GREAT Program Faculty Mentors and Research Areas

Department	Faculty	Research Area
Animal Science	Dr. Hao Cheng	the development of statistical and computational methods for the (genetic) improvement of populations through more accurate, efficient, and biologically meaningful analysis
Biological and Agricultural Engineering	Bruno Carciofi	Food processing engineering: simultaneous product-process development; Modeling: heat and mass transfer, (bio)chemical reactions, and predictive microbiology
Biological and Agricultural Engineering	Dr. Alireza Pourreza	sensing tech, agricultural automation, precision agriculture, big data
Biological Science	Dr. Min Zhao	the control of directed cell motility and directed cell division. One particular interest is in the role played by small physiological electrical fields in wound healing, the development and regeneration of many tissues.
Biomedical Engineering	Dr. Soheil Ghiasi	design methods for embedded computing systems with a focus on streaming and data analytic workloads, such as signal processing, computer vision and machine learning
Biomedical Engineering	Dr. Cheemeng Tan	Synthetic biology, artificial cellular systems, gene regulation, cellular heterogeneity, antibiotic treatment
Biomedical Engineering	Dr. Atul Parikh	Membranes, vesicles, and cells: biophysical mechanisms and bio-inspired materials
Biomedical Engineering	Dr. Cheemeng Tan	Synthetic biology, artificial cellular systems, gene regulation, cellular heterogeneity, antibiotic treatment
Chemistry	Dr. Lee Ping Wang	investigates chemical energy conversion by developing cutting-edge theoretical and computational chemistry methods to accelerate the discovery of reaction pathways, providing new insight into the reaction mechanisms and formulating design principles for improved catalysts. We are focusing on three areas that bridge renewable energy with biochemistry and inorganic / materials chemistry: (1) CO_2 reduction pathways in molecular and heterogeneous catalysts, (2) proton transfer pathways in membrane proteins, and (3) surface reconstruction of perovskite electrocatalysts and photovoltaics.

Chemistry	Dr. Xi Chen	We focus on developing novel chemoenzymatic methods that combine the flexibility of chemical synthesis and the high efficiency and superior selectivity of enzyme-catalyzed reactions for elucidating the structure-function relationship of carbohydrates and glycoconjugates.
Civil and Environmental Engineering	Dr. Michael Gardner	focuses on quantifying how geologic setting and infrastructure design interact. This involves numerical models implemented in software that is capable of capturing the multiscale nature of these interactions. He is especially interested in natural hazard modeling and describing how infrastructure responds to this type of loading as an aggregated system. His research group incorporates the latest advances made in computing technology into open-source tools that can be used by the research community as well as practitioners. Additionally, his research group is working on ways to utilize advances made in remote sensing and UAV technology such that the data acquired from these technologies can be quickly processed and used to update model predictions.
Computer Science	Dr. Joel Porquet-Lupine	pedagogical and curricular innovation for teaching undergraduate computer science courses. Specifically, he works on curriculum development for teaching introductory programming courses, with a keen interest in developing software tools for education.
Computer Science	Dr. Hao Chen	broad range of security problems, including machine learning security, software security, and mobile and wireless security
Computer Science	Dr. Isaac Kim	research focuses on building powerful, efficient and reliable quantum computers. To simulate and study quantum mechanical systems, such as cations and electrons orbiting an atom, researchers need a computer that thinks along the same lines.
Computer Science	Dr. Muhao Chen	directs the Language Understanding and Knowledge Acquisition (LUKA) Lab. My research focuses on robust and minimally supervised data-driven machine learning for natural language processing, as well as accountability and security problems with large language models. Our long-term goal is to develop robust, generalizable and trustworthy learning systems that help machines understand nature.

