

## *Schedule at a Glance*

*Breakfast 8:15 a.m.*

*Welcome by Vice President for Research Tanju Karanfil*

*8:30 a.m.*

*Grad 3-Minute Thesis Presentations 8:45 a.m.*

*ClemsonForward Research Panel with Provost Bob Jones,  
Associate Provost Ellen Granberg, and Vice President for  
Research Tanju Karanfil 9:15 a.m.*

*Morning Break 10:00 a.m.*

*Session 1 10:15-11:00 a.m.*

### **WFIC Auditorium**

SC EPSCoR/IDeA Panel  
Presenters:

1. Nadim Aziz
2. NSF and DoE  
Representative

### **WFIC 106**

Caribbean Initiative Panel  
Presenters:

1. Gary Machlis
2. Jean McKendry
3. Saara DeWalt

### **WFIC 208**

Conflict of Interest Open  
Forum

Presenter:

1. Alisha Oxendine

## *Session 2 11:15-12:00 p.m.*

### **WFIC Auditorium**

#### **CAREER Awardees Panel**

##### **Presenters:**

1. Liuz Jacobsohn
2. Marissa Porter
3. Sapna Sarupria
4. Rachel Getman

### **WFIC 106**

#### **Academic Analytics Panel**

##### **Presenters:**

1. Jonathan Fink
2. Jeremy King
3. Ellen Granberg

### **WFIC 208**

#### **Responsible Conduct of Research: Safety and Compliance \***

##### **Presenters:**

1. Jim Grieger
2. Tracy Arwood

*\*RCR Credit will be offered*

## *Lunch 12-1pm*

### **Watt Family Innovation Center Atrium**

## *CUSHR Health Innovation Panel 12-1:30pm*

### **Academic Success Center, Room 118 (50 spots available)**

**\*RCR Credit offered**

## *Session 3 1:00-2:30 p.m.*

### **Advanced Materials**

#### **WFIC Auditorium**

**1. Sourav Saha**  
"Stimuli-Responsive Functional Materials"

### **Energy, Transportation, & Advanced Manufacturing**

#### **WFIC 106**

**Weitain Wang**  
"Robot Action Planning in Human-Robot Collaborative Assembly Tasks"

### **Health Innovations**

#### **WFIC 208**

**Arelis Moore**  
"Perceptions and Determinants of Partnership Trust Among Hispanic Participants in SC"

### **Sustainable Environment Caribbean Research Initiative**

#### **WFIC 218**

**Gary Machilis**  
"Grand Challenges and Opportunities for Sustainable Science in the Caribbean"

**2. Sudeep Papat**

*"Microbes Interfaced with Electrodes"*

**Venkat N. Krovi**

*"A Distibuted Robotics Systems Roadmap for Robotics and Automation Systems"*

**Christopher Saski**

*"The Genomics and Computational Biology Laboratory"*

**Saara DeWalt**

*"Tropical Forest Dynamics in the Caribbean"*

**3. Thompson Mefford**

*"The Fabrication of Multifunctional Particles and Polymers"*

**Yunyi Jia**

*"Automatic Sensor Correction of Autonomous Vehicles by Human-Vehicle Teaching-and-Learning"*

**Jeryl Jones**

*"Diagnostic Imaging in Animal Research"*

**Michael J. Childress**

*"Developing a Model to Predict Coral Reef Restoration Success"*

**4. Sapna Sarupria**

*"Using Molecular Simulations for Nanoscopying Materials"*

**Xin Zhao**

*"Advanced Laser-Based Manufacturing and Material Processing"*

**Joshua Alper**

*"Physical Principles of Biological Phenomena"*

**J. Antonia Baeza**

*"Research Challenges on Sustainable Use of Marine Resources and Biodiversity Discovery"*

**5. David Ladner**

*"CFD Simulation of Fluid Profiles for Membranes with Engineered Surface Features"*

**Yongqiang Wang**

*"Secure and Privacy-Preserving Average Consensus"*

**Naren Vyavahare**

*"Nanoparticle Based Targeted Therapies to Reverse Diseases"*

**Stephen Moysey**

*"Infrastructure Risk and Resiliency From a Geoscience Perspective"*

**6. Rachel Getman**

*"The Wide Applicability of Molecular Simulations"*

**Kuang-Ching Wang and Ron Gimbel**

*"BSMAT: A Data Platform Strategy for Research in Health Disciplines and Beyond"*

**Darcia Wilkinson, Bart Knijnenbury, and Kelly Caine**

*"Cross-Cultural Privacy Differences in the Caribbean"*

**7. Chris Kitchens**

*"Magnesium Oxychloride Cement – A Sustainable Alternative for Conventional Building Materials"*

**Sachin Rustgi**

*"Dietary Therapies for the Gluten Syndrome"*

**Lauren Duffy**

*"Critical Tourism Studies: An Agenda for the Caribbean and Beyond"*

**8. Qiushi Chen**

*"Regolith-based  
Material Innovation  
for Mars Exploration"*

**Julia Brumaghim**

*"Metals,  
Mechanisms, and  
the Search for  
Predictive Structure-  
Activity  
Relationships"*

**9. Chris Cox**

*"Modeling of Cross  
Flow Filtration for  
Deep Space Manned  
Missions"*

**Cheryl Ingram-  
Smith**

*"Energy Metabolism  
in the Pathogen  
Entamoeba  
Histolytica"*

*Session 4 2:50-4:30 p.m.*

**Cyberinfrastructure  
and Big Data**

**WFIC Auditorium**

**1. Alex Feltus**

*"Scientific Data Analysis  
at Scale"*

**2. Yuheng Du**

*"Data Analytics in  
Intelligent  
Transportation  
Systems"*

**3. Andrew Wesolek**

*"Open Access  
Publishing: Opportunity  
and Challenges"*

**Human  
Resilience**

**WFIC 106**

**Andrew**

**Whitehead**

*"Christian  
Nationalism and  
American Identity:  
Cultural Contours  
and Implications"*

