safety and quality, HACCP, yeast and molds, and FSMA Preventive Controls.
Juice HACCP Certification Course includes (cont.):

- Corrective Actions (Principle 5)
- Verification (Principle 6)
- Record Keeping Procedures (Principle 7)
- Sources of Info

Calendar

<table>
<thead>
<tr>
<th>Topic</th>
<th>Date Offered</th>
<th>Location</th>
<th>Category</th>
<th>Training Delivery</th>
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<tr>
<td>Juice HACCP</td>
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<td>Juice HACCP</td>
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<td>Food Processing, Food Safety, Regulatory</td>
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Course Information
Enhancing development of the livestock and meats processing industries by assessing production and marketing challenges and guiding management practices.

Cured Meats Workshop
(2 Days Hands-On, 2 CEUs)
The Cured Meats Workshop is geared towards large and small processors and producers who would like to increase their value added section of their meat sales. Participants will learn how to cure meats, make sausage, and create different blends of flavors/spices to use in the cured meats. Lectures will include food safety, HACCP plans for cured meats, and cuts of meats that can and should be used in the curing and charcutery process.

The course consists of two days of hands on lectures and processing of cured meats. Food safety will be discussed and carried out throughout the workshop.

Learning Outcomes
- Generate meat products based on knowledge acquired in course
- Identify and appraise value-added meats for charcutery board
- Apply food safety principles to creation of value-added meat products

Meet the Team

MacKenzie L. Waro
Livestock Processing & Marketing Specialist
E-mail: mlw55@cornell.edu
Areas of Expertise: Livestock product marketing, meat marketing, livestock production, land preservation.

Randy Worobo
Professor, Institute for Food Safety
E-mail: rww8@cornell.edu
Areas of Expertise: Food safety; food microbiology; fruit and vegetable safety.

Louise M. Felker
Program Coordinator
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.

Hazard Analysis Critical Control Point Programs for Meat and Poultry Processors (HACCP)
(2 Days Lecture and Hands-On, 2 CEUs)
This course covers the fundamentals of HACCP (Hazard Analysis Critical Control Point) and the application in meat and poultry processing operations. It provides the participant with hands-on experience in developing a HACCP plan. This course is certified by the International HACCP Alliance and meets USDA requirements for HACCP training. Training is a collaboration between Cornell Cooperative Extension and Penn State Extension. Training is intended for:

- Plant managers
- HACCP coordinators
- Quality assurance/control personnel
- Sanitation management
- Line supervisors
- Line operators employed by meat and poultry processing plants
- Professionals looking to increase their knowledge of HACCP
Meat Foods

Learning Outcomes
- Hazards associated with meat foods
- Prerequisite programs and GMPs

Meat Processing Workshops
(1 day Hands-On, 0.5 CEUs)
Want to learn about various cuts of beef, pork, lamb, or poultry? Looking to be more confident when selling your meat cuts? Wondering how to get the most return on investment for your product? CCE Harvest New York and SUNY Cobleskill invite meat producers to hone their skills in several one-day processing seminars. The course is taught by SUNY Cobleskill faculty and specialists from the Harvest New York program of Cornell Cooperative Extension.

The all-day class is designed for producers who are selling to markets, would like to learn to cut their own meats, or are interested in learning about cuts of meat. It will cover which cuts are most profitable, quality of meat, what products consumers want, and marketing strategies.

Learning Outcomes
- Identifying and producing cuts of meat
- Business development and marketing

Home Cured Meats
(1 day Hands-On, 1 CEUs)
This one day home cured meats course is geared towards home owners, or anyone who loves meat and wants to learn how to make cured meats such as sausages, jerky, and meat sticks. Participants will learn what cuts of meats can and should be used in the curing and charcutery process, as well as how to create different blends of flavors and spices to using in the cured meats.

The course consists of a one day hands on lectures and processing of cured meats. Food safety will be discussed and carried out throughout the workshop.

