

# What we do & Why it matters

## Agricultural and Biological Engineering | [abe.illinois.edu](http://abe.illinois.edu)

The Department of Agricultural and Biological Engineering integrates engineering, technology, and life sciences to solve problems associated with the enhancement of living systems in global agriculture, food, energy, water, and the environment. Our faculty and students demonstrate excellence in addressing the land-grant mission through cutting-edge research and consistently high national rankings of our undergraduate and graduate programs.

### ALAN HANSEN (interim department head)

Dr. Hansen's research creates innovative solutions to improve the operation of off-road machine systems. He leads a U.S. team that has established innovation and field hubs in Bangladesh, Cambodia, Ethiopia, and Burkina Faso. He develops appropriate-scale technologies to help smallholder farmers, especially women, be more productive while benefiting the local environment and economic well-being of rural communities.

### ROBERT AHERIN (professor & ag safety program leader)

Dr. Aherin is reducing the number of agricultural work-related injuries and deaths by advancing understanding of agricultural injury causation and effective injury and illness risk reduction measures. He leads AgrAbility Unlimited, utilizing technologies and identifying resources to assist farm people with physical limitations maintain their livelihood at the highest level possible, regardless of age, disease, or accident-related disability.

### NESLIHAN AKDENIZ (clinical assistant professor)

Dr. Akdeniz studies livestock mortality and waste management/utilization. She develops ways to improve air quality and environmental conditions in livestock buildings. Her extension program focuses on sustainable livestock production.

### KAUSTUBH BHALERAO (associate professor)

Dr. Bhalerao develops new sensor, instrumentation, and computational technologies to improve decision-making in crop and animal agricultural production. He created a robotic system for quantifying soybean cyst nematode pathogens, a sensor to improve swine insemination outcomes, and a detector to screen for adulterated milk samples.

### RABIN BHATTARAI (assistant professor)

Dr. Bhattarai discovers innovative ways to clean polluted waters. He uses laboratory and field experiments, along with computer simulation models, to study how various factors impact water quality.

### GIRISH CHOWDHARY (assistant professor)

Dr. Chowdhary is advancing how to design, build, and automate collaborative aerial and ground robotic systems. He advances machine learning and decision-making algorithms to enable drones and ground robots to collaboratively manage agricultural tasks. His work improves the robustness of robots utilized in defense, home-land security, and hostile environment exploration.

### MARIA CHU (assistant professor)

Dr. Chu investigates how climate and land-use changes affect water quantity and quality in order to achieve a sustainable agro-ecosystem where productivity, environmental soundness, and social relevancy are optimized. She models the impacts of changes in environmental stressors on ecosystem services, and provides economic and social endpoints to these impacts.

### RICHARD COOKE (professor)

Dr. Cooke is increasing the efficiency of drainage-related best management practices, and developing protocols for their design. He also develops techniques to simplify the extraction of elevation data from a pulsed laser system (LiDAR) images, and creates rainfall harvesting systems to extend cropping into the dry season in Sierra Leone.

### PAUL DAVIDSON (assistant professor, ABE)

Dr. Davidson improves and maintains surface water systems by reducing the transport of nutrients, pathogens, and pesticides from agricultural systems to waterways. He works with farmers and other stakeholders to develop solutions that protect the quality of our water resources while maintaining efficient farming operations.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Agricultural and Biological Engineering

### **RICHARD S. GATES (professor)**

Dr. Gates conducts research on engineering issues of controlled environment plant and animal production, including greenhouse gas emissions and energy efficiency. He directs the Certified Livestock Managers Training program, required of all livestock operations in Illinois.

### **ANGELA GREEN (associate professor)**

Dr. Green advances our understanding of animal husbandry issues in order to address production and sustainability challenges. Using a systematic "speaking animal" approach to explore the interactions of animals with their environment, she designs housing systems and management strategies to simultaneously promote animal welfare and more efficient resource utilization.

### **TONY GRIFT (associate professor)**

Dr. Grift develops robotics and sensing technologies that aid agriculture with efficiently reaching its production potential while minimizing its environmental impact. The grand challenge is to set humanity on a trajectory where it can feed itself sustainably, indefinitely, and from renewable sources alone.

### **JOE HARPER (professor)**

Dr. Harper works with industry representatives to develop and implement educational and career placement programs. He leads the Technical Systems Management program and provides undergraduate and graduate teaching and advising.

### **KENT RAUSCH (associate professor)**

Modern grain processes produce a high-valued primary product with an assortment of low-valued coproducts. Dr. Rausch improves nutrient separation in processing streams so the resulting coproducts are better suited to the end user and more valuable to the producer. Improved separation increases efficiency, reduces the environmental footprint, and increases sustainability of grain processing.

### **LUIS RODRIGUEZ (associate professor)**

Dr. Rodriguez specializes in biological system modeling, simulation, and analysis. He works to ensure that complex food and agricultural systems can operate efficiently, with minimal wastage, while managing costs for the benefit of both society and the environment.

### **VIJAY SINGH (professor, director of Integrated Bioprocessing Research Laboratory)**

Dr. Singh focuses on science and engineering required to produce sustainable food, biofuels, and bioproducts. He develops novel, cost-effective bioprocessing technologies that improve recovery of chemical and phytochemical constituents from biological material and their conversion to higher value industrial products.

### **LEI TIAN (associate professor)**

Dr. Tian develops real-world precision and site-specific tools for industry and government agencies to use in agriculture and natural resources management. His research ranges from on-farm production uses such as weed control to large-scale agribusiness uses such as regional yield estimations.

### **XINLEI WANG (professor)**

Dr. Wang develops creative engineering solutions to problems dealing with the environment and energy in biosystems that involve humans, plants and animals. He investigates renewable energy such as solar, wind, and geothermal energy and technologies that improve energy efficiency in building environment controls, agricultural production, and processes. He also studies how to control livestock production emissions for air quality improvement.

### **YUANHUI ZHANG (professor, Innoventor Professor in Engineering)**

Dr. Zhang advances hydrothermal processes of converting wet biomass into biocrude oil and biochemicals. The processes recover nutrients, treat the wastewater, and capture carbon dioxide. The biocrude is then upgraded into transportation fuel. He develops advanced technology for fluid flow studies that can quantify profiles of velocity, acceleration, pressure, and particulate transport fate.

# What we do & Why it matters

## Agricultural and Consumer Economics | [ace.illinois.edu](http://ace.illinois.edu)

The Department of Agricultural and Consumer Economics is comprised of world-renowned faculty whose research and outreach programs influence national and international policymaking on issues ranging from how producers, consumers, and agribusinesses manage risk and adapt to climate change to the impacts of new technologies, environmental regulations, federal laws on profitability and human well-being.

### **SEAN FOX** (department head)

Dr. Fox uses surveys, market experiments, and retail trials to investigate how consumers value new food attributes and improvements in food safety. He studies the differences in valuation that occur between hypothetical and non-hypothetical situations, and how new information about products or technologies influences their valuation.

### **AMY W. ANDO** (professor)

Dr. Ando helps conservation agencies and groups maximize the benefits people glean from investments to protect nature. She helps conservation agents decide where conservation should be, how long conservation contracts should last, and how we can reduce the risk of future conservation failure. She quantifies the benefits people gain from the environment and studies how those benefits are distributed among different groups of people.

### **MARY ARENDS-KUENNING** (associate professor)

Dr. Arends-Kuenning studies the decisions that households make about fertility, schooling, and work. She examines the implications of these decisions for household members' present and future well-being.

### **KATHY BAYLIS** (associate professor)

Dr. Baylis helps stakeholders design agricultural, conservation, and trade policy to promote ecosystem preservation and international food security. She assesses the effectiveness of interventions and their consequences for global food security, the environment, and social welfare.

### **DAVID S. BULLOCK** (professor)

Dr. Bullock improves the way the world fertilizes its crops. He leads a multinational project that uses precision agriculture technology and the Global Positioning System (GPS) to conduct on-farm field trials in the Northern and Southern Hemispheres. He studies how fertilizer management, soil characteristics, and weather interact to affect crop yields in order to help farmers fertilize more efficiently, which lowers production costs and improves water quality.

### **PETER CHRISTENSEN** (assistant professor)

Dr. Christensen leads a team of economists and computer scientists that are integrating new forms of data, machine learning algorithms, and large-scale experiments into economic research in his role as a core faculty member at the National Center for Supercomputing Applications (NCSA). He focuses on energy and environmental economics, particularly as related to public goods provision in cities around the world.

### **JONATHAN COPPESS** (clinical assistant professor)

Mr. Coppess' experience in federal policymaking guides his research, extension, and teaching in agricultural policy and law. His work connects the history of federal agricultural policy development to current policy development, specifically applied to risk management and natural resource conservation.

### **BEN CROST** (assistant professor)

Dr. Crost explores the mechanisms through which climate change and development aid interventions affect agriculture and civil conflict. Understanding these mechanisms is important for the design of adaptive policies that can prevent conflict and limit the negative effects of climate change on agriculture and human well-being.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Agricultural and Consumer Economics

### **SANDY DALL'ERBA** (associate professor)

Dr. Dall'Erba advances our understanding of the impact of climate change and associated extreme weather events such as droughts and floods on our economy, agricultural productivity, and on water scarcity. He also improves regional economic development models and assesses the impact of regional development policies.

