Department of Food Science
Advisory Council Update, Fall 2016

Ithaca

Geneva
Cornell Food Science: Leadership

Executive Committee

Dir. Undergraduate Studies (FS and Enology): Dr. Orta-Ramirez and Dr. Sacks
Dir. Graduate Studies: Dr. Wiedmann
Chair of Curriculum Committee: Dr. Moraru
Dept. Extension Leader: Dr. Worobo
NYSAES Program Leader: Dr. Mansfield
Dept. Business Administrator: Matt Stratton

Olga Padilla-Zakour
Chair
Department of Food Science Structure

• 2 buildings: Ithaca and Geneva
• Teaching, Research and Extension/Outreach
• Facilities: Dairy Plant, 2 Pilot Plants, Teaching Winery, Research Winery, Sensory Lab, Product Development Kitchen, Research and Teaching labs
• Advisory Council: leaders from industry, government and non-government organizations
Food Science Advisory Council

Council Leadership:
Leslie Herzog, Chair, The Understanding and Insight Group
Erica Reiner, Past Chair, David Michael & Co., Inc.
Chuck Marble, Chair Elect, Elevation Brands

Council Members:

Kristin Alongi, Rich Products Corporation
Tim Andon, TIC Gums
Shen-Youn Chang, Mizkan America Inc.
Michelle Colban, Unilever
Nick Dokoozlian, E&J Gallo Winery
Andrew Gellert, Gellert Global Group
Bill Graves, Dairy Management Inc.
Ed Jaquay, Proliant Dairy Ingredients
Ricke Kress, Southern Gardens Citrus
Jonathan Licker, Frito-Lay, Inc., a division of PepsiCo
Jane Leland, Leland Global Enterprises
Douglas Marshall, Eurofins Microbiology Laboratories Inc.

Jim Matthews, JEM Innovations
Alejandro Mazzotta, Chobani
Casey McCue, NYS Dept. of Agriculture & Markets
Kathleen O’Donnell, Wegmans Food Markets
Silvia Perez, 3M Corporation
Ruth Petran, Ecolab Inc.
Marlene Quijano, Sr. R&D/Innovation
Anju Rao, Starbucks
Brad Riemenapp, Covance
Michael Robach, Cargill
Peter Salmon, International Food Network
George Sent Jr., KeyBanc Capital Market
Elizabeth Westring, General Mills
Bruce Wolcott, Seneca Foods Corporation
Cornell Food Science: Department Overview

• Academic members include:
  – 21 Professorial Faculty
  – 2 Joint Professorial Faculty
  – 1 Sr. Lecturer
  – 2 Lecturers
  – 1 Sr. Research Associate
  – 1 Research Associate
  – 3 Sr. Extension Associates
  – 5 Extension Associates
  – 9 Post Doctorate Associates

• 62 employees
• 86 graduate students
• 121 undergraduate Food Science majors
Cornell Food Science: Our Core Values

- Maintain the highest standards of academic integrity in everything we do. Continuously strive for excellence in teaching, learning, research, and outreach. Treat all individuals with respect, dignity, and fairness. Foster a sense of community and collegiality within the Department. Embrace diversity in our faculty, staff, and student body.
To create and apply knowledge for the purpose of ensuring a safe, appealing, and nutritious food supply for all, today and in the future
To enhance the safety, quality, and abundance of the global food supply by educating students for leadership roles, advancing research on foods and beverages, and translating and communicating discoveries for the benefit of all people.
Strengthen and expand the Cornell Institute for Food Systems (CIFS). Build the Cornell Institute for Food Systems Industry Partnership Program. Maintain and expand teaching, research, and extension programs in dairy chemistry and dairy fermentation.

Develop innovative teaching and research programs in ingredient technology.
Strengthen teaching, research, and extension programs in the areas of foods for health, value addition, and food protection.

Expand research, teaching, and extension programs in plant-based fermentation science.
Stocking Hall: $105 Million Investment by New York State
Classrooms, Conference Center, Teaching and Research Labs, Dairy Plant, Food Processing & Development Lab, Sensory Center
Dairy Plant: Kosher Certified

State-of-the-art small scale model of a full-sized dairy industry plant. Designed to be transparent for teaching purposes.

Milk comes from Cornell’s Veterinary Teaching Dairy Farm

Dairy Plant processes, on average, 1.5 million pounds of raw milk every year (175,000 gallons)

13,000 gallons go to research

146,000 gallons of fluid milk and cream

20,000+ gallons of ice cream are produced

Products: Fluid milk, Ice Cream, Yogurt, Cheese, Juice (including processing and packaging Cornell Orchards apple cider)

Distribution: 80% of products sold to Cornell Dining facilities, Statler Hotel, Cornell Store and Mandible Café in Mann Library.