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Computer Science	Dr. Slobodan Mitrovic	algorithmic graph theory and combinatorial approach to optimization. My research focuses on designing efficient algorithms in the context of memory-constrained computation, such as parallel, distributed, streaming and local computation.
Computer Science	Dr. Jiawei Zhang	research interests focus on deep learning, machine learning and data mining, with emphasis on addressing the real-world artificial intelligence (AI) and data science (DS) problems by proposing novel machine learning algorithms. Professor Zhang has been working on graph neural networks, graph mining, recommender systems, natural language processing, social networks mining and neuroscience
Computer Science	Dr. Hao-Chuan Wang	Human-Computer Interaction (HCI); computer-mediated communication, conversation support tools, social media, crowdsourcing and human computation
Department of Surgery	Dr. Diana Farmer	principal investigator of several National Institutes of Health clinical trials on the effectiveness and safety of spina bifida treatments before birth, and she is researching a novel stem cell therapy for repairing damaged neural tissue in spina bifida patients.
Electrical and Computer Engineering	Dr. Houman Homayoun	computer engineering, with an emphasis on hardware security and trust, computer system security, heterogeneous computing and energy-efficient computing.
Electrical and Computer Engineering	Dr. Junshan Zhang	eneral field of information networks and data science, including edge intelligence, reinforcement learning, continual learning, network optimization and control, game theory, with applications in connected and automated vehicles, 5G and beyond, wireless networks, IoT, and smart grid.
Electrical and Computer Engineering	Dr. Wieijian Yang	Biophotonics, implantable biomedical devices, MEMS/NEMS devices, metastructures, optical imaging, two-photon microscopy, brain imaging and modulation, neural circuits
Electrical and Computer Engineering	Dr. Yubei Chen	Dr. Chen's research is at the intersection of computational neuroscience and deep unsupervised/self-supervised learning, sensorimotor representation, NeuroAI and computational neuroscience, world models, and efficient deep learning.

Electrical and Computer Engineering	Dr. Saif Islam	focuses on the synthesis and incorporation of low-dimensional and nanostructured materials and devices with conventional integrated circuit (IC) elements and systems
Electrical and Computer Engineering	Dr. Lifeng Lai	Information theory, stochastic signal processing, machine learning and their applications
Electrical and Computer Engineering	Dr. Ben Yoo	future Internet architectures, high-performance optical switching systems, optically-interconnected computing systems
Electrical and Computer Engineering	Dr. Houman Homayoun	computer engineering, with an emphasis on hardware security and trust, computer system security, heterogeneous computing and energy-efficient computing.
Land , Air and Water Resources	Dr. Zhang Minghua	GIS database development. Spatial analysis of groundwater leaching and surface water runoff as affected by pesticide applications in agriculture fields using GIS. Integrated solute transport modeling in GIS.
Materials Science and Engineering	Dr. Erika La Plante	kinetics of low-temperature aqueous processes at mineral-fluid interfaces to address the many research questions in the field of climate, sustainability, built environment, and energy.
Mathematics	Dr. Yunpeng Shi	3D Computer Vision & Image Processing; Cryo-electron Microscopy Imaging (3D Imaging for Protein Molecules); Scalable Computational Methods; Nonlinear Dimension Reduction & Manifold Learning
Microbiology and Molecular Genetics	Dr. Lifeng Xu	Telomeres are the protective nucleoprotein structures at the ends of linear eukaryotic chromosomes. Telomere dysfunction contributes to cancer progression and aging. Our laboratory employs molecular and cytological approaches to study telomere maintenance in human normal cells and cancer cells.
Molecular and Cellular Biology	Dr. James Letts	focuses on how organisms use electron transport membrane proteins to convert energy from the food that we eat into a form that can be used by cells across many essential processes, as well as in cellular defense and signaling. I seek to characterize the structures and functions of these important membrane protein complexes in order to learn about how they work and how their dysfunction results in disease.

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Neurobiology, Physiology and Behavior	Dr. Fumika Hamada	to understand the molecular and neural mechanisms of temperature homeostasis. We are particularly interested in how the circadian clock, sleep, sensory experience, and internal nutrient state modulate temperature homeostasis. My lab uses Drosophila as a model system through a combination of genetic, behavioral, optogenetic, and physiological (i.e., calcium imaging) approaches.
Neurobiology, Physiology, and Behavior	Dr. Wilsaan Joiner	studies how we use different sources of information to aid behavior, ranging from visual perception to movement planning and updating. Specifically, we are interested in how external and internally-generated sensory information is integrated in healthy individuals, in comparison to certain disease and impaired populations (e.g., Schizophrenia and upper extremity amputees). Achieving this understanding may lead to better methods for diagnosing and treating impairments of the nervous system.
Physics and Astronomy	Dr. Mukund Rangamani	heoretical physicist, specializing in areas of string theory, quantum field theory, quantum gravity, and quantum information
Statistics	Dr. Shizhe Chen	emerging statistical problems in learning large complex biological systems from massive data. I address these problems using statistical theory and methods in high-dimensional statistics and graphical models.