

## TABLE OF CONTENTS

### Contents

1. Executive Summary.....	2
2. University of Florida Energy Expertise .....	3
3. UF Energy Research Focus Areas .....	4
3.1. Energy Efficiency in Built Environment and in Manufacturing .....	4
3.2. Diversified Power Source and Delivery .....	4
3.3. Smart Grid/Grid Security and Energy Storage .....	6
3.4. Moving Towards all Electric Transportation (towards sensor based autonomy) .....	6
3.5. Quantum Materials.....	6
3.6. Climate Change .....	6
3.7. Policy and Economics.....	6
3.8. Overarching Education/Workforce Development .....	7
4. Florida Energy Systems Consortium (FESC) .....	7
APPENDIX 1 – UF Energy Faculty Expertise.....	9
APPENDIX 2 – List of UF Energy/Sustainability Faculty.....	31
APPENDIX 3 – Grant and Education/Workforce Development Examples .....	39
APPENDIX 4 – UF Energy Technology Commercialization and Industry Partnerships.....	47
APPENDIX 5 – UF Institutes, Centers, Laboratories Supporting Energy Research.....	50
APPENDIX 6 - Florida Energy Profile .....	51

## 1. Executive Summary

Florida is the third-most populous state and the third-largest energy-consuming state in the nation. In 2019, Florida consumed almost eight times more energy than it produced. Florida's many tourists helped make the state the nation's third-highest motor gasoline consumer in 2019, and the third-highest jet fuel user in 2020. Florida is the second-largest producer of electricity after Texas, and natural gas fueled about 75% of Florida's total electricity net generation in 2020. Florida's residential sector, where more than 9 in 10 households use electricity for home heating and air conditioning, consumes more than half of the electricity used in Florida, the largest share of any state. In 2020, Florida surpassed Arizona to become fourth in the nation, after California, Texas, and North Carolina, in total solar power generating capacity. Only 3.5% of electricity is generated through renewable sources. Solar thermal and photovoltaic is the largest renewable contributor to the power grid in the Sunshine State. (<https://www.eia.gov/state/?sid=FL>).

Abundant, reliable, clean, and affordable energy is essential for a healthy State of Florida economy. The development of environmentally friendly, renewable, and cost-effective replacement energy options to power automobiles, other vehicles, homes, and businesses, is very important to our State's future.

The Florida Energy Systems Consortium (FESC - <http://floridaenergy.ufl.edu/>) was created in 2008 by Florida statute to promote collaboration among the energy experts at Florida's 12 public universities for the purposes of sharing energy-related expertise and assisting in the development and implementation of a comprehensive energy strategic plan for the state. The Consortium was charged with performing research and development on innovative energy systems that lead to alternative energy strategies, improved energy efficiencies, and expanded economic development for the state. The University of Florida (UF) administers the consortium.

UF has the capability to combine energy research and education programs in energy technology with policy and economics. This combination of technology and policy is critical to assist the government, the energy industry, and utilities in their decision process in setting priorities for energy resource investment. The broad energy technology expertise is also critical to the energy industry and utilities in comparing technologies and determining the most appropriate one for each site and application based on the available resources.

Currently UF energy expertise is in the areas of:

1. Energy Efficiency in Built Environment and in Manufacturing
2. Diversified Power Source and Delivery – Biomass, Solar, Hydrogen/Solar Fuels, Nuclear energy
3. Smart Grid/Grid Security and Energy Storage
4. Moving towards all Electric Transportation (towards sensor based autonomy)
5. Quantum Materials
6. Climate Change
7. Overarching Education/Workforce Development
8. Policy and Economics
9. Other expertise supporting energy technology

UF energy expertise covers numerous units within the Colleges of Engineering, Business, Law, Liberal Arts and Sciences, Institute for Food and Agriculture Sciences (IFAS), the UF Office of Sustainability, and DCP (Design, Construction, and Planning), including the Rinker School of Building Construction and the School of Landscape Architecture and Planning.

## 2. University of Florida Energy Expertise

The University of Florida (UF) has strong programs in basic and applied clean energy research. Over 100 faculty members are engaged in research ranging from energy efficiency, power generation, distribution, security to nuclear energy. In FY 2020, UF energy faculty were awarded over \$9M in competitive federal and state funding. Total awards are over \$100 million during the last 5 years in partnership with industry and other organizations such as Florida utilities, EPRI, ExxonMobil, Ford Motor Co., Synhelion SA, NuSeed, Applied Research Associates (ARA), Commercial Aviation Alternative Fuels Initiative (CAAFI), and National Labs. Detailed list of partnerships is given in Appendix 4.

During FY 2019, over 50 Patents issued, 60 Patents and 70 Invention Disclosures filed in areas supporting clean energy. UF has 6 energy spin off companies: NanoPhotonica, Inc., RedOx Power Systems, LLC., Integrated Solar Technologies Inc., SensorComm Technologies, Inc., Molekule Inc., RedoxBlox Inc.

Noteworthy mentions: With 90 Green Building certifications, UF prides itself as having more green building certifications than any other public higher education institution. UF Transportation Institute (UFTI) houses McTrans, the largest transportation dissemination center in the world, and the Florida Transportation Technology Transfer Center, which provides training and technical assistance to professionals around the country and internationally. UF is one of four academic institutions in US to have a High Flux solar simulator designed to test high temperature thermal receivers and thermochemical reactors under realistic conditions.

UF energy research focus areas are:

- ☐ **Energy Efficiency in Built Environment and in Manufacturing**
  - Building Construction
  - Combined Heat and Power
  - Energy Assessment
- ☐ **Diversified Power Source and Delivery**
  - Biomass and Solid Waste Resources
  - Solar / Photovoltaics
  - Solar Fuels / Hydrogen
  - Nuclear Energy
- ☐ **Smart Grid/Grid Security and Energy Storage**
- ☐ **Moving Towards all Electric Transportation**
- ☐ **Quantum Materials**
- ☐ **Climate Change**
- ☐ **Policy and Economics**
- ☐ **Overarching Education / Workforce Development**
- ☐ **Other Areas**

### 3. UF Energy Research Focus Areas

#### 3.1. Energy Efficiency in Built Environment and in Manufacturing

Energy efficient technologies have the potential to reduce energy consumption. The research focus is to improve building efficiency, sustainable community developments, industry energy auditing and manufacturing energy efficiency. Integration of innovative technologies into building construction results in cleaner, sustainable communities and reduce energy use. With 90 Green Building certifications, UF prides itself as having more green building certifications than any other public higher education institution. Centers and programs in this area includes:

- ② **UF Industrial Assessment Center** (UF-IAC, <https://iac.university/center/UF>) provides free energy, productivity, and waste assessments to small and medium sized industrial facilities through funding provided by the US Department of Energy. UF-IAC provided 515 assessments and trained 160 students to this date.
- ② **Powell Center for Construction and Environment** (<https://www.cce.ufl.edu/about-us-2/our-mission/>) fosters the implementation of sustainability principles into the creation of the built environment internationally.
- ② **The Program for Resource Efficient Communities (PREC, <http://buildgreen.ufl.edu/>)** applies UF’s educational and analytical assets to promote the adoption of best design, construction, and management practices that measurably reduce energy and water consumption and environmental degradation in new residential community developments. Focus extends from the individual home and lot level through site development to surrounding lands and ecological systems. The Program supports the implementation of resource efficient community development practices through direct training and consulting activities, applied research projects and case studies, academic courses and degree programs, and evaluation of “green” certification standards.

#### 3.2. Diversified Power Source and Delivery

##### Biomass, Solar, Hydrogen/Solar Fuels, Nuclear energy

##### 3.2.1. Biomass energy

The State of Florida produces more biomass than any other state in the U.S. (~7% of total). UF has extensive experience in biomass energy technologies such as microbial and gasification routes to produce carbon-neutral fuel including algae related research. In addition, algae production systems

**Bagasse – Biomass Residues**  
("Brown Gold" of the future) South of Lake Okeechobee, Florida



promise a direct route to fuel. UF faculty has been involved in growing, harvesting, and processing algae for over 30 years. The algae research encompasses every aspect of technical development of freshwater and marine algae. The research includes identifying and optimizing algal species, strain development, to maximize fuel quality and production, genetic engineering to maximize lipid, hydrocarbon and carbohydrate content and yield. A systems approach is being pursued to optimize water and land use, biomass harvesting and transport, and refining processes. UF faculty has established centers and laboratories to strengthen the research. These include:

- ☐ **Florida Center for Renewable Chemicals and Fuels (FCRC - <https://fcrc.ifas.ufl.edu/what-we-do/>)**  
 FCRC has the resources that are available to do research in metabolic engineering, enzyme development, biomass processing, and evaluation. FCRC has 30 participating faculty members, 3 of who come from industry. The over \$36M ongoing grants and contracts awarded to the faculty members support part-time undergraduate assistants and research interns, graduate students, and post-docs, research faculty, and technical staff.
- ☐ **Bioenergy and Sustainable Technology Laboratory (BEST), <http://biogas.ifas.ufl.edu/>**  
 BEST conducts basic and applied research on environmental biotechnology, with particular emphasis on anaerobic microbiology and the practical application of anaerobic digestion technology for renewable energy production from biomass and organic residues. It is located at **UF Energy Research and Education Park**. The park houses, Bioenergy and Sustainable Technology Lab and Demonstration area.

### 3.2.2. Solar Energy

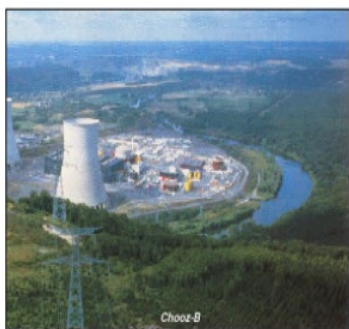
UF has sustained a research program with a long history involved with the innovative utilization of photovoltaics and solar energy including research in nanostructured electronic materials, organic-inorganic hybrid materials, surfaces and interfaces, energy materials, photovoltaic cells, light-emitting diodes and other optoelectronic devices.

**UF Energy Research and Education Park:** The park has UF Solar Decathlon House and 70kW Solar PV. The PV modules were installed under Progress Energy (Now Duke) Florida's SunSense Solar Schools Program.

### 3.2.3. Solar Fuels/Hydrogen

UF is one of four academic institutions in the United States to have a High Flux solar simulator designed to test high temperature thermal receivers and thermochemical reactors under realistic conditions. It is capable of delivering up to 10 kW of high flux radiation (5000 suns peak) using Xe-arc lamps with a photo-spectrum similar to sunlight. The simulator laboratory is fully equipped with data acquisition and control hardware (temperature, mass flow rates, pressure) residual gas analysis (mass spectroscopy and NDIR) and is fully compatible with a range of reactor geometries and sizes. Beyond testing concentrated solar power receivers and solar thermochemical reactors, this device is well suited for testing materials and/or engineered structures for a range of high temperature applications. The solar simulator and reactor for hydrogen generation research are located at the UF Energy Research and Education Park.

### 3.2.4. Nuclear Energy



UF has a strong research focus related to nuclear power generation. Research in [Nuclear Engineering](#) include: design, development, and operation of nuclear power systems; numeric simulation of nuclear systems; radiation measurements; national security and non-proliferation; nondestructive examination of materials and structures using radiation techniques; characterization and modeling of the performance of reactor materials during reactor operation. Faculty perform research to advance nuclear energy in collaboration with industry partners. The research is enabled by powerful facilities, including the HiperGator research computing capabilities, the University of Florida Florida Training Reactor, and the Nuclear Fuels and Materials Characterization

facility (NFMCF). The NFMCF is a unique facility for carrying out advanced characterization, including electron microscopy, on radioactive materials.

### **3.3. Smart Grid/Grid Security and Energy Storage**

To reduce system-wide power outages and for more stable and reliable power delivery, UF is pursuing research in smart grid including control strategies, cyber physical security, demand response & consumer behavior, renewable energy aggregation, and policy in energy systems. Smart grids allow control strategies and two-way communications via Smart Meter system, provide intelligent energy management and improve energy efficiency (Power Lab -<http://power.ece.ufl.edu/>).

### **3.4. Moving Towards all Electric Transportation (towards sensor based autonomy)**

UF Transportation Institute (UFTI): Brings together faculty, staff, and students from many diverse backgrounds to provide solutions to a variety of transportation problems. The Institute was created in 2013 as an umbrella organization housing several other transportation-related centers within the University of Florida. It houses McTrans, the largest transportation dissemination center in the world, and the Florida Transportation Technology Transfer Center, which provides training and technical assistance to professionals around the country and internationally. UFTI is home to the Southeastern Transportation Research, Innovation, Development and Education (STRIDE) Center, one of ten Regional University Transportation Centers (UTCs) funded by the US Department of Transportation (USDOT).

### **3.5. Quantum Materials**

**Center for Molecular Magnetic Quantum Materials (M2QM);** Dr. Hai Cheng, PHYSICS; Sponsor: US DOE, Funding: \$9,801,000: M2QM (<https://science.osti.gov/bes/efrc/Centers/M2QM>) aims to provide the materials physics and chemistry understanding of molecular magnetic quantum materials essential for quantum and conventional computing beyond Moore's Law. The overarching goal is to turn molecular magnets into quantum materials useful for both quantum computing and quantum current conventional devices. Partner Institutions: California Institute of Technology, Florida State University, Los Alamos National Laboratory, University of Central Florida, University of Texas at El Paso.

### **3.6. Climate Change**

The University of Florida is one of the members of the Florida Climate Institute. The Florida Climate Institute (FCI) is a multi-disciplinary network of national and international research and public organizations, scientists, and individuals concerned with achieving a better understanding of climate variability and change (<https://floridaclimateinstitute.org/about>).

The FCI has eleven member universities – Florida A&M University (FAMU); Florida Atlantic University (FAU); the Florida Institute of Technology (FIT); Florida International University (FIU); Florida State University (FSU); Nova Southeastern University (NSU); the University of Central Florida (UCF); the University of Florida (UF); the University of Miami (UM); the University of South Florida (USF); and Stetson University (SU) – and is supported by relevant colleges, centers, and programs at these universities. UF and FSU initiated the FCI in 2010; FAU, UCF, UM, and USF formally joined in 2012; FIU formally joined in 2013; FAMU formally joined in 2014; FIT formally joined in 2015; and NSU formally joined in 2017.

### **3.7. Policy and Economics**

#### **3.7.1 Public Utility Research Center (PURC)**

PURC is an internationally recognized academic center dedicated to research and to providing training in utility regulation and strategy, as well as the development of leadership in infrastructure policy

[\(https://warrington.ufl.edu/public-utility-research-center/\)](https://warrington.ufl.edu/public-utility-research-center/). PURC training programs teach the principles and practices that support effective utility policy, regulation, management, and leadership. With these tools, we help government and industry officials develop efficient utility infrastructure to better meet the needs of their customers. Regulators and industry professionals, seasoned and new to the field, benefit from continuing education as the regulatory landscape continues to change. With educated employees, organizations benefit from better decision making and thus a more promising future.

### **3.7.2. Public Policy Research Center (PPRC)**

<https://economics.clas.ufl.edu/research-centers/pprc/>

The principal goal of the Robert F. Lanzillotti Public Policy Research Center is to foster high-quality, independent research that ultimately improves the design of sound, effective public policy in Florida and elsewhere. The insights developed through creative, objective public policy research can have immediate impacts on current policy makers, and can also help to better train future generations of business and policy leaders.

PPRC, together with other research centers on campus, helps to establish the University of Florida as a leading voice in rational discussions of public policy issues that affect the lives of all of Florida's citizens. PPRC focuses its research in energy regulation & other regulatory policy, antitrust, education, the environment, health care, international trade, and tax policy.

### **3.7.3. Center for Governmental Responsibility**

<https://www.law.ufl.edu/areas-of-study/centers/cgr>

The Center for Governmental Responsibility (CGR) at UF Levin College of Law is a legal research and public policy center. Faculty at CGR teach primarily at the College of Law and conduct grant and contract-funded external research of the areas of environmental law, democracy and governance, privacy issues, international trade, and social policy. CGR provides experiences for law students to research, analyze and develop good public policy through applied research on matters of public importance.

### **3.8. Overarching Education/Workforce Development**

**Engaging Quality Instruction through Professional Development (EQuIPD)** led by Nancy Ruzycki, Instructional Associate Professor, Director of Undergraduate Laboratories Materials Science & Engineering. Sponsor: Department of Education; Award Amount: \$3,730,128 (federal funds) and \$1,214,797 in Cost Share. Award Period: 10/01/2018-09/30/2021; Partners: Our partners are Microsoft, Arduino, Pasco Scientific, Vernier, BlueGrass Technologies: EQuIPD is a facilitative train the trainer coaching model (<https://equipd.mse.ufl.edu/the-equipd-model/>). EQuIPD provides professional development which is content focused, incorporates active learning utilizing technology, supports collaboration, models effective practice, and provides ongoing coaching and expert support.

## **4. Florida Energy Systems Consortium (FESC)**

Headquartered at the University of Florida, FESC (<http://floridaenergy.ufl.edu/>) was created in 2008 by Florida statute to promote collaboration among the energy experts at Florida's 12 public universities for the purposes of sharing energy-related expertise and assisting in the development and implementation of a comprehensive energy strategic plan for the state. The Consortium was charged with performing research and development on innovative energy systems that lead to alternative energy strategies, improved energy efficiencies, and expanded economic development for the state. The University of Florida administers the consortium.

**FESC - Research Seed Funding:** The role of state universities in economic development is broadly recognized. They are a primary source of intellectual property creation, its incubation, subsequent new company generation, and workforce development. The bottleneck to sustained economic development is producing a steady stream of innovation that feeds the established new venture investment industry. Universities conduct ~55% of basic research in the US, mainly funded by the federal government. Success in obtaining research funding is enhanced considerably by conducting preliminary research to evidence the potential for success. This has proven to be the result with FESC research funding.