20% sold to fraternity and sorority houses, individual departments, the Dairy Bar, caterers
Small Scale Food Processing Plant
- Supports teaching, research and extension for Food Science
- 6 Food Science student interns assist staff of 2
- Produces Cornell Big Red and A.D. White Cheddar and Cornell Greek Yogurt (which supplies the NYS Fair Yo-2-Go Booth since 2014)
- Works with industry on product development projects (DSM, IFN, Chr. Hansen, Old Chatham)
- Partners with artisanal cheese and yogurt makers (Keelys, Crossmans Farm & Creamery, Western NY Enterprises)
- Supports the Cornell Cheese Club and student product development teams
In 2015 Faculty and Senior Academic Staff

- Published 135 refereed journal articles
- Authored 11 book chapters, 46 research publications
- Responsible for 50 Sponsored Awards and Contracts
- 44 extension media presentations
- Presented 532 workshop lectures
- Provided 41,324 contact hours of extension and outreach within NYS
- Provided 30,567 contact hours outside NYS, including international events
Cornell Food Science: Undergraduate Program

• 121 Undergraduate majors
• Our Curriculum:
  – IFT Approved (2014)
  – Depth in chemistry, biology, math
  – Breadth in social sciences, humanities, communication
  – Depth and breadth in food science disciplines:
    • Food chemistry, food microbiology, food engineering/processing, sensory science
Viticulture and Enology Undergraduate Program

- Teaching, research and extension work focuses on grape growing and winemaking in New York and other cool-climate regions
- Draws on the expertise of over 40 faculty across departments
- Faculty in Food Science and Horticulture additionally serve as V&E undergraduate student advisors
Viticulture and Enology Program: Undergraduates

- 30 Undergraduate majors
- 17 Undergraduate minors
- Two concentrations:
  1. Viticulture – Focus on grape production processes
  2. Enology – Focus on wine production
     - Strong foundation in the physical, biological and social sciences
     - Curriculum emphasizes both a scientific and practical understanding of grape growing and winemaking
- Students complete an internship in the industry and a capstone project
Graduate Field of Food Science and Technology: Concentrations

- General Food Science
- Food Chemistry
- Food Microbiology
- Food Engineering
- Dairy Science
- Sensory Science
- Enology
- International Food Science
- Food Processing Waste Technology

- 48 PhD Students
- 15 MS Students
- 22 MPS Students
Our students participate in a array of product development competitions

- American Baking Society
- Developing Countries, Developing Solutions
- Disney
- Idaho Milk Processors Association
- IFTSA/MARS
- Ocean Spray

A team of Cornell food science students developed a new beverage combining the smooth texture of drinkable yogurt with mint-flavored pearls that pop in the mouth - “Yojito” won the grand prize of $10,000 at the product development competition of the Idaho Milk Processors Association (IMPA) on August 14 in Sun Valley, Idaho.

Michelle Duong, Belen Vila, Linran Wang and Jiyu Zhu.
Cornell Food Science: Research & Technology

- Food microbiology/food safety
- Food chemistry
- Food engineering/processing
- Foods for health
- Sensory Science
- Enology
- Sustainable Food Systems
Cornell Food Science: Extension

- Dairy Foods
- Food Safety Programs
- Food Entrepreneurship
- Beer, Brewing, Wine & Spirits
- Kosher Foods
Our dairy foods extension program works with partners to focus on supporting the production of safe and high quality dairy products with specific expertise in microbial spoilage and food safety issues.
Cornell Dairy Foods Extension Certificate Program

- Basic Dairy Science & Sanitation Courses
  - HACCP Courses
  - Pasteurization Courses
- Fluid Milk Processing Certificate
- Fermented Dairy Products Certificate
- Cheese Products Certificate
- Membrane Filtration Certificate
- Advanced Fermented Dairy Products Certificate
- Advanced Cheese Making Certificate
In 2015 the Dairy Food Certification Program

- Offered 17 Workshops (15,293 contact hours) with 704 total attendees
- Granted 8 Certifications

*(participants who completed a 4 course track)*
Cornell Food Science: Food Safety

- NYS Integrated Food Safety Center of Excellence
- Institute for Food Safety
- National Good Agricultural Practices (GAPS) Program & Produce Safety Alliance (PSA)
- Safety and Compliance Training: Juice HACCP Certification, BPCS Certification, FSMA PCQI & PSA
Centers for Disease Control Integrated Food Safety Centers of Excellence

The Integrated Food Safety Centers of Excellence (CoE) were established by CDC under the Food Safety Modernization Act. The Centers are headquartered at state health departments and collaborate with academic partners to build capacity in other state and local health departments.