### **BRENNA ELLISON** (assistant professor)

Dr. Ellison studies how people make food choices, particularly how consumers use information in their food choice decisions, in order to promote consumer health and well-being.

### **A. BRYAN ENDRES** (professor)

Dr. Endres studies the impact of law throughout food and bio-products supply chains and develops solutions to improve regulatory outcomes. He explores a range of issues, including legal structures to support farms engaged in direct marketing, small farm regulatory compliance, liability issues relating to use of genetically engineered seed, and developing cooperative legal structures to better manage invasive plants.

### **PHILIP GARCIA** (professor)

Dr. Garcia studies agricultural commodity futures and options markets. He investigates how prices are determined, the uncertainty that exists, and how producers and market participants can use these markets to manage the risks they face in their business operations.

### **PETER D. GOLDSMITH** (professor)

Dr. Goldsmith brings new ideas about markets, commercial practices, and management to help small- and medium-scale farmers escape the trap of persistent poverty while helping small agribusinesses establish a vibrant private sector. He leads USAID's Feed the Future Lab for Soybean Value Chain Research bringing 50 researchers across 15 countries together to develop soybean as a technology to reduce poverty and malnutrition in the poorest countries of the world. He is using his soybean research and teaching experience over the past 15 years in Brazil and Argentina to make a difference in Africa and other developing countries.

### **BENJAMIN M. GRAMIG** (associate professor)

Dr. Gramig works on issues at the interface between humankind and the environment related to water quality and quantity, and climate change mitigation and adaptation. He conducts research to understand farmer behavior, and designs policies and programs to increase economic efficiency in agricultural conservation. He develops decision support tools and conducts outreach to train extension educators and farm advisers.

### **CRAIG GUNDERSEN** (professor)

Dr. Gundersen informs policymakers and program administrators who are seeking paths to reduce food insecurity and its consequences. Over 40 million Americans live in food insecure households and, due to serious health consequences, food insecurity has become one of the leading health care crises in the United States. He evaluates food assistance programs, with a particular emphasis on the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program).

### **TODD HUBBS** (clinical assistant professor)

Dr. Hubbs performs outlook analysis and research for commodities of importance to Illinois farmers. He develops price forecasting models and risk assessments for agricultural commodities, financial variables, and production issues related to Illinois farming.

### **SCOTT H. IRWIN** (professor)

Dr. Irwin helps farmers in Illinois, the United States, and throughout the world make more informed production, marketing, and financial decisions by evaluating the economic factors that affect corn and soybean prices. He also leads *farmdoc*, a pathbreaking Extension project that provides timely, useful, and relevant online information about Corn Belt farm economics.

### **MADHU KHANNA** (professor)

Dr. Khanna examines the motivations for producers to adopt innovative production technologies to meet demands for food and fuel, such as precision farming, biofuels, and to participate in conservation programs. Her work informs stakeholders and policy makers about the cost-effectiveness of various policy approaches to improve environmental quality and their implications for farm profitability, land use and food and fuel production.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Agricultural and Consumer Economics

### **TODD KUETHE** (clinical assistant professor)

Dr. Kuethe helps policymakers, farmers, and landowners make better decisions to ensure a safer, more flexible, and more stable agricultural economy. Farm real estate accounts for more than 80% of the U.S. farm sectors asset base and serves as the primary source of collateral in farm loans. He studies a variety of issues related to farm real estate markets, agricultural credit, and agricultural policy.

### **CRAIG LEMOINE** (director of Financial Planning Program)

Dr. Lemoine leads the Financial Planning Program in the College of ACES. He prepares students to enter a profession that can change the lives and financial outcomes of clients, families, and their businesses. He teaches students to become wealth managers, insurance professionals, and Certified Financial Planning™ professionals.

### **ANGELA LYONS** (associate professor)

Dr. Lyons works closely with industry, education, and government to build practical, sustainable, and measurable models that offer innovative solutions for improving the financial stability of families and communities worldwide. She focuses on emerging issues in economic and financial inclusion, poverty and wealth inequality, financial education, and consumer financial protection.

### **MINDY MALLORY** (associate professor/undergrad director)

Dr. Mallory examines the effects of electronic trading on liquidity costs and price discovery in commodity futures markets. She is advancing our understanding about how markets digest information minute by minute and second by second, and is working to develop tools to mitigate risk in a variety of settings.

### **PAUL MCNAMARA** (associate professor)

Dr. McNamara develops and strengthens extension services to help them meet the needs of some of the world's poorest smallholder farmers in places like Ghana, Kenya, and Malawi. Through his AgReach Program, he assists organizations and programs that reach over 12 million smallholder farmers and helps them to improve their agricultural productivity, increase their incomes, and achieve better household food security.

### **HOPE MICHELSON** (assistant professor)

Dr. Michelson studies the dynamics of poverty and security in low-income countries where market failures are a fact of life. One of her key subjects is the interaction of international development efforts with local and large-scale agribusiness. She investigates how small farmers respond to the expansion of international supply chains, the sourcing of agricultural products, and the buying and selling of agricultural inputs.

### **ERICA MYERS** (assistant professor)

Dr. Myers provides new evidence on the causes of the “energy efficiency gap”—consumers’ apparent under-investment in energy efficiency given many measures could pay for themselves in a short period. She identifies market failures for energy efficiency investments and quantifies the effects of policy solutions for those market failures. She informs the design of recent international and regional greenhouse gas reduction policies, which rely heavily on energy efficiency investments to meet their targets.

### **CARL H. NELSON** (associate professor)

Dr. Nelson’s research impacts the evaluation of food policies by highlighting errors in impact measurements that fail to account for household budget constraints and substitution in response to relative price changes. He focuses on the economic impacts of market outcomes like commodity price spikes, economic development projects, and human health outcomes like child stunting from malnutrition.

### **HAYRI ONAL** (professor)

Dr. Onal applies mathematical methods and develops computer models to find improved or best solutions to problems involving operations management and economic analysis of complex decision-making situations. His recent research focuses particularly on environmental and resource economics, renewable energy, and conservation of ecosystems.

### **NICK PAULSON** (associate professor/grad director)

Dr. Paulson helps agricultural producers make the best farm- and risk-management decisions possible to optimize profitability and environmental sustainability. He analyzes government policies impacting agriculture, including crop insurance, commodity, and biofuels programs.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Agricultural and Consumer Economics

### **MICHEL ROBE** (professor)

Dr. Robe provides insight on the financialization and the automation of commodity trading. His research reveals their impact on commodity pricing and market liquidity. He is advancing our understanding of the causes and consequences of price volatility in financial and commodity markets, improving grain price forecasting.

### **GARY D. SCHNITKEY** (professor)

Dr. Schnitkey uses Farm Business Farm Management (FBFM) data on revenue and costs to analyze profitability of major field crops and to assess impacts of farm programs and risk management strategies. His research informs farmers of the most profitable rotations and encourages long-term change to impact yield.

### **JON SCHOLL** (instructor)

Mr. Scholl leads experiential learning programs that build leadership skills and knowledge of the policy process at the local, state, and federal levels of government. These courses help students understand in a real-world context how policy affects them and how they can constructively engage in the policy-making process.

### **TERESA SERRA** (associate professor)

Dr. Serra studies agricultural commodity financial markets, including price discovery in agricultural futures markets, forecasting, risk management, and volatility spillovers. Her recent research focuses on market microstructure in the age of electronic and high frequency trading.

### **BRUCE J. SHERRICK** (professor)

Dr. Sherrick helps make crop insurance programs work better for crop producers across the United States. Through Farmer Mac, he helps create and implement loan-funding programs that increase farmers' access to capital. As a member of the Farmland Technical Advisory Board, he coordinates the required calculations that support the use-value farmland assessment system in Illinois. He helps build information systems for agricultural asset markets that utilize big data and novel computational strategies to better understand farmland values.

### **PAUL STODDARD** (lecturer)

Mr. Stoddard challenges students to think about new things in different ways and old things in new ways in order to open up new areas of study and exploration in agricultural economics. Every day, he strives to reduce knowledge to "that simple compound of the obvious and the wonderful", as H. L. Mencken put it, to help students become passionate ambassadors for agriculture, for the business of food, and for the department and college.

### **ALEX WINTER-NELSON** (professor)

Dr. Winter-Nelson applies economics to better understand how we can alleviate poverty and hunger in some of the world's most disadvantaged places. He works in Africa and Asia to examine what technologies, policies, and programs are most effective in enabling poor people in rural areas to move themselves from poverty into economic security. He examines the constraints on the adoption of new agricultural technologies by small-scale farmers whose livelihoods depend on finding sustainable ways to intensify their production.

### **YILAN XU** (assistant professor)

Dr. Xu advances the knowledge of the financial decision-making process, the motivators and barriers to financial wellbeing, and the mechanisms of social mobility. She uses empirical economic methods to address policy-relevant issues related to financial behavior and consumer welfare. Her research provides policy implications on financial regulation, consumer financial protection, financial education, and neighborhood stability.

