

# BIOLOGICAL SYSTEMS ENGINEERING

## PEOPLE

### Assistant Professor Neslihan Akdeniz

Developing climate-smart technologies to improve the profitability of livestock producers; finding alternative ways of utilizing co-products of animal agriculture; assessing air quality inside livestock buildings for improved occupational health; exploring strategies to minimize the impacts of foreign animal diseases; organizing extension activities to deliver on-farm research knowledge. I make every attempt to include graduate students in my extension program to enhance their networking opportunities.

### Professor Robert Anex

Biological systems analysis and assessment; life cycle assessment; techno-economic analysis

### Professor Christopher Choi

Heat and mass transfer and computational fluid dynamics (CFD); controlled environments – livestock housing and greenhouse; water distribution system modeling and water quality; experimental methods, data acquisition, and systems optimization in biological systems

### Assistant Professor Matthew Digman

Impact of autonomy on agricultural machine forms; application of sensors to predict chemical and physical properties of agricultural materials

### Professor Sundaram Gunasekaran

Engineering properties and quality of food and biomaterials; rheology of food and other macromolecular systems and hydrogels; structure function relationships in foods; novel and value-added bioprocess engineering

### Assistant Professor Margaret Kalcic

Watershed modeling; watershed management; conservation practice effectiveness; agricultural hydrology; nutrient transport; water quality; land use change; climate change

### Professor K.G. Karthikeyan

Fate, removal, and transport of nutrients and contaminants in surface/subsurface environments; water quality chemistry; land application of agricultural/municipal/industrial waste; applications of GIS/water quality models; physical and chemical processes for water, wastewater, and waste treatment; soil decontamination

### Associate Professor Brian Luck

Machine management, variable rate technology; agricultural “Big Data” management; remote sensing

### Professor Xuejun Pan

Development of innovative biorefining process for producing energy, fuels, chemicals, and materials from renewable resources (biomass) with specific

research interests in pretreatment and fractionation of lignocellulosic biomass for bioconversion to chemicals and fuels; enzymatic and non-enzymatic saccharification of cellulose and lignocellulose; catalytic conversion of lignocellulose to drop-in hydrocarbon fuel; platform chemicals from biomass; functional materials from cellulose, lignin, hemicellulose, and extractives.

### Professor Douglas Reinemann

Biomechanics of machine milking; sustainable development of bio-energy systems; renewable energy technology and policy; biosensors for milk quality analysis; effects of the electrical environment on farm animals; integral thought and philosophy

### Associate Professor Troy Runge

Bioenergy – biomass composition impact on bioprocessing systems, including anaerobic digestion, combustion, gasification, and catalysis; Biomaterials – pulp, paper, bio-based chemicals, cellulose composites and nonwoven structures

### Professor John Shutske

Safety engineering and education related to occupational and public health hazards in agricultural and food systems; multidisciplinary approaches for solving complex risk-related problems; design and evaluation of sensors and control systems to mitigate environmental and machine risks; risk communication methods and limitations.

### Associate Professor Paul Stoy

Surface-atmosphere exchange; ecosystem ecology; natural resource management

### Professor Anita Thompson

Hydrologic implications of land use change; urban hydrology and stormwater management; water quality impacts of biofuel crop production; cold regions hydrology; hydrologic modeling; sediment, nutrient and pathogen transport; polyacrylamides and biosolids for fertilizer and erosion management

### Assistant Professor Zhou Zhang

Multi-source remote sensing data fusion (e.g., hyperspectral, LiDAR, RGB); machine learning for high dimensional data analysis; UAV-based imaging platform developments for precision agriculture; crop yield prediction using remote sensing and machine learning; high-throughput image-based plant phenotyping.

## AFFILIATE FACULTY

### Assistant Professor Grace Bulltail, Nelson Institute

### Professor Awad Hanna, Dept. of Civil Engineering

### Professor Richard Hartel, Dept. of Food Engineering

### Professor John Ralph, Dept. of Biochemistry