**Catherine Mobley**

*"Entering the  
Engineering  
Pathway: Student  
Veterans' Decision  
to Major in  
Engineering"*

**Daniel Frost**

*"How Discrimination  
Theory Undermines  
Itself, and How to  
Make It Better"*

**Health  
Innovations**

**WFIC 208**

**Lori Dickes**

*"A State and  
National Comparison  
of an Innovative  
Neonatal Abstinence  
Syndrome Treatment  
Model"*

**Kathleen  
Valentine**

*"Building  
International  
Capacity for  
Transforming  
Healthy Aging  
Care Delivery"*

**Roxanne  
Amerson**

*"Childhood Anemia  
in Rural Peru"*

**Sustainable  
Environment**

**WFIC 218**

**Bhupinder Singh  
Farmaha**

*"Systems Approach  
to Address Soil,  
Water, and  
Environmental  
Quality Issues"*

**Christopher  
Darnault**

*"Flow and  
Transport of  
Pathogens and  
Radionuclides"*

**Jose Payero**

*"Development of a  
Low-Cost Internet  
of Things System  
for Soil Monitoring"*

**4. Ellen Breazel**

*"Statisticians and Mathematicians at your Service"*

**Joseph B. Ryan**

*"Using Assistive Technology to Promote Employment and Independent Living for Individuals with Intellectual Disabilities"*

**John Whitcomb**

*"Post-Resuscitation Care of the Cardiac Arrest Survivor"*

**Julia Frugoli**

*"Plant Signal Transduction"*

**5. Jan Comfort & Nashieli Marcano**

*"Research Support Services Available through Clemson Libraries"*

**Lauren Duffy**

*"Critical Tourism Studies: An Agenda for the Caribbean and Beyond"*

**M. Gabriela Sava**

*"Modeling the Sensitivity and Stability of Preferences Among Colorectal Cancer Screening Alternatives"*

**Tom O'Halloran**

*"Informing Sustainable Environments Research Through Multi-Platform Field Measurement Systems"*

**6. Kuang-Ching Wang**

*"Next Generation Computing and Creativity Highlights"*

**Victoria Prieto**

*"Migration Responses to Great Recession among Immigrants in Spain"*

**Susan O'Hara**

*"A Focused Ethnographic Study of 'Neighborhoods' in a PICU"*

**Michael Carbajales-Dale**

*"An Overview of Energy-Economy-Environment Systems Analysis"*

**8. Jan Holmevik & Nuyun Zhang**

*"Southeast Secure Cybersecurity Communications for NSF Investigators"*

**Eric Touya**

*"Why should STEM students study the Humanities?"*

**Sheri Webster**

*"Newly Licensed Registered Nurses' Interrupted Transitions to Professional Practice"*

**Andrew S. Mount**

*"Cellular Basis of Biomineralization in Marine Invertebrates"*

**Barry A. Garst**

*"Supporting Healthy, Positive Development in Youth and Families: An Applied Research and Evaluation Program at Clemson University"*

**Joseph Singapogu**

*"Medical Simulation for Clinical Skills Training"*

**Kalyan Piratla**

*"Resilient Water Supply: Battle of Metrics"*

**Marissa Shuffler**  
"What is the "Right  
Stuff" For  
Healthcare  
Leadership?  
Evaluating Multilevel  
Effects of a  
Healthcare  
Leadership  
Development  
Program"

**Leah Casabianca**  
"NMR Studies of  
Nanomaterial  
Surface  
Interactions"

**Marzieh Motallebi**  
"How and Where  
Environmental  
Markets Work"

*Poster Session and Interfacing Hours Sponsored by Clemson  
University Research Foundation 4:30-5:30 p.m.*

## *Program Abstracts:*

### **Advanced Materials WFIC Auditorium**

Sourav Saha

#### **"Stimuli-Responsive Functional Materials"**

The skyrocketing energy demand and growing urgency to limit anthropogenic strains on our health and environment have created a need for smart materials that can generate energy from clean renewable sources, capture and detect pollutants and toxic chemicals, improve energy efficiency of modern electronic devices, deliver drugs in our bodies in a controlled fashion, and help sustain a myriad of other technological advances. To meet these demands, we need functional materials that can carry out these functions by interacting with various chemical and physical stimuli, such as guest molecules and ions, applied electric field, and light. This poster will summarize our contributions toward the (i) detection and remedy of toxic anions using  $\pi$ -acidic anion receptors, (ii) conversion of light into electricity using multi-chromophoric supramolecular solar cells, (iii) construction of electrically conducting metal-organic frameworks<sup>6</sup> that can be used in chemiresistive sensors, capacitors, field-effect transistors, and rechargeable batteries, and (iv) development of controlled drug-delivery systems based on pH-responsive self-assembled vesicles.

Sudeep Popat

#### **"Microbes Interface with Electrodes: Possible Applications in Environmental Engineering and Beyond"**

The discovery that microorganisms can use electrodes as terminal electron acceptors or electron donors has led to the development of a suite of technologies referred to collectively as microbial electrochemical technologies. Possible applications include wastewater treatment, bioremediation, environmental sensing, integrated systems with membrane technologies, and electro-synthesis of commodity chemicals, among many others. To move these technologies towards pilot scale testing and expand into new applications, there is a need for interdisciplinary research involving environmental engineers, chemical engineers, materials scientists and engineers, biochemists and molecular biologists, microbial ecologists, electrochemists, and life-cycle and techno-economic analysts, among others. In this presentation, I will highlight the key areas of research focus in my laboratory, as well as possible opportunities for collaboration with faculty members at Clemson.