FESC funding through the state is not recurrent; however there may be opportunities in the future to get seed fund from the state. The only available fund for UF faculty through the consortium, at the present time, is for industry/faculty collaboration projects. FESC provides up to \$50,000 per project if industry partner is willing to provide same amount of cash (at the agreement stage) and in kind support. Please contact Canan Balaban at [cbalaban@ufl.edu](mailto:cbalaban@ufl.edu) if there is interest.

**FESC - Workforce Development:** FESC worked with the Florida Advanced Technological Association to develop Energy jobs training programs as shown in the table below:

**Engineering Technology Energy-Related Programs as of January 2014**

COLLEGE CREDIT CERTIFICATES	COLLEGES OFFERING
Alternative Energy Systems Specialist (CCC) Career Cluster: Manufacturing CIP #: 0615000003 Program Length: 18 (Primary) or 15 (Secondary)Credits	Eastern Florida State College/BCC, Daytona State College (pending), State College of Florida, Gulf Coast State College, Broward College (pending), Palm Beach State College
Industrial Energy Efficiency Specialist (CCC) Career Cluster: Manufacturing CIP #: 061500000x Program Length: 21 (Primary) or 24 (Secondary) Credits	Florida State College at Jacksonville – pending with content being included in current courses
A.S. DEGREE SPECIALIZATIONS (60 credit hours)	COLLEGE OFFERING
A.S. Eng Tech Alternative Energy Technology	Eastern Florida State College/BCC, State College of Florida, and Gulf Coast State College
A.S. Eng Tech Industrial Energy Efficiency	Florida State College at Jacksonville - pending

Frameworks are posted on the FLDOE website:

[http://www.fl DOE.org/workforce/dwdframe/mfg\\_cluster\\_frame12.asp](http://www.fl DOE.org/workforce/dwdframe/mfg_cluster_frame12.asp)



## APPENDIX 1 – UF Energy Faculty Expertise

### Energy Efficiency, Sustainability, Resiliency

**Barooah, Prabir**, MAE Excellence Term Professor, [pbarooah@ufl.edu](mailto:pbarooah@ufl.edu), Web: <https://dicelab.mae.ufl.edu/>  
Research Interests: Control systems for a smart and sustainable energy infrastructure (in particular, on enabling buildings to reduce their energy use and provide “virtual storage” to the electric grid for integrating renewable energy sources such as solar and wind), distributed estimation and control algorithms (for applications such as localization/synchronization of sensor networks and robotic swarms), distributed optimization.

**Cassiano, Eric**, Assistant Extension Scientist, Tropical Aquaculture laboratory, [ericcass@ufl.edu](mailto:ericcass@ufl.edu), Web: <https://tal.ifas.ufl.edu/people/faculty/eric-cassiano/>  
Research Interests: Improvements in Energy Usage on Tropical Fish Farms in Florida.

**Galinski, Andrea**, Assistant Scholar, Department of Landscape Architecture, [andrea.galinski@ufl.edu](mailto:andrea.galinski@ufl.edu), Web: <https://dcp.ufl.edu/faculties/andrea-galinski/>  
Research Interests: Working in the Shimberg Center for Housing Studies, Andrea focuses on the nexus between climate change and affordable housing with a particular interest in pre-disaster mitigation plans and policies. Most recently, she is exploring the ethical use of drones and other AI technologies in relation to landscape site analysis and community engagement.

**Guo, Jing**, Professor, ECE, [guoj@ufl.edu](mailto:guoj@ufl.edu), Web: <http://www.guo.ece.ufl.edu/>  
Research Interests: Modeling and Simulation of Nanoelectronic Devices; Theory of Nanoscale Transistors; Nanoscale Memory Devices and Quantum Computing Devices; Device-Circuit Co-design in Nanoelectronics.

**Issa, Raja**, Distinguished Professor, M.E. Rinker, Sr. School of Construction Management, [raymond-issa@ufl.edu](mailto:raymond-issa@ufl.edu), Web: <https://dcp.ufl.edu/faculties/r-raymond-issa/>  
Research Interests: BIM/VDC, AI/ML, industrialized construction, construction management, construction law, information technology, ontologies and semantics and structures and foundations and technology integration in the AECO industry.

**Manuel, Michele**, Rolf E. Hummel Professor of Electronic Materials and Department Chair, [mmanuel@mse.ufl.edu](mailto:mmanuel@mse.ufl.edu), Web: <https://mse.ufl.edu/people/faculty/>  
Research Interests: Computation and experiments in material thermodynamics and kinetics, advanced manufacturing, materials design, materials under extreme environments.

**Minchin, Robert**, Professor, M.E. Rinker, Sr. School of Construction Management, [minch@ufl.edu](mailto:minch@ufl.edu), Web: <https://dcp.ufl.edu/faculties/minchin-edward/>  
Research Interests: Construction Supply Chain Integrity (emphasis on counterfeit materials and products), Construction Project Delivery Methods, and Construction Contract Disputes Resolution.

**Moghaddam, Saeed**, William F. Powers Professor, [saeedmog@ufl.edu](mailto:saeedmog@ufl.edu), Web: <https://mae.ufl.edu/neslabs/>  
Research Interests: Micro/nanoscale transport and micro/nanoengineering for energy applications; high-efficiency dehumidification and drying systems for commercial buildings and industrial/agricultural applications; advanced heat transfer surfaces for enhanced energy efficiency and reduce size/cost in

power generation, conversion and use systems; microchannel two-phase cooling for high power electronics and data centers (DCs).

**Nino, Juan**, Professor, Materials Science and Engineering, [jnino@mse.ufl.edu](mailto:jnino@mse.ufl.edu), Web: <https://nrg.mse.ufl.edu/>

Research Interests: Sustainable synthesis of advanced functional ceramics; energy materials; materials under extreme environments, high temperature catalysts and ionic conductors; nuclear fuel cycle materials and nuclear detectors.

**Ries, J. Robert**, Professor and Director, Powell Center for Construction and Environment, M.E. Rinker, Sr. School of Construction Management, College of Design, Construction, and Planning (DCP), [rries@ufl.edu](mailto:rries@ufl.edu), Web: <https://www.cce.ufl.edu/> <https://dcp.ufl.edu/faculties/ries-robert-j/>

Research Interests: Sustainability (Building Energy, Equity in Building Energy; Building Materials, Built Environment Resilience, Renewable Energy, Smart Buildings/Cities Sustainable Architecture and Design, Sustainable Construction, Sustainable Technology); The spatial dimensions of work range from assessing indoor environmental quality in spaces to modeling water resources regionally to modeling the potential for ground-level ozone formation nationally. The dimensions of interest range from the health and performance of people, life cycle pollution generation and resources, and life cycle financial performance, sometimes all at once, based on a foundation of ethics and equity. Research indicates that of the range of environmental impacts we generally consider in sustainability and resilience, biodiversity has been impacted to the greatest extent, and in my opinion, biodiversity impact is an under-appreciated environmental impact of the built environment; Special Fields Green Building, Sustainable Development, Life Cycle Assessment in the Construction Process.

**Srinivasan, Ravi**, M.E. Rinker, Sr. School of Construction Management, College of Design, Construction, and Planning (DCP), [sravi@ufl.edu](mailto:sravi@ufl.edu), Web: <https://dcp.ufl.edu/faculties/srinivasan-ravi/>

Research Interests: Sustainability (Building Energy, Building Materials, Built Environment Resilience, Renewable Energy, Smart Buildings/Cities, Sustainable Architecture and Design, Sustainable Construction,, Sustainable Technology); Developing dynamic sustainability information modeling (dSIM) platform; more info is available here: <https://built-ecologist.com/2019/05/11/dynamic-sustainability-information-modeling-d-sim-for-smart-cities/>.

**Steiner, Ruth**, Department of Urban and Regional Planning, [rsteiner@dcp.ufl.edu](mailto:rsteiner@dcp.ufl.edu), Web: <https://dcp.ufl.edu/faculties/ruth-l-steiner/>

Research Interests: (Built Environment Resilience, Renewable Energy, Smart Buildings/Cities) Her research focuses on the coordination of transportation and land use, with a particular focus on planning for sustainable modes of transportation, and its impact on communities, the environment, and public health. Her current research is on the impact of school siting, school transportation and land development patterns on children's travel, transportation and aging, the changing pattern of travel among millennials, impacts of new transportation technologies on transportation systems, parking supply and demand management, equity in planning, and the incorporation of risk into long-range transportation planning.

**Sherif, S.A.**, MAE Excellence Term Professor, [sasherif@ufl.edu](mailto:sasherif@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/sa-sherif/>

Research Interests: Heat and Mass Transfer, Thermodynamics, Thermal System Design and Optimization, Refrigeration and Cryogenics, HVAC, Solar and Hydrogen Energy

**Taylor, Nicholas**, State Specialized Extension Agent, Program for Resource Efficient Communities, [nwtaylor@ufl.edu](mailto:nwtaylor@ufl.edu), web: <https://buildgreen.ifas.ufl.edu/taylor.html>

Research Interests: Utility data analysis to identify effective water and energy conservation measures and evaluation of land development impacts. Dr. Taylor leads the H2OSAV extension program, providing data analysis tools and data-driven insights that help regional utility providers, governmental agencies and extension agents optimize water conservation efforts.

**Wang, Shuo**, Professor, IEEE Fellow, Department of Electrical and Computer Engineering, [shuo.wang@ece.ufl.edu](mailto:shuo.wang@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/shuo-wang/>

Research Interests: Power electronics, electrical power, electromagnetic interference, electric vehicles, green energy conversion and grid integration, electromagnetic security, IoT security, cyber security, and hardware security.

## Biomass

**Altpeter, Fredy**, Professor of Agronomy, Molecular Genetics, Plant Breeding & Biotechnology, [altpeter@ufl.edu](mailto:altpeter@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/fredy-alt peter/>

Research Interests: integration of translational genomics, molecular physiology and metabolic engineering for crop improvement and sustainable production of value added products. The approaches include precision genome editing, synthetic biology, and molecular dissection of regulatory networks.

**Bartels, Wendy-Lin**, Assistant Research Scientist, School of Forest, Fisheries, Geomatics Sciences, IFAS, [wendylin@ufl.edu](mailto:wendylin@ufl.edu), Web: <https://ffgs.ifas.ufl.edu/faculty/bartels-wendy-lin/>

Research Interests: Rural development, family farming, and the convening role universities can play to facilitate knowledge exchange among diverse stakeholder groups.

**Chung, Jacob**, Andrew H. Hines, Jr./Florida Progress Corporation Eminent Scholar, MAE, [jnchung@ufl.edu](mailto:jnchung@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/jacob-chung/>

Research Interests: Fluid mechanics and heat transfer with a special focus on bubble dynamics, phase change heat transfer, multiphase flows, microgravity boiling, turbulence in heated flows, micro-scale thermal transport, fuel cell thermal transport, space cryogenic line chilldown, storage and transport, energy conversion, hydrogen Energy, biomass and solid waste conversion to clean energy by steam gasification.

**Gao, Bin**, Professor, Department of Agricultural and Biological Engineering (ABE), [bg55@ufl.edu](mailto:bg55@ufl.edu), Web: <https://abe.ufl.edu/faculty/bingao/>

Research Interests: Studying water quality and environmental sustainability. It spans a broad range of topics including environmental and water resources engineering, environmental nanotechnology, biochar technology, contaminant hydrology, and hydrologic modeling.

**Chase, Carlene**, associate professor, Horticultural Sciences, [cachase@ufl.edu](mailto:cachase@ufl.edu), web: <https://hos.ifas.ufl.edu/people/on-campus-faculty/carlene-a-chase/>

Research Interests: Reducing environmental impact of weed management; Methyl bromide alternatives; Cover crops and living mulches

**Fletcher, Robert**, Associate Professor of Wildlife Ecology and Conservation, [robert.fletcher@ufl.edu](mailto:robert.fletcher@ufl.edu), Web: <https://www.fletcherlab.com/>

Research Interests: Integrating diverse perspectives into ecology, conservation, and management.

**George, Sheeja**, Biological Scientist, Agronomy Department, UF/IFAS North Florida Research and Education Center, Quincy, FL, [sheejageorge@ufl.edu](mailto:sheejageorge@ufl.edu), Web:

<https://edis.ifas.ufl.edu/experts/sheejageorge>

Research Interests: Agronomic crops with a major focus on conservation technology production of peanuts, cotton, corn, soybean, small grains, and oil seed crops such as Carinata.

**Hagelin Weaver, Helena**, Associate Professor, Dr. and Mrs. Frederick C. Edie Term Professor, and Ph.D. Recruitment Coordinator, Chemical Engineering, [hweaver@che.ufl.edu](mailto:hweaver@che.ufl.edu), Web:

<https://www.che.ufl.edu/hagelin-weaver/>

Research Interests: Catalytically facilitated biomass gasification to produce hydrogen or synthesis gas (carbon monoxide and hydrogen); Catalytically facilitated hydrothermal liquefaction of algae biomass to produce bio-oils, and deoxygenation of bio-oils for future use as liquid fuels.

**Kirst, Matias**, Professor, School of Forest, Fisheries, & Geomatics Sciences, [mkirst@ufl.edu](mailto:mkirst@ufl.edu), Web:

<https://ffgs.ifas.ufl.edu/faculty/kirst-matias/>

Research Interests: Fundamental Genomic Research in the genetic regulation of gene expression and gene expression networks; Applied Genomic Research for the discovery of genes, metabolic and regulatory networks that control variation in wood quality, growth and other important traits for the forestry and agronomic industry; and Technology and genomic tool development.

**Liao, Hui-Ling**, Assistant Professor, Soil Microbial Ecology, Soil and Water Sciences Department, [sunny.liao@ufl.edu](mailto:sunny.liao@ufl.edu), Web: <https://soils.ifas.ufl.edu/people/faculty/hui-ling-liao/>

Research Interests: Primary interests lie at understanding relationships between microbial diversity and their function to the ecosystem. Current research areas include applying integrated metaomics to visualize the role of soil microbiomes play on nutrient cycling, plant fitness and (natural/agro-) ecosystem processes.

**Martin-Ryals, Ana**, Assistant Professor and Biological Engineering Undergraduate Coordinator, [admartin@ufl.edu](mailto:admartin@ufl.edu), Web: <https://abe.ufl.edu/people/faculty/ana-martin-ryals/>

Research Interests: Anaerobic digestion; advancing anaerobic membrane bioreactor (AnMBR) technology, microbial community analysis, hydrothermal liquefaction biofuel production, nutrient recovery from wastewater, bioplastic production from food waste, and life-cycle assessment to evaluate environmental impacts of different waste treatment strategies and technologies. Dr. Martin-Ryals is also involved in engineering education research and improving undergraduate STEM education.

**Mehta, Siddhartha**, Research Associate Scientist, MAE, [siddhart@ufl.edu](mailto:siddhart@ufl.edu), Web:

<https://mae.ufl.edu/people/profiles/sid-mehta/>

Research Interests: Effects of magnetic fields on plant growth, development, and disease response from phenome to genome and metabolome; Robotics, non-linear control.

**Odero, Dennis**, Associate Professor of Agronomy, Weed Science, [dcodero@ufl.edu](mailto:dcodero@ufl.edu), Web:

<https://agronomy.ifas.ufl.edu/people/dennis-odero/>

Research Interests: Management of potential escapes in sugarcane and vegetables, weed management options for newly released bioenergy crop varieties; Herbicide evaluation, weed biology and ecology, soil-herbicide interactions, weed-insect interactions, and interaction between pest management strategies. The extension focuses on providing current weed management recommendations to

growers, extension county faculty, crop consultants, and industry representatives via extension publications (EDIS), field days, grower meetings, and web-based electronic formats.

**Osorio Wallau, Marcelo**, Assistant Professor, Agronomy Department, [mwallau@ufl.edu](mailto:mwallau@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/marcelo-wallau/>

Research Interests: Forage Extension Specialist (70% extension, 30% research); Forage production systems for livestock and wildlife, and on integrated crop-livestock systems.

**Peter, Gary**, Professor, School of Forest, Fisheries, & Geomatics Sciences, [gfpeter@ufl.edu](mailto:gfpeter@ufl.edu), Web: <https://ffgs.ifas.ufl.edu/faculty/peter-gary/>

Research Interests: Research is focused in three areas: (1) Genetic mechanisms that control metabolic and regulatory networks that control variation in growth, wood quality, fungal and insect resistance; (2) Accelerating breeding and deployment of southern pines; and (3) Improving productivity, health and sustainability of planted pines.

**Pullammanappallil, Pratap**, Associate Professor, Bioprocessing, Agricultural and Biological Engineering, [pcpratap@ufl.edu](mailto:pcpratap@ufl.edu), Web: <https://abe.ufl.edu/people/faculty/pratap-pullammanappallil/>

Research Interests: Anaerobic digestion; Bio-waste management.

**Sandhu, Hardev**, Associate Professor of Agronomy, Crop Physiology & Crop Management, Sugarcane Specialist, [hsandhu@ufl.edu](mailto:hsandhu@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/hardev-sandhu/>

Research Interests: Sugarcane cultivar development and management with a major focus on evaluation of new sugarcane clones for agronomic performance and disease resistance in on-farm multilocation trials; Evaluation of new agronomic practices (tillage, row spacing, planting and harvesting methods etc.) in sugarcane, energy cane and industrial hemp; Involvement in the leadership of the sugarcane focus action team and to provide strong educational support to sugarcane producers and county extension faculty on sugarcane cultivar selection and management practices.