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# What we do & Why it matters

## **Agricultural Communications** | [agcomm.illinois.edu](http://agcomm.illinois.edu)

Agricultural Communications at Illinois interweaves the study of agricultural and environmental sciences with that of journalism, advertising, marketing, multimedia communications, and more. The program is presented jointly by two colleges: the College of ACES and the College of Media. Students develop expertise in agriculture and related topics taught by world-class ACES faculty while learning the principles and practices of the communications profession from award-winning faculty in the College of Media.

### **LULU RODRIGUEZ** (director)

Dr. Rodriguez leads the only program in the country that interweaves the study of agricultural and environmental sciences with that of journalism, advertising, public relations, and multimedia communications. Agricultural Communications develops proficient communicators who promote a broader understanding of agriculture and the environment while applying critical thinking skills to explain complex agricultural and environmental issues and their implications.

### **HEATHER CUPPS-MILLER** (full-time instructor)

Ms. Miller teaches courses that strengthen journalism and communications involving the food complex, natural resources, rural-urban interactions, and other dimensions of agriculture and the environment. She cultivates students skilled in communicating across multimedia platforms.

### **RICK DANZL** (part-time instructor)

Mr. Danzl brings 25 years of experience as a photojournalist to cultivate visual communicators who can make the images of agriculture and the environment come alive to a variety of audiences. He teaches students photographic skills that can be applied in developing visuals for a variety of multimedia platforms.

# What we do & Why it matters

## **Agricultural Education** | [aged.illinois.edu](http://aged.illinois.edu)

The Agricultural Education Program prepares students for careers that help develop other people, organizations, and communities to solve real-world problems. Our graduates work with people in a variety of settings from high school classrooms to corporate-office training to workshop facilitation.

### **JASMINE COLLINS** (assistant professor)

Dr. Collins applies critical theories and methods to examine college student awareness and advocacy around contemporary social issues. Through her research, teaching, and service, she develops agricultural leaders who are self-and-socially aware, multiculturally competent, and unafraid to tackle big issues.

### **JASON EMMERT** (associate director)

Dr. Emmert provides leadership and mentorship for faculty, staff, and students, and assists with development of additional financial support for the agricultural education program. He also helps the program provide support to local, regional, and statewide agricultural education-related organizations, which also offer opportunities to students in the program.

### **PRASANTA KALITA** (director)

Dr. Kalita leads the Agricultural Education Program in the College of ACES. He oversees the budget, hires faculty and staff, oversees promotion and recognition, recruits students, and manages educational programs within the unit.

### **DAVID ROSCH** (associate professor)

Dr. Rosch explores ways to help high school and college students develop leadership skills to help set them apart from their peers and distinguish themselves as future leaders in the job market. He helps students build their confidence in serving as a leader of their peers and motivates them to become more engaged in their communities.

### **ERICA THIEMAN** (assistant professor)

Dr. Thieman identifies stress and resilience factors that impact teacher development, performance, and reflection. She studies the current U.S. supply and demand crisis to fill secondary education and agricultural education teacher positions. Thieman helps professionals in high-stress careers understand how their lifestyle choices affect their performance and recovery.

# What we do & Why it matters

## **Animal Sciences** | [ansc.illinois.edu](http://ansc.illinois.edu)

The Department of Animal Sciences' graduates and discoveries contribute to a safe, nutritious, sustainable, and affordable food supply and enhance the well-being of humans and animals.

### **DOUG PARRETT** (interim department head)

Dr. Parrett works with beef producers to identify more predictable genetics for their beef herds to improve the sustainability and quality of beef and beef production enterprises. His teaching in Introductory Animal Sciences informs students to the breadth of animal production and research and helps them to discover pathways and opportunities to meet their career goals.

### **JONATHAN BEEVER** (professor)

Dr. Beever is one of the foremost leaders in identifying genetic defects and congenital abnormalities in cattle and sheep. His research and development of DNA testing has equipped livestock producers with tools to eliminate genetic problems in their herds. Gene-editing methods are being used in cattle and pigs to enhance production efficiencies, allowing producers to reduce costs and increase meat quality and flavor.

### **DUSTIN BOLER** (assistant professor)

Dr. Boler is finding ways to increase the efficiency of meat animals and improve the quality of fresh and processed meat products. He works with the pharmaceutical industry to evaluate the effects of on-farm practices on carcass characteristics and yield. Boler also investigates issues related to the fat quality of meats and bacon production.

### **ISAAC CANN** (professor)

Dr. Cann examines genes and corresponding enzymes that catalyze efficient conversion of biomass cellulose to sugars in order to help develop sustainable, renewable energy for the world. He is advancing knowledge in plant cell wall hydrolysis in ruminants, fiber digestion in the human gut, and also DNA replication/repair in single-celled microorganisms to reduce greenhouse gas emissions.

### **FELIPE CARDOSO** (assistant professor)

Dr. Cardoso addresses the most important challenges faced by the dairy industry through his research in nutrition and reproduction. He engages dairy producers to implement data-driven best management practices into their operation. He studies the mechanisms of metabolic adaptation from gestation to lactation and the impact of nutrition on metabolism, reproduction, and health.

### **MARIA R. C. DE GODOY** (assistant professor)

Dr. Godoy is improving the quality of life and wellness of companion animals through research focusing on ingredient evaluation and foodomics, pet food technology, and therapeutic nutrition.

### **MEGAN DAILEY** (assistant professor)

Dr. Dailey is advancing the understanding of regenerative biology and tissue engineering with exciting potential to mitigate disease like obesity and diabetes. Through studying the impact of nutrition on gastrointestinal stem cell proliferation and differentiation, she will be able to better design diets for malfunctioning organs or to produce organs for transplantation.

### **ANNA DILGER** (associate professor)

Dr. Dilger is advancing the use of performance-enhancing technologies in livestock production to provide high-quality meat products to consumers. Her research examines the molecular mechanisms related to increased animal growth, efficiency, and the effects on meat quality.

## Animal Sciences

### **RYAN DILGER** (associate professor)

Dr. Dilger conducts interdisciplinary research involving nutrition, immunology, and neuroscience. Working with pig and chicken models, his research solves practical nutrition issues faced by modern animal agriculture, and use of a translational pig model to study early-life effects of nutrition on the microbiome, immune system, and brain to improve both human and animal health and well-being.

### **JAMES DRACKLEY** (professor)

Dr. Drackley works extensively with dairy and feed industry groups around the world to improve the health and productivity of dairy cattle. He focuses much of his nutrition and metabolism research on the transition period from pregnancy to lactation in cows and the transition from milk-feeding to solid feed intake in calves.

### **MICHAEL ELLIS** (professor)

Dr. Ellis is advancing swine production operations around the world through his applied swine research program. His research tackles a range of production and management issues including managing growth of pigs in wean-to-finish facilities, animal handling and transportation, and pork quality.

### **JASON EMMERT** (professor)

Dr. Emmert seeks nutritional strategies to improve efficiency of nutrient utilization in broiler chicken diets, with the goal of reducing production cost and reducing nutrient excretion. He actively contributes to the teaching program and uses his interactions with animal sciences students to help them understand the depth and breadth of opportunities in the field.

### **REX GASKINS** (professor)

Dr. Gaskins studies cancer metabolism. His current research focuses on the investigation of the biological basis of the increased risk for the development of colorectal cancer associated with consuming a diet high in red meat and saturated fat, and the role of mitochondria in tumor cell migration in patients with brain cancer.

### **RODNEY JOHNSON** (professor; director of DNS)

Dr. Johnson is finding ways to promote, protect, and maintain brain health by studying communication pathways between the immune system and the brain. He investigates how infection, nutrition, and birth weight affect brain and cognitive development. He also studies how aging causes deterioration in brain health.

### **KEVIN KLINE** (professor)

Dr. Kline's research focuses on the detection of illegal substances in race horses, the effects of feed processing on growth and feed efficiency in young horses, stallion fertility, and detecting osteochondritis in foals. Kline has served as a consultant for state racing commissions and race tracks to maintain the integrity of horse racing.

### **ROBERT KNOX** (professor)

Dr. Knox helps swine producers around the world provide high-quality pork to consumers. A national and international leader in applied swine reproductive management, his research focuses on swine fertility, stress, reproductive diagnostics, hormonal control of reproduction, and fertility of cryopreserved swine sperm.

### **KENNETH KOELKEBECK** (professor)

Dr. Koelkebeck helps poultry producers across the globe provide high-quality eggs and meat for consumers. His research in poultry production, environmental management, waste management, nutrition, and biosecurity impacts small flock and commercial poultry producers.

### **ANNA KUKEKOVA** (assistant professor)

Dr. Kukekova studies genetics of social behaviors. She works with unconventional animal models that hold a significant potential for understanding genetic regulation of affiliation, aggression, anxiety, and fear, social behaviors that are consistently associated with human neurological disorders. The identification of genes and gene networks involved in regulation of these behaviors can also be a subject of interest for animal breeding programs focused on selection for behavioral traits.

### **JUAN LOOR** (associate professor)

Dr. Loor is an international leader in his field, advancing knowledge to better understand cattle development while helping feed a growing world population. He studies nutritional and physiological genomics during the neonatal, lactation, and rapid growth periods in both beef and dairy cattle.