Thompson Mefford

#### **"Integrated Approach for the Fabrication of Multifunctional Particles and Polymers"**

Over the past decade there has been extended interest in the use of magnetic nanoparticles for both imaging and therapeutic applications in medicine.. Key to the success of these opportunities is the preparation of well-characterized materials with tailored magnetic, thermal, colloidal, and bio-interaction properties. To address these issues we have focused our efforts on three distinct areas in this problem: 1.) Nanoparticle synthesis and morphology, 2.) Surface-ligand interfaces, and 3.) Specialized surface moieties for additional imaging, therapy, and targeting.

Sapna Sarupria

“Using Molecular Simulations for Nanoscopying Materials”

In our research we use largescale molecular dynamics simulations to study various materials including proteins and membranes. We are motivated by enabling computational driven materials science. In our presentation we will present some techniques and systems we study in hopes of generating interest for collaborations.

David Ladner

“CFD Simulation of Fluid and Fouling Profiles for Membranes with Engineered Surface Features”

The goal of this research is to develop a computational framework to predict fouling of patterned membranes designed for purification of impaired waters. Our research hypothesizes that the combination of certain pattern geometries and chemical coatings can significantly reduce membrane fouling and multi-scale computational models will accelerate the discovery of the best combinations. Simulations evaluated the effects of velocity and pressure on the fluid flow around the features. Local turbulence and shear stress are generated, which are predicted to disrupt concentration polarization layers and decrease foulant particle attachment.

Rachel Getmen

“The Wide Applicability of Molecular Simulations and How Our Group is Using Them to Understand Molecular Level Phenomena”

Computational molecular science facilitates understanding of many chemical and physical phenomena. In the Getman Group, we use quantum chemical calculations, Monte Carlo, and molecular dynamics simulations to solve problems in catalysis, adsorption, and advanced materials. We collaborate with experimentalists, since combining molecular simulations and experimental observations is unsurpassed for elucidating molecular level phenomena. In this presentation, we provide examples of how we are designing our models and experiments so that the two can be compared, with the aim of inspiring new collaborations in our present areas of expertise or others.

Chris Kitchens

“Magnesium Oxychloride Cement: A Sustainable Alternative for Conventional Building Materials”

Current construction projects demands materials that possess superior structural integrity while are also fire retardant, water and thermal stable, and safe to human health and the environment. Magnesium oxychloride (MOC) is an emerging material with significant fire resistance, structural properties, and potential to serve as an alternative to modern construction materials for applications such as structural insulating panel systems (SIPS). Despite many advantages, this material has shortcomings that include a lack of understanding of the chemistry involved in manufacture and inconsistent weathering stability. Our research goal is to elucidate the chemical reactions involved in the formation of MOC and the mechanisms by which the degradation transformation occurs.



Qiushi Chen

**"Regolith-Based Material Innovation for Mars Exploration"**

The long-term goal of this research is to develop innovative, energy efficient and sustainable Mars-compatible processes to transform in situ Martian resources (regolith and atmosphere) into functional materials. Aiming at this research goal, two ongoing efforts focusing on regolith-based composite material manufacturing and bio-cementation of regolith materials will be presented. Findings and future work will be discussed.

Chris Cox

**"Modeling of Cross Flow Filtration for Applications on Deep Space Manned Missions"**

A colleague from industry, a graduate student and I are working on development of cross flow filters for use on manned missions to Mars. The two applications of current interest are particulate filtration for the closed cabin environment, and filtration of carbon particles generated by the NASA Plasma Pyrolysis Assembly (PPA). The PPA is used to recover hydrogen from methane that is a byproduct of the Sabatier process in which water is produced from the carbon dioxide-rich Martian atmosphere. An overview of modeling results-to-date will be provided, along with a discussion of continuing work.

**Cyberinfrastructure and Big Data**

Alex Feltus

**"Scientific Data Analysis at Scale (SciDAS)"**

We will discuss our new NSF CC\* national collaboration including petascale resources it brings to Clemson and how we are flipping the cyberinfrastructure model by embedding the customer in the systems engineering design process.

Project URL: [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1659300](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1659300)

Yuheng Du

**"Data Analytics in Intelligent Transportation Systems"**

CommonCrawl, a large publicly available dataset hosted on Amazon Web Services, has been created as a snapshot of data retrieved from web sites across the Internet over a period of many years. It enables the study of web data without the disadvantages of having to actually access the data directly. We use topic models and summary statistics to evaluate CommonCrawl as a representative sample of user forums. Our research is supported through a gift from BMW.

Andrew Wesolek

**"Open Access Publishing: Opportunities and Challenges"**

Scholarly communication in the digital environment is rapidly changing. We now have the opportunity to disseminate the results of our research quickly, broadly, and openly. With this changing environment, though, comes changing publishing models. Audience members will learn how to retain their rights to their research publications, share their research

openly through the traditional publishing process, and how to evaluate open access journals for editorial rigor.

Ellen Breazel

“Statisticians & Mathematicians at Your Service”

The Statistics and Mathematics Consulting Center (SMCC) in the Department of Mathematical Sciences provides analytical assistance on a wide variety of projects across campus. It was started in 2014 to give structure to consulting traditionally done on campus. The SMCC serves as a collaboration hub for faculty and students by bridging researchers between different disciplines on projects and providing a more direct connection to compatible statisticians and mathematicians. The SMCC offers an interdisciplinary environment for collaboration and consultation in terms of statistical guidance, interpretation, and mathematical modeling.

Jan Comfort and Nashieli Marcano

“Research Support Services available through Clemson Libraries”

We offer a number of services to support research, including: assistance with data management plans; assistance with literature reviews; assistance with patent searches; meeting space for students; individualized library instruction classes for graduate or undergraduate students; collaboration via Canvas and other media; and selection of materials for the library collection

Kuang-Ching Wang

“Center of Excellence for Next Generation Computing & Creativity Highlights 2016-2017”

We introduced the Center of Excellence (COE) to the campus in last year’s Research Symposium. In 2016-2017, CoE has had a range of exciting successes in new campus initiatives, sponsored research projects, and curriculum development. We will present highlights of these activities and take a closer look at the collaboration experiences, lessons learned, and new opportunities.