**Seepaul, Ramdeo**, Assistant research scientist, Agronomy Department, UF/IFAS North Florida Research and Education Center, Quincy, FL, [rseepaul216@ufl.edu](mailto:rseepaul216@ufl.edu), Web:

<https://edis.ifas.ufl.edu/experts/rseepaul216>

Research Interests: Agronomic crops with a major focus on conservation technology production of peanuts, cotton, corn, soybean, small grains, and oil seed crops such as Carinata.

**Shukla, Sanjay**, Professor, Water Quality, Agricultural and Biological Engineering, [sshukla@ufl.edu](mailto:sshukla@ufl.edu), Web: <https://abe.ufl.edu/people/faculty/sanjay-shukla/>

Research Interests: Managing water and nutrient discharges from the agricultural and ranching operations in terms of how to conserve water and reduce the nutrient loads to the Northern Everglades region that contain the Lake Okeechobee and the Everglades.

**Small, Ian**, Assistant Professor, Plant Pathology, UF/IFAS North Florida Research and Education Center, Quincy, FL, [ismall@ufl.edu](mailto:ismall@ufl.edu), Web: <https://nfrec.ifas.ufl.edu/faculty-directory/ian-small/>

Research Interests: integrated research and extension program to improve our understanding of plant diseases and reduce their impact on food, feed, fiber and bioenergy crops in Florida. Primary areas of interest within plant pathology are epidemiology, integrated disease management, smart crop protection, and plant breeding for disease resistance.

**Strauss, Sarah**, Assistant Professor, Soil Microbiology, Soil and Water Sciences Department, [strauss@ufl.edu](mailto:strauss@ufl.edu), Web: <https://soils.ifas.ufl.edu/people/faculty/sarah-strauss/>  
Research Interests: Nutrient, Pesticide, and Waste Management; Carbon Dynamics and Ecosystem Services.

**Trainham, James**, Professor, MAE, [jtrainham@ufl.edu](mailto:jtrainham@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/james-trainham/>  
Research Interests: Renewable energy, synthetic fuels including hydrogen production, energy storage, electrochemical engineering, high temperature materials for high temperature solar thermal applications, and techno-economics of energy alternatives.

**Vermerris, Willem**, Professor, Microbiology and Cell Science Department, [wev@ufl.edu](mailto:wev@ufl.edu), web: <https://microcell.ufl.edu/people/faculty-directory/vermerris/>  
Research Interests: Elucidating biochemical and physiological processes relevant for the genetic improvement of crops that can be used as feedstocks for renewable fuels and chemicals. We use genetic approaches to not only improve the performance and yield of the crop, but also the bioprocessing characteristics and properties of the materials that can be produced from plant biomass.

**Vansanten, Edzard**, Professor of Agronomy, [evsanten@ufl.edu](mailto:evsanten@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/edzard-van-santen/>  
Research Interests: Provide timely and relevant statistical support for IFAS Faculty, Staff, and Students. Provide experiment design and data analysis. Develop better approaches that will assist to generate fewer problems during manuscript review, making clients more competitive in publications and grants. In addition, improved efficiency of minirhizotron data collection and analysis.

**Wright, David**, Professor of Agronomy, [wright@ufl.edu](mailto:wright@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/david-wright/>  
Research Interests: As an extension specialist (65% FTE) include development and delivery of information to support county faculty and their clientele in agronomy in crop production and management. Research (35% FTE) provides information for county faculty and agricultural industry on agronomic crops with a major focus on conservation technology production of peanuts, cotton, corn, soybean, small grains, and oil seed crops.

**Zare, Alina**, Professor and Director of the Machine Learning and Sensing Lab, ECE, [azare@ufl.edu](mailto:azare@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/alina-zare/>  
Research Interests: Machine Learning, Pattern Recognition, Remote Sensing, Artificial Intelligence, Image Analysis and Processing, Phenomics, Computational Intelligence, Sensor Fusion.

## Algae

**Laughinghouse, Haywood Dail**, Assistant Professor, Phycology, Agronomy, [hlaughinghouse@ufl.edu](mailto:hlaughinghouse@ufl.edu), Web: <https://agronomy.ifas.ufl.edu/people/dail-laughinghouse-iv/>  
Research Interests: Diversity and toxicity of cyanobacteria, environmental influences on macroalgae and microbial photoautotrophs, novel applied uses for algae, bioremediation, and the detection and effects of bioactive compounds. Research on testing different algal treatment methods with the industry is

ongoing in the lab where Dr. Laughinghouse uses different approaches, bridging chemistry, genetics, diversity, and environment.

**Phlips, Edward**, Professor, School of Forest, Fisheries, Geomatics Sciences, [phlips@ufl.edu](mailto:phlips@ufl.edu), Web: <https://ffgs.ifas.ufl.edu/faculty/phlips-ed/>

Research Interests: Planktonic primary production in the Suwannee River estuary, located in Florida's Big Bend region, and in the Indian River Lagoon, along the east coast of Florida; Toxic algae research in both freshwater and marine ecosystems; Optimization of algae species for biofuels production.

**Wilkie, Ann** Research Professor, Bioenergy and Sustainable Technology, Soil and Water Sciences Department, [acwilkie@ufl.edu](mailto:acwilkie@ufl.edu), Web: <https://soils.ifas.ufl.edu/people/faculty/ann-c-wilkie/>

Research Interests: Carbon Dynamics and Ecosystem Services; Soil, Water and Aquifer Remediation; Nutrient, Pesticide and Waste Management.

## Solar

**Hages, Charles**, Assistant Professor, Chemical Engineering, [c.hages@ufl.edu](mailto:c.hages@ufl.edu), Web: <https://www.che.ufl.edu/people/faculty/name/charles-hages/>

Research Interests: Developing next-generation semiconductors for energy research is the primary focus of our group. New material discovery in our lab starts with screening for desired material properties from first-principles theoretical calculations. Advanced optoelectronic characterization at all stages of the material development process is a key aspect of material development.

**Wei, David Wei**, Professor, Chemistry, [wei@chem.ufl.edu](mailto:wei@chem.ufl.edu), Web: <https://www.chem.ufl.edu/about-all/directory/people/name/david-wei/>

Research Interests: Discover novel electronic and optical properties of metallic and semiconductor nanomaterials and their implications for electronics, photonics, energy, and biomedicine; Gain comprehensive knowledge of the surface plasmon-directed growth of novel anisotropic nanostructures, and design rules for the synthesis and fabrication of hybrid nanostructures with optimized properties for solar energy harvesting, conversion and storage, photocatalysis, and chemical and biological detection.

**Xue, Jiangeng**, Professor, [jxue@mse.ufl.edu](mailto:jxue@mse.ufl.edu), Web: <https://xue.mse.ufl.edu/>

Research Interests: Nanostructured electronic materials, organic-inorganic hybrid materials, surfaces and interfaces, energy materials, photovoltaic cells, light-emitting diodes and other optoelectronic devices.

## Solar Fuels/Hydrogen

**Choi, Won Tae**, Assistant Professor, Chemical Engineering, [wontae.choi@ufl.edu](mailto:wontae.choi@ufl.edu), Web: <http://www.wchoilab.com/>

Research Interests: Photoelectrochemistry for artificial photosynthesis, development of photoelectrodes, charge carrier dynamics, thermodynamics and kinetics of heterogeneous electrode reactions.

**Chung, Jacob**, Andrew H. Hines, Jr./Florida Progress Corporation Eminent Scholar, MAE, [jchung@ufl.edu](mailto:jchung@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/jacob-chung/>

Research Interests: Fluid mechanics and heat transfer with a special focus on bubble dynamics, phase change heat transfer, multiphase flows, microgravity boiling, turbulence in heated flows, micro-scale

thermal transport, fuel cell thermal transport, space cryogenic line chilldown, storage and transport, energy conversion, hydrogen Energy, biomass and solid waste conversion to clean energy by steam gasification.

**Hagelin Weaver, Helena**, Associate Professor, Dr. and Mrs. Frederick C. Edie Term Professor, and Ph.D. Recruitment Coordinator, Chemical Engineering, [hweaver@che.ufl.edu](mailto:hweaver@che.ufl.edu), Web: <https://www.che.ufl.edu/hagelin-weaver/>

Research Interests: Materials development and characterization for 1) thermochemical water and carbon dioxide splitting and 2) chemical looping reactions using a solar energy to produce hydrogen and carbon monoxide (synthesis gas), a precursor for liquid fuels synthesis.

**Nino, Juan**, Professor, Materials Science and Engineering, [jnino@mse.ufl.edu](mailto:jnino@mse.ufl.edu), Web: <https://nrg.mse.ufl.edu/>

Research Interests: High temperature catalysts and ionic conductors; sustainable synthesis of advanced functional ceramics; energy materials; materials under extreme environments; nuclear fuel cycle materials and nuclear detectors.

**Scheffe, Jonathan Associate Professor**, MAE, [jscheffe@ufl.edu](mailto:jscheffe@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/jonathan-scheffe/>

Research Interests: Solar thermochemical and electrochemical energy conversion, defect chemistry and thermodynamics of nonstoichiometric oxides.

**Sherif, S.A.**, MAE Excellence Term Professor, [sasherif@ufl.edu](mailto:sasherif@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/sa-sherif/>

Research Interests: Heat and Mass Transfer, Thermodynamics, Thermal System Design and Optimization, Refrigeration and Cryogenics, HVAC, Solar and Hydrogen Energy

**Trainham, James**, Professor, MAE, [jtrainham@ufl.edu](mailto:jtrainham@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/james-trainham/>

Research Interests: Renewable energy, synthetic fuels including hydrogen production, energy storage, electrochemical engineering, high temperature materials for high temperature solar thermal applications, and techno-economics of energy alternatives.

## Nuclear energy

**Aitkaliyeva, Assel**, Assistant Professor, MSE, [aitkaliyeva@mse.ufl.edu](mailto:aitkaliyeva@mse.ufl.edu), Web: <https://manatee.mse.ufl.edu/>

Research Interests: Nuclear Fuels and Materials, with emphasis on characterization and property evaluation; Mechanical and Thermal properties of materials; Reactor Irradiation; Radiation damage in materials; Ion Implantation; Kinetics; Composites; Nanostructured materials; Multi-Scale simulation of nuclear fuel.

**Baciak, James**, Professor, Florida Power and Light Professor, [jebaciak@ufl.edu](mailto:jebaciak@ufl.edu), Web: <https://mse.ufl.edu/people/name/james-baciak/>

Research Interests: Applied aspects of cargo monitoring, detector testing and characterization for gamma-ray spectroscopy, as well as development and analysis of techniques for environmental sampling and surveys related to on-site inspections.



**Enqvist, Andreas**, Nuclear Engineering Program Director, Florida Power and Light Professor, [enqvist@ufl.edu](mailto:enqvist@ufl.edu), Web: <https://enqvist.mse.ufl.edu/>  
Research Interests: Nuclear safeguards, detection statistics of radiation from fissile materials, and the physics behind particle-detector interactions. Neutron physics & detectors. Neutron noise signals. Radiation signal analysis.

**Hartig, Kyle**, Assistant Professor, MSE, [hartig@mse.ufl.edu](mailto:hartig@mse.ufl.edu), Web: <https://hartig.mse.ufl.edu/>  
Research Interests: Remote Sensing, Nuclear Nonproliferation/counterproliferation, Nuclear Security, and Nuclear Policy.

**Nino, Juan**, Professor, MSE, [jnino@mse.ufl.edu](mailto:jnino@mse.ufl.edu), Web: <https://nrg.mse.ufl.edu/>  
Research Interests: Nuclear fuel cycle materials and nuclear detectors; materials under extreme environments; high temperature catalysts and ionic conductors; sustainable synthesis of advanced functional ceramics; energy materials.

**Phillpot, Simon**, Distinguished Professor, Vladimir A. Grodsky Professor of Materials Science & Engineering, [sphil@mse.ufl.edu](mailto:sphil@mse.ufl.edu), Web: <https://phillpot.mse.ufl.edu/>  
Research Interests: Computational materials science; heat transport; nuclear materials; ferroelectrics and dielectrics; mechanical properties of metals; simulation methodologies

**Subhash, Ghatu**, Newton C. Ebaugh Professor, MAE, [subhash@ufl.edu](mailto:subhash@ufl.edu), Web: <https://mae.ufl.edu/subhash/>  
Research Interests: Cutting-edge research in the areas of solid mechanics, material science; Dynamic multiaxial response, characterization of deformation modes, and fracture behavior of structural ceramics, ultrahigh temperature materials, metallic glasses, 3D woven composites, structural foams, nanostructured materials, and refractory metals; Processing-structure-property relationships in ultra-high temperature ceramics and composites; Development of novel test methods for low density materials and Experimental mechanics; Dynamic wear, Dynamic hardness,

**Tonks, Michael**, Professor, Alumni Professor of Materials Science & Engineering and MSE Undergraduate Coordinator, [michael.tonks@ufl.edu](mailto:michael.tonks@ufl.edu), Web: <https://tonks.mse.ufl.edu/>  
Research Interests: Computational materials science, Computational mechanics, Coevolution of microstructure and properties, Materials in Harsh Environments, Mesoscale modeling and simulation, Nuclear materials, Numerical methods.

**Tulenko, James**, Emeritus Faculty, MSE, [tulenko@ufl.edu](mailto:tulenko@ufl.edu), Web: <https://mse.ufl.edu/people/name/james-tulenko/>  
Research Interests: Nuclear fuel cycle, focusing on the processing, fabrication and in core and excore performance of nuclear fuel, multi-scale simulation of nuclear Fuel, economic and environmental evaluation of all forms of electrical energy generation.

**Watson, Justin**, Associate Professor and NE Graduate Coordinator, MSE, [justin.watson@ufl.edu](mailto:justin.watson@ufl.edu), Web: <https://faculty.eng.ufl.edu/watson/>  
Research Interests: Reactor Kinetics and Dynamics, Neutronics, Thermal Hydraulics, Multiphysics Simulation, Advanced Numerical Methods, Applied Mathematics, Advanced Code Coupling Techniques, Scientific Software Development, High Performance Computing.

**Wall, Nathalie**, Professor, MSE, [nathalie.wall@ufl.edu](mailto:nathalie.wall@ufl.edu), Web: <https://wall.mse.ufl.edu/>

Research Interests: Radiochemistry, Nuclear Wastes, Nuclear Forensics, Nuclear Fuel Cycle, Environmental Behavior of Radionuclides.

**Yang, Yong**, Associate Professor, MSE, [yongyang@ufl.edu](mailto:yongyang@ufl.edu), Web: <https://mse.ufl.edu/people/faculty/name/yong-yang/>

Research Interests: Structural and fuel materials for nuclear energy systems; LWRs sustainability and aging management; advanced fabrication and joining technologies; used fuel dry storage and disposition.

### Smart Grid

**Bretas, S. Arturo**, Professor, ECE, (affiliated faculty) [arturo@ece.ufl.edu](mailto:arturo@ece.ufl.edu), Web: [http://power.ece.ufl.edu/?page\\_id=50](http://power.ece.ufl.edu/?page_id=50)

Research Interests: Smart Grids, Cyber-Physical Security, Power Systems Protection, Reliability Optimization, State Estimation, Control and Dynamics.

**Barooah, Prabir**, MAE Excellence Term Professor, [pbarooah@ufl.edu](mailto:pbarooah@ufl.edu), Web: <https://dicelab.mae.ufl.edu/>

Research Interests: Control systems for a smart and sustainable energy infrastructure (in particular, on enabling buildings to reduce their energy use and provide “virtual storage” to the electric grid for integrating renewable energy sources such as solar and wind), distributed estimation and control algorithms (for applications such as localization/synchronization of sensor networks and robotic swarms), distributed optimization.

**Guan, Yongpei**, George and Rolande Willis Endowed Professor Associate Chair of Graduate Studies, Industrial & Systems Engineering, [guan@ise.ufl.edu](mailto:guan@ise.ufl.edu), Web: <https://www.ise.ufl.edu/guan/>

Research Interests: Stochastic and discrete optimization, power system operations, and supply chain management.

**Harley, Joel**, Associate Professor, ECE, [joel.harley@ufl.edu](mailto:joel.harley@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/joel-b-harley/>

Research Interests: Signal Processing, Machine Learning, Acoustics, Nondestructive Evaluation, Structural Health Monitoring, Electrical Fault Monitoring, Material Characterization

**Maghari, Nima**, Associate Professor, ECE, [maghari@ufl.edu](mailto:maghari@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/nima-maghari/>

Research Interests: High performance data converters, delta-sigma modulators, synthesizable analog to digital converters, biomedical applications.

**Meyn, Sean**, Professor and Robert C. Pittman Eminent Scholar Chair, ECE, [meyn@ece.ufl.edu](mailto:meyn@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/sean-meyn/>

Research Interests: Markov processes (with or without control), spectral theory and large deviations; Stochastic approximation, reinforcement learning

**Wang, Shuo, Professor**, ECE, [shuo.wang@ece.ufl.edu](mailto:shuo.wang@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/shuo-wang/>

Research Interests: Power electronics, electrical power, electromagnetic interference, electric vehicles, green energy conversion and grid integration, electromagnetic security, IoT security, cyber security, and hardware security.

**Zare, Alina**, Professor & Graduate Admissions Coordinator, ECE, [azare@ufl.edu](mailto:azare@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/alina-zare/>

Research Interests: Machine Learning, Pattern Recognition, Remote Sensing, Artificial Intelligence, Image Processing.