## Animal Sciences

### **RODERICK MACKIE** (professor)

Dr. Mackie is advancing animal health, biofuel production, and food safety through his research in microbiology. His work focuses on anaerobic microbiology and fermentations, molecular microbial ecology in gut ecosystems, degradation of plant cell wall polymers and biomass, nitrogen metabolism, anaerobic waste digestion, and antibiotic resistance genes.

### **JOSH MCCANN** (assistant professor)

Dr. McCann studies the influence of nutrition on metabolism and growth of feedlot cattle by characterizing ruminal fermentation, the gut microbiome, and muscle development. His work contributes to the efficiency, sustainability, and profitability of feedlot cattle operations providing high-quality beef to consumers.

### **DAVID MILLER** (professor)

Dr. Miller is advancing knowledge in mammalian fertilization and early development. His work has led to novel ways of storing sperm outside of the reproductive tract and greater accuracy in estimating male fertility, allowing livestock producers to improve and control farm animal fertility. His research also helps human medical professionals provide better services to their patients.

### **JAN NOVAKOFSKI** (professor)

Dr. Novakofski studies prion diseases or infectious agents composed entirely of protein in animals such as “mad cow disease” and scrapie. His efforts are contributing to better understanding the genetics and transmission of these types of diseases to protect the health of animals and humans.

### **ROMANA NOWAK** (professor)

Dr. Nowak is finding new therapeutic strategies to address reproductive diseases in women. Using the chicken as a model, she studies the use of dietary intervention as a way to prevent and treat uterine fibroids. Her research provides insight into important aspects of reproductive biology, including how environmental factors impact reproductive diseases and infertility in women.

### **CARL PARSONS** (professor)

Dr. Parsons is developing high-quality feeds to enhance the growth and health of humans and animals. Although his primary focus is on poultry nutrition, he also studies nutrition of humans, ruminants, companion animals, fish, and zoo animals with an emphasis on feed ingredient and foodstuffs evaluation.

### **JASON RIDLON** (assistant professor)

Dr. Ridlon is helping find treatment strategies to improve human health and animal well-being. He studies gut microbiology, specifically the biochemistry and molecular biology of steroid and bile acid biotransformations by the gut microbiota. He is trying to understand how microbial metabolites promote gastrointestinal tract diseases such as liver and colorectal cancers, as well as essential hypertension.

### **ALFRED ROCA** (associate professor)

Dr. Roca conducts genetic studies on wildlife and domesticated animals. He uses DNA from elephants to determine conservation priorities for the species and to establish the geographic origins of confiscated ivory. He also studies “endogenous” retroviruses, which are retroviral copies that have become permanent components of the DNA of humans and animals, and can impact their health.

### **SANDRA RODRIGUEZ-ZAS** (professor)

Dr. Rodriguez-Zas is helping find ways to prevent and cure diseases in both livestock and humans. She uses biostatistics and computational approaches to identify biomarkers and molecular pathways associated with health, reproduction, and performance in livestock species, and cancers in humans.

### **JANEEN SALAK-JOHNSON** (associate professor)

Dr. Salak-Johnson's research on the impact of the environment and stressors on animal well-being has enabled her to implement many changes that help U.S. livestock producers raise healthy animals. Her work focuses on sow housing, prenatal stress, and effects of the environment on immune status and behavior of swine and other livestock.

### **LAWRENCE SCHOOK** (professor)

Dr. Schook is developing the pig as a biomedical cancer model to help medical professionals better understand and treat this life-threatening disease. An international scholar in comparative genomics, he led the pig genome-sequencing project that has provided researchers insights into human cancer and other chronic diseases.

## Animal Sciences

### **DAN SHIKE** (associate professor)

Dr. Shike identifies management and nutritional strategies that not only improve the reproduction and longevity of beef cows, but also optimize growth, efficiency, and carcass traits of the cow's offspring. Collectively this work leads to the efficient, sustainable production of an affordable, abundant food supply.

### **ANDREW STEELMAN** (assistant professor)

Dr. Steelman investigates the impact of environmental factors such as infection, nutrition, and environmental and psychological stress on the intercellular communication pathways between cells of the brain and the immune system.

### **HANS STEIN** (professor)

Dr. Stein evaluates energy and nutrient digestibility and metabolism in monogastric animals and humans. He makes discoveries in the area of energy, mineral, carbohydrate, and amino acid absorption and utilization with applications for pig, as well as for humans.

### **KELLY SWANSON** (professor)

Dr. Swanson's research is contributing to the development of quality feeds for companion animals and dietary guidelines to help prevent obesity and other health-related issues in humans. He studies the effects of nutritional intervention on health outcomes, identifying mechanisms by which nutrients impact gene expression and host physiology, with primary emphasis on gastrointestinal health and obesity.

### **MATTHEW WHEELER** (professor)

Dr. Wheeler is a tireless advocate for using embryo technologies to improve genetics of livestock and reduce food insecurity throughout the world. He is advancing technology in both livestock production and human medicine through his research on embryo/developmental biology, stem cells, cloning, transgenic livestock, reproduction, genomics, and regenerative biology.

# What we do & Why it matters

## **Crop Sciences** | [cropsciences.illinois.edu](http://cropsciences.illinois.edu)

The Department of Crop Sciences is advancing agriculture through local and international research to increase food security while protecting the environment. Our internationally recognized faculty lead cutting-edge research programs that educate the next generation of agriculture professionals.

### **GERMÁN BOLLERO** (department head)

Dr. Bollero utilizes advanced statistical methods to define, quantify, and find solutions to increase productivity and profitability of food systems, while reducing undesirable impacts of agricultural practices on ecosystems. His accurate modeling and interpretation of cropping system productivity and environmental services drive future agricultural and environmental practices.

### **MOHAMMAD BABADOOST** (professor)

Dr. Babadoost develops solutions for vegetable and fruit crop diseases. He is internationally renowned for identifying effective disease management strategies for cucurbits, tomatoes, peppers, horseradish, basil, and apples. He also educates scientists in developing countries to improve production and quality of food crops.

### **FRED BELOW** (professor)

Dr. Below creates strategies to teach farmers and agricultural professionals the value of crop management decisions, and develops systems to sustainably produce high-yielding corn and soybeans. He evaluates environmental, genetic, and management factors that impact the productivity of corn and soybeans.

### **MARTIN BOHN** (associate professor)

Dr. Bohn breeds corn lines that contribute to economically efficient and sustainable, high-yielding production. He studies the genetic basis of biotic and abiotic stress responses, root development, and grain processing characteristics of corn using innovative, high-throughput phenotyping tools and genomic information.

### **BRUCE BRANHAM** (professor)

Dr. Branham studies horticultural cropping and food systems. His research focuses on management and production issues in perennial crops ranging from turf grasses to small fruits.

### **GUSTAVO CAETANO-ANOLLÉS** (professor)

Dr. Caetano-Anollés explores molecular diversity and how molecular structure determines biological function in plants, animals, fungi and microbes of significance to agriculture. He studies the origin, structure, and evolution of genomes, proteomes, RNomes, and functionomes for applications including bioengineering, biomedicine, and systems biology.

### **LAURA CHRISTIANSON** (assistant professor)

Dr. Christianson addresses important challenges in water quality by finding new techniques to grow crops in a way that preserves clean water, nutrient-rich soil, and healthy ecosystems. She is an international expert in woodchip bioreactors that help growers reduce the amount of nitrogen in drainage water from agricultural fields.

### **REID CHRISTIANSON** (research assistant professor)

Dr. Christianson studies regional and national impacts of landscape decisions (agricultural and urban) on water quality. This work relies on collaborative partnerships and data-driven approaches to quantify benefits—water quality and other—provided by conservation practices. He also has expertise in water movement through the natural and man-made environment and stormwater management.

### **ADAM DAVIS** (professor)

Dr. Davis uses innovative modeling tools to identify and test new management strategies to make cropping systems more productive, profitable, and environmentally friendly. His research on integrated weed management provides farmers tools to reduce their reliance on herbicides. His group's data-mining analyses present new ways for farmers to improve yield resilience in a changing climate.

## Crop Sciences

### **BRIAN DIERS** (professor)

Dr. Diers develops new soybean varieties and germplasm to help meet the growing global demand for protein and vegetable oil. He advances knowledge in soybean breeding and genetics by identifying genetic diversity using modern genetic tools with a goal of improving economically important traits in the crop.

### **ANDREA FABER TAYLOR** (teaching assistant professor)

Dr. Faber Taylor examines child development in the context of 'nature' and green spaces to support healthy functioning and future stewardship of the earth. She is advancing our understanding of the importance of nature experiences in human development. She teaches courses on this topic, sustainable gardening, and planting design to support pollinators.

### **AARON HAGER** (associate professor)

Dr. Hager contributes to increased crop production through development and implementation of integrated weed management programs. His research helps to identify and manage herbicide-resistance in the most aggressive agronomic weeds.

### **GLEN HARTMAN** (professor)

Dr. Hartman addresses significant challenges faced by soybean producers through his research on soybean diseases and pests. His research includes differentiating pathogens and pests that attack soybeans and providing management strategies for these pests. His collaborative efforts with breeders, biochemists, and molecular biologists are instrumental in unraveling complex disease and pest conditions.