**Colorado:** Colorado Department of Public Health and Environment & Colorado School of Public Health

**Florida:** Florida Department of Health & University of Florida

**Minnesota:** Minnesota Department of Health & University of Minnesota

**New York:** New York State Department of Health & Cornell University

Co-Directors: **Martin Wiedmann, Cornell;** Shelley Zansky & Alexandra Newman, DOH

**Oregon:** Oregon Public Health Division & Oregon State University & University of Minnesota

**Tennessee:** Tennessee Department of Health & University of Tennessee
New York State Integrated Food Safety Center of Excellence

- Partnership with:
  - New York State Department of Health
    - Laboratory, Epidemiology, and Environmental Health

- Pursues a regional approach to food safety by establishing a dynamic, academic-government “Learning Collaborative” with regional states

- Focus on 3 main areas of food safety:
  - Surveillance
  - Lab Detection
  - Training
Main Activities of the CoEs:

1. **Strengthen** and standardize surveillance and outbreak investigations

2. **Analyze** and improve timeliness, completeness and effectiveness of responses

3. **Train** public health staff in competency-based training of surveillance and investigation techniques

4. **Educate** next generation of epidemiology, environmental health, and laboratory future food safety leaders

5. **Improve** capacity of information systems

6. **Evaluate** and communicate best practices
Institute for Food Safety At Cornell (IFS@CU)

• Catalyzing advancements in food safety technology through research and innovative application strategies; preparing farmers and food business entrepreneurs for new business growth and opportunities

• Executive Director, Dr. Elizabeth Bihn

• $2 million for 3 years from NYS supported by Senator Nozzolio to establish the Institute

• Enhanced capacity for training of growers, processors, retailers and regulators to meet the emerging regulatory demands of the Food Safety Modernization Act (FSMA)

• Food safety research and quality optimization from farm-to-table

• Food industry sustainability research and outreach
President Barack Obama signed the **Food Safety Modernization Act (FSMA)** into law into effect on January 4, 2011.

The Final Rule on Preventive Controls for Human Food was Proposed in January 2013.

The Final Rule went into effect September 2015.
Who is Affected by FSMA?
<table>
<thead>
<tr>
<th>REGULATION</th>
<th>FINAL RULE</th>
<th>GENERAL</th>
<th>SMALL BUSINESS</th>
<th>VERY SMALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive Controls for Human Food</td>
<td>09/17/2015</td>
<td>09/19/2016</td>
<td>09/18/17</td>
<td>09/17/2018</td>
</tr>
<tr>
<td>Preventive Controls for Animal Food</td>
<td>09/17/2015</td>
<td>09/19/2016</td>
<td>09/18/2017</td>
<td>09/17/2018</td>
</tr>
<tr>
<td>Produce Safety</td>
<td>11/27/2015</td>
<td>2 years + 60 days</td>
<td>3 years + 60 days</td>
<td>4 years + 60 days</td>
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<tr>
<td>Foreign Supplier Verification Program</td>
<td>11/27/2015</td>
<td></td>
<td>05/01/2017</td>
<td></td>
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<tr>
<td>3rd Party Accreditation</td>
<td>11/27/2015</td>
<td></td>
<td>01/26/2016</td>
<td></td>
</tr>
<tr>
<td>Sanitary Transportation</td>
<td>03/31/2016</td>
<td>1 year</td>
<td>2 years</td>
<td></td>
</tr>
<tr>
<td>Intentional Adulteration</td>
<td>05/31/16</td>
<td>1 year + 60 days</td>
<td>2 years + 60 days</td>
<td>3 years + 60 days</td>
</tr>
</tbody>
</table>
Preventive Controls for Human Food Qualified Individual Training (PCQI) – Required by FSMA
Upcoming Course Offerings by Cornell University

- December 6-8, 2016 in Ithaca, NY
- February 7-8, 2017 in Ithaca NY
- May 23-25, 2017, Location TBD
- September 5-7, 2017, Location TBD
- December 5-7, 2017, Ithaca NY
Produce Safety Alliance
Train-the-Trainer Courses