## Cyber / Grid Security

**Abdollahi Biron**, Zoleikha, Assistant Professor, ECE, [z.biron@ece.ufl.edu](mailto:z.biron@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/zoleikha-biron/>

Research Interests: Security and control of Cyber Physical Systems, Intelligent Transportation System, Control theory, Diagnosis, Energy management

**Bobda, Christophe**, Professor, Department of Electrical and Computer Engineering, [cbobda@ece.ufl.edu](mailto:cbobda@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/christophe-bobda/>,

Research Interests: Embedded Vision, Embedded Systems, Reconfigurable Computing, Computer Architecture, Cybersecurity, System-Level Design.

**Ray, Sandip**, Professor, ECE, [sandipr@ufl.edu](mailto:sandipr@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/sandip-ray/>

Research Interests: Trustworthy computing; Reconfigurable platforms; Automotives and IoT; Post-silicon validation; Formal Methods.

**Tehranipoor, Mark**, Intel Charles E. Young Endowed Chair Professor in Cybersecurity, ECE, [tehranipoor@ece.ufl.edu](mailto:tehranipoor@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/mark-m-tehranipoor/>

Research Interests: Hardware security and trust, IoT security, electronics supply chain security, and reliable and testable VLSI design.

**Yuguang “Michael” Fang**, Distinguished Professor, ECE, [fang@ece.ufl.edu](mailto:fang@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/yuguang-michael-fang/>

Research Interests: Cybersecurity, wireless networks, cognitive radio networks, mobile computing, mobile health, smart grid.

**Wang, Shuo**, Professor, IEEE Fellow, Department of Electrical and Computer Engineering, [shuo.wang@ece.ufl.edu](mailto:shuo.wang@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/shuo-wang/>

Research Interests: Power electronics, electrical power, electromagnetic interference, electric vehicles, green energy conversion and grid integration, electromagnetic security, IoT security, cyber security, and hardware security

## Energy Storage

**Aifantis, Katerina**, Associate Professor and MAE Faculty Fellow, [kaifantis@ufl.edu](mailto:kaifantis@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/katerina-aifantis/>

Research Interests: Leads a state of the art electrochemistry lab. Using her expertise in modelling she has developed multiphysics computational models that provide design criteria for the most promising cathode and anode materials for Li-ion and Na-ion batteries. Based on her theoretical predictions she has synthesized and tested new Si and Prussian blue materials that show great promise.

**Butala, Megan**, Assistant Professor, MSE, [mbutala@ufl.edu](mailto:mbutala@ufl.edu), Web: <https://butala.mse.ufl.edu/>  
Research Interests: Energy Storage Materials, Lithium-ion Batteries, Structure-Property Relationships, X-ray Diffraction, Pair Distribution Function Analysis.

**Choi, Won Tae**, Assistant Professor, Chemical Engineering, [wontae.choi@ufl.edu](mailto:wontae.choi@ufl.edu), Web: <http://www.wchoilab.com/>  
Research Interests: Redox active materials for energy storage devices, multiscale coupled electron and ion transport, heterogeneous electrode reactions.

**Evans, Austin M.**, Assistant Professor, Polymer Division, Department of Chemistry, [austinevans@chem.ufl.edu](mailto:austinevans@chem.ufl.edu), Website: <https://evans.chem.ufl.edu>, <https://www.chem.ufl.edu/about-all/directory/people/name/austin-evans/>  
Research Interests: Organic electronic devices including organic electrodes, organic pseudo-capacitors, organic solid-state electrolytes, and membrane separators. Organic materials for lithium ion (and other mineral) harvesting from sea water through kinetic electrochemical processes.

**Martin, Charles**, Crow and Distinguished Professor, Chemistry, [crmartin@chem.ufl.edu](mailto:crmartin@chem.ufl.edu), Web: <https://www.chem.ufl.edu/about-all/directory/name/charles-martin/>  
Research Interests: Electrochemistry, nanoscience and bioanalytical chemistry. Beginning in the 1980s, his research group pioneered a powerful and versatile approach for preparing nanomaterials called template synthesis. This method has since become a workhorse procedure for preparing nanomaterials, and is used in laboratories throughout the world. His research currently focuses on applications of template-prepared nanotubes and nanotube membranes to electrochemical biosensors and to electrochemical energy.

**Nino, Juan**, Professor, Materials Science and Engineering, [jnino@mse.ufl.edu](mailto:jnino@mse.ufl.edu), Web: <https://nrg.mse.ufl.edu/>  
Research Interests: Fuel Cells, capacitors, sustainable synthesis of advanced functional ceramics; energy materials, high temperature catalysts and ionic conductors; nuclear fuel cycle materials and nuclear detectors; materials under extreme environments.

**Orazem, Mark**, Distinguished Professor, Chemical Engineering, [meo@che.ufl.edu](mailto:meo@che.ufl.edu), Web: <https://www.che.ufl.edu/orazem/>  
Research Interests: Electrochemical Engineering: Electrochemical Impedance Spectroscopy, Corrosion (including cathodic protection), Current Distribution in Electrochemical Systems, Fuel Cells, Mathematical Modeling.

**Rinzler, Andrew**, Professor, Department of Physics, [rinzler@ufl.edu](mailto:rinzler@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/andrew-rinzler/>  
Research Interests: Exploitation of nanoscale materials for scientific and technological gain, particularly with respect to electronic and optical properties.

**Sigmund, Wolfgang**, Professor and MSE Graduate Coordinator, [sigmund@ufl.edu](mailto:sigmund@ufl.edu), Web:  
Research Interests: Semiconductor oxides for energy harvesting and storage, photocatalysis and photolysis, electrodes for secondary batteries, barrier coatings, nanostructures in surface science and, biomedical applications of nanoparticles.

**Trainham, James**, Professor, MAE, [jtrainham@ufl.edu](mailto:jtrainham@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/james-trainham/>

Research Interests: Renewable energy, synthetic fuels including hydrogen production, energy storage, electrochemical engineering, high temperature materials for high temperature solar thermal applications, and techno-economics of energy alternatives.

**Ziegler, Kirk**, Associate Chair for Graduate Studies and Charles A. Stokes Endowed Professor, Chemical Engineering, [kziegler@che.ufl.edu](mailto:kziegler@che.ufl.edu), web: <https://ziegler.che.ufl.edu/>

Research Interests: Nanomaterial synthesis, dispersion, and separation, Transport at nanoscale interfaces.

## Transportation

**Agarwal, Nithin**, Adjunct Faculty and Director for T2 Center, Department of Civil & Coastal Engineering, [nithin.agarwal@ufl.edu](mailto:nithin.agarwal@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/nithin-agarwal/>

Research Interests: Signal systems, traffic operations, and highway safety. Dr. Agarwal manages the Transportation Safety Center and other resources Centers for FDOT at T2 Center. Dr. Agarwal is the current chair of the TRB Signal Timing Manual Subcommittee and a member of the Traffic Signal Systems Committee.

**Bejleri, Ilir**, Associate Professor, Department of Urban and Regional Planning, [ilir@ufl.edu](mailto:ilir@ufl.edu), Web: <https://dcp.ufl.edu/faculties/bejleri-ilir/>

Research Interests: Urban Design; 3D Visual Urban Simulation; Planning & Geographic Information Systems (GIS)

**Du, Lili**, Associate Professor, Chair of AEP40-4, Emerging Technologies in Network Modeling, TRB Chair of AI in Transportation Committee, Transportation & Development Institute, ASCE, Department of Civil & Coastal Engineering, [lilidu@ufl.edu](mailto:lilidu@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/lili-du/>

Research Interests: Connected and autonomous vehicle systems; Big Data Analytics for Transportation Systems; Interdependent Infrastructure network modeling; Transportation system analysis and network modeling; Multi-Modal Transportation System Sustainability; Traffic signal control and system operation Dynamic and green vehicle routing. Dr. Du leads the sustainability and resilience initiatives for the UFTI.

**Elefteriadou, Lily Ageliki**, Professor of Civil Engineering and the Director of the UF Transportation Institute, [elefter@ce.ufl.edu](mailto:elefter@ce.ufl.edu), Web: <https://www.transportation.institute.ufl.edu/overview/people/ufti-director/>

Research Interests: Traffic operations, signal control optimization, highway capacity analysis, and traffic simulation.

**Goodison, Crystal**, Associate Director + Associate Scholar, GeoPlan Center, Department of Urban and Regional Planning, [goody@geoplan.ufl.edu](mailto:goody@geoplan.ufl.edu), Web: <https://dcp.ufl.edu/faculties/goodison-crystal/>

Research Interests: Geospatial projects which provide mapping data, tools, and technical training to the State, regional, and local governments to assist with sea level rise and coastal resiliency planning efforts. Her work involves understanding the data needs of transportation planners and urban planners and then building mapping tools to facilitate data delivery, analysis, and visualization. She enjoys developing and offering technical training to planning professionals around the state to build local capacity and empowerment.

**Hochmair, Hartwig**, Associate professor, Fort Lauderdale Research and Education Center, [hhhochmair@ufl.edu](mailto:hhochmair@ufl.edu), Web: <https://flrec.ifas.ufl.edu/faculty/dr-henry-hochmair/>  
Research Interests: Dr. Hochmair leads the Geomatics program at the Fort Lauderdale Research and Education Center (FLREC). The primary goal of the Geomatics program is to prepare students for careers as practitioners and researchers in response to the increasing demand for licensed surveyors and experts in geospatial technologies. Using the general framework of Geographic Information Systems (GIS), Dr. Hochmair provides leadership in teaching activities and research related to the analysis and quality assessment of geodata and geodata visualization.

**Peng, Zhong-Ren**, Professor/Director International Center for Adaptation Planning and Design (iAdapt), Department of Urban and Regional Planning, [zpeng@dcp.ufl.edu](mailto:zpeng@dcp.ufl.edu), Web: <https://dcp.ufl.edu/faculties/peng-zhong-ren/>  
Research Interests: Geospatial Information Systems and Analysis; Information Technology for Planning International Planning; Landscape Planning Using GIS; Transportation

**Ranka, Sanjay**, Distinguished Professor, CISE, [ranka@cise.ufl.edu](mailto:ranka@cise.ufl.edu), Web: <https://www.cise.ufl.edu/ranka-sanjay/>  
Research Interests: Database, Data Science and Informatics.

**Reisi Gahrooei, Mostafa**, Assistant Professor in Industrial and Systems Engineering, [mreisigahrooei@ufl.edu](mailto:mreisigahrooei@ufl.edu), Web: <https://www.ise.ufl.edu/reisi-gahrooei/>  
Research Interests: Developing efficient methodologies and algorithms for modeling and monitoring systems through the fusion of high-dimensional and multimodal data. The applications of his work are in precision agriculture, manufacturing, healthcare, and transportation systems. He is a co-director of Data Informatics for Systems Improvement and Design (DISIDE) lab.

**Riding, Kyle**, Professor, Department of Civil & Coastal Engineering, [kyle.riding@essie.ufl.edu](mailto:kyle.riding@essie.ufl.edu), Web: <https://www.essie.ufl.edu/people/name/kyle-riding/>  
Research Interests: Materials & Pavements.

**Sansalone, John J.**, Professor, Environmental Engineering Sciences, [jsansal@ufl.edu](mailto:jsansal@ufl.edu), Web: <https://www.eng.ufl.edu/about/contact/college-directory/name/john-sansalone/>  
Research Interests: Interactions of hydrology, chemistry and control/treatment/reuse of rainfall-runoff and snowmelt; green materials and infrastructure systems in the urban environment, such as engineering permeable pavement systems; in-situ geoenvironmental systems for hydrologic and chemical cycling; soil modification, unit operations and processes for stormwater and wastewater, storm water TMDL analysis and sampling methods, adsorptive-filtration phenomena, control of metals and nutrients, anaerobic digestion, urban drainage systems and solidification/stabilization.

**Steiner, Ruth**, Department of Urban and Regional Planning, [rsteiner@dcp.ufl.edu](mailto:rsteiner@dcp.ufl.edu), Web: <https://dcp.ufl.edu/faculties/ruth-l-steiner/>  
Research Interests: (Built Environment Resilience, Renewable Energy, Smart Buildings/Cities)  
Her research focuses on the coordination of transportation and land use, with a particular focus on planning for sustainable modes of transportation, and its impact on communities, the environment, and public health. Her current research is on the impact of school siting, school transportation and land development patterns on children's travel, transportation and aging, the changing pattern of travel among millennials, impacts of new transportation technologies on transportation systems, parking

supply and demand management, equity in planning, and the incorporation of risk into long-range transportation planning.

**Thomas, Alexis**, Director, GeoPlan Center, Department of Urban and Regional Planning, [alexis@geoplan.ufl.edu](mailto:alexis@geoplan.ufl.edu), Web: <https://dcp.ufl.edu/faculties/thomas-alexis/> and <https://www.geoplan.ufl.edu/people/>

Research Interests: Geo planning.

**Washburn, Scott**, Professor, Department of Civil & Coastal Engineering, [swash@ce.ufl.edu](mailto:swash@ce.ufl.edu), Web: <https://www.essie.ufl.edu/people/name/scott-washburn/>

Research Interests: Transportation Engineering

**Peng, Zhong-Ren**, Professor/Director International Center for Adaptation Planning and Design (iAdapt), Department of Urban and Regional Planning, [zpeng@dcp.ufl.edu](mailto:zpeng@dcp.ufl.edu), Web: <https://dcp.ufl.edu/faculties/peng-zhong-ren/>

Research Interests: Conducting research in sustainable transportation systems such as public transportation systems, shared mobility and environment impacts of transportation networks; conducting research in adaptation planning for climate change like sea level rise and extreme weather.

## Catalysis

**Choi, Won Tae**, Assistant Professor, Chemical Engineering, [wontae.choi@ufl.edu](mailto:wontae.choi@ufl.edu), Web: <http://www.wchoilab.com/>

Research Interests: Heterogeneous electrocatalysts, scanning electrochemical microscopy for probe investigation of electrocatalytic activity and *in-situ* analysis of electrocatalytic reaction kinetics and mechanisms.

**Hagelin Weaver, Helena**, Associate Professor, Dr. and Mrs. Frederick C. Edie Term Professor, and Ph.D. Recruitment Coordinator, Chemical Engineering, [hweaver@che.ufl.edu](mailto:hweaver@che.ufl.edu), Web: <https://www.che.ufl.edu/hagelin-weaver/>

Research Interests: Heterogeneous catalyst development for renewable energy processes. Well-defined catalysts are synthesized using nanoparticle oxides and atomic layer deposition and carefully characterized to provide fundamental information on different reactions. Reactions include, for example, steam reforming of methanol to produce hydrogen, oxidative coupling of methane to produce ethylene, low-temperature activation of methane for selective conversion to higher value chemicals, and selective hydrogenation reactions.

**Hibbitts, David**, Associate Professor and Moreno Rising Star Professor, Chemical Engineering, [hibbitts@che.ufl.edu](mailto:hibbitts@che.ufl.edu), Web: <https://hibbitts.rc.ufl.edu/group.html>

Research Interests: Heterogeneous Catalysis, Kinetic Studies, Density Functional Theory, Catalyst Synthesis and Characterization.

**Mcelwee-White, Lisa**, Crow Professor and Chair, Chemistry, [chair@chem.ufl.edu](mailto:chair@chem.ufl.edu), Web: <https://www.chem.ufl.edu/about-all/directory/name/lisa-mcelwee-white/>

Research Interests: Applications of organometallic chemistry to problems in materials deposition. Recent areas of research include chemical vapor deposition of inorganic films that are of interest for manufacture of semiconductor devices and OLEDs, organometallic precursors for electron beam-

induced deposition of nanostructures, and precursors for photochemical metallization of thermally sensitive organic electronics.

**Weaver, Jason**, Dow Chemical Company Foundation Term Professor, Chemical Engineering, [jweaver@che.ufl.edu](mailto:jweaver@che.ufl.edu), Web: <https://www.che.ufl.edu/weaver/>

Research Interests: Gas-surface Reactivity and Dynamics, Atomic and Molecular Beam Methods, Surface Spectroscopy.

## Environmental

**Annable, Michael**, Professor and EES Department Head, Department of Environmental Engineering Sciences, [annable@ufl.edu](mailto:annable@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/michael-annable/>  
Research Interests: Physical-chemical processes related to field scale application of innovative technologies for subsurface remediation. His research also focuses on innovative methods for measuring contaminant and water flux in hydrologic systems.

**Schert, John D.**, Director, Florida Hinkley Center for Solid and Hazardous Waste Management (FHCSHWM), [jschert@ufl.edu](mailto:jschert@ufl.edu), Web: <https://www.eng.ufl.edu/about/contact/college-directory/name/john-schert/>

Research Interests: His center provides funds for research.

**Townsend, Timothy**, Edmonds & Associates, Inc. Professor, Department of Environmental Engineering Sciences, [ttown@ufl.edu](mailto:ttown@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/timothy-townsend/>

Research Interests: Sustainable Materials Management, Solid and Hazardous Waste Management, Geosystems Engineering, Sustainable Construction Engineering.

## Quantum Materials

**Cheng, Hai-Ping**, Professor, Department of Physics, [hping@ufl.edu](mailto:hping@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/hai-ping-cheng/>

Research Interests: Research aims at physical phenomena at ultra small (nano)-scale via large-scale computational approach. The goal is to develop a basic understanding of physical properties of finite-size systems (cluster, nano-crystals, molecular/nano-wires) and their interaction with bulk matter. Small systems exhibit unique properties because of size confinement, and therefore are of great fundamental significance as well as technological value. We are working on systematic investigations of size-dependent energetic, structural, electronic structure, electronic transport, mechanical, dynamic, and thermodynamic properties of various systems, as well as their interaction with bulk matter.