### **SARAH HIND** (assistant professor)

Dr. Hind examines how the plant immune system detects pathogenic bacteria that cause diseases on tomato and other vegetable crops. Her research contributes to the understanding of plant-microbe interactions and aids in the development of plants with enhanced resistance to infection.

### **STEVEN HUBER** (affiliate professor)

Dr. Huber studies proteins and cellular communication to ultimately enhance crop performance in the field. He focuses on proteins in the chloroplast that affect the efficiency with which cells conduct photosynthesis, which has implications for crop yield.

### **MATTHEW HUDSON** (professor)

Dr. Hudson uses supercomputing and DNA sequencing to solve problems in plant, animal, and human genetics. His current research focuses on how crops are bred and on ways to treat and prevent plant, animal, and human diseases. He is particularly interested in the genetics of crop traits and the genetic and molecular interactions of soybeans with pathogens, pests, and other organisms.

### **TIFFANY JAMANN** (assistant professor)

Dr. Jamann is finding ways to decrease losses caused by corn diseases by studying plant host resistance. Her research provides the foundation for the deployment of host resistance as an effective disease management strategy that will provide long-term solutions to corn producers and industry.

### **JACK JUVIK** (professor)

Dr. Juvik is finding ways to enhance food nutritional quality while reducing the incidence of cancer, heart disease, macular degeneration, obesity, and other degenerative diseases in his plant breeding program, which focuses on the development of brassica vegetable germplasm (broccoli, cabbage, cauliflower, and kale) with improved flavor and health properties. He investigates the genetics controlling the biosynthesis of health-promoting phytochemicals in these vegetables.

### **GARY KLING** (associate professor)

Dr. Kling evaluates woody plant species for bioenergy production as a low-emissions alternative to fossil fuels. His current focus is the improvement of black locust germplasm for bioenergy production in a short rotation cropping system.

### **FREDERIC KOLB** (professor)

Dr. Kolb is developing disease-resistant varieties of soft red winter wheat and spring oats. Results from his research are increasing productivity, stabilizing production, and enhancing food safety for farmers, the agriculture industry, and consumers.



## WHAT WE DO & WHY IT MATTERS, CONT'D

### Crop Sciences

#### **MOSBAH KUSHAD** (associate professor)

Dr. Kushad identifies practices that improve production, nutrition, and safety of horticultural food crops. His pioneering work is enhancing food security and economic prosperity of small farmers nationally and internationally.

#### **KRIS LAMBERT** (associate professor)

Dr. Lambert develops sustainable strategies to manage plant nematodes. He studies the molecular and biochemical basis of plant-nematode interactions in order to determine how plant parasitic nematodes evade plant resistance mechanisms.

#### **D.K. LEE** (associate professor)

Dr. Lee improves perennial grass production systems for sustainable biomass and bioenergy feedstocks. His research focuses on increasing genetic and abiotic stress tolerances of perennial grasses. He is finding new ways to integrate perennial grasses into row cropping systems to improve sustainability, ecosystem services, and water quality.

#### **ALEXANDER LIPKA** (assistant professor)

Dr. Lipka accelerates the development of high-performing crops by identifying specific DNA regions associated with agronomically important traits. He uses statistical approaches for quantitative genetic analyses in crops.

#### **STEPHEN LONG** (professor)

Dr. Long's research bioengineers the photosynthesis process in crops to achieve higher productivity, sustainability, and adaptation to climate change. He heads an international project to improve the crops that feed many of the poorest in the world, which has led to the discovery of a way to engineer photosynthesis that resulted in a 20% increase in crop productivity.

#### **SARAH TAYLOR LOVELL** (associate professor)

Dr. Lovell designs landscapes to provide multiple ecological, cultural, and production functions that sustainably address food insecurity, water shortages, and climate change. She focuses much of her research on urban agriculture and productive agroforestry systems that integrate a wide range of functions, including food production.

#### **ANDREW MARGENOT** (assistant professor)

Dr. Margenot addresses the literal foundation of all cropping systems: soils. He is advancing how we monitor and manage soils as natural capital. His research team evaluates how human activities can enhance or compromise soil services to human societies, with an emphasis on food security from urban and rural agroecosystems in the U.S. Midwest and East Africa.

#### **NICOLAS MARTIN** (assistant professor)

Dr. Martin improves long-term profitability and stability of cropping systems by exploring applications of quantitative methods on big data. He leverages interdisciplinary efforts to expand the frontiers of agricultural research; investigates quantitative methods on processes at multiple spatial and temporal scales; and studies effective approaches to implement new insights and discoveries in agricultural decisions and operations.

#### **SANTIAGO MIDEROS** (assistant professor)

Dr. Mideros translates his research on plant pathogens of Illinois field crops into practical management recommendations for producers that increase yield and preserve natural resources.

#### **MARK MIKEL** (assistant professor)

Dr. Mikel studies genetic diversity in field and vegetable crops. He was instrumental in the release of the second corn annotated reference genome, which has become a valuable resource for agricultural research.

#### **STEPHEN MOOSE** (professor)

Dr. Moose discovers genes that influence corn and related bioenergy grasses' response to nitrogen supply. He develops new approaches to increase crop yields with lower input costs and help mitigate environmental issues associated with nitrogen fertilizer. His work reveals how genes cooperate to control plant traits important to both productivity and nutritional quality.

#### **EMERSON NAFZIGER** (professor)

Dr. Nafziger turns agronomic data collected from research throughout Illinois into tools that help producers better manage crops by predicting responses to crop inputs. He created a data-driven nitrogen rate calculator, an online resource that assists producers in improving nitrogen management for corn in most of the largest corn-producing states.

## Crop Sciences

### **CAMERON PITTELKOW** (assistant professor)

Dr. Pittelkow develops management strategies to enhance crop productivity while minimizing nitrogen, carbon, water, and energy footprints. His work addresses sustainability challenges in crop production through collaborative partnerships in the U.S. and internationally.

### **A. LANE RAYBURN** (professor)

Dr. Rayburn examines the role of chromosome changes in crop and native plants for the benefit of crop improvement. He also investigates how plants adapt to changing environmental conditions.

### **DEAN RIECHERS** (professor)

Dr. Riechers investigates how plants respond and adapt to stress caused by herbicides. He explains herbicide-resistance mechanisms and describes herbicide safener mode of action by discovering new genes and proteins that rapidly detoxify herbicides. His work leads to an increased margin of selectivity between cereal crops and difficult-to-control weeds.

### **CHANCE RIGGINS** (research assistant professor)

Dr. Riggins conducts research in plant evolution, molecular biology, and weed science. His research on agricultural weeds advances fundamental knowledge about the genetics of adaptive traits and helps develop molecular-based tools to assist growers in detecting and managing herbicide-resistant plants.

### **ERIK SACKS** (associate professor)

Dr. Sacks studies the genetics of rice, miscanthus, and sugarcane to facilitate the breeding of improved cultivars that address critical societal needs, such as the sustainable production of food, fiber, and energy. By identifying genes that confer tolerance to environmental stresses, such as cold, heat, or salt, and resistance to diseases and pests, he allows farmers to do more with less by reducing the risks and costs of production.

### **NATHAN SCHROEDER** (assistant professor)

Dr. Schroeder makes new discoveries on the biology of nematodes, one of the world's most abundant group of animals. His work identifies how nematodes survive difficult environmental conditions, which helps control parasitic nematodes and reveals how higher animals like humans deal with stress.

### **NICHOLAS SEITER** (research assistant professor)

Dr. Seiter develops and evaluates management strategies for insect pests of field crops. His research includes developing economic decision-making tools, identifying natural enemies of insect pests, and assessing insect control methods for their effectiveness and fit within management systems. His overall goal is to provide management recommendations that improve the economic returns and environmental profile of insect management practices.

### **ANTHONY STUDER** (assistant professor)

Dr. Studer improves the efficiency and productivity of cereal crops by optimizing photosynthesis and water use. His research contributes to the development of crops that are resilient to climate change and meet the needs of growers at the regional, national, and international levels.

### **PATRICK TRANEL** (professor)

Dr. Tranel uses molecular and genomic approaches to investigate how weeds evolve in response to farmers' attempts to manage them. Resulting knowledge aids in the development of effective, sustainable weed management systems.

### **MARÍA VILLAMIL** (associate professor)

Dr. Villamil identifies management strategies to improve soil health and productivity in agroecosystems by addressing the societal challenge of sustainable food production. She focuses on how changes in soil health brought about by agronomic practices relate to carbon and nutrient cycling, crop production, and mitigation of greenhouse gas emissions.

### **THOMAS VOIGT** (professor)

Dr. Voigt studies the use, selection, and management of perennial turf, ornamental, and bioenergy grasses by identifying high quality and yielding grasses that grow with the fewest labor and management inputs. His applied, field-based work impacts turf managers, landscape designers and architects, and bioenergy producers.

## Crop Sciences

**DAVID WALKER** (assistant professor)

Dr. Walker breeds soybean lines with broad and durable resistance to economically important diseases to reduce dependence on pesticides. He also conducts research on the genetic control of soybean resistance to pathogens and on pathogenic diversity.