To be able to train Growers for FSMA Compliance

Upcoming Course Offerings by Cornell University

<table>
<thead>
<tr>
<th>Start Date</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/7/16</td>
<td>Geneva</td>
<td>NY</td>
</tr>
<tr>
<td>9/13/16</td>
<td>Yuma</td>
<td>AZ</td>
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<tr>
<td>9/14/16</td>
<td>Wimauma</td>
<td>FL</td>
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<tr>
<td>9/29/16</td>
<td>Fayetteville</td>
<td>AR</td>
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<tr>
<td>10/4/16</td>
<td>Mills River</td>
<td>NC</td>
</tr>
<tr>
<td>10/12/16</td>
<td>Minneapolis/St. Paul</td>
<td>MN</td>
</tr>
<tr>
<td>10/17/16</td>
<td>Albuquerque</td>
<td>NM</td>
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<td>10/20/16</td>
<td>Denver</td>
<td>CO</td>
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<tr>
<td>10/24/16</td>
<td>Montgomery</td>
<td>AL</td>
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<tr>
<td>11/7/16</td>
<td>Overton</td>
<td>TX</td>
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<td>11/14/16</td>
<td>Irvine</td>
<td>CA</td>
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<td>11/16/16</td>
<td>Brattleboro</td>
<td>VT</td>
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<td>11/17/16</td>
<td>Salinas</td>
<td>CA</td>
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<tr>
<td>11/29/16</td>
<td>Kansas City (Olathe)</td>
<td>KS</td>
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<tr>
<td>11/29/16</td>
<td>Portland</td>
<td>OR</td>
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<tr>
<td>12/19/16</td>
<td>Wooster</td>
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<td>1/11/17</td>
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<td>1/18/17</td>
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<td>1/23/17</td>
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<td>1/29/17</td>
<td>Beckley</td>
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<td>2/15/17</td>
<td>Murfreesboro</td>
<td>TN</td>
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<tr>
<td>2/20/17</td>
<td>Carbondale</td>
<td>IL</td>
</tr>
<tr>
<td>2/27/17</td>
<td>Honolulu</td>
<td>HI</td>
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Institute for Food Safety At Cornell (IFS@CU)

• Expanded use of the renovated FVC in partnership with the Cornell Agriculture and Food Technology Park & Start-Up NY

• Small scale commercial production options for tenants of the Park

• New High Pressure Processing Validation Center

• Next Generation processing capabilities for the renovated FVC: Forward Osmosis, Pulse Electric Field, High Pressure Homogenization, Membrane Systems, Electro Spining (microencapsulation), Micro Compounder (new packages).

Food Science Geneva Renovations

• Converting the pilot plant storage into the new High Pressure Processing Validation Center (HPP)

• Upgrades to the infrastructure of the Food Research Lab, also known as the ASRL, Agricultural Sciences Research Laboratory

• Renovation to the NYS Food Venture Center - Fruit and Vegetable Processing Pilot Plant, starting December 2016

• Purchase and installation of a new brewing system
Food Venture Center Pilot Plant – to be renovated in 2017: For Research, Teaching, Extension and Industry Trials
Equipment for canning, pasteurization, UV treatment, blanching, peeling, cutting, dehydration, freezing, freeze-drying, juicing, pureeing, concentration, filtration, and more
Fruit and Vegetable Processing Plant
To be renovated in 2017

Fruit & Vegetable Processing Pilot Plant: 10,000 sq. ft.
Processing capacity: 1 to 100 gal/day, 10 to 1000 lb/day
NextGen Food Tech

Pulse Electric Field (PEF)

Membrane Processing System

High Pressure Homogenization

Forward Osmosis

Electrospinning Unit - Nanospider

MiniCTW Micro-Compounder
Custom ½ Barrel Brewing System

Hiperbaric 55

High Pressure Processing Validation Center

Stone Fruit Preparation System

Rapid Microbial Analyzer
High Pressure Processing and the National Validation Center for Hiperbaric at Cornell University in Geneva

New High Pressure Processing Laboratory to open Jan 2017: National HPP Validation Center

- Currently supported by Hiperbaric, LiDestri, Suja, Wegmans
- NYS – $600,000 from Senator Nozzolio
Cornell HPP Lab, Geneva, NY

600 MPa = 87,000 psi for 30-180 s
HPP Processed Foods

- Juices, dressings, jams, guacamole, baby food, deli meats, seafood, shellfish
Cornell’s Expertise in HPP

- Dr. Randy Worobo: lead scientist, food microbiologist
- Dr. Carmen Moraru: food safety engineering
- Dr. Olga Padilla-Zakour: food preservation