**Hamlin, James**, Associate Professor, Department of Physics, [jhamlin@ufl.edu](mailto:jhamlin@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/james-hamlin/>

Research Interests: Directed towards utilizing a combination of materials synthesis/characterization and high pressure measurements to advance our understanding of novel and potentially useful electronic and magnetic materials. Pressures employed span the range from kilobars (the pressure at the bottom of the ocean) to megabars (nearing the pressure at the core of the earth); Understanding the conditions under which unconventional and/or high temperature superconducting states form.



**Meisel, Mark**, Professor, Department of Physics, [meisel@phys.ufl.edu](mailto:meisel@phys.ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/mark-meisel/>

Research Interests: The electromagnetic and thermodynamic properties of a variety of novel low dimensional systems are investigated for the purpose of studying the underlying quantum mechanical phenomena. From room temperature down to the millikelvin temperature range, the research focuses on low dimensional organic and inorganic conductors and magnets, nanostructured antiferromagnetic particles, and novel superconducting and heavy fermion materials. The millikelvin research is extended to the microkelvin regime when the behavior of the systems requires further clarification. In addition, superfluid <sup>3</sup>He is studied at microkelvin temperatures using ultrasonic techniques. Finally, biophysical research involves the study of plants growing in low gravity environments generated by magnetic levitation and the influence of strong magnetic fields on gene expression.

**Maslov, Dmitrii**, Professor & Associate Chair, Department of Physics, [maslov@ufl.edu](mailto:maslov@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/dmitrii-maslov/>

Research Interests: Correlated electron systems: Fermi-liquid theory, quantum phase transitions, electron transport, quantum paraelectrics and paramagnets; Spin-orbit interaction in solids; New phases of matter induced by strong magnetic fields.

**Takano, Yasumasa**, Professor, Department of Physics, [takano@ufl.edu](mailto:takano@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/yasumasa-takano/>

Research Interests: Quantum magnetism, nuclear magnetism, quantum fluids, and solids quantum solids.

### **Water/Energy Nexus**

**Asche, Frank**, Professor, Forest Resources and Conservation, [frank.asche@ufl.edu](mailto:frank.asche@ufl.edu), Web: <https://foodsystems.ifas.ufl.edu/people/faculty/frank-asche/>

Research Interests: Use of ecolabels for seafood, seafood trade and food security, the role of innovation and productivity growth in increasing aquaculture production and regime shifts in seafood and energy prices.

**Kipp Searcy, Mary Jennison**, Resource Economist, Program for Resource Efficient Communities, Center for Land Use Efficiency, [mjkippp@ufl.edu](mailto:mjkippp@ufl.edu), Web: <https://clue.ifas.ufl.edu/faculty/kipp.html>

Research Interests: Applied research and outreach on water, energy, and land-use conservation and efficiency in Florida, with an emphasis on community engagement and facilitation to bridge gaps between science and policy. She is especially interested in the dynamic relationships among land use planning, natural resource demands, utility incentive structures, climate change impacts, community resilience, and environmental justice. Collaborators in her work include state and regional agencies, local governments, utilities, and public- and private-sector practitioners (urban planners, developers, engineers, landscape architects, economists, and educators).

### **Climate Change**

**Asseng, Senthold**, Professor, Cropping Systems Modeling, Director, Florida Climate Institute, [sasseng@ufl.edu](mailto:sasseng@ufl.edu), Web: <https://abe.ufl.edu/people/faculty/senthold-asseng/>

Research Interests: Simulation of global wheat cropping systems under current and future climate change for global food security; Simulation of fruit and vegetable systems in the US, linked to economic modeling and Life Cycle Assessment; Quantification of climate change impact assessment uncertainties; Seasonal forecasting for crop decision making.

**Crandall, Raelene**, Professor, School of Forest, Fisheries, & Geomatics Sciences, [raecrandall@ufl.edu](mailto:raecrandall@ufl.edu), Web: <https://ffgs.ifas.ufl.edu/faculty/crandall-raelene/>  
Research Interests: Disturbance Ecology; Ecological Modelling; Invasive Species; Population & Community Ecology; Restoration & Management

**Engström, Johanna C. L.**, Assistant Professor, Department of Geography, [joem@ufl.edu](mailto:joem@ufl.edu), Web: <https://geog.ufl.edu/faculty/engstrom/>.  
Research Interests: Climate services for renewable energy production with particular interest in hydropower. Currently developing a course called "The future of Energy". Worked in wind power development in industry prior to joining academia.

**Goodison, Crystal**, Associate Director + Associate Scholar, GeoPlan Center, Department of Urban and Regional Planning, [goody@geoplan.ufl.edu](mailto:goody@geoplan.ufl.edu), Web: <https://dcp.ufl.edu/faculties/goodison-crystal/>  
Research Interests: Geospatial projects which provide mapping data, tools, and technical training to the State, regional, and local governments to assist with sea level rise and coastal resiliency planning efforts. Her work involves understanding the data needs of transportation planners and urban planners and then building mapping tools to facilitate data delivery, analysis, and visualization. She enjoys developing and offering technical training to planning professionals around the state to build local capacity and empowerment.

**Jones, James W. Jones**, Co-founder and Emeritus Advisor, FL Climate Institute, Dept. of Agricultural & Biological Engineering, [JWJones@ifas.ufl.edu](mailto:JWJones@ifas.ufl.edu), Web: <https://abe.ufl.edu/people/faculty/james-jones/>  
Research Interests: Climate Risk Management and Decision Support System: USDA-RMA project emphasizing the development and implementation of a climate information and decision support system for use by the Cooperative Extension Services in the SE USA.

**Jutla, Antarpreet**, Associate Professor, Department of Environmental Engineering Sciences, [ajutla@ufl.edu](mailto:ajutla@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/antarpreet-jutla/>  
Research Interests: Water Systems.

**Kipp Searcy, Mary Jennison**, Resource Economist, Program for Resource Efficient Communities, Center for Land Use Efficiency, [mjkippp@ufl.edu](mailto:mjkippp@ufl.edu), Web: <https://clue.ifas.ufl.edu/faculty/kipp.html>  
Research Interests: Applied research and outreach on water, energy, and land-use conservation and efficiency in Florida, with an emphasis on community engagement and facilitation to bridge gaps between science and policy. She is especially interested in the dynamic relationships among land use planning, natural resource demands, utility incentive structures, climate change impacts, community resilience, and environmental justice. Collaborators in her work include state and regional agencies, local governments, utilities, and public- and private-sector practitioners (urban planners, developers, engineers, landscape architects, economists, and educators).

**Martin, Jonathan**, Professor of Geology, Associate Chair of Geological Sciences, [jbmartin@ufl.edu](mailto:jbmartin@ufl.edu), Web: <https://geology.ufl.edu/people/faculty/dr-jonathan-martin/>  
Research Interests: Physical and chemical hydrogeology of carbonate aquifers, sea level change and impact to coastal aquifers, and weathering of Greenland and marine records of glacial retreat.

**Muneepeerakul, Rachata (Chot)**, UF, Dept. of Agricultural & Biological Engineering, Statewide Florida Climate Institute Lead, [rmuneepe@ufl.edu](mailto:rmuneepe@ufl.edu), Web: <https://abe.ufl.edu/people/faculty/rachata-muneepeerakul/>

Research Interests: Dynamical models, complex networks, game theory, and stochastic processes. In recent years, he has been interested in systematic development of models of coupled natural-human systems.

**Peng, Zhong-Ren**, Professor/Director International Center for Adaptation Planning and Design (iAdapt), Department of Urban and Regional Planning, [zpeng@dcp.ufl.edu](mailto:zpeng@dcp.ufl.edu), Web:

<https://dcp.ufl.edu/faculties/peng-zhong-ren/>

Research Interests: Conducting research in sustainable transportation systems such as public transportation systems, shared mobility and environment impacts of transportation networks; conducting research in adaptation planning for climate change like sea level rise and extreme weather.

**Southworth, Jane**, Department Chair, Geography, [jsouthwo@ufl.edu](mailto:jsouthwo@ufl.edu), Web:

<https://geog.ufl.edu/faculty/southworth/>

Research Interests: Study of human-environment interactions within the field of Land Change Science and Geospatial Science. Interdisciplinary research involving both social and physical scientists. Remote sensing of vegetation dynamics; land use, land cover change and land change modeling; the implications of scale and scaling in remote sensing and modeling analyses; people and parks; and modeling of the impacts of climate change on human-environment systems and vegetation dynamics.

**Tucker, Catherine May**, Professor, Anthropology, [tuckerc@ufl.edu](mailto:tuckerc@ufl.edu), Web:

<https://anthro.ufl.edu/2013/11/23/tucker/>

Research Interests: Human-environment interactions through a transdisciplinary approach encompassing environmental and economic anthropology, political ecology, institutional analysis, and participatory approaches. Focus on the Latin American experience, including community-based forest and water management, coffee production and value chains, interactions between people and protected areas, governance of common-pool resources, adaptation to climate change, sustainability, globalization, and belief systems.

**Zare, Alina**, Professor & Graduate Admissions Coordinator, ECE, [azare@ufl.edu](mailto:azare@ufl.edu), Web:

<https://www.ece.ufl.edu/people/faculty/alina-zare/>

Research Interests: Machine Learning, Pattern Recognition, Remote Sensing, Artificial Intelligence, Image Processing.

## Policy

**Donna, Javier D.**, Assistant Professor of Economics, [jdonna@ufl.edu](mailto:jdonna@ufl.edu), Web: <http://www.jdonna.org/>

Research Interests: Industrial Organization, Environmental Economics, Transportation Economics, Auctions.

**Hartig, Kyle**, Assistant Professor, MSE, [hartig@mse.ufl.edu](mailto:hartig@mse.ufl.edu), Web: <https://hartig.mse.ufl.edu/>

Research Interests: Remote Sensing, Nuclear Nonproliferation/counterproliferation, Nuclear Security, and Nuclear Policy.

**Jamison, Mark**, Gerald L. Gunter Memorial Professor, Director, Public Utility Research Center,

[mark.jamison@warrington.ufl.edu](mailto:mark.jamison@warrington.ufl.edu), Warrington College of Business, Web:

<https://warrington.ufl.edu/directory/person/5331/>

Research Interests: Competition policy and regulation of information technologies, institutional development in regulation, and competition and innovation in the information sectors. He has conducted educational programs in numerous countries: Africa, Europe, the Caribbean, and North, South, and Central America.

**Kury, Ted**, Director of Energy Studies, Warrington College of Business, [ted.kury@warrington.ufl.edu](mailto:ted.kury@warrington.ufl.edu), Web: <https://warrington.ufl.edu/directory/person/5004/>

Research Interests: Conducts interdisciplinary research related to Florida's energy and climate change policies.

**Sappington, David**, Director, Robert F. Lanzillotti Public Policy Research Center, [sapping@ufl.edu](mailto:sapping@ufl.edu), Web: <https://people.clas.ufl.edu/sapping/> and <https://economics.clas.ufl.edu/research-centers/pprc/>

Research Interests: Industrial Organization, Regulation.

## Other

**Andrew, Jennifer**, Associate Professor, Margaret A. Ross Professor of Materials Science & Engineering, [jandrew@mse.ufl.edu](mailto:jandrew@mse.ufl.edu), Web: <http://andrewresearchgroup.com/>

Research Interests: nanomaterials, nanocomposites for electronic and biomedical applications, magnetic materials, multiferroics, polymers.

**Balachandar, Sivaramakrishnan**, Newton C. Ebaugh Professor, Distinguished Professor, MAE, [bala1s@ufl.edu](mailto:bala1s@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/bala-balachandar/> and <https://www.eng.ufl.edu/ccmt/>

Research Interests: Compressible Multiphase Turbulence.

**Behdad, Sara**, Associate Professor, Department of Environmental Engineering Sciences, [sarabehdad@ufl.edu](mailto:sarabehdad@ufl.edu), Web: <https://www.essie.ufl.edu/people/name/sara-behdad/>

Research Interests: E-waste Management, Sustainable Design, Decision Analysis, Product Lifecycle Engineering.

**Fuchs, Gerhard**, Associate Professor, MSE, [gfuch@mse.ufl.edu](mailto:gfuch@mse.ufl.edu), Web: <https://fuchs.mse.ufl.edu/>

Research Interests: Interaction of Primary research and teaching interests include inter-relationship of processing, microstructure and properties of high temperature/high performance materials, including superalloys, intermetallics and composites. National AGEP Doctoral Advisor/Mentor (UF-NSF) and Triple-Point Professor Award (UF-MSE).

**Jain, Eakta**, Associate Professor, CISE, [ejain@ufl.edu](mailto:ejain@ufl.edu), Web: <https://jainlab.cise.ufl.edu/>

Research Interests: Human-Centered Computing, Graphics and Virtual Reality, VR/AR in future workforce training, User modeling, Eye tracking

**Farahmandi, Farimah**, Assistant Professor, ECE, [ffarahmandi@ufl.edu](mailto:ffarahmandi@ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/farimah-farahmandi/>

Research Interests: Formal Verification, Post-silicon Validation, and Design Automation

**Feng, Philip, Professor**, ECE, [feng@ece.ufl.edu](mailto:feng@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/philip-feng/>

Research Interests: Solid-State Devices, Nanoelectromechanical Systems (NEMS), Quantum Engineering, Nanotechnology, Transducers, High-Precision Measurement & Instruments, Advanced Materials

**Hennig, Richard**, Professor, Alumni Professor of Materials Science & Engineering, [rhennig@mse.ufl.edu](mailto:rhennig@mse.ufl.edu), Web: <https://hennig.mse.ufl.edu/>

Research Interests: Computational materials science, ab-initio methods, structure prediction algorithms, two-dimensional materials, materials for energy technologies, solid-liquid interfaces.

**Law, Mark**, Distinguished Professor and Director of the UF Honors Program, ECE, [law@ece.ufl.edu](mailto:law@ece.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/mark-law/>

Research Interests: Design and modeling of IC fabrication process, computer modeling of semiconductor process, device, and sensor behavior, modeling of superconductor process and device behavior.

**Moudgil, Brij**, Distinguished Professor, Materials Science & Engineering, [bmoudgil@perc.ufl.edu](mailto:bmoudgil@perc.ufl.edu), Web: <https://mse.ufl.edu/people/name/brij-moudgil/>

Research Interests: Engineered particulate systems for enhanced performance in nano and bio technologies, micro-electronics, advanced materials and minerals, photocatalytic degradation of hazardous microbes, nanotoxicity, and greener reagents and particle technologies.

**Principe, Jose**, Distinguished Professor, ECE, [principe@cnel.ufl.edu](mailto:principe@cnel.ufl.edu), Web: <https://www.ece.ufl.edu/people/faculty/jose-c-principe/>

Research Interests: Adaptive systems, learning theory

**Ragan, Eric**, Assistant Professor, CISE, Director, Interactive Data and Immersive Environments (Indie) Lab, [eragan@ufl.edu](mailto:eragan@ufl.edu), Web: <https://www.cise.ufl.edu/ragan-eric/>

Research Interests: Database, Data Science and Informatics, Graphics and Visualization, Human-Centered Computing, Machine Learning.

**Roitberg, Adrian E.**, Professor, Chemistry, [roitberg@qtp.ufl.edu](mailto:roitberg@qtp.ufl.edu), Web:

<https://www.chem.ufl.edu/about-all/directory/people/name/adrian-roitberg/>

Research Interests: Accurate calculations of biologically relevant molecular systems and processes using proven methods from Quantum Mechanics, Statistical Mechanics and Molecular Dynamics. He is also interested in advanced visualization.

**Sanders, Beverly**, Associate Professor, CISE,

Research Interests: Software engineering and programming languages for concurrent and high performance parallel computing.

**Segal, Corin**, Professor, MAE, [cor@ufl.edu](mailto:cor@ufl.edu), Web: <https://mae.ufl.edu/people/profiles/corin-segal/>

Research Interests: Combustion, fluid diagnostics, Fluid mechanics, aircraft design.

**Veige, Adam**, Professor, Chemistry, [veige@chem.ufl.edu](mailto:veige@chem.ufl.edu), Web: <https://www.chem.ufl.edu/about-all/directory/name/adam-veige/>

Research Interests: Design, synthesis, isolation, and characterization of novel inorganic molecules. Our efforts are concentrated towards building new complexes that either model or affect new small molecule transformations relevant to the industrial sector. We undertake detailed mechanistic studies in order to uncover subtle details of catalytic processes in hopes of building upon or challenging current models of molecular structure, periodic trends, reactivity, and bonding.

**Zhang, Xiao-Xiao**, Assistant professor, Department of Physics, [xxzhang@ufl.edu](mailto:xxzhang@ufl.edu), Web: <https://www.phys.ufl.edu/wp/index.php/people/faculty/xiao-xiao-zhang/>

Research Interests: Probing the light-matter interaction and transient dynamics in nanoscale materials. We also aim to fabricate novel functional 2D material heterostructures with etc. all-optical control capabilities and explore new physics across their interfaces. Our 2D material platform so far includes monolayer semiconductors, magnetic materials, and superconductors.

### **Overarching Education/Workforce Development**

**Jain, Eakta**, Associate Professor, CISE, [ejain@ufl.edu](mailto:ejain@ufl.edu), Web: <https://jainlab.cise.ufl.edu/>  
Research Interests: Human-Centered Computing

**Jeffcoat, David**, UF Innovation Station REEF Regional Director, [djeffcoat@ufl.edu](mailto:djeffcoat@ufl.edu), Web: <https://www.eng.ufl.edu/flex/about/people/uf-innovation-station-reef-regional-director/>  
Research Interests: Leads UF Innovation Station at the REEF, including programs supportive of economic and workforce development across the region.