Jan Holmevik and Nuyun Zhang

“Southeast Secure: Cybersecurity Communications for NSF Investigators”

This presentation will discuss the CICI Secure NSF Project (1642102) and related communications efforts aimed at raising awareness of secure data handling and behaviors for NSF science investigators. Partners include Auburn University, University of Alabama in Huntsville, Jackson State University and Voorhees College. Presented by the Center of Excellence in Next-Generation Computing.

## **Energy, Transportation and Advanced Manufacturing**

Weitian Wang

“Robot Action Planning in Human-robot Collaborative Assembly Tasks”

A novel and practical cost function-based approach is proposed for robot action planning to improve the task quality in human-robot collaborative assembly. We verify the developed robot action planning algorithms with a series of simulated experiments and analyze the experimental results.

Venkat N. Krovi

#### "A Distributed Robotic Systems Roadmap for Robotics & Automation Systems"

For over 50 years now, the robotics "Sense-Think-Act" paradigm has enabled extending the reach of humans for manipulating, interacting with and transforming the world. However, a next-generation Distributed Robotic System paradigm has been slowly emerging capitalizing on the triple convergence of computation, communication and miniaturization. The principal opportunities within this new paradigm now lie in building upon loosely-interconnected heterogeneous systems-of-systems and engineering high-performance/high-confidence operational capacities in the presence of uncertainties. In this context, I'll highlight the role of novel design-architectures and scalable-control approaches for modulating physical power (motions/forces) in Distributed Robotic Systems to unlock this "power of the many" in emerging applications. Please visit <https://sites.google.com/view/armlab-cuicar/> for further detail.

Yunyi Jia

#### "Automatic Sensor Correction of Autonomous Vehicles by Human-Vehicle Teaching-and-Learning"

The sensors on Autonomous vehicles needs to be recalibrated after an accident has occurred. In the presentation we will introduce an efficient way to make human drivers be able to teach autonomous vehicles to drive under sensor errors on-line. A human-vehicle teaching-and-learning framework for automatic sensor correction is proposed. The applications of this framework to radar and vision sensors to recover adaptive cruise control and lane keeping functions will be introduced in detail.

Xin Zhao

#### "Advanced Laser-Based Manufacturing and Material Processing"

Ultrashort lasers are promising tools for micro/nano-scale high precision manufacturing and material processing, due to their unique advantages in ultrashort pulse duration and ultrahigh power density. Our research group focuses on the understanding of fundamental laser-matter interaction mechanisms by both numerical simulation and experimental investigation. Based on the obtained knowledge base, novel applications are explored, such as multi-scale surface texturing, micro-scale 3D printing, micro-machining, laser shock peening, etc.

Yongqiang Wang

#### "Secure and Privacy-Preserving Average Consensus"

Average consensus is fundamental for distributed systems since it underpins key functionalities of such systems ranging from distributed information fusion, decision-making, to decentralized control. In order to reach an agreement, existing average

consensus algorithms require each agent to exchange explicit state information with its neighbors. This leads to the disclosure of private state information which is undesirable in cases where privacy is of concern. In this paper, we propose a novel approach that enables secure and privacy-preserving average consensus in a decentralized architecture in the absence of any trusted third-parties. By leveraging homomorphic cryptography, our approach can guarantee consensus to the exact value in a deterministic manner. The proposed approach is light-weight in computation and communication, and applicable to time-varying interaction topology cases. Implementation details and numerical examples are provided to demonstrate the capability of the protocol.

## **Health Innovations**

Arelis Moore

“Perceptions and Determinants of Partnership Trust among Hispanic Participants in a Culturally Relevant Health Promotion Organization (PASOs) in South Carolina”

This community-based participatory study allowed us to identify perceptions and determinants of trust among stakeholders of the PASOs organization, at two different stages of organizational development. The role of culture as a determinant of trust in partnerships was identified, in addition to organizational and socio-economic determinants. Data gathered was used to identify types of trust based on a selected typology (Lucero, 2013), used in the context of CBPR partnerships.

Christopher A. Saski

“The Genomics and Computational Biology Laboratory: A Core Facility for Genomics, Bioinformatics, and Computational Biology”

The CU-GCL provides core expertise in areas that focus on the discovery and functional analysis of important genes, networks, and genomic regions from plants, animals, fungi, microbes and humans using an integrated suite of specialized biological tools.

Jeryl Jones

“Diagnostic Imaging in Animal Research”

Non-invasive diagnostic imaging tests are powerful tools for supporting longitudinal research studies in natural and experimental animal models. This presentation will provide an overview of diagnostic imaging methods currently available at Clemson University and examples of our lab's previous research collaborations.

Joshua Alper

“Physical Principles of Biological Phenomena”

The Alper Lab uses single-molecule experiments and models to study the physical principles that underlie biological phenomena at the cell level. Specifically, we investigate the coordination mechanisms of the molecular motor proteins that drive the oscillatory beat of eukaryotic cilia and flagella using pathogenic (trypanosome) and non-pathogenic (Chlamydomonas) microorganisms. We use optical tweezers to apply and measure piconewton-scale forces at nanometer length-scale, high resolution microscopy to observe

physical behavior from single motor proteins to whole cells, and biophysical modeling to explain phenomena across multiple length scales. We are eager to collaborate with labs from across the University, including cell and microbiologists, geneticists, biochemists, chemists, bioengineers, mechanical engineers, chemical engineers, materials scientists, nanotechnologists, and mathematicians on experiments and models of molecular, cellular, and engineered biophysical systems.

Leah Casabianca

#### "NMR Studies of Nanomaterial Surface Interactions"

Understanding the structure of molecules at the surface of nanomaterials is important to the fields of catalysis, drug delivery, and nanoparticle toxicity. Nuclear Magnetic Resonance (NMR) spectroscopy is one of the most informative techniques for obtaining both structural and dynamic information about molecules; however, due to the low sensitivity of NMR it is often difficult to observe molecules adsorbed on a surface in the presence of bulk molecules. In this talk, we will describe our recent progress in developing NMR methods for molecules interacting with nanoparticle surfaces.