**MARTY WILLIAMS** (associate professor)

Dr. Williams helps growers sustainably produce affordable and nutritious vegetables for consumers. He is an international leader in framing high-caliber research, explaining critical problems in weed management and crop production, and delivering solutions to the vegetable seed and processing industries in the U.S. and beyond.

**FRANK ZHAO** (associate professor)

Dr. Zhao's research advances the understanding of microorganism—host interactions to develop novel control strategies for bacterial and fungal diseases of field crops and fruits. He also studies antibiotic resistance in non-agricultural and non-clinical environments to benefit plant and human health.

# What we do & Why it matters

## Food Science and Human Nutrition | [fshn.illinois.edu](http://fshn.illinois.edu)

The Department of Food Science and Human Nutrition implements research, education, and outreach programs designed to promote a safe, nutritious, accessible, and affordable food supply that enhances human health. The basic human need for high-quality foods for optimal health and wellness drives the core of student education as stellar faculty and exceptional students work collectively toward learning, discovering, and disseminating new knowledge and in applying novel technologies in dietetics, food science, hospitality management, and human nutrition.

### **SHELLY NICKOLS-RICHARDSON** (professor and department head)

Dr. Nickols-Richardson helps individuals and families manage body weight and prevent obesity, metabolic syndrome, and osteoporosis through a variety of dietary, physical activity, and nutrition education approaches. She promotes dietary guidelines through community-based interventions and explores consumer behaviors around vegetable choice, preparation, and consumption.

### **JAIME AMENGUAL TERRASA** (assistant professor; Jan 2018)

Dr. Amengual contributes to the reduction of cardiovascular disease by examining how carotenoids and lipid metabolism interact to mediate atherosclerosis. Using animal models and cell culture techniques, he explores the structure and function of vitamin A and its metabolites to mitigate metabolic disease progression.

### **JUAN ANDRADE** (assistant professor)

Dr. Andrade develops and implements technologies and strategies to reduce micronutrient deficiencies in food insecure countries worldwide. He designs and evaluates diagnostic tools to identify populations at risk, and then, develops cost-effective fortification strategies to address their nutrition needs. He leverages his work in different countries to create study abroad programs to train the next generation of competent leaders in food engineering and nutrition.

### **ANNA ARTHUR PARKER** (assistant professor and Sylvia D. Stroup Scholar in Nutrition and Cancer)

Dr. Arthur works to improve overall health and longevity of adults with cancer through nutrition. She studies how diet influences health outcomes after cancer diagnosis. Her ultimate goal is to develop new and beneficial nutrition recommendations and medical nutrition therapies for cancer patients and survivors.

### **HANS BLASCHEK** (professor emeritus)

Dr. Blaschek manipulates the genes of microorganisms for biotechnological applications, examines the feasibility of using food processing co-products as a raw material for value-added biotransformation, and develops integrated fermentation systems for biobutanol production and recovery. He is an expert in the commercialization of butanol fermentation using the solvent-producing clostridia.

### **DAWN BOHN** (teaching assistant professor)

Dr. Bohn delivers award-winning instruction in the introductory food science and human nutrition course, advanced food science electives, and the senior capstone course in food product development. She directs the online Master's of Science in food science program and teaches the online food chemistry course. Many of her student-centered instructional endeavors focus on creating opportunities to solve complex food science problems from raw material quality and handling through sensory exploration while developing novel food products.

### **KEITH CADWALLADER** (professor)

Dr. Cadwallader contributes to the understanding of fundamental and applied flavor chemistry and analysis. He identifies and characterizes key flavor (aroma) compounds, determines the interaction of flavor compounds with food matrix components, and develops methods to stabilize labile potent flavor compounds for use in foods.

### **KAREN CHAPMAN-NOVAKOFSKI** (professor and Extension specialist)

Dr. Chapman-Novakofski investigates how food choice impacts health. Through classes, web applications, and mobile apps, she demonstrates how understanding behavior is a key to supporting those with chronic diseases with making better choices. Her interests include diabetes, bone health, healthy aging, and consumer choices.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Food Science and Human Nutrition

### **HONG CHEN** (associate professor)

Dr. Chen focuses on molecular, biochemical, and nutrigenomic research that advances the knowledge of how diets affect each individual's epigenome. Understanding nutrient regulation of genes during human development and carcinogenesis facilitates precision nutritional care for improved patient outcomes.

### **JILL CRAFT** (clinical assistant professor)

Ms. Craft ensures that hospitality management students develop problem-solving skills to critically analyze managerial issues and implement practical solutions. She teaches, develops, mentors, and advises students to be successful managers and hospitality industry professionals.

### **ELVIRA DE MEJIA** (professor)

Dr. de Mejia investigates bioactive peptides and proteins in foods that promote health benefits for reducing inflammation, markers of type 2 diabetes, cancer, and cardiovascular disease risk. She identifies and characterizes the functional properties of food components, notably flavonoids in ethnic teas, herbs, and berries.

### **SHARON DONOVAN** (professor and Melissa M. Noel Endowed Chair in Nutrition and Health)

Dr. Donovan investigates dietary approaches to improve intestinal and brain development and the gut microbiome. She works with researchers in other fields to find ways to prevent childhood obesity and picky eating behaviors and to reduce the severity of symptoms in children with autism.

### **NICKI ENGESETH** (professor)

Dr. Engeseth works to ensure optimal food quality and nutritional value of the food supply by investigating the impact of environmental growing conditions, processing, and storage on produce and oilseed quality, with emphasis on enzymatic action, lipids, and natural antioxidants.

### **JOHN ERDMAN** (professor emeritus)

Dr. Erdman reduces the risk of prostate cancer by conducting studies on the bioavailability of carotenoids, biological effects of carotenoid metabolites, and use of ultrasound techniques for early detection of prostate cancer and its progression as related to atherosclerosis and non-alcohol liver disease. His work has helped establish dietary reference intakes for humans, as well as recommendations for food intake and dietary patterns to lower cancer risk and improve brain function during aging.

### **HAO FENG** (professor)

Dr. Feng investigates new physical and chemical treatments to increase food safety and quality. He explores how innovative food processing methods contribute to enhanced nutrition in edible plants and seeds, and how novel engineering approaches improve processing efficiency and food quality.

### **BILL HELFERICH** (professor and Diet, Women's Health, and Aging Professor)

Dr. Helferich investigates diet and breast cancer growth and progression with a specific interest on botanical estrogens from soy and other dietary supplemental sources. He also has interest in how thermally abused oil can alter breast cancer metastasis using preclinical models.

### **HANNAH HOLSCHER** (assistant professor)

Dr. Holscher studies how diet influences gut microbes. Using big data approaches, she studies the link between diet, gut microbes, and health and disease.

### **ELIZABETH JEFFERY** (professor emerita)

Dr. Jeffery has identified many mechanisms by which cruciferous vegetables, such as broccoli and Brussels sprouts, lowers the risk of developing liver, prostate, and colorectal cancer in humans. She has shown that bioactive components of crucifers alter the production of certain enzymes, allowing for rapid removal of harmful compounds from the body before toxicity or carcinogenicity can occur.

### **YONG-SU JIN** (associate professor)

Dr. Jin is pioneering the use of engineered microorganisms to deliver bioactive molecules and therapeutic proteins into the gut to prevent and treat gastrointestinal disease. He advances the use of engineered microorganisms for safe and sustainable production of value-added products from renewable biomass. He also optimizes genetic and metabolic processes within cells for enhanced production of target products while minimizing production of byproducts and waste.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Food Science and Human Nutrition

### **JUSTINE KARDUCK** (clinical assistant professor)

Ms. Karduck directs a top-ranked accredited Dietetics Education Program whose alumni achieve a 98% first-time pass rate on the national Registered Dietitian Certification Exam. As a former clinical dietitian and diabetes educator, she utilizes years of experience in the field to train future dietitians.

### **SOO-YEUN LEE** (professor)

Dr. S-Y Lee investigates food systems intended for enhancing consumer health, such as low sodium and low sugar foods. She relates mealtime behavior and genetic predisposition to picky eating, develops nutritional therapies for population with gastrointestinal distress, and identifies context effect in sensory testing.

### **YOUNGSOO LEE** (assistant professor)

Dr. Y Lee designs healthier food products by studying food processing and food engineering. His current research focuses on the food structure-sodium release relationship to develop sodium reduction strategies and novel technologies to deliver bioactive compounds to improve intestinal health. He is also an expert in spray drying and extrusion processes.

### **ZEYNEP MADAK-ERDOGAN** (assistant professor)

Dr. Madak-Erdogan improves the quality of life for postmenopausal women and breast cancer survivors by understanding how diet and nutrition affect hormone action. Her lab uses multiscale modeling of -omics data from patient samples, animal models, and cell lines to understand the molecular basis of metabolic regulation by estrogen receptors and endocrine resistance.

### **JESSICA MADSON** (clinical assistant professor)

Ms. Madson mentors graduate students who participate in the dietetic internship and are pursuing the career pathway to registered dietitian nutritionist credentialing. She makes sure all interns receive the highest level of practical work-related experiences to achieve all learning competencies for success in future careers. She secures supervised practice sites that meet and exceed standards set forth by the accrediting body for the profession.