**Jones, Kevin**, Distinguished Professor, Frederick N. Rhines Professor of Materials Science & Engineering Materials Science & Engineering, [kjones@eng.ufl.edu](mailto:kjones@eng.ufl.edu), Web: <https://mse.ufl.edu/people/name/kevin-jones/>

Research Interests: Semiconductor Processing and electron microscopy characterization; Ion implantation of Si, Ge and compound semiconductors; Li ion battery anode and cathode development

**Ruzycki, Nancy**, Instructional Associate Professor, Director of Undergraduate Laboratories, Materials Science & Engineering, [nruzycki@mse.ufl.edu](mailto:nruzycki@mse.ufl.edu), Web: <https://mse.ufl.edu/people/name/nancy-ruzycki/> .  
Research Interests: Engineering education, characterization techniques, surface physics, solid-state devices, dye-sensitized solar cells.

**Wall, Don**, Director, UF Training Reactor (UFTR), Professor of Practice, MSE, [donald.wall@ufl.edu](mailto:donald.wall@ufl.edu)

## APPENDIX 2 – List of UF Energy/Sustainability Faculty

### UF Energy/Sustainability Faculty (Alphabetical List)

#	PI	Department
1	Abdollahi Biron, Zoleikha	ECE
2	Agarwal, Nithin	EG-SCHOOL SUSTAIN INFRST ENVIR
3	Aifantis, Katerina	MAE
4	Aitkaliyeva, Assel	MSE
5	Altpeter, Fredy	AG-AGRONOMY
6	Andrew, Jennifer	MSE
7	Annable, Michael	EG-SCHOOL SUSTAIN INFRST ENVIR
8	Asche, Frank	AG-GLOBAL FOOD SYSTEMS
9	Baciak, James	MSE - Nuclear
10	Balachandar, Sivaramakrishnan	MAE
11	Barooah, Prabir	MAE
12	Bartels, Wendy-Lin	AG-SCHL FOR, FISH, & GEOMATICS
13	Behdad, Sara	EG-SCHOOL SUSTAIN INFRST ENVIR
14	Bejleri, Ilir	DCP-GEOGRPHC PLN / RES INF CTR
15	Bobda, Christophe	ECE
16	Boote, Kenneth	AG-AGRICUL / BIOLOGICAL ENG
17	Bretas, Arturo	ECE
18	Butala, Megan	MSE
19	Chase, Carlene	AG-HORTICULTURAL SCIENCES
20	Cheng, Hai	LS-PHYSICS-GENERAL
21	Choi, Won Tae	ChE
22	Chung, Jacob	MAE
23	Crandall, Raelene	AG-SCHL FOR, FISH, & GEOMATICS
24	Donna, Javier D	Economics
25	Du, Lili	Civil & Coastal Engineering
26	Elefteriadou, Ageliki	EG-SCHOOL SUSTAIN INFRST ENVIR
27	Enqvist, Andreas	MSE
28	Engström, Johanna C. L.	Department of Geography
29	Evans, Austin M	LS-CHEMISTRY-GENERAL
30	Farahmandi, Farimah	ECE
31	Feng, Philip	ECE
32	Fletcher, Robert	AG-WILDLIFE ECOLOGY / CONSERV
34	Galinski, Andrea	DCP-SHIMBERG CTR AFFORD HOUS
35	Gao, Bin	AG-AGRICUL / BIOLOGICAL ENG
36	George, Sheeja	AG-NFREC-QUINCY
37	Goodison, Crystal	DCP-GEOGRPHC PLN / RES INF CTR
38	Guan, Yongpei	EG-INDUSTRIAL / SYSTEMS
39	Guo, Jing	ECE

40	Hagelin Weaver, Helena	ChE
41	Hages, Charles	ChE
42	Hamlin, James	LS-PHYSICS-GENERAL
43	Harley, Joel	ECE
44	Hartig, Kyle	MSE
45	Hennig, Richard	MSE
46	Hibbitts, David	ChE
47	Hochmair, Hartwig	AG-Fort Lauderdale Research and Education Center (FLREC)
48	Issa, Raja	DCP-CONSTRUCTION MGMT-ADMIN
49	Jain, Eakta	EG-COMP / INFO SCI & ENG
50	Kury, Ted	PURC
51	Jamison, Mark	PURC
52	Jeffcoat, David	MAE
53	Jones, Kevin	MSE
54	Jutla, Antarpreet	EG-SCHOOL SUSTAIN INFRST ENVIR
55	Kirst, Matias	AG-SCHL FOR, FISH, & GEOMATICS
56	Laughinghouse, Haywood	AG-FLREC-FT LAUDERDALE
57	Law, Mark	ECE
58	Liao, Hui-Ling	AG-NFREC-QUINCY
59	Maghari, Nima	ECE
60	Martin, Charles	LS-CHEMISTRY-GENERAL
61	Martin, Jonathan	LS-GEOLOGY-GENERAL
62	Martin-Ryals, Ana	AG-AGRICUL / BIOLOGICAL ENG
63	Maslov, Dmitrii	LS-PHYSICS-GENERAL
64	Mcelwee-White, Lisa	LS-CHEMISTRY-GENERAL
65	Mehta, Siddhartha	MAE
66	Meisel, Mark	LS-PHYSICS-GENERAL
67	Meyn, Sean	ECE
68	Minchin, Robert	DCP-CONSTRUCTION MGMT-ADMIN
69	Moghaddam, Saeed	MAE
70	Moudgil, Brij	MSE
71	Manuel, Michele	MSE
72	Nancy Ruzycski	MSE
73	Nino, Juan	MSE
74	Odero, Dennis	AG-EREC-BELLE GLADE
75	Orazem, Mark	ChE
76	Osorio Wallau, Marcelo	AG-AGRONOMY
77	Peng, Zhong-Ren	DCP-CTR INTL ADAP,PLAN & DESIG
78	Peter, Gary	AG-SCHL FOR, FISH, & GEOMATICS
79	Phillpot, Simon	MSE



80	Phlips, Edward	AG-SCHL FOR, FISH, & GEOMATICS
81	Principe, Jose	ECE
82	Pullammanappallil, P	ABE
83	Ragan, Eric	EG-COMP / INFO SCI & ENG
84	Ranka, Sanjay	EG-COMP / INFO SCI & ENG
85	Ray, Sandip	ECE
86	Ries, J. Robert	DCP - M.E. Rinker, Sr. School of Construction Management
87	Reisi Gahrooei, Mostafa	EG-INDUSTRIAL / SYSTEMS
88	Riding, Kyle	EG-SCHOOL SUSTAIN INFRST ENVIR
89	Rinzler, Andrew	LS-PHYSICS-GENERAL
90	Roitberg, Adrian	LS-CHEMISTRY-GENERAL
91	Sanders, Beverly	EG-COMP / INFO SCI & ENG
92	Sandhu, Hardev	AG-EREC-BELLE GLADE
93	Sansalone, John	EG-SCHOOL SUSTAIN INFRST ENVIR
94	Sappington, David	Economics
95	Savin, Daniel	LS-CHEMISTRY-GENERAL
96	Scheffe, Jonathan	MAE
97	Schert, John	EG-HINKLEY CENTER
98	Searcy, Mary	AG-RESOURCE EFFICIENT COMMUNIT
99	Seepaul, Ramdeo	AG-NFREC-QUINCY
100	Segal, Corin	MAE
101	Sherif, S.A.	MAE
102	Shukla, Sanjay	AG-SWFREC-IMMOKALEE FAC-55
103	Sigmund, Wolfgang	MSE
104	Small, Ian	AG-NFREC-QUINCY
105	Southworth, Jane	LS-GEOGRAPHY-GENERAL
106	Srinivasan, Ravi	DCP - M.E. Rinker, Sr. School of Construction Management
107	Steiner, Ruth	DCP-CTR FOR HLTH/BUILT ENVIRON
108	Strauss, Sarah	AG-SWFREC-IMMOKALEE FAC-65
109	Subhash, Ghatu	MAE
110	Takano, Yasumasa	LS-PHYSICS-GENERAL
111	Taylor, Nicholas	AG-RESOURCE EFFICIENT COMMUNIT
112	Tehranipoor, Mark	ECE
113	Thomas, Alexis	DCP-GEOGRPHC PLN / RES INF CTR
114	Tonks, Michael	MSE - Nuclear
115	Townsend, Timothy	EG-SCHOOL SUSTAIN INFRST ENVIR
116	Trainham, James	MAE
117	Tucker, Catherine	LT-CTR-LT AMER STUDIES-ADMIN
118	Tulenko, James	MSE
119	Veige, Adam	LS-CHEMISTRY-GENERAL

120	Vermerris, Willem	AG-MICROBIOLOGY / CELL SCI
121	Wall, Don	MSE
122	Wall, Nathalie	MSE
123	Wang, Shuo	ECE
124	Washburn, Scott	EG-SCHOOL SUSTAIN INFRST ENVIR
125	Cassiano, Eric	UF/IFAS Tropical Aquaculture Laboratory
126	Watson, Justin	MSE - Nuclear
127	Weaver, Jason	ChE
128	Wei, Wei	LS-CHEMISTRY-GENERAL
129	Wright, David	AG-NFREC-QUINCY
130	Xue, Jianguo	MSE
131	Yang, Yong	MSE - Nuclear
132	Zare, Alina	ECE
133	Zhang, Xiao-Xiao	LS-PHYSICS-GENERAL
134	Ziegler, Kirk	ChE

**UF Energy/Sustainability Faculty - Sorted by Department**

<b>PI</b>	<b>Department</b>
Pullammanappallil, P	ABE
Boote, Kenneth	AG-AGRICUL / BIOLOGICAL ENG
Gao, Bin	AG-AGRICUL / BIOLOGICAL ENG
Martin-Ryals, Ana	AG-AGRICUL / BIOLOGICAL ENG
Altpeter, Fredy	AG-AGRONOMY
Osorio Wallau, Marcelo	AG-AGRONOMY
Odero, Dennis	AG-EREC-BELLE GLADE
Sandhu, Hardev	AG-EREC-BELLE GLADE
Laughinghouse, Haywood	AG-FLREC-FT LAUDERDALE
Hochmair, Hartwig	AG-Fort Lauderdale Research and Education Center (FLREC)
Asche, Frank	AG-GLOBAL FOOD SYSTEMS
Chase, Carlene	AG-HORTICULTURAL SCIENCES
Vermerris, Willem	AG-MICROBIOLOGY / CELL SCI
George, Sheeja	AG-NFREC-QUINCY
Liao, Hui-Ling	AG-NFREC-QUINCY
Seepaul, Ramdeo	AG-NFREC-QUINCY
Small, Ian	AG-NFREC-QUINCY
Wright, David	AG-NFREC-QUINCY
Searcy, Mary	AG-RESOURCE EFFICIENT COMMUNIT
Taylor, Nicholas	AG-RESOURCE EFFICIENT COMMUNIT
Bartels, Wendy-Lin	AG-SCHL FOR, FISH, & GEOMATICS
Crandall, Raelene	AG-SCHL FOR, FISH, & GEOMATICS
Kirst, Matias	AG-SCHL FOR, FISH, & GEOMATICS
Peter, Gary	AG-SCHL FOR, FISH, & GEOMATICS
Phlips, Edward	AG-SCHL FOR, FISH, & GEOMATICS
Shukla, Sanjay	AG-SWFREC-IMMOKALEE FAC-55
Strauss, Sarah	AG-SWFREC-IMMOKALEE FAC-65
Fletcher, Robert	AG-WILDLIFE ECOLOGY / CONSERV
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Hagelin Weaver, Helena	ChE
Hages, Charles	ChE
Hibbitts, David	ChE
Orazem, Mark	ChE
Weaver, Jason	ChE
Ziegler, Kirk	ChE
Du, Lili	Civil & Coastal Engineering

Elefteriadou, Lily Ageliki	Civil & Coastal Engineering
Issa, Raja	DCP-CONSTRUCTION MGMT-ADMIN
Minchin, Robert	DCP-CONSTRUCTION MGMT-ADMIN
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Goodison, Crystal	DCP-GEOGRPHC PLN / RES INF CTR
Thomas, Alexis	DCP-GEOGRPHC PLN / RES INF CTR
Galinski, Andrea	DCP-SHIMBERG CTR AFFORD HOUS
Abdollahi Biron, Zoleikha	ECE
Bobda, Christophe	ECE
Bretas, Arturo	ECE
Farahmandi, Farimah	ECE
Feng, Philip	ECE
Guo, Jing	ECE
Harley, Joel	ECE
Jin, Yier	ECE
Law, Mark	ECE
Maghari, Nima	ECE
Meyn, Sean	ECE
Principe, Jose	ECE
Ray, Sandip	ECE
Tehranipoor, Mark	ECE
Wang, Shuo	ECE
Zare, Alina	ECE
Donna, Javier D	Economics
Sappington, David	Economics
Jain, Eakta	EG-COMP / INFO SCI & ENG
Ragan, Eric	EG-COMP / INFO SCI & ENG
Ranka, Sanjay	EG-COMP / INFO SCI & ENG
Sanders, Beverly	EG-COMP / INFO SCI & ENG
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Reisi Gahrooei, Mostafa	EG-INDUSTRIAL / SYSTEMS
Agarwal, Nithin	EG-SCHOOL SUSTAIN INFRST ENVIR
Annable, Michael	EG-SCHOOL SUSTAIN INFRST ENVIR
Behdad, Sara	EG-SCHOOL SUSTAIN INFRST ENVIR
Elefteriadou, Ageliki	EG-SCHOOL SUSTAIN INFRST ENVIR
Jutla, Antarpreet	EG-SCHOOL SUSTAIN INFRST ENVIR
Riding, Kyle	EG-SCHOOL SUSTAIN INFRST ENVIR

Sansalone, John	EG-SCHOOL SUSTAIN INFRST ENVIR
Townsend, Timothy	EG-SCHOOL SUSTAIN INFRST ENVIR
Washburn, Scott	EG-SCHOOL SUSTAIN INFRST ENVIR
Evans, Austin M	LS-CHEMISTRY-GENERAL
Martin, Charles	LS-CHEMISTRY-GENERAL
Mcelwee-White, Lisa	LS-CHEMISTRY-GENERAL
Roitberg, Adrian	LS-CHEMISTRY-GENERAL
Savin, Daniel	LS-CHEMISTRY-GENERAL
Veige, Adam	LS-CHEMISTRY-GENERAL
Wei, Wei	LS-CHEMISTRY-GENERAL
Engström, Johanna C. L.	LS-GEOGRAPHY-GENERAL
Southworth, Jane	LS-GEOGRAPHY-GENERAL
Martin, Jonathan	LS-GEOLOGY-GENERAL
Maslov, Dmitrii	LS-PHYSICS-GENERAL
Cheng, Hai	LS-PHYSICS-GENERAL
Hamlin, James	LS-PHYSICS-GENERAL
Meisel, Mark	LS-PHYSICS-GENERAL
Rinzler, Andrew	LS-PHYSICS-GENERAL
Takano, Yasumasa	LS-PHYSICS-GENERAL
Zhang, Xiao-Xiao	LS-PHYSICS-GENERAL
Tucker, Catherine	LT-CTR-LT AMER STUDIES-ADMIN
Jamison, Mark	PURC
Kury, Ted	PURC
Aifantis, Katerina	MAE
Balachandar, Sivaramakrishnan	MAE
Barooah, Prabir	MAE
Chung, Jacob	MAE
Jeffcoat, David	MAE
Mehta, Siddhartha	MAE
Moghaddam, Saeed	MAE
Scheffe, Jonathan	MAE
Segal, Corin	MAE
Sherif, S.A.	MAE
Subhash, Ghatu	MAE
Trainham, James	MAE
Aitkaliyeva, Assel	MSE
Andrew, Jennifer	MSE
Butala, Megan	MSE
Enqvist, Andreas	MSE
Hartig, Kyle	MSE
Hennig, Richard	MSE

Jones, Kevin	MSE
Moudgil, Brij	MSE
Manuel, Michele	MSE
Nancy Ruzycki	MSE
Nino, Juan	MSE
Phillpot, Simon	MSE
Sigmund, Wolfgang	MSE
Tulenko, James	MSE
Xue, Jiangeng	MSE
Baciak, James	MSE - Nuclear
Yang, Yong	MSE - Nuclear
Tonks, Michael	MSE - Nuclear
Wall, Don	MSE - Nuclear
Wall, Nathalie	MSE - Nuclear
Watson, Justin	MSE - Nuclear

## APPENDIX 3 – Grant and Education/Workforce Development Examples

### 1. Energy Efficiency in Built Environment and in Manufacturing

#### *Grant Examples*

- **Advanced Technologies for Rapid Manufacturing of Post-Disaster Housing**; C. Kibert (PI), A. Chini, R. Srinivasan, J. Carney, R. Sharston, S. Bender (Co-PIs); Sponsor: US Department of Housing and Urban Development; Award Period: 9/19 to 9/21; Funding: \$250,000: The goal of this research is to design an advanced modular home that is hyper-efficient and energy self-sufficient and that is able to cope with future severe weather events while also providing basic services needed for families during post-disaster recovery. The research address the design of housing that can be rapidly built in factories, that can cope with future major events, and that can become a major community asset.
- **Membrane-based Ionic Liquid Absorption System for Ultra-Efficient Dehumidification and Heating**, led by Saeed Moghaddam, Knox T. Millsaps Professor, Mechanical Aerospace Engineering; Sponsor: US DOE; Award Amount: \$1,887,780; Award Period: 2020-2023; Partners: Gas Technology Institute (GTI), Utilization Technology Development (UTD), American Gas Association (AGA), and Modine Manufacturing; The aim is to develop a fuel agnostic dehumidification system for outdoor air treatment. The system can operate with renewable electricity, natural gas, or hydrogen addressing the storage issue. The system increases HVAC efficiency and indoor air quality.
- **ONR: Characterization of Critical Two-Phase Flow Regimes for Design and Reliable Operation of Compact Naval Energy Systems**, led by Saeed Moghaddam, Knox T. Millsaps Professor, Mechanical Aerospace Engineering; Award Amount: \$408,377; Award Period: 2018-2021: Fundamental studies are being conducted to improve efficiency and modeling accuracy of microchannel phase change cooling in naval ships.
- **Deciphering the Physic of Critical Heat Flux (CHF)**, led by Saeed Moghaddam, Knox T. Millsaps Professor, Mechanical Aerospace Engineering; Sponsor: NSF; Award Amount: \$349,996; Award period: 2020-2023: The operation physics and performance limits of a new heat sink is studied for use in Data Centers. Data Centers energy usage is rapidly rising and cooling of electronics is responsible for great energy consumption.
- **Thermally Driven Industrial Semi-Open Absorption Heat Pump Dryer**, Co-PI: Saeed Moghaddam; Sponsor: US DOE ARPA-E; Award Amount: \$499,450; Award Period: 2021-2023; Partners: Micro Nano Technologies (MNT) and Gas Technology Institute: The aim is to enhance energy efficiency in drying industry by developing a high efficiency system based on a recently invented thermodynamic cycle. Estimates suggest that drying is responsible for 10-20% of industrial energy use.
- **Predictive Maintenance of HVAC Systems using Audio Sensing**, led by Ravi Srinivasan, Associate Professor, M.E. Rinker, Sr. School of Construction Management; National Science Foundation; Award Amount: \$50,000; Award period: 03/2106 – 08/2018: Use of audio-sensing technologies to predict HVAC system failures. Sensing equipment were installed in the Harn Museum to gather and analyze data.
- **Flood Hazard Management & Practitioner Information Network for Florida Coastal Communities**, led by Ravi Srinivasan, Associate Professor, M.E. Rinker, Sr. School of Construction Management; National Science Foundation, Smart & Connected Communities (SCC); Award Amount: \$150,000; Award period: 07/2020 – 06/2021: A novel method of capturing Thermal Infra-Red (TIR) images of building envelope using a drone and calibrating the image color value with a temperature scale were developed. The algorithm estimated envelope energy leakages

owing to building envelope ageing and other factors, and their impact to energy use and climate change.