Naren Vyavahare

#### "Nanoparticle Based Targeted Therapies to Reverse Diseases"

I will provide an overview of nanoparticle-based therapies developed in our laboratory to reverse debilitating diseases like vascular calcification, aortic aneurysms, lung emphysema, and skin disorders. We developed nanoparticles attached with targeting antibodies that when injected systemically find diseased tissue, latch on like a velcro, and deliver agents to repair the diseased tissue.

Sachin Rustgi

#### "Dietary Therapies for the Gluten Syndrome"

Gluten, the major storage proteins in wheat grains elicit a variety of reactions in about 7% of the US population. Abstinent diet is the only known therapy. We researched dietary therapies for the 'gluten syndrome' by engineering wheat genotypes deficient in immunogenic gluten proteins or expressing detoxifying enzymes.

Julia Brumaghim

#### "Yeah, But Which Antioxidant? Metals, Mechanisms, and the Search for Predictive Structure-Activity Relationships"

Antioxidants have great potential to prevent neurodegenerative and cardiovascular diseases, diabetes, cancer, and aging, but there are thousands of antioxidant compounds and very few clues to determine which antioxidants might most effectively prevent oxidative stress. The Brumaghim group has examined in vitro and bacterial oxidative DNA damage prevention by antioxidants to quantify and compare the abilities of widely studied sulfur, selenium, and polyphenol antioxidants. We established that all three classes of antioxidants prevent DNA damage and cell death by coordinating the iron and copper ions responsible for hydroxyl radical generation. By understanding antioxidant mechanisms, this work has established the first predictive structure-activity relationships for antioxidant activity that

will enable targeted development of antioxidant therapies to treat and prevent diseases caused by oxidative stress.

Cheryl Ingram-Smith

“Energy Metabolism in the Pathogen *Entamoeba Histolytica*”

*Entamoeba histolytica* causes ~90 million cases of amoebic dysentery and up to 100,000 deaths yearly. *Entamoeba* typically colonizes in the lower intestine to cause disease, but can escape to the liver and cause death if left untreated.

We are studying how *Entamoeba* obtains energy for growth in these two very different environments.

Lori Dickes

“Potential for Medicaid Savings: A State and National Comparison of an Innovative Neonatal Abstinence Syndrome Treatment Model”

Regression models were used to project state and national neonatal abstinence syndrome (NAS) birth rates from 2015-2025 and to predict future NAS charges under current treatment protocols. Three scenarios were developed to compare the potential saved charges of implementing a novel care model (MAiN) across the state and nation with assumptions related to the percent of NAS infants eligible for MAiN, percent funded by Medicaid, and fluctuations in average length of stay. A statewide MAiN expansion could reduce charges to state Medicaid by over \$71,000,000, and if MAiN was expanded nationally, the average savings is projected to be over \$337 million annually in Medicaid charges, totaling \$3.7 billion from 2015-2025. The potential saved charges are substantial, creating a compelling case for policymakers and hospitals in the pursuit of safe, effective, and cost-conscious NAS care.

Kathleen Valentine

“Building International Capacity for Transforming Healthy Aging Care Delivery”

This presentation highlights our approach to building capacity to support and maintain Seniors, in particular those with mild/moderate cognitive impairment (dementia) in their communities. Through initial funding from the New Brunswick Health Research Foundation (NBHRF), we have been able to focus on capacity building of a cadre of research colleagues as well as engage 5 students, working with a Long Term Care facility in Fredericton, New Brunswick and with the Clemson Creative Inquiry program. We have been able to explore an initial environmental scan and review of the literature re: Adult Day Programs, and are continuing this work with York Care Centre, the universities (Clemson and University of New Brunswick) and community agencies in both countries. The focus of capacity building through this project has allowed us to begin to engage in evaluation models for Adult Day Programs, engage with colleagues on developing new approaches to healthy aging and to submit research grant proposals.

Roxanne Amerson

“Childhood Anemia in Rural Peru”

In the summer of 2016, faculty and nursing students screened 160 children (7 months through 5 years of age) for anemia in 12 rural villages in the high-altitude regions of

Ollantaytambo District of Peru. Adjusted hemoglobin levels revealed that over 47% of the children were anemic, which according to the World Health Organization represents a severe public health problem. Chi Square results indicated more than expected cases of anemia existed in the 25-36 month age range and at the elevations of 3100 and 4100 meters. The findings from this pilot study will be used to seek future funding to expand the anemia screenings and to implement interventions to address the high rates of anemia.

John Whitcomb

#### Post-Resuscitation Care of the Cardiac Arrest Survivor"

Since the heart is one of the most vital organs in the body, one can assume that repercussions of cardiac arrest not only affect the heart itself, but jeopardize the integrity of other organs as well, most notably the brain. Cardiac arrest leads to cerebral hypoxia, which results in death of the brain tissue.

Kuang-Ching Wang and Ron Gimbel

#### "BSMAT: A Data Platform Strategy for Research in Health Disciplines and Beyond"

BSMAT originated as a computing solution for a DoD mobile health project to conduct a range of research surveys and extract data from them via a collaboration among PHS, ECE, and CCIT. From the successful experience, we believe BSMAT can be a potential strategy for supporting research in broader disciplines, especially ones with security and privacy requirements and/or special data requirements. We will give an overview of BSMAT and discuss various potential ways BSMAT can assist researchers by integrating computing, data, and expertise across boundaries.

M. Gabriela Sava

#### "Modeling the Sensitivity and Stability of Preferences among Colorectal Cancer Screening Alternatives"

Patients are faced with multiple alternatives when selecting the preferred method for colorectal cancer screening, and there are multiple criteria to be considered in the decision process. We model the patient's choice using an Analytic Network Model and propose a new approach for characterizing the idiosyncratic preference regions for each patient. We show how to use that characterization to derive insights as to the sensitivity and stability of a patient's individual choice of alternative.