Learning Outcomes
- Generate meat products based on knowledge acquired in course

Calendar

<table>
<thead>
<tr>
<th>Topic</th>
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<th>Location</th>
<th>Category</th>
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<td>Food Processing</td>
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About the Produce Safety Alliance

The Produce Safety Alliance (PSA) was created to help fresh produce growers meet the regulatory requirements included in the Food Safety Modernization Act (FSMA) Produce Safety Rule. It was established through a cooperative agreement between Cornell University, the United States Food and Drug Administration (FDA), and the United States Department of Agriculture (USDA). The PSA has developed two types of training courses; the PSA Grower Training Course and the PSA Train-the-Trainer Course. The PSA began offering both courses across the country in September 2016.

Meet the Team

Elizabeth Bihn, Ph.D.
PSA Director & Sr. Extension Associate,
Institute for Food Safety
Based in Geneva, New York
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E-mail: glw53@cornell.edu

Barbara Fick, M.S.
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Based in Corvallis, Oregon
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Kristin Woods, Ph.D.
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Don Stoeckel, Ph.D.
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Michele Humiston
PSA Extension Aide II
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The PSA Grower Training Course was created through a five-year nationwide curriculum development process. In 2011, after hosting an international gathering to review current Good Agricultural Practices (GAPs) educational resources, the PSA launched ten open Working Committees (WCs), composed of one hundred seventy-eight members from academia, the grower community, the produce industry, and regulatory agencies. The WCs identified key priority areas and learning objectives to be addressed in the grower curriculum. Additionally, grower preferences regarding produce safety training programs were collected through eight farmer focus groups nationwide, collecting feedback from eighty-nine fruit and vegetable growers. Beginning in the fall of 2015, the PSA engaged with the FDA Division.
Produce Safety Alliance Course Information

Produce Safety Alliance Grower Training Course (Basic Level)

(1 Day Course)

This course is one way to satisfy the FSMA Produce Safety Rule requirement outlined in § 112.22(c) that requires ‘At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.’ The course will provide a foundation of GAPs and co-management of natural resources and food safety, FSMA Produce Safety Rule requirements, and details on how to develop a farm food safety plan. After attending the course, participants will be eligible to receive a certificate from the Association of Food and Drug Officials (AFDO) that verifies they have completed the training course.

Learning Outcomes

- Understand microorganisms relevant to produce safety and where they may be found in the farm environment
- Identify microbial risks and potential routes of contamination, practices that reduce risks, and how to begin implementing produce safety practices on the farm
- Understand FSMA Produce Safety Rule requirements
- Understand how to begin writing a Farm Food Safety Plan

For additional information about the PSA Grower Training Course and scheduled courses, please visit the PSA website at: http://producesafetyalliance.cornell.edu/

Produce Safety Alliance Train-the-Trainer (Advanced Level)

(2 Day Course)

This two-day course will provide detailed information about Good Agricultural Practices (GAPs), co-management of natural resources and food safety, FSMA Produce Safety Rule requirements, and a review of the PSA Grower Training curriculum. The course will also cover principles of adult education, how to incorporate the PSA curriculum into extension trainings, how to develop working partnerships, expectations for trainers, how to become a PSA Lead Trainer, and how to register a PSA Grower Training Course with the Association of Food and Drug Officials (AFDO).

Trainer Prerequisite Knowledge

Individuals who want to become PSA Trainers or PSA Lead Trainers are expected to have basic knowledge in four competency areas including:

- Produce safety scientific knowledge and experience
- Fruit and vegetable production knowledge
- Effective training delivery
- Knowledge of the FSMA Produce Safety Rule
After attending the course, participants will be eligible to receive a certificate from the Association of Food and Drug Officials (AFDO) that verifies they have completed the PSA Train-the-Trainer course. Completing this training allows participants to deliver the PSA Grower Training curriculum under the direction of a PSA Lead Trainer. Any participant who has completed this training may also apply to become a PSA Lead Trainer. More detailed information about becoming a PSA Trainer or PSA Trainer is available on the PSA website listed below.