**Targeted HPP Research**

- Microbial safe harbors for acidified and low acid foods
  - Effect of acid types and concentration
  - Effect of solids, water activity, preservatives
  - Predicting pathogen inactivation rates
  - Alternative applications

- Processing effects on organoleptic quality and physicochemical properties
National GAPs Program

• Since 1999, supported by over $2.4 million in external funding
• Developed novel 2-day GAPs training and farm food safety plan writing workshop that has become national model
  – Since 2009, 773 individuals trained, representing 413 farms in New York
  – In 2014, 132 individuals trained, representing 78 farms in New York
• GAPs Online Produce Safety Course
  – Since 2008, 1165 course participants in 61 courses
  – In 2014, 119 course participants in 8 courses
• Developed award-winning extension publications
  – Over 250,000 copies distributed nationally and internationally
  – Newest publication in 2014: Farm Food Safety Decision Trees

www.gaps.cornell.edu
• Since 2010, supported by over $4.9 million in external funding
• Main Goal: helping fresh produce growers meet regulatory expectations of Food Safety Modernization Act’s Produce Rule
• Developed the standardized, national curriculum that satisfies The Food Safety Modernization Act - Produce Rule requirements for all growers who are subject to the regulation, implemented September 2016
• Collaborators in 42 states from 44 Land Grant Institutions

producemanager@cornell.edu
NYS Food Venture Center (FVC), Northeast Center for Food Entrepreneurship (NECFE)

In 2015, answered 7,000 requests for assistance; worked with >400 companies for commercialization of >1,200 food products

Projected Job Creation
- 1539 businesses assisted generating
- 770 full-time jobs
- 1539 part-time jobs
Safety Evaluation of New Food Products Outside NYS, 2012-2014 (NY 2,212)

- MA
- NJ
- OH
- VT
- CT
- PA
- RI
- IL
- MD
- MI
- FL
- VA
- NH

Bar chart showing the number of safety evaluations for each state.
Cornell Food Science: Enology Extension

- NY Wine Analysis Lab, >600 analyses/year
- Vinification & Brewing Laboratory
- Short courses and demonstrations
- Periodic electronic communications to wine industry
- New Certification program in 2015
The Cornell Institute for Food Systems is a group of Cornell faculty, staff, and students who share a passion for and an interest in food and food systems.

**Goal:** To provide a forum for CIFS members to meet, share ideas, and develop collaborative teaching, research, and extension initiatives.

CIFS Fellows: Over 90 Fellows from 18 units/departments within 5 colleges
Synergistic Thinking. Innovative Food Solutions.

Industry Partnership Program

An exciting public-private partnership that expands and enhances engagement of Cornell University with industry scientists, engineers and business leaders at companies throughout the food system.
## Coordinated CIFS-IPP Services and Benefits

<table>
<thead>
<tr>
<th>CIFS-IPP Membership</th>
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<tbody>
<tr>
<td><strong>Cornell Institute for Food Systems Events</strong></td>
</tr>
<tr>
<td><strong>Targeted Research: Fundamental and Applied</strong></td>
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<tr>
<td><strong>Multi-disciplinary Consulting for Innovative Solutions</strong></td>
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<tr>
<td><strong>Strategically-aligned Engagement with Students</strong></td>
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<tr>
<td><strong>Technical and Hands-on Training for Employees</strong></td>
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<tr>
<td><strong>State-of-the-Art Food &amp; Beverage Processing Plants</strong></td>
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<tr>
<td><strong>Start-up and Technology Transfer Assistance</strong></td>
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<tr>
<td><strong>Timely and Relevant Conferences, Seminars and Webinars</strong></td>
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<tr>
<td><strong>Sensory Facility ~ NYS Food Venture Center</strong></td>
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</tbody>
</table>
Industry Partnership Program

Gold-level Members

Silver-level Members

Field Day Forum: An Exclusive Event for CIFS IPP Members
Thursday, October 27, 2016 at the NYS Ag Experiment Station, Geneva, NY
Food Science – New Faculty Search

Faculty Renewal Initiative
Assistant Professor – Wine Microbiology

– Faculty Renewal Funded by E&J Gallo
– Anticipated Timeline:
  • Applications being accepted through Academic Jobs Online - ongoing
  • Initial application review – October 13, 2016
  • Interview dates: mid-October – November, 2016
  • Offer to candidate: late-November– December 2016
  • Start date: Spring 2017 or as negotiated with selected candidate
Cornell Food Science: 2015 Holiday Party
Thank You!
oip1@cornell.edu