Susan O'Hara

#### "A Focused Ethnographic Study of 'Neighborhoods' in a Pediatric Intensive Care Unit: Macro cognition in the Health Care Built Environment (mHCBE)"

Patient quality and safety literature identifies the role of macrocognitive functions of sensemaking, deciding, detecting problems, re-planning, and coordinating (Patterson and Hoffman, 2012) in both inpatient and outpatient settings but the effect of these settings on macrocognitive functions had not been described.



This ethnographic research, built on nursing (the environment of care), macrocognition and space syntax theory (visibility, connectivity, openness) in a systems view, investigated how the physical layout of a new 21,000 sf 40 bed academic medical center pediatric intensive care unit affects interprofessional team members' (clinical, therapeutic, operational) adaptation of cognition to complexity (macrocognition).

Formal (routinized and planned) events such as rounding activities allowed for less situated macrocognitive interactions than impromptu (auditory and visual) interactions which were located more often in the corridor and near team rooms.

'Neighborhood' configurations were considered ideal when all macrocognitive functions and the space syntax constructs were present but when not present, interprofessional team members labeled these spaces as 'islands' affecting 'eyes on the patients' and between each other.

Sheri Webster

"Newly Licensed Registered Nurses' Interrupted Transitions to Professional Practice"

Current employment data indicate newly licensed registered nurses (NLRNs) experience interruptions while transitioning to practice during the first 24 months of employment post licensure. Research has focused on the NLRN experience during transition to practice, however, little is known about the nurse managers' experiences with NLRN turnover and attrition during this time. The purpose of this research was to explore nurse managers' experiences with interrupted transitions to practice within the first 24 months of NLRN employment, using Transitions Theory as the framework. Five patterns of interrupted NLRN transitions were identified: resignation (n=6), in-house transfer (n=4), probationary dismissal (n=5), resignation after disciplinary action (n=4), and termination (n=3).

Joseph Singapogu

"Medical Simulation for Clinical Skills Training: An Interdisciplinary Approach"

I will briefly present our ongoing research that spans multiple departments at Clemson as well as collaboration with the Greenville Health system to develop meaningful, next generation medical simulators for clinical skills training.

## **Human Resilience**

Andrew Whitehead

"Christian Nationalism and American Identity: Cultural Contours and Implications"

My recent work concerning Christian nationalism and American identity highlights both the cultural contours of these belief systems as well as their implications. I demonstrate how Christian nationalism is an ideology that influences both religious and non-religious Americans. I also examine shifts in the use of Christianity as a symbolic boundary of American identity over time.



Catherine Mobley

**"Entering the Engineering Pathway: Student Veterans' Decision to Major in Engineering"**

We are conducting a comparative case study at four institutions enrolling undergraduate student veterans in engineering (SVEs). In this paper, we draw upon in-depth interviews conducted with SVEs at two of these institutions to: (1) better understand the factors that shape SVEs' decisions to major in engineering and, (2) determine whether and how the military influences student veterans' decisions to major in engineering. Our work provides insights into the timing of the decision as well as the extent to which military training and experiences provide a direct, or indirect, pathway into engineering. Our research advances understanding of STEM career pathways.

Daniel Frost

**"How Discrimination Theory Undermines Itself, and How to Make It Better"**

Discrimination theory frequently makes two claims that point in different directions: 1) structural discrimination is harmful, pervasive, and entrenched, and massive effort is needed to combat it; and 2) individuals ought to be free to live their lives as they see fit, without undue pressure or coercion from the government or other groups. This focus on individual autonomy undermines discrimination theory's aim to achieve a society based on respect and compassion for all. I argue that the philosophy of Personalism can better make sense of freedom and our obligations to assist the oppressed.

Joseph B. Ryan

**"Using Assistive Technology to Promote Employment and Independent Living for Individuals with Intellectual Disabilities"**

This session will provide an overview of ongoing research with the Clemson LIFE (Learning is for Everyone) program investigating the efficacy of assistive technology for promoting employment and independent living skills for adults with intellectual disabilities. This presentation provides a brief overview of several smart phone apps developed in conjunction with Clemson University's Computer Science Department to assist with (a) meal planning and food shopping, (b) community navigation, and (c) prompting and teaching complex tasks in the workplace. We will also review an ongoing study with Clemson's International Center for Automotive Research (ICAR) using an interactive driving simulator for improving driving skills of individuals with disabilities, and screen potential candidates who are capable of pursuing a driver's license.

Lauren Duffy

**"Critical Tourism Studies: An Agenda for the Caribbean and Beyond"**

The purpose of the presentation is to provide an overview of my current research program within the Caribbean region. Under a framework of critical sustainable tourism – guided by critical, feminist, political economy, and social justice theories – my work has broadly focused tourism planning, development, and impacts in the Dominican Republic (DR), Cuba, and Haiti. I will (very) briefly describe past projects that have focused on: (1) 'trickle-down' neoliberal economic policy guiding tourism development in the DR, (2) how gender ideology has shifted in the DR since women entered the workforce within tourism, (3) the (in)justices of tourism development in rural Dominican communities, (4) the growth of

agroecology/organiponicos as important tourist attractions in Cuba, (5) the uniqueness of human resilience and ingenuity in the landscape as part of the Cuban tourism product, and (6) the utility of Airbnb homesharing as a means for community development in Haiti. Next steps for research in the Caribbean will be discussed.

Victoria Prieto

#### "Migration Responses to Great Recession among Immigrants in Spain"

This paper assesses the internal and international emigration of immigrants taking into account the different stages of economic recession, with a special focus on the mobility of Latin Americans. I describe the intensity of inter-regional migration, return and remigration to EU and non-EU destinations for the period 2006-2013, and assess the probability of return and remigrate in reference to migrating within Spain. Controls include individual demographic characteristics, period, and economics of the region of origin. This paper contribution shows the prevalence of each migration response varies greatly according to citizenship status and stages of economic downturn, confirming the existence of a preference for internal migration at early stages of economic crisis.