Learning Outcomes

- Understand microorganisms relevant to produce safety and where they may be found on the farm environment
- Identify microbial risks and potential routes of contamination, practices that reduce risks, and how to begin implementing produce safety practices on the farm
- Become familiar with the PSA Grower Training curriculum and resources
- Understand FSMA Produce Safety Rule requirements and their impact to fruit and vegetable growers
- Develop the skills necessary to deliver an effective PSA Grower Training to produce growers, packers, shippers, regulatory personnel, and others

For additional information about the PSA Train-the-Trainer Course and scheduled courses, please visit the PSA website at: [http://producesafetyalliance.cornell.edu/](http://producesafetyalliance.cornell.edu/)

Good Agricultural Practices (GAPs) Course Information

Multi-Day Good Agricultural Practices (GAPs) Training Course

*(2–3 Days)*

This two-day course provides a solid foundation of Good Agricultural Practices (GAPs) knowledge, time to support produce safety discussions, and opportunities for hands-on activities, including the development of a written Farm Food Safety Plan. Offered in collaboration with colleagues from Cornell Cooperative Extension’s Regional Teams, this course includes the PSA Grower Training curriculum, which satisfies the Food Safety Modernization Act (FSMA) Produce Safety Rule requirement outlined in § 112.22(c) that requires ‘At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.’

The course is intended to improve grower’s understanding of GAPs and the FSMA Produce Safety Rule to guide the assessment of microbial risks and implementation of practices to reduce risks on fresh produce farms. On the second day of training, knowledge gained on Day 1 is utilized to write their own Farm Food Safety Plan by using templates and sample recordkeeping logs. A third optional day may be offered that includes a mock third-party audit hosted on one of the training participants’ farm. The mock third party audit is conducted during the growing season so that participants can learn about the audit protocol and see produce safety practices in action.

After attending the course, participants will be eligible to receive a certificate from the Association of Food and Drug Officials (AFDO) that verifies they have completed the PSA Grower Training course.

Learning Outcomes

- Understand microorganisms relevant to produce safety and where they may be found in the farm environment
- Identify microbial risks and potential routes of contamination, practices that reduce risks, and how to begin implementing produce safety practices on the farm
Produce Safety

- Understand FSMA Produce Safety Rule requirements
- Begin writing a Farm Food Safety Plan and develop written SOPs, recordkeeping logs, and produce safety policies for your farm
- Understand third party audits for produce safety

For additional information about Multi-Day Good Agricultural Practices (GAPs) Trainings in New York, visit the National Good Agricultural Practices Program website at:

http://gaps.cornell.edu/person-gaps-trainings

Good Agricultural Practices (GAPs) Online Produce Safety Course
(Web-based, 3-weeks, self-paced)

The GAPs Online Produce Safety Course is a 3-week web-based course offered through the National GAPs Program. This course is intended to improve your understanding of GAPs to guide assessment of risks and implementation of practices to reduce risks on fresh produce farms. Taking this course will not result in your farm being “GAPs Certified”. GAPs certification is done by a third party (e.g. USDA, Primus, Global GAP) and involves the successful completion of an on-farm audit. This course does not include information about the Food Safety Modernization Acts (FSMA) Produce Safety Rule.

Time Commitment

Most students spend 15 to 20 hours on this course, but depending on your knowledge, more or less time may be required. Once the course opens, it is open 7 days a week, 24 hours a day for 3 weeks so you will be able to complete the course when time permits in your schedule. There are no required hours of participation. There is an instructor and the instructor may schedule office hours, but you are not required to attend these hours. You will be able to e-mail your instructor at all times during the course and they will respond in a timely manner. All course requirements must be completed within the 3 week window. Within the three weeks you are expected to:

- Complete a pre and post test
- Read all course materials
- Turn in 4 assignments for evaluation
- Complete 2 self-tests
- Contribute to the discussion boards.
- Complete Course Evaluation

Course Scheduling and Class Size

Courses run several times throughout the year. Please check the website for a current list of course offerings. Class size is limited to 25 people on a first come, first serve basis. A minimum of 10 participants must be registered for us to offer the course. Special arrangements can be made for large groups to ensure everyone is in the same class together.