### **MICHAEL MILLER** (associate professor)

Dr. Miller solves problems related to various aspects of fermentation, in part to develop contamination solutions for industrial fermentations. He develops strategies to improve the safety of fermented dairy products, especially Hispanic-style cheeses. He evaluates the microbial metabolism of dietary components in the gut to maximize health benefits for humans.

### **MARCIA MONACO SIEGEL** (research assistant professor)

Dr. Monaco Siegel develops strategies to optimize infant health to prevent diseases later in life by studying the benefits of breast milk and how it impacts the gut and the immune system.

### **SCOTT MORRIS** (associate professor)

Dr. Morris investigates optical and acoustic Non-Destructive Evaluation in materials and in processes, and works with the optimization and security of production systems, namely food packaging systems. He analyzes data for production efficiency increases, reduction of supply chain diversion, and loss and counterfeiting in the food, pharmaceutical, and consumer product goods sectors.

### **MANABU NAKAMURA** (associate professor)

Dr. Nakamura investigates the role of dietary essential fats on reducing infertility, inflammation, and chronic diseases. He studies how human bodies adapt their gene expression in response to positive or negative energy balances, as well as to varying macronutrient compositions for translation into effective obesity prevention strategies.

### **GRACIELA PADUA** (research professor)

Dr. Padua advances the understanding of nano-scale protein organization and its applications in food, agricultural, and biomedical fields. She has developed nanoencapsulation systems to increase nutrient bioavailability and to retain the taste of fresh fruits.

### **YUAN-XIANG PAN** (associate professor)

Dr. Pan investigates how molecular mechanisms of epigenetic regulation control physiological functions and chronic disease processes. He identifies novel epigenomic mechanisms that will lead to individualized nutritional interventions for specific health outcomes to enhance the well-being of humans.

## WHAT WE DO & WHY IT MATTERS, CONT'D

# Food Science and Human Nutrition

### **M. YANINA PEPINO** (assistant professor)

Dr. Pepino advances the understanding of the effects of taste perception on ingestive behavior and nutrient metabolism. She investigates bariatric surgery-induced weight loss on taste perception, eating and drinking, and the effects of consuming nonnutritive sweeteners on taste preference and blood sugar balance.

### **MELISSA PFLUGH PRESCOTT** (assistant professor; Feb 2018)

Dr. Prescott determines the impact of farm-to-school programs on farmers and food supply chain businesses, household consumption patterns, and school choice, consumption, and plate waste. Using student-driven food systems campaigns promoting meal participation, vegetable consumption, and plate waste reduction, she promotes child nutrition through school-based programming.

### **SHELLY SCHMIDT** (professor)

Dr. Schmidt develops strategies for the food industry to process shelf-stable, high-quality food products. She utilizes food materials science (i.e. water activity, isotherms, glass transition temperatures, and nuclear magnetic resonance spectroscopy) to identify relationships to the physical, chemical, and microbial stability and quality of food systems.

### **MATT STASIEWICZ** (assistant professor)

Dr. Stasiewicz applies new tools in genomics and data science to food safety microbiology. He develops methods to identify when bacterial pathogens persist in food-associated environments and to clean corn that has been contaminated with toxins produced by fungi. His work takes global strides toward building risk-based food safety systems.

### **PAWAN TAKHAR** (associate professor)

Dr. Takhar explores polymer mechanics coupled with movement of heat, moisture, and oil in porous foods to improve their quality during processing. He designs and solves complex mathematical models to optimize energy use and improve food processing and engineering methods.

# What we do & Why it matters

## Human Development and Family Studies | [hdfs.illinois.edu](http://hdfs.illinois.edu)

The Department of Human Development and Family Studies is comprised of highly productive faculty committed to addressing challenges regarding human development, relationships, and families through cutting-edge research, award-winning instruction, and culturally sensitive outreach. HDFS faculty and student scholarship is always conducted with a view to relevant contextual issues and to practical implications be they for community or health professionals, families/parents, schools/teachers/youth program leaders, or policymakers.

### **SUSAN SILVERBERG KOERNER** (department head)

Dr. Koerner advances knowledge about the emotional and physical well-being of adults who provide care for elder family members who are frail, ill, or disabled (e.g., older parents or spouses). Through her research on caregiver daily stress reactivity, family members' conflict and disagreement regarding elder care, and the unique experiences of Hispanic/Latino caregivers, she aims to inform interventions and culturally relevant programs for family caregivers at risk.

### **KELLY BOST** (professor)

Dr. Bost examines how families and parent-child attachment relationships impact children's socioemotional and health-related outcomes. Her work is advancing knowledge about the role of self-regulatory processes in the development of pediatric obesity, and cuts across disciplinary boundaries to examine complex interactions between biological and family factors to ultimately improve the health and well-being of children and families.

### **AARON EBATA** (associate professor, Extension specialist)

Dr. Ebata applies community-based Extension strategies and technological innovations in supporting families, including families with young children and those with children on the autism spectrum. He also investigates the impact of nature on family health and how family-based nature activities can promote strong family relationships.

### **GAIL FERGUSON** (assistant professor)

Dr. Ferguson is a leader in understanding how the identities and well-being of youth and families internationally are being impacted by 21st-Century globalization. She has pioneered theory and research identifying Americanization and U.S. media viewing as risk factors for unhealthy eating and family conflict among teenagers and parents in the Caribbean and elsewhere. Through international transdisciplinary collaborations spanning psychology, advertising, and nutrition, she has catapulted these cutting-edge findings into an innovative global health family intervention.

### **BARBARA H. FIESE** (professor, director of the Family Resiliency Center)

Dr. Fiese explores the effects of shared mealtimes on child and family health. She applies this knowledge to advance research and policy in the prevention of childhood obesity starting at birth and the reduction of childhood hunger through private-public partnerships.

### **JENNIFER HARDESTY** (professor)

Dr. Hardesty is advancing the understanding of intimate partner violence, separation/divorce, and parenting after separation. Through studying how different types of violence during marriage relate to different co-parenting experiences and health outcomes after separation, she will be able to inform prevention and intervention efforts with divorcing parents.

### **ROBERT HUGHES, JR.** (professor)

Dr. Hughes studies divorce and its effects on children and their parents. He is particularly interested in developing educational programs that can help children and their parents develop healthy ways of dealing with changes and stresses in their families. He has worked with Sesame Street and many other groups to develop interesting and engaging activities for coping. He is also developing social media strategies to engage teens and young adults.

### **ROBIN JARRETT** (professor)

Dr. Jarrett conducts research on resilience in ethnic-racial group families. Her work advances our understanding of how, despite the adversity of poverty and residence in resource-poor neighborhoods, families promote the positive development of their children. As an urban ethnographer, she uses a wide array of qualitative data collection strategies that highlight the strengths of ethnic-racial group families.



## Human Development and Family Studies

### **KAREN KRAMER** (assistant professor)

Dr. Kramer is advancing the understanding of the relationship between the division of work and care in families, and career and family outcomes of individuals. She investigates how policies such as paid and unpaid parental leave affect the division of care between parents, future career outcomes of mothers and fathers, and the health and well-being of families.

### **SOO AH KWON** (associate professor)

Dr. Kwon uses qualitative ethnographic methods that focus on the role of young people in local community-based organizations, international NGOs, and universities, and how they mediate power relations and social inequalities. Given that youth in the United States and around the world stand as metaphors for society, her work advances contemporary understandings of race, citizenship, and governance.

### **REED LARSON** (professor)

Dr. Larson's research identifies the types of key experiences that young people have in arts, STEM, and leadership programs that facilitate their development of skills for problem solving, learning from emotions, and sustaining motivation in challenging work. These findings are used to train program staff and design programs that empower youth.

### **CHRISTY LLERAS** (associate professor)

Dr. Lleras addresses some of the most critical problems of our time including racial health disparities, educational inequality, and poverty by examining how schools and neighborhoods affect child and adolescent health and development and maternal well-being. Her work examines how exposure to chronic social stressors including adverse childhood experiences, poverty, and crime affect mental health, immune functioning, and disease risk among racial minority populations.

### **BRENT MCBRIDE** (professor, director of the Child Development Laboratory)

Dr. McBride is one of the leading researchers in the area of father involvement in families of children with disabilities. His cutting-edge research provides critical insight on how to better support fathers struggling within this challenging parenting context, as well as early intervention personnel working with these families. Additionally, he studies the role of child care contexts in influencing children's obesity and inappropriate weight gain during the early childhood years.

### **NANCY MCELWAIN** (professor)

Dr. McElwain advances understanding of the dynamic early-life interactions between parents and children that shape children's developing abilities to regulate stress. She adopts an interdisciplinary approach that combines neuroscience, psychophysiology, linguistics, and developmental psychology. Through investigating stress regulation during early development, she aims to promote healthy parent-child relationships and children's long-term social and emotional well-being.

### **BRIAN OGOLSKY** (associate professor)

Dr. Ogolsky examines how relational partners maintain healthy romantic relationships across the life course. His work has the potential to inform practitioners and promote policy initiatives designed to enhance family dynamics.