- **Development of High Energy Density Thermomagnetic Processing Technology for Intensification of Industrial Heat-Treatment and Increased Material Performance:** Michele Manuel (PI); Sponsor: US DOE EERE AMO; Industry Partners: Eck Industries, Ajax Tocco, John Deere, Queen City Forge, Dante; Other Partners: Virginia Tech, University of Illinois Urbana-Champaign, Oak Ridge National Laboratory; Funding: \$10,940,572; Award Period: 02/28/2024. The goal is to develop a predictive capability to define and drive processing validation experiments under magnetic fields and demonstrate the feasibility of Induction-coupled Thermomagnetic Processing (ITMP) technology for the heat treatment of steel through a strong R&D Public-Private Industry driven research team.

#### ***Education/Workforce Development***

- **The curriculum for TRAIning in Manufactured CONstruction (TRAMCON);** Charles Kibert (PI) and Abdol Chini (Co-PI); Sponsor: US Department of Labor; Partners: Miami-Dade College, Polk State College, Santa Fe College, and Seminole State College; Total Funding: \$9.9M and UF Funding: \$1,028,332; Award Period: October 1, 2014 - September 15, 2017: TRAMCON was developed by UF and is being delivered throughout Florida by the TRAMCON Consortium partners by offering four different levels of training that provide the students with six industry recognized certificates. The Manufactured Construction (MC) curriculum provides great opportunities to trainees who are interested in joining the MC industry and advancing their knowledge and skills. The certificates can be earned by passing the component training programs provided in the four levels of training. Students earn aligned industry certifications from both the construction and manufacturing sectors.

## **2. Diversified Power Source and Delivery – Biomass, Solar, Hydrogen/Solar Fuels, Nuclear energy**

### **2.1. Biomass energy**

#### ***Grant Examples***

- **Southeast Partnership for Advanced Renewables from Carinata (SPARC)** led by Dr. David Wright, Professor, Agronomy. Sponsor: USDA; Award Amount \$15M; Partners: NuSeed, Applied Research Associates (ARA), Commercial Aviation Alternative Fuels Initiative (CAAFI), FL Farm Bureau, Naval Air Systems, Wenck Associates, FDACS: SPARC has a twofold mission of removing physical, environmental, economic and social constraints of regional Brassica carinata production as a renewable fuel, bioproducts and coproducts feedstock and ensuring stable markets for jet fuel and bioproducts through demonstration of enhanced value across the supply chain (<https://sparc-cap.org/>)
- **Evaluation of Energycane for Bioenergy and Sustainable Agricultural Systems (EC-BioSALTS)** led by Dr. Hardev Sandhu, Associate professor, Agronomy. Award Amount: \$3,992,520; Partners: Lanzatech, Inc., FESC, FDACS, USDA, Argonne National Laboratory, Commercial Aviation Alternative Fuels Initiative: Focus is to demonstrate feedstock production systems adaptable for the sub-tropical growing conditions of the U.S. Southeast Coastal Plain region. Agronomic and ecosystem services data, techno-economic and life-cycle analyses, and market transformation plan would fill knowledge gaps and overcome technical barriers for an affordable and sustainable feedstock supply for the emerging bioeconomy.

#### ***Education/Workforce Development***



Southeast Partnership for Advanced Renewables from Carinata (SPARC) program has biomass education and workforce development program.

## 2.2. Solar Energy

### *Grant examples*

- **NSF CAREER Award: Developing solution-based thin-film chalcogenide perovskites** led by Charles J. Hages, Assistant Professor, Chemical Engineering. Sponsor: NSF; Award Amount: \$621,189; Award Period: 2/1/21 to 1/31/26: The aim is to develop a new class of materials – chalcogenide perovskites – into low-cost, non-toxic, and stable photovoltaics, which can replace existing technologies due to their improved properties. Integrated with this research is a cross-generational STEM education and outreach plan targeting the underserved local community. This includes (1) a tailored STEM education program in renewable energy for the aging population at local independent- and assisted-living communities, and (2) K-12 education and youth programs in climate change and renewable energy education. The outcomes of this educational plan are: to enhance the perception of the value of science & technology to society, the role of academia, and the value of public funding for these pursuits; to increase public engagement with science and technology; and to enhance scientific literacy, particularly among underrepresented communities.
- **A Versatile Photovoltaic Window Technology for Building-Integrated Photovoltaic Applications** led by Jiangeng Xue, Professor, Materials Science & Engineering. Sponsor: FDACS; Award Amount: \$399,919; Award Period: 6/11/19 to 10/31/21
- **QLED Device Physics and New Device Architectures** led by Jiangeng Xue, Professor, Materials Science & Engineering. Sponsor: TCL Corporate Research; Award Amount: \$250,000; Award Period: 5/15/20 to 5/16/22
- **Theoretical inquiries beyond the Standard Model** led by Jiangeng Xue, Professor, Materials Science & Engineering. Sponsor: US DOE; Award Amount: \$1,110,000; Award Period: 6/1/21 to 5/31/25

### *Education/Workforce Development*

- **Creating Modules for Contemporary Materials Challenges** Led by Dr. Kevin Jones, Distinguished Professor, Frederick N. Rhines Professor of Materials Science & Engineering; Sponsor: NSF; Award Amount: \$115,813; Award Period: 03/01/2020-02/28/2022: A freshman course entitled the Impact of Materials on Society (IMOS) has been developed to help increase the social literacy of engineers and simultaneously increase the technical literacy of non-engineers. A national program to disseminate the class around the US has been supported by NSF and MRS. All of the materials to teach the class are freely available to other universities. Many universities in the US are now teaching this class. Working groups help create the content for the modules. The industry partners for the Photovoltaics module and Water Module are Mountain View Energy and Tampa Bay Water respectively.
- **NSF CAREER Award: Developing solution-based thin-film chalcogenide perovskites** led by Charles J. Hages, Assistant Professor, Chemical Engineering. Described above.

## 2.3. Solar Fuels/Hydrogen

### *Grant Examples*

- **The Renewable Energy Conversion Laboratory:** Jonathan Scheffe, Mechanical and Aerospace Engineering, PI; Sponsor: Synhelion SA, a company based in Switzerland focused on commercializing solar fuels. This is a three year project focused on advancing solar thermal fuel

production pathways through discovery and characterization of new materials that enable lower temperature operation and improved efficiencies.

- **Materials Development for Solar Thermochemical Methane Reforming:** Jonathan Scheffe (PI); Sponsor: Synhelion SA; Funding: \$335,002; The aim is to conduct materials based research and process optimization for solar driven reforming of methane via chemical looping. Experiments will entail thermal analysis for the kinetic and thermodynamic characterization of candidate redox materials. Process optimization will entail theoretical thermodynamic analysis to predict solar to fuel conversion efficiencies of candidate materials.
- **A New Paradigm for Materials Discovery and Development for Lower Temperature and Isothermal Thermochemical H<sub>2</sub> Production:** Jonathan Scheffe (PI); Sponsor: US DOE; Funding: \$999,594. The aim is to implement a materials design concept that will identify and characterize a host of new material classes, compositions, and operating conditions that are ideal for isothermal thermochemical H<sub>2</sub> production. Specifically, in this project we aim to use high-throughput computational screening powered by machine learning, density functional theory calculations, advanced synthesis techniques and unique experimental methods to identify and characterize novel and efficient second generation thermochemical redox materials that operate isothermally or near isothermally below 1400 °C. We will identify new materials and compositions that improve performance (i.e. increase solar to hydrogen efficiency and decrease operating temperature) compared to the state of the art material, ceria, by operating at high pO<sub>2</sub> (> 10<sup>-6</sup> atm) and perturbing the system from equilibrium. This will be accomplished by using engineered structures (e.g. cellular ceramics, also known as ceramic foams) that afford enhanced surface driven kinetics without requiring bulk heating and cooling or particle handling.

#### ***Education/Workforce Development***

**The Energy Sustainability, Technology and Resiliency Testing Hub and Certificate Program (E-Start HUB)** led by Dr. Jonathan Scheffe, Mechanical and Aerospace Engineering. Sponsor: Duke Energy Foundation; Award Amount: \$100,000: The goal is to provide needed training and research opportunities in advanced energy generation, storage and grid resiliency technologies. The e-START Hub will be dedicated to comprehensive technology solutions and the demo facility will be upgraded to a gross net zero and resilient building, using a combination of solar photovoltaics, solar thermal and solar H<sub>2</sub> technologies, accompanied by battery, thermal and H<sub>2</sub> storage mechanisms. This grant will help job seekers and students prepare for employment, primarily in the energy sector, as well as further bolster and expand the state's existing skilled workforce.

## **2.4. Nuclear Energy**

#### ***Grant Examples***

- **Simulation of Fission Gas in Uranium Oxide Nuclear Fuel**, led by Dr. Michael Tonks, Alumni Professor, Department of Materials Science and Engineering; Sponsor: Department of Energy, offices of Nuclear Energy and Scientific Computing (though the University of Tennessee); Award Amount: \$650,000, Award Period: 8/1/2017 - 7/30/2022. The goal of this work is to improve light water reactor safety by improving our ability to predict the behavior of fission gas in the UO<sub>2</sub> fuel during reactor operation.
- **Enhancing Yellowjacket for Modeling the Impact of Radiation and Stress on the Corrosion of Molten-Salt-Facing Structural Components**, led by Dr. Michael Tonks, Alumni Professor, Department of Materials Science and Engineering, Sponsor: US Nuclear Energy University Program, Award Amount: \$700,000, Award Period: 8/1/2021 - 7/30/2024. In this project, we are

improving the capability to model corrosion in next-generation nuclear reactors that use molten salt, to better improve their safety.

- **High-fidelity modeling of fuel-to-coolant thermomechanical transport behaviors under transient conditions** led by Dr. Justin Watson, Associate Professor, Department of Materials Science and Engineering, Nuclear Engineering Program, Sponsor: US Nuclear Energy University Program, Award Amount: \$800,000, Award Period: 10/1/2021 - 7/30/2024. The aim is to develop a high-fidelity modeling tool that can capture the important phenomena in high burnup UO<sub>2</sub> and accident tolerant fuels (ATF) during transient conditions.
- **Nuclear Power Plant Simulator Modifications for Integrated Energy Systems** led by Dr. Justin Watson, Associate Professor, Department of Materials Science and Engineering, Nuclear Engineering Program, Sponsor: Idaho National Laboratory, Award Amount: \$50,000, Award Period: 1/1/2021 – 8/30/2021. The aim is to modify a full-scope generic boiling water reactor (GBWR) simulator developed by GSE Systems to extract thermal power for direct or indirect use in industrial applications.
- **A Model for Localized Corrosion of Copper under a Droplet** led by Dr. Mark Orazem, Distinguished Professor, Department of Chemical Engineering; Sponsor: Nuclear Waste Management Organization of Canada; Award Amount: \$218,198; Award Period: 8/1/20 to 7/31/23: The goal is to study corrosion of copper intended to clad steel containers holding nuclear waste.

#### ***Education/Workforce Development***

- **Nuclear Training Reactor at UF:** The UF Training Reactor (UFTR), built in 1959, was one of the first nuclear reactors on a university campus. Today it is one of fewer than 30 such reactors used for education, training, research and testing at colleges and universities around the United States. The Herbert Wertheim College of Engineering uses the reactor to train students to operate reactors and for laboratory courses in nuclear engineering, physics, chemistry, geology and environmental engineering. The reactor also serves as a radiation/neutron source for various research programs and experiments such as trace element analysis of ocean sediments, soil sediments, plants and biological materials.
- **Interaction of Ionizing Radiation in Materials University Research Alliance** led by Dr. Kyle C. Hartig, Assistant Professor, Nuclear Engineering Program; Sponsor: Defense Threat Reduction Agency (DTRA) via Penn State; Award Amount: \$3,947,000; Award Period: 07/01/2020-12/31/2024; Partners: Pacific Northwest National Laboratory, Sandia National Laboratories, Naval Research Laboratory, H3D, and Radiation Monitoring Devices (RMD): UF Team participates in the Interaction with Ionizing Radiation with Matter University Research Alliance (IIRM–URA) to advance understanding of radiation-material interaction, to reduce, eliminate or counter nuclear and radiological WMD threats. The program develops a pipeline of future researchers, engineers, scientists, and professionals.

### **3. Smart Grid/Grid Security and Energy Storage**

#### ***Grant Examples***

- **Cyber-Physical Systems Security through Robust Adaptive Possibilitistic Algorithms: a Cross Layered Framework** led by Dr. Arturo Bretas; Sponsor: NSF; Award Amount: \$360,000; Award Period: 2018 – 2021: The goal of this project is to develop a cross-layer cyber-physical security framework for the smart grid to improve the quality of real-time monitoring through anomaly analysis. This will lead to more reliable data for control, situation awareness to first responders and other improved applications to smart grids, improve the resilience of smart grids to cyber-attacks in meters, parameters, topology and communication infrastructure and large physical

disturbances by developing new techniques for distributed control of large complex systems that guarantees secure and reliable performance. The project will foster education through enhancement to curriculum by building bridges among communications, machine learning, power and control systems.

- **Synergy: Distributed Coordination of Smart Devices To Mitigate Intermittency Of Renewable Generation For A Smarter And Sustainable Power Grid** led by Dr. Arturo Bretas; Sponsor: NSF; Award Amount: \$760,000; Award Period: 2016 – 2020: The project goal is to help the electric grid become more reliable even when a large amount of electricity is generated from green, but intermittent - sources such as solar and wind. To deal with this intermittency, inexpensive source of energy storage is required. Instead of investing in batteries, this project seeks to obtain cheap storage by manipulating power demand in consumer loads through intelligent decision-making algorithms. By varying power demand up and down from what a load would nominally consume, the load can be made to behave like a battery, effectively creating a source of Virtual Energy Storage (VES). This kind of virtual storage is cheaper than batteries since it is a software-based solution; little additional hardware is needed. Another aspect of the project is to develop decision-making algorithms to cope with operational issues faced by the power distribution networks (that deliver electricity to neighborhoods) due to increasing use of intermittent solar power.
- **Security Certification of Autonomous Cyber-Physical Systems (CPS)**, led by Dr. Shuo Wang, ECE, Award period: 2017-2021; Award Amount: \$830K; The aim is to provide a comprehensive real-time, resource-aware solution for detection and recovery of autonomous CPS from physical and cyber-attacks. This project also includes effort to educate and prepare the community for the potential cyber and physical threats on autonomous CPS.
- **Probing the Effect That Ion Insertion has on the Mechanical Stability of High Capacity Nanocomposite Anodes** led by Dr. Katerina Aifantis, Associate Professor and MAE Faculty Fellow, Mechanical and Aerospace Engineering; Sponsor: NSF; Award Amount: \$324,276; Award Period: 7/15/18 to 6/30/22: The focus of the project is to develop high-capacity anodes for next generation Li-ion and Na-ion batteries. Particularly, polymer coated silicon based porous electrodes are proposed for replacing commercially used graphitic anodes in Li-ion batteries, while tin based for anodes are proposed for commercial Na-ion batteries.