Special Note

As you consider taking the GAPs Online Produce Safety Training Course, be aware that this course is not currently equivalent to the required supervisor training described in the FSMA Produce Safety Rule 21 CFR Subpart C § 112.22(c). This GAPs Online Produce Safety Training Course may, however, satisfy training requirements as described in the FSMA Produce Safety Rule in §§ 112.21(a) and (b).

For additional information about the GAPs Online Produce Safety Course and scheduling classes, visit the National Good Agricultural Practices website at: http://gaps.cornell.edu/gaps-online-course
About the Program

The Seafood HACCP Course offered through NY Sea Grant and Cornell University was developed through the Seafood HACCP Alliance and is recognized by the US Food and Drug Administrations (FDA) to meet the training requirements established under the FDA’s mandatory seafood HACCP regulation (21 CFR Part 123). This regulation requires that the following HACCP activities be conducted by a “trained individual”.

- Developing a HACCP plan
- Annual reassessment of the HACCP plan
- Modifying the HACCP plan
- Performing a review of HACCP records

Meet the Team

Michael Ciaramella, MSc, PhD
Seafood Safety and Technology Specialist
New York Sea Grant, Cornell Cooperative Extension
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E-mail: mc2544@cornell.edu
Web: www.nyseagrant.org/seafood
Areas of Expertise: Seafood Safety (HACCP), nutrition, quality and processing, Good Manufacturing Practices, Aquaculture and Physiology.

Course Information

The course provides training for the seafood industry and regulatory agencies on the fundamentals of HACCP, the current Seafood HACCP regulation, introduction to guidance and training materials and the development of a HACCP plan for seafood products. There are two options for completing the Seafood HACCP Course: the Segmented Course, or the Basic Course: (3 consecutive days).

Segmented Course

Segment 1:
Is an online course that can be taken at your own pace and on average takes 8–10 hours to complete. You will have 6 months from time of enrollment to complete. The Segment 1 online Seafood HACCP course is ongoing and one can register online at any time.
http://seafoodhaccp.cornell.edu/Intro/index.html
*Course is administered manually and enrollment/completions are processed Monday-Friday between 9am and 4pm excluding holidays.
Segment 2:
The Segment 2 in person course is will be offered at least 2x a year (Spring and Fall) Dates will vary depending on room availability and location.

NOTE: Additional courses can be scheduled as needed. Basic and segment 2 courses are typically offered in Jamaica, NY. If the need exists, the course can be offered throughout the state but pricing will vary depending on location. Contact the instructor to inquire about additional courses. The segment 2 runs from 9:00 am – 4:30 pm

Learning outcomes:
- General understanding of HACCP Fundamentals and seafood safety concerns/hazards
- Understanding of FDA’s current seafood HACCP regulation
- Utilize training and guidance materials available to develop a HACCP plan

Basic Course
The basic 3 day HACCP course is offered as needed. Dates will vary depending on need. Scheduled basic courses will be listed on the NY Sea Grant website (www.nyseagrant.org/seafood). If courses do not appear contact the instructor for more information and to request a basic Seafood HACCP course.

Cost
- Basic Course: $200.00+ (price will vary based on size and location, contact instructor for more info)
- Segment 1 (E-course): $60.00
- Segment 2 (in-person): $100.00 (Jamaica Location)
  ** Training materials for the course will cost an additional $25.00-$50.00.