### **RAMONA OSWALD** (professor)

Dr. Oswald is advancing knowledge about lesbian, gay, bisexual, and transgender families living in smaller communities. Even though many LGBT families live outside of major cities, most research ignores this fact. She looks at what support these families need, and how their residential communities can provide it in ways that fit local culture.

### **MARCELA RAFFAELLI** (professor)

Dr. Raffaelli examines how individuals and families facing challenges are able to maintain positive functioning such as demonstrating resilience. Her work extends theoretical models by focusing on diverse populations around the globe (e.g., Latino immigrants in the U.S., homeless youth in Brazil). By identifying modifiable risk and protective factors, this work informs the creation of interventions and policies.

### **SHARDÉ SMITH** (assistant professor)

Dr. Smith is finding ways to contribute to the reduction of mental health disparities for African Americans. She does this by examining racism, social support, and mental health in the family context. She also investigates the barriers to, and facilitators of, mental health treatment among African American youth and their families.

WHAT WE DO & WHY IT MATTERS, CONT'D

## Human Development and Family Studies

**MARGARITA TERÁN-GARCIA** (research assistant professor, Extension specialist, College of Medicine course director)

Dr. Terán conducts transdisciplinary research on obesity and other nutrition-related diseases (e.g., diabetes, hypertension) among low-income populations. She works on promoting health and wellness among families of Hispanic-heritage and translates evidence-based science to community-based programs that serve children and families in need. Her aim is to better understand the biological and psychological dimensions that could be modified in individuals and families, to tailor more efficient and practical interventions to prevent obesity and chronic diseases.

**KELLY TU** (assistant professor)

Dr. Tu is advancing the understanding of adaptive stress responses among children and adolescents. She investigates children's physiological and behavioral responses to stress and parents' role in helping children navigate and manage challenges. Her work will inform broader efforts to promote positive youth development and well-being.

# What we do & Why it matters

## Natural Resources and Environmental Sciences | [nres.illinois.edu](http://nres.illinois.edu)

The Department of Natural Resources and Environmental Sciences brings biological, physical, and social scientists together to identify, teach, and publicize solutions for the sustainability of urban, managed, and natural ecosystems from the local to global scale.

### **JEFFREY BRAWN** (professor and department head)

Dr. Brawn investigates how climate change and land use affect biodiversity. With an emphasis on birds in Illinois and tropical ecosystems, he is advancing understanding of how we can conserve populations and communities of wildlife. He also studies the role of wildlife in the dynamics of infectious diseases such as West Nile Virus.

### **YUJI ARAI** (associate professor)

Dr. Arai employs a broad range of traditional and cutting-edge molecular scale approaches and tools at various temporal scales to better understand the complex chemical processes in soils and at the mineral-water interface. This understanding allows him to predict the biogeochemical fate/cycles of nutrients and contaminants and to assess the risk in the aquatic and terrestrial environment.

### **RICHARD J. BRAZEE** (associate professor)

Dr. Brazee's research mathematically models the optimal use of natural resources, including forests, land, and fishery stocks over time. His research provides extensive foundations for other scholars' research efforts, is adopted by financial institutions to evaluate long-term projects, and serves as a basis for public policy and management debates.

### **JENNIFER FRATERRIGO** (associate professor)

Dr. Fraterrigo is advancing the mechanistic understanding of how ecosystems, and the services that they supply, respond to environmental change. By integrating processes that operate at different spatial scales, she supports decision-making that promotes ecosystem and landscape resilience.

### **KAIYU GUAN** (assistant professor, Blue Waters professor)

Dr. Guan provides solutions for real-life problems, such as large-scale crop monitoring and forecasting, water management and sustainability, and global food security. He uses satellite data, computational models, field work, and machine learning approaches to address how climate and human practices affect crop productivity, water resource availability, and ecosystem functioning.

### **ROBERT J.M. HUDSON** (associate professor)

Dr. Hudson's research helps advance methods for more accurately simulating soil carbon dynamics and the reactivity of trace metals in natural waters. His group developed a novel technique for measuring methylmercury that has been applied to quantify mercury pollution in muscle tissues of wildlife, waters of wetlands, rivers, and denitrifying bioreactors, and sediments of wetlands and coastal oceans.

### **ANGELA D. KENT** (professor)

Dr. Kent studies microbial communities that help sustain healthy ecosystems. Her work predicts impacts of global change and other human forces on the functions of microbial ecosystems, and enhances environmental quality by harnessing microbial processes.

### **MING KUO** (associate professor)

Dr. Kuo's work helps cities provide a healthy human habitat for their residents by showing the benefits of urban greening. Her research shows that urban greening reduces aggression and crime in inner cities, reduces ADHD symptoms in communities of all sizes, promotes self-discipline and academic achievement in children, and promotes health across the lifespan by boosting the human immune system. She also defines sustainable landscape practices for all federal lands in the United States and internationally.

## Natural Resources and Environmental Sciences

### **ERIC LARSON** (assistant professor)

Dr. Larson focuses on protecting and managing freshwater species and ecosystems. He improves conservation decision-making by taking advantage of modern tools like environmental DNA (eDNA), stable isotope analysis, and species distribution modeling. This approach allows him to forecast which species are at risk of extinction and which species are likely to become invasive before those patterns are detectable using classical tools.

### **JEFFREY MATTHEWS** (assistant professor)

Dr. Matthews contributes to the conservation and restoration of wetland ecosystems. He conducts field research on the ecology of freshwater wetlands, ecological restoration, and ecosystem services. He also studies U.S. and international environmental policies that affect wetlands.

### **KEVIN MCSWEENEY** (clinical professor)

Dr. McSweeney focuses on reclamation of disturbed land. He is improving handling and transport of soil material and use of specially selected plants to reduce soil compaction. Research is conducted in Illinois and China on active and abandoned mine sites and has application to other disturbed lands in rural, industrial, and urban areas.

### **DANIEL C. MILLER** (assistant professor)

Dr. Miller identifies solutions to one of the most pressing challenges of our time: conserving the earth's rich biological diversity while enhancing the well-being of some of the world's poorest people. He focuses on understanding the effectiveness of funding for conservation and development programs around the world, especially relating to forests in tropical countries. His findings inform policy, funding decisions, and new research directions.

### **JAMES MILLER** (professor)

Dr. Miller is advancing our understanding of strategies for conserving biodiversity in working landscapes, comprising both private agricultural holdings and protected areas. He collaborates with social and natural scientists at several universities, as well as land managers in the private and public sectors to address this crucial issue.

### **RICHARD MULVANEY** (professor)

Dr. Mulvaney focuses on increasing nitrogen fertilizer uptake in crops, with the goal of increasing profits while reducing negative environmental impacts of excessive nitrogen inputs. This has led to partnerships with the private sector that are directed toward improving application techniques and exploiting the potential of the Illinois Soil Nitrogen Test for site-specific nitrogen management.

### **LULU RODRIGUEZ** (associate professor)

Dr. Rodriguez designs, implements, and evaluates the impact of communication campaigns related to agriculture, renewable energy, the environment, food safety, and food security. She works to cultivate science literacy among citizens, and her studies illuminate best practices in communicating science, especially when science is disputed, and when scientific issues become controversial.

### **ROBERT SCHOOLEY** (associate professor)

Dr. Schooley investigates how wildlife species and communities respond to human land-uses in a rapidly changing world. He investigates the effects of habitat fragmentation and landscape connectivity on mammals and applies insights to effective conservation. He also assesses the outcomes of large-scale restoration projects intended to benefit biodiversity.

### **CORY SUSKI** (associate professor)

Dr. Suski integrates tools in animal behavior, animal physiology, and ecology to protect aquatic resources. He designs novel conservation strategies for stressors that include climate change, angling, and invasive species. His research spans from genes to watersheds, and involves both field and laboratory work.

### **CARENA VAN RIPER** (assistant professor)

Dr. van Riper advances knowledge of the psychological mechanisms that shape how people make decisions about the environment. She works closely with stakeholders to incorporate their viewpoints into policy outcomes, as well as develop management strategies for responding to threats ranging from global environmental change and invasive species to human-wildlife conflicts in protected areas.

## Natural Resources and Environmental Sciences

### **MICHELLE WANDER** (professor)

Dr. Wander works with farmers, educators, and policymakers to quantify the benefits of diversified and organic production, precision conservation and woody perennial polycultures, and determine how standards, voluntary marketing, and decision support tools can encourage soil stewardship.

### **MICHAEL WARD** (associate professor)

Dr. Ward focuses on species of conservation concern and has developed novel approaches to species conservation. He uses telemetry to radio monitor the behavior and migration of birds. He works with a broad spectrum of people from farmers in central Illinois to the U.S. Army to the Cuban and Mexican governments.

### **ANTHONY YANNARELL** (associate professor)

Dr. Yannarell uses microorganisms to control weeds and harmful invasive plants. His research sheds new light on the microorganisms that help these pest plants to succeed and the ones that can be used to fight them. By understanding the many different ways that plants and microbes interact, he seeks to improve agricultural productivity and to protect natural areas that are threatened by invasive pests.