Eric Touya

#### "Why should STEM Students Study the Humanities?"

Countering the perception that the humanities are unessential, my presentation examines the extent to which they are as important as science and technology and how students in STEM can benefit from taking courses in the humanities: ie. literature, art, philosophy.

Barry A Garst

#### "Supporting Healthy, Positive Development in Youth and Families: An Applied Research and Evaluation Program at Clemson University"

This session highlights the research agenda of Clemson's Youth Development Leadership faculty, reflecting a diverse portfolio of research and evaluation projects designed to better understand programs and settings that promote positive and healthy development in youth and families. Highlighted work will include projects focusing on: (1) statewide application of the Positive Youth Development framework, (2) factors contributing to overparenting behaviors in out-of-school time youth settings, and (3) outcomes of the Family Solutions Program, a multiple family group best practice program for strengthening families for at-risk youth. Outcomes of two national evaluation projects supporting resiliency and reintegration within military families in collaboration with the Boys and Girls Clubs of America will also be shared.

Marissa Shuffler

#### "What is the 'Right Stuff' For Healthcare Leadership? Evaluating Multilevel Effects of a Healthcare Leadership Development Program"

In healthcare organizations, emotional demands and high levels of stress can negatively impact relationships among employees, leading to critical challenges for teamwork and associated patient safety outcomes. Leaders of healthcare teams who have the capacity to help their teams work through these often difficult interpersonal dynamics are more likely to reinforce good teamwork and subsequently enhance patient care. This longitudinal study of

255 healthcare leaders in a large healthcare system is designed to evaluate the impact of a leadership development program aimed at improving these critical interpersonal leadership skills. We evaluate outcomes at the leader, team, and department level to determine the effects and practical value for multiple levels of healthcare organizations.

## **Sustainable Environment**

Gary Machilis

“Grand Challenges and Opportunities for Sustainability Science in the Caribbean”

The Caribbean region faces considerable and complex challenges, from sea level rise to exotic species invasions to economic disruption and cultural diasporas. These challenges create significant opportunities for interdisciplinary research and scholarship engaging Clemson faculty and regional partners, and Clemson has established a Caribbean Initiative to act on these opportunities. In This presentation, several specific grand challenges will be described, along with a coupled human-natural framework for developing both theoretical and empirical research.

Saara DeWalt

“Tropical Forest Dynamics in the Caribbean”

I will describe my research that examines changes in vegetation over time in tropical rainforests in the Caribbean. My work is anchored in monitoring shrubs, trees, and vines in 17 permanent vegetation plots in hurricane-prone sub-montane rain forests on the island of Dominica in the Lesser Antilles of the eastern Caribbean. I will also describe my involvement in creating a permanent plot network in the Caribbean to study region-wide changes in tropical forests.

Michael J. Childress

“Developing a Model to Predict Coral Reef Restoration Success”

Caribbean coral reefs are rapidly disappearing with an 80% loss of live coral cover over the past 30 years. So marine resource managers are employing more direct efforts to restore reefs by transplanting corals to damaged reefs. In our current research, we are using the results of a preliminary coral transplant study in combination with an extensive community dataset to develop a structured equation model to predict future coral transplant success among the reefs of the Florida Keys National Marine Sanctuary. By using a hypothesis-driven, experimental approach to restoration ecology, our hope is to better understand how coral reef communities are structured while providing practical solutions to marine resource managers.

J. Antonio Baeza

“Research Challenges on Sustainable Use of Marine Resources and Biodiversity Discovery in Tropical Diversity Hotspots”

The Laboratory of Integrative & Evolutionary Biology at the Department of Biological Sciences, Clemson University, conducts research along four main foci: [i] biodiversity discovery in marine environments, including the description of species new to science, [ii]

molecular phylogenetics, including research on diversification and evolutionary innovations, [iii] formal testing of sexual selection, sex allocation, and mating systems theories using experimental and comparative approaches, and [iv] conservation of marine and freshwater socio-economically important resources. In this talk, the laboratory PI, Dr. J. Antonio Baeza, will highlight current research on biodiversity discovery in the Indo-Pacific and Caribbean regions and on the sustainable use and conservation of marine resources presently impacted by human activities and global climate change. New avenues of research in collaboration with other colleagues/laboratories at the new College of Sciences will be proposed.

Stephen Moysey

#### "Infrastructure Risk and Resiliency from a Geoscience Perspective"

Humanity faces critical challenges in the years ahead and Earth science will play a key role in defining and overcoming those problems. Looking forward, however, we require new approaches to understanding coupled natural and human systems that integrate data, sensors, and modeling efforts. We also require unique experiences, technologies, and interdisciplinary communities that allow us to understand these coupled systems from both disciplinary and interdisciplinary perspectives. One specific example of how we are pursuing such efforts is through research and education programs that we are building in South Carolina and Dominica to investigate and document different aspects at the interface of human and natural systems.

Darcia Wilkinson, Bart Knijnenbury, and Kelly Caine

#### "Cross-Cultural Privacy Differences in the Caribbean"

The Caribbean region has made considerable strides to develop and regulate technology-driven economies. Policymakers have acknowledged the rising concerns for online personal privacy and data protection as advances in technology facilitates increased levels of data collection and surveillance. However, regional efforts to create a working framework for data privacy legislation have had limited to no success. The purpose of this study is to investigate the effect of cultural, constitutional and societal factors on privacy concerns and preferences among the different Caribbean countries. In addition to helping us understand policy and design implications for members of this region, this research will broaden our understanding of cultural factors in privacy worldwide.