#### ***Education/Workforce Development/Policy***

- **Public Utility Research Center (PURC)**: PURC is an internationally recognized academic center dedicated to research and to providing training in utility regulation and strategy, as well as the development of leadership in infrastructure policy (<https://warrington.ufl.edu/public-utility-research-center/>). PURC training programs teach the principles and practices that support effective utility policy, regulation, management, and leadership. With these tools, we help government and industry officials develop efficient utility infrastructure to better meet the needs of their customers. Regulators and industry professionals, seasoned and new to the field, benefit from continuing education as the regulatory landscape continues to change. With educated employees, organizations benefit from better decision making and thus a more promising future.
- **IRES Track II Advanced Study Institute: Using Nanotechnology for Fabricating New Biomaterials and Next-Generation Electrodes** led by Dr. Katerina Aifantis, Associate Professor and MAE Faculty Fellow, Mechanical and Aerospace Engineering; Sponsor: NSF; Award Amount: 350,000; Award Period: 07/15/19-6/30/22; The focus is to organize Advanced Study Institutes at the University of Cambridge (England) and the University of Erlangen-Nuremberg (Germany) for US grad students in energy storage.

- Silicon Anodes in Li-ion batteries for Space Applications led by Dr. Katerina Aifantis, Associate Professor and MAE Faculty Fellow, Mechanical and Aerospace Engineering and Student: Anthony Concepcion; Sponsor: NASA FSGC Masters Fellowship Program. Award Amount: \$10,000.

#### 4. Moving Towards all Electric Transportation (towards sensor based autonomy)

##### *Grant Examples*

- **Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies (I-STREET)** led by Dr. Lily Elefteriadou, Barbara Goldsby Professor Department of Civil & Coastal Engineering; UF Transportation Institute (UFTI), the Florida Department of Transportation (FDOT) and the City of Gainesville (CoG) have partnered to create the I-STREET living lab. The principal objective of the three partners in developing I-STREET is to make significant improvements to transportation safety and mobility. I-STREET seeks to collaborate with industry in order to develop, test, and deploy intelligent transportation infrastructure and related technologies across Florida. The mission of I-STREET is to provide a real-world environment to enable the development, testing, evaluation and implementation of emerging technology solutions that will provide real and measurable transportation safety and mobility solutions for all roadway modes and users. The main goals of I-STREET are to improve safety and mobility locally, and across Florida; to facilitate the development and implementation of advanced and emerging technologies that can improve safety and mobility; to foster collaboration with industry wishing to develop, test and implement their own technologies to improve safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility.
- **The Southeastern Transportation Research, Innovation, Development and Education Center (STRIDE) consortium** led by Dr. Lily Elefteriadou, Barbara Goldsby Professor Department of Civil & Coastal Engineering: UFTI has been awarded the Region 4 (Southeast) University Transportation Center (UTC) by the US Department of Transportation (USDOT) Office of the Assistant Secretary for Research and Technology (OST-R). STRIDE grant provides up to \$2.75 million per year (starting in 2017 total funding being \$13M), to develop novel strategies for reducing congestion. UFTI leads the consortium of nine university partners in the region: Auburn University, The Citadel, Florida International University, Georgia Institute of Technology, Jackson State University, North Carolina State University, Tennessee Technological University, University of Alabama at Birmingham, and the University of North Carolina at Chapel Hill. STRIDE addresses congestion through the use of new technologies available in vehicles, telecommunications capabilities, and shared autonomy in transportation improving energy efficiency. It also involves educational activities, and technology transfer initiatives throughout the region and nationally.

##### *Education/Workforce Development*

**The Southeastern Transportation Research, Innovation, Development and Education Center (STRIDE) consortium** led by Dr. Lily Elefteriadou as described above.

#### 5. Quantum Materials

##### *Grant Examples*

**Center for Molecular Magnetic Quantum Materials (M2QM)**; Dr. Hai Cheng, PHYSICS; Sponsor: US DOE, Funding: \$9,801,000: M2QM (<https://science.osti.gov/bes/efrc/Centers/M2QM>) aims to

provide the materials physics and chemistry understanding of molecular magnetic quantum materials essential for quantum and conventional computing beyond Moore's Law. The overarching goal is to turn molecular magnets into quantum materials useful for both quantum computing and quantum current conventional devices. Partner Institutions: California Institute of Technology, Florida State University, Los Alamos National Laboratory, University of Central Florida, University of Texas at El Paso.

## **6. Overarching Education/Workforce Development**

### ***Grant Examples***

**Engaging Quality Instruction through Professional Development (EQUIPD)** led by Nancy Ruzycki, Instructional Associate Professor, Director of Undergraduate Laboratories Materials Science & Engineering. Sponsor: Department of Education; Award Amount: \$3,730,128 (federal funds) and \$1,214,797 in Cost Share. Award Period: 10/01/2018-09/30/2021; Partners: Our partners are Microsoft, Arduino, Pasco Scientific, Vernier, BlueGrass Technologies: EQUIPD is a facilitative train the trainer coaching model (<https://equipd.mse.ufl.edu/the-equipd-model/>). EQUIPD provides professional development which is content focused, incorporates active learning utilizing technology, supports collaboration, models effective practice, and provides ongoing coaching and expert support.

## APPENDIX 4 – UF Energy Technology Commercialization and Industry Partnerships

Number of Patents Issued during FY 2019: Over 50

Number of Patents Filed during FY 2019: Over 60

Number of Idea Disclosure during FY 2019: Over 70

### University of Florida Energy Spin-off Companies

#	Name of Business	Location	Year Formed	Specialty	# of Employees
1	NanoPhotonica, Inc.	Orlando, FL	2010	Next Generation Optoelectronic Devices	3
2	RedOx Power Systems, LLC	Fulton, MD	2010	Solid Oxide Fuel Cells	15
3	Integrated Solar Technologies Inc.	Orlando, FL	2014	Solar	3
4	SensorComm Technologies, Inc.	Albuquerque, NM	2014	Sensors to monitor NOx emissions	5
5	Molekule Inc.	San Francisco CA	2015	Energy Efficient Air Purification	>100
6	RedoxBlox Inc.	East Lansing, MI	2021	Decarbonizing the electric power grid for a sustainable future	2

### Description of UF Spin-off Companies

#### [NanoPhotonica, Inc. \(Orlando, FL\)](#)

<http://nanophotonica.net/>- NanoPhotonica provides innovative nano-materials and fabrication techniques that enable electronic displays to have high resolution, pure, vivid colors, and high efficiency at significantly reduced manufacturing cost. NanoPhotonica’s system of light emitting nano-materials, including Quantum Dots (QDs), and method of layering these materials together, form the core technology for a new generation of electronic displays.

#### [RedOx Power Systems, LLC \(Fulton, MD\)](#)

<http://www.redoxpowersystems.com/> - Redox develops distributed generation systems that will disrupt the way energy is delivered for commercial, industrial, and residential markets. With advanced solid oxide fuel cell technology inside every product, RedOx is able to drastically reduce the size, weight, and most importantly, the cost of reliable on-site generation of electricity while also providing high quality heat for combined heat and power (CHP) applications. The modular nature RedOx products lends itself to constructing systems with a broad range of power generation capacities and fuel options. The initial systems will work directly with natural gas or propane fuels.

### **[Integrated Solar Technologies Inc. \(Orlando, FL\)](#)**

<https://www.ist-fl.com/> Name change from Innovative Space Technologies LLC (IST) in 2019. IST is a research and development company headquartered in Florida that provides resources for technology development and commercialization. IST clients are in the aerospace, defense, energy, and emerging technology markets. IST transitions research and development (both basic and applied) efforts from government, academic, and industry partners to mature technology offerings.

### **[SensorComm Technologies, Inc. \(Albuquerque, NM\)](#)**

<http://sensorcommtech.com/> - SensorComm Technologies Inc. (SCT), has developed a real-time IoT-based NOx emissions monitoring system called Wi-NOx™ that is installed at the tailpipe of vehicles for the transportation and smart city segments. Wi-NOx™ is the cornerstone of a global pollution mitigation strategy that provides the unique ability to create alternative revenue sources for cities and municipalities. The Wi-NOx™ system is designed for fleet, city and transportation managers who are investing in solutions that support operational efficiencies, cleaner air, lower healthcare costs and improved quality of life. Wi-NOx™ identifies polluting vehicles, supports existing regulations, and establishes the foundation for future incentive programs, while enabling socially conscious smart cities and individuals to effectively practice sustainability.

### **[Molekule Inc. \(San Francisco CA\)](#)**

<https://molekule.com/> - Molekule Inc. is a brand new energy efficient air cleaner technology that rapidly, safely, and completely destroys most common indoor air pollutants including bacteria, viruses, mold, asthma triggers and allergens. When it comes to destroying pollutants, speed matters. Competing technologies take hours to destroy contaminants, allowing them to recirculate and cause sickness. Molekule Inc. technology turns contaminants into simple carbon dioxide and water in minutes, keeping you safe from harm.

### **[RedoxBlox Inc. \(East Lansing, MI\)](#)**

<https://www.redoxblox.com/> offers RedoxBlox developed a thermochemical energy storage solution that allows natural gas power plant operators to support increased renewable power deployment on the grid to increase the capacity factors of their existing gas turbines, reduce their plant's CO2 and NOx emissions, gradually convert into a renewable energy storage facility, to make the transition to a low-carbon future.

## **UF Faculty Partnerships**

**Energy Efficiency in Built Environment and in Manufacturing:** Synergy, OSRAM, Epistar, BORAL, Diakin,

**Biomass:** Burcell Technologies, Mosaic Fertilizer, LLC, Wenck Associates, FDACS, Lanzatech, Inc., FL Farm Bureau, NuSeed, Applied Research Associates (ARA), Commercial Aviation Alternative Fuels Initiative (CAAFI), Agriculture Intelligence Inc., Harvest Croo Robotics, BAYER, Kalera (vertical Community Farms), Syngenta, Corteva

**Solar:** Nanophotonica, Sunpower, Kyocera

**Hydrogen/Solar Fuels:** Synhelion Solar Fuels,

**Nuclear energy:** Idaho National Lab



**Smart Grid/Grid Security and Energy Storage:** FP&L, Duke Energy, Orlando Utilities Commission, TECO, EPRI, GRU, GERS USA, Quanta Energy, Intel, TCL Corporate Research, Open Innovation Lab,

**Moving towards all Electric Transportation (towards sensor based autonomy):** City of Gainesville (CoG), FDOT, Ford Motor Co.,

**Quantum Materials:** Ames Laboratory, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, PNNL

**Overarching Education/Workforce Development:** US DOE, NSF

**Policy and Economics:** FP&L, Duke Energy, Orlando Utilities Commission, TECO, EPRI, GRU, FDACS,

**Overarching several areas:** National Labs: PNNL, Sandia NL, NREL, Argonne National Laboratory, Savannah River NL, Ames Laboratory, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory

Industry: ExxonMobil, Interdisciplinary Consulting Corp (IC2), Jabil, Pecan Street Inc. (Data Research),

Federal: NSF, Naval Air Systems

## APPENDIX 5 – UF Institutes, Centers, Laboratories Supporting Energy Research

### UF Institutes Supporting Energy Research

- ☐ Florida Energy Extension Service, Program for Resource Efficient Communities, <http://www.buildgreen.ufl.edu/>
- ☐ Florida Climate Institute, <https://floridaclimateinstitute.org/about>

### UF Centers Supporting Energy Research

- ☐ Center for Catalysis, <https://catalysis.chem.ufl.edu/>
- ☐ Florida Center for Renewable Chemical and Fuels, <https://frcr.ifas.ufl.edu/what-we-do/>
- ☐ Powell Center for Construction and Environment, <https://www.cce.ufl.edu/>
- ☐ Industrial Assessment Center, <https://iac.mae.ufl.edu/>
- ☐ Public Utility Research Center, <https://warrington.ufl.edu/public-utility-research-center/> ,
- ☐ Public Policy Research Center (PPRC), <https://economics.clas.ufl.edu/research-centers/pprc/>
- ☐ Center for Governmental Responsibility <https://www.law.ufl.edu/areas-of-study/centers/cgr>

### UF Laboratories Supporting Energy Research

- ☐ Renewable Energy Conversion Laboratory, <https://faculty.eng.ufl.edu/jonathan-scheffe/> , Dr. Jonathan Scheffe
- ☐ University of Florida Training Reactor (UFTR), <https://mse.ufl.edu/people/name/don-wall/> , Dr. Don Wall
- ☐ BioEnergy and Sustainable Technology Lab (BEST), <https://biogas.ifas.ufl.edu/> Dr. Ann C. Wilkie, Director

## **APPENDIX 6 - Florida Energy Profile**

Ref: <https://www.eia.gov/state/analysis.php?sid=FL>

Known as the Sunshine State, Florida contains significant solar energy potential as well as substantial biomass resources and some oil and natural gas reserves. Florida consumes almost eight times as much energy as it produces. In 2018, Florida was the third-most populated state and the fourth-largest energy-consuming state. However, Florida ranks third-lowest in the nation in per capita energy consumption, mainly because of its large population and relatively low industrial sector energy use. The transportation sector, which includes the energy used by the automobiles, trains, planes, and ships that bring the many tourists who visit Florida's beaches and attractions, leads end-use energy consumption, and it accounted for almost two-fifths of the state's total energy use in 2018.

### **Electricity**

Florida is the second-largest producer of electricity in the nation, after Texas. In 2019, natural gas fueled three-fourths of Florida's net generation, and 7 of the state's 10 largest power plants by capacity and by generation are natural gas-fired. The second-largest source of in-state generation in Florida is nuclear power. The state's two nuclear power stations, located on Florida's Atlantic Coast, typically provide more than one-tenth of the state's net generation. Renewables, mainly biomass and solar energy, petroleum coke, and generation at industrial plants that use multiple fuels accounted for almost all the remaining net generation in Florida. Almost all the state's recent and planned additions of generating capacity are natural gas-fueled or solar powered.

Florida is the third-largest electricity consumer in the nation, after Texas and California, and electricity demand is expected to increase in the years ahead as the state's population continues to grow. The residential sector, where more than 9 in 10 Florida households use electricity as their primary energy source for home heating and air conditioning, consumes more than half of the electricity used in Florida. The commercial sector accounts for about two-fifths of state consumption, and the industrial sector uses most of the rest. A very small amount of electricity is used in the transportation sector.

### **Renewable energy**

Renewable energy fueled about 4% of Florida's net generation in 2019, and most of the state's renewable-sourced electricity generation comes from solar energy and biomass. At the end of 2019, Florida ranked fifth in the nation in total solar power generating capacity, and utility- and small-scale solar installations contributed more than one-half of the state's renewable-sourced net generation. About 85% of the state's solar generation is at utility-scale (1 megawatt or larger) facilities. Florida is one of only four states with utility-scale electricity generation from solar thermal technologies that concentrate sunlight to produce the high temperatures needed to generate electricity. The Martin Next Generation Solar Energy Center in Martin County, Florida, is a 75-megawatt concentrating solar power facility with almost 200,000 mirrors, and it is combined with a 1,100-megawatt natural gas-fired power plant. The Martin plant is the only concentrating solar thermal generating facility east of the Rocky Mountains.

Florida accounts for about 8% of the nation's biomass-fueled electricity generation, more than all but two other states, California and Georgia, and biomass fuels almost all of the non-solar renewable generation in Florida. The largest share of the state's almost 1,200 megawatts of biomass-fueled

generating capacity is at plants that process municipal solid waste, followed by those fueled by wood and wood waste. However, Florida has a variety of other biomass resources that are burned at utility-scale electricity generating facilities throughout the state, including sugarcane waste (bagasse), citrus pulp, other plant and animal agricultural residues, and yard waste. The state's biomass resources also provide feedstock for a wood pellet manufacturing plant located in the state's Panhandle. That plant has a production capacity of about 827,000 tons per year. Although there are many landfill gas facilities in Florida, they account for only 6% of the state's biomass generating capacity.

Florida has few other renewable energy assets. A small amount of power is generated at one hydroelectric plant in the Florida Panhandle. However, the state's flat terrain gives Florida little opportunity for hydropower development.

### **CleanTech/Energy Industry in Florida**

*Ref: Enterprise FL - <https://www.enterpriseflorida.com/industries/cleantech/>*

With particular strengths in energy, efficiency and environmental technologies, there are over 11,750 cleantech companies in Florida. From solar energy to bioplastics to bioremediation, Florida powers all facets of the cleantech industry. Notable Employers: FPL, Duke Energy, TECO, Enviva, GE Renewable Energy, Jinko Solar, Parabel, SAFT, Siemens Energy, UrbanVolt, Alternate Energy Technologies, Atlantic Bearings, EnerFuel, Green Circle Bio Energy, Mitsubishi Power Systems Americas, Ocean Renewable Power Company.

Energy Efficiency: Areas of Excellence: LEDS and OLEDs; advanced materials including nanomaterials, coatings, bioplastics, and ceramics; green architecture; building controls and automation; energy modeling. Select Companies in Florida: Dais Analytic, FHP Manufacturing / BOSCH Group, Industrial Nanotech, LEDnovation, MSCW, Textured Coatings of America

### **Workforce in Florida**

*Ref: American Job Project: <http://americanjobsproject.us/ajp-state/florida>*

Florida already has a strong foundation in the advanced energy sector, and is well-positioned to benefit further as demand for alternative energy products increases. The state's \$6.2 billion advanced energy economy currently contains 14,000 businesses employing more than 130,000 Floridians. Florida's public universities, research facilities, and skilled labor force present opportunities for the state to further serve growing regional, national, and global markets and create even more good-paying jobs for its residents. The advanced energy industry can play a significant role in Florida's future economic development. By emphasizing technological innovation in the solar and biofuels sectors, Florida can enable its companies to take advantage of market opportunities across the globe. Florida's leaders can enact policies that will expand the solar and biofuels industries and help local businesses innovate, grow, and outcompete national and global competitors. Indeed, with the right policies, Florida's solar and biofuels sectors can support as many as 98,500 jobs annually through 2030.