Calendar

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<td>Segment 2</td>
<td>April 4, 2017</td>
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About the Program

The Cornell Enology Extension Lab (CEEL) works with the beverage industries to create educational programs that support the growth and improved quality of premium wines, ciders and distilled spirits throughout the state. CEEL facilities include the Vinification & Brewing Technology lab, where fermentations are conducted in collaboration with research projects and applied trials; and the New York Wine Analytical Lab, where products may be submitted for troubleshooting, routine analysis or sensory appraisal. CEEL also offers training for industry members and anyone else who might be interested in the areas of fermented and distilled beverage production. Areas of emphasis include:

- Wine, fermented cider and distilled spirits production
- Analytical techniques
- Sensory science and evaluation methods
- Sanitation
- Tasting room strategies

CEEL partners with the Cider Institute of North America (CINA) to offer certificate-granting fermented cider production classes that cover all aspects of starting or expanding a production business. The lab has also created the EnoCert curriculum, which combines a series of short courses into certificate tracks. EnoCert provides novices with wine production fundamentals but also allows industry veterans with targeted topics that may be of interest. CEEL collaborates with the Finger Lakes Grape Program and colleagues in the Dyson School of Applied Economics and the School of Hotel Administration to present the annual B.E.V. NY conference [Business. Enology. Viticulture.], and also participates in regional extension meetings and tastings across New York State.

Meet the Team

Anna Katharine Mansfield
Associate Professor
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Areas of Expertise: Sensory evaluation of wine, cold-hardy and hybrid wine production, wine flavor chemistry, fermentation nutrition.

Cortni Stahl
Enology Extension Laboratory Assistant
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Course Information

EnoCert 101: Basic Viticulture & Enology
(2 Days, Hands-On)

EnoCert 101: Basic Viticulture & Enology is designed for consumers and members of the wine industry who have little or no background in grape growing and winemaking. Participants will leave with a working knowledge of the core concepts of grape and wine production and a specific understanding of the opportunities and challenges inherent to cool-climate production regions.

During the first day, a series of lectures and group activities will cover vineyard site parameters, the components and function of grape vines and trellis systems, and the major threats to wine grape production. Viticultural instruction will culminate in a visit to a regional vineyard showcasing several grape
cultivars important to the region. On the second day, participants will explore production steps for specific wine types through lectures, group work, and sensory evaluation. Participants will learn processing variables for white, red, rosé, and sparkling wines, and will understand the key decisions required to influence wine style.

EnoCert 101 is the entry point for the EnoCert certification program, and is required for both the Harvest Technology and Tasting Room Educator certificates offered by the Cornell Enology Extension Laboratory. Participants may take this course as a stand-alone program, or as a component of the certificate curriculum.

Tuition for EnoCert 101 is $300. (Tuition for EnoCert 101, 201, and 202 together is $800).

Learning Outcomes
- Grapevine structure and function
- Site selection parameters
- Trellis systems
- Grapevine pests and diseases
- Winemaking plans for specific wine types
- Wine processing parameters and decisions

EnoCert 201: Wine Sensory Analysis and Description
(2 Days, Hands-On)
Attendees of EnoCert 201: Wine Sensory Analysis and Description will be guided through an in-depth exploration of their own sensory capabilities, and the ways in which their unique sensory perception influences their interactions with wine. Based on current sensory science, this course can serve as a starting point for new wine industry members or to complement more traditional wine evaluation programs.

The course is largely experiential, consisting of short lectures and related sensory exercises. Participants will start with exercises demonstrating the range and limitations of their own senses, including learning their own thresholds for important wine components, and their supertaster status. Further exercises will cover the concept of sensory balance in wines and identification of common wine flaws. Participants will then apply their skills in a series of benchmark tastings of significant wine types.

EnoCert 201 is a core course for the EnoCert certification program, and is required for both the Harvest Technology and Tasting Room Educator certificates offered by the Cornell Enology Extension Laboratory. Participants may take this course as a stand-alone program, or as a component of the certificate curriculum.

Tuition for EnoCert 201 is $400. (Tuition for EnoCert 101, 201, and 202 together is $800).