Lauren Duffy

#### "Critical Tourism Studies: An Agenda for the Caribbean and Beyond"

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human resilience and ingenuity in the landscape as part of the Cuban tourism product, and (6) the utility of Airbnb homesharing as a means for community development in Haiti. Next steps for research in the Caribbean will be discussed.

Bharpinder Singh Farmaha

“Systems Approach to Address Soil, Water, and Environmental Quality Issues”

In past decade or so, weather patterns, crop genetics, weed and insect management, farm technology, and cropping systems have changed and that have resulted into increase in major food crop yields but at the expense of degradation of soil, air, and water quality. In order to conserve and enhance our natural resources (soil, air, and water), we need to study crop production as a system approach and link it with big data-sets and crop models. This system approach should include producers to collect field-specific information and share with researchers so we can help them in benchmarking their crop yields and input use efficiencies.

Christopher Darnault

“Flow and Transport of Protozoan Pathogens and Radionuclides in the Vadose Zone”

To study the fate and transport of protozoan pathogens and radionuclides in the vadose zone, we have investigated their mobility under different hydrodynamic and biogeochemical conditions found in the natural environment. We have demonstrated the critical role that preferential flow, transient in water content and velocity, transient in solution chemistry, gas-water interfaces, solid interfaces, system heterogeneities, and their interactions and feedback have in the transport and retention of contaminants in the vadose zone. To elucidate the individual contribution of the mechanisms and environmental parameters affecting the transport and retention of these contaminants, as well as to quantify and visualize them, we have developed monitoring methods and tools using physical, chemical, microbiological, molecular, and non-intrusive technologies. The results of our research will contribute to the development and validation of fate and transport models of contaminants from pore scale to watershed scale for management and protection of groundwater resources, public health, ecosystem sustainability, risk assessment, and life-cycle analysis.

Jose Payero

“Response of Decagon EC-5 and Watermark 200ss Soil Moisture Sensors for Twelve Soil Texture Classes”

Farmers use a variety of soil sensors to monitor soil water status in order to make irrigation scheduling decisions. However, interpretation of sensor data can be affected by soil characteristics, especially by soil texture. The objective of this study was to evaluate the effect of soil texture on the response of two commonly used soil sensors: the Decagon EC-5 capacitance soil moisture sensor and the Watermark 200ss soil tension sensor. Twelve soil samples were prepared by blending appropriate percentages of sand, silt and clay, to simulate each of the twelve soil texture types described by the soil texture triangle. Soil water content and tension, ranging from saturation to air-dried soil, were measured from each soil sample with both sensor types. Results indicated significant effect of texture on sensor response and calibration.

Julia Frugoli

### "Plant Signal Transduction"

Plants can't get up and move when the environment changes, but they have evolved strategies to adapt to changes in situ. My lab uses genetic analysis of a signaling event between plants and bacteria, the establishment and regulation of symbiotic nitrogen fixation, to understand how a plant responds to multiple stimuli and makes a "decision" about growth. Understanding this signal transduction will allow manipulation of plants to meet the challenges of feeding a rapidly growing population in a changing climate.

Tom O'Halloran

### "Informing Sustainable Environments Research through Multi-Platform Field Measurement Systems in Forestry, Ecology, Agriculture, and Air Quality"

Developing a sustainable future requires a systems approach to natural resource management. To that end we must quantify and understand the processes controlling the cycling of mass and energy between natural resources and human systems. Here I review my research experiences and capabilities in making in situ field observations of the fluxes and cycling of water, energy, carbon dioxide and other gasses between the land surface and the atmosphere.

Michael Carbajales-Dale

### "An Overview of Energy-Economy-Environment (E3) Systems Analysis"

Dr. Carbajales-Dale heads the Energy-Economy-Environment (E3) Systems Analysis Group, which sits within the Department of Environmental Engineering & Earth Sciences (EEES) at Clemson. The group's research focuses on building tools to reduce the environmental impacts of technology systems and to understand the structural transformation necessary to navigate a peaceful transition to prosperous and sustainable future. Specifically, we model energy and material resource requirements at three distinct levels: (1) the device/facility level, using engineering-based, bottom-up life cycle assessment and techno-economic modeling tools; (2) the industry/local level, using multi-layer, network-analytic techniques; and (3) the regional/national/global scale, using geographic information systems (GIS) and environmentally-extended input-output models.

Andrew S. Mount

### "The Cellular Basis of Biomineralization in Marine Invertebrates"

Studying the cellular mechanisms of calcification in marine invertebrates is fundamental to understanding how organisms produce their hard parts, which include, tests, spicules, shell, bone and teeth. It is directly applicable to understanding how marine organisms calcify under pH stress, a central area of concern for the ocean acidification research community. Our prior research of the shell repair mechanism in the Eastern oyster, *Crassostrea virginica*, has significantly advanced the field, especially since the publication of the oyster genome in 2012. We have found a specialized type of calcite producing cell, called the refractive (REF) granulocyte, in which crystallization of calcite occurs within specialized vesicles.

Kalyan Piratla

“Resilient Water Supply: Battle of Metrics”

This study evaluated five water supply resilience metrics based on a computationally-intensive reliability approach. A non-iterative pressure driven demand simulation is carried out to estimate the shortage of water supply in failure scenarios. A statistically significant number of failure scenarios comprised of highly-probable single, double, and triple edge failures are considered. The correlation with reliability is assessed to comparatively evaluate the five resilience metrics.

Marzieh Motallebi

“How and Where Environmental Markets Work with an example of Water Quality Trading Programs”

Environmental markets are tools to help farmers and forest landowners get conservation practices on the ground. Here I review my research experience and capabilities in defining environmental markets and specifically water quality trading (WQT) programs. I apply my research framework to a case study in the Jordan Lake Watershed, where the State of North Carolina is currently attempting to implement a market for trading nutrients to improve water quality. This work should help policy makers determine a more precise setting for designing WQT programs and give some insight on how to implement policies that reduce the magnitude of any hurdles where possible.