Learning Outcomes
- Defining and differentiating between smell, taste, and ‘flavor’
- Thresholds for key wine aroma and taste components
- Components of wine mouthfeel
- Expert and novice use of wine descriptors
- Common wine types

EnoCert 202: Tasting Room Sales Strategies
(1 Day, Hands-On)
EnoCert 202: Tasting Room Sales Strategies is designed for new and experienced tasting room staff. Most consumers’ first contact with a regional wine industry is in a tasting room, so understanding consumer
interests, motivations, and educational needs is key to promoting the industry as a whole and increasing individual sales.

Through lectures and collaborative exercises, participants will learn how accepted wine jargon can both help and hurt wine sales, the sometimes surprising factors that influence number of bottles bought, and how to engage guests to create a fun and profitable tasting room experience. Instructors will draw on classic consumer psychology and research specific to New York and regional tasting rooms.

EnoCert 202 is the final course required for the Tasting Room Educator certificate offered by the Cornell Enology Extension Laboratory. Participants may take this course as a stand-alone program, or as a component of the certificate curriculum.

Tuition for EnoCert 202 is $225. (Tuition for EnoCert 101, 201, and 202 together is $800).

Learning Outcomes
- Common wine consumer types and buying habits
- Factors driving tasting room sales
- Building a positive consumer experience

**EnoCert 203: Winery Safety and Sanitation**
*(Online lectures, approx. 6 hours)*

EnoCert 203: Winery Safety and Sanitation is intended for all cellar personnel. Safety and sanitation are often overlooked in winemaking courses, but are essential to the production of high quality—and more importantly, LEGAL—wines. In this digital learning course, participants will learn to identify and address safety hazards, the role of OSHA and other regulatory bodies, the difference between cleaning and sanitizing, and common areas of contamination in a winery setting.

EnoCert 203 is the final course required for the Harvest Technology certificate offered by the Cornell Enology Extension Laboratory. Participants may take this course as a stand-alone program, or as a component of the certificate curriculum.

Tuition for EnoCert 203 is $225.

Learning Outcomes
- Winery safety regulations
- Personal safety issues
- Fundamentals of cleaning and sanitation
- Common microbial and chemicals hazards in the winery

**EnoCert 302: Wine Microbiology**
*(On-line lectures, approx. 6 hours, and 1 day Hands-On)*

EnoCert 302: Wine Microbiology is intended for participants who have some winery experience but have little or no specific training in wine microbiology. On-line lectures will cover the growth cycle of *Saccharomyces cerevisiae*, optimal parameters for fermentation, non-*Saccharomyces* yeast strains, lactic acid bacteria and malo-lactic conversion, acetic acid bacteria, and molds. In the hands-on portion of the course, participants will apply information from the lectures to understand the impacts of winemaking decisions on microbial issues, diagnosis of fermentation problems, and critical control points for wine quality.

EnoCert 302 is one of four intermediate courses offered by the Cornell Enology Extension Laboratory,
and is required for the certificate in Wine Production & Analysis. Participants may take this course as a stand-alone program, or as a component of the certificate curriculum. Tuition for EnoCert 302 is $450.

Learning Outcomes
- Common wine microorganisms and their role in wine production
- Factors influencing yeast and bacterial metabolism
- Identifying, preventing, and managing major microbial threats to wine quality

Calendar

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<tr>
<td>EnoCert 302: Wine Microbiology</td>
<td>Web roll-out June 23rd; hands-on July 21</td>
<td>Geneva Campus</td>
<td>Food Processing</td>
<td>Multi-modal</td>
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<tr>
<td>EnoCert 101: Basic Viticulture &amp; Enology</td>
<td>August 14–15, 2017</td>
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<td>August 16–17, 2017</td>
<td>Geneva Campus</td>
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<td>Online</td>
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Industry partners have access to a selection of benefits including:

- Cross-disciplinary consulting and targeted research
- Student engagement opportunities
- Cornell Food Systems Global Summit attendance
- Discounts on pilot plant usage and coordination of on-site training at member facility
- Start-up and technology transfer assistance

Contact: Julie L. Stafford, Ph.D.
Industry Liaison, Department of Food Science
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