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# Fall

## SYMPOSIUM OF STUDENT SCHOLARS

**Virtual Edition**  
**December 2020**

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*Recognizing excellence in student scholarship and creative activity*



**KENNESAW STATE**  
UNIVERSITY

# Coles College of Business

## Information Systems

### ***Impact of COVID-19 on Health Disparities in the United States - A Preliminary Study***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Graduate Student(s): Alina Panjwani

Research Mentor(s): Govind Hariharan

*Health disparities are the differences in health outcomes and health status among people belonging to different groups. This means that people with low socioeconomic status, old age, racial and ethnic minorities, who are often those with limited access to healthcare may often face a higher disease burden and experience worse health outcomes. The current pandemic of Coronavirus 2019 (COVID-19), caused by the novel coronavirus SARS-CoV-2, provides a painful reminder of why inequities harm all of us as the devastating impact of the pandemic is apparent. This paper examines the differences in and possible cause of the rates of COVID infections, hospitalizations, ICU admissions and mortality rates across age, gender, race and Socioeconomic groups in the United States*

## College of Computing and Software Engineering

### Computer Science

### ***Towards a Framework of Dynamic Affective Virtual Environment Gaming (DaveG) System for Autism Spectrum Disorder Detection***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Graduate Student(s): Estephanos Mekbib, Christopher Baxter, Chao Mei

Research Mentor(s): Yi (Joy) Li

*In the previous decade, virtual reality (VR) innovation has been quickly developing, making it a hot pattern in amusement as well as in medical services research. VR gives a completely different encounter and can offer help for variable controls. These favorable circumstances spurred specialists to utilize VR in restorative intercession for people with developmental problems, for example, Autism Spectrum issue (ASD). The advantages of utilizing VR in diagnosing devices for formative issues have not been completely examined at this point. Studies have demonstrated that VR can trigger more grounded and more explicit enthusiastic reactivities in clients than other visual/sound tools. In addition, the ability of virtual reality to provide private and safe virtual climate makes VR the right tool for individuals with social and developmental problems. This paper proposed a VR framework that can adequately trigger*

*and examine impulsive responses from participants. The comprehensive feeling of a VR game is intended to relate with participants about their impulsive responses to neutral, negative, and positive scenes. The responses are analyzed between the control and diagnosed subjects. The analysis incorporates pre-and post-overviews on feeling responses and excitement scales, psychophysiological sensor signals, in-game response time, and minigames for movement tests under various effects. We foresee that this investigation will uncover various examples between people with ASD and the control group, along these lines finding inventive and rational techniques to raise simpler yet more exact analysis for people with ASD. A definitive objective is to plan a unique emotional virtual climate (DaveG), which is a VR structure with ongoing input to help early screening and treatment of ASD. More advanced data analysis methods are planned to be performed in the future to build customizable user models for DaveG.*

### **Energy Saving on Edges: State-of-the-Art and Future Directions**

Presentation - [Join now.](#)

3:15pm – 3:30pm

Graduate Student(s): Kousalya Banka

Research Mentor(s): Kun Suo

*Internet of Things (IoT) comprises a set of devices that are interconnected ranging from our daily used objects to advanced networked devices. It is a constantly evolving phenomenon as the number of devices owned by the regular user is increasing at a rapid rate. These devices are used for various reasons such as social networking, monitoring, performing complex operations and with the increase of advanced technologies, they demand more energy to perform such tasks. Cloud computing enables these communications to seamlessly perform complex tasks in a cloud environment but utilizing these resources properly to perform at the best is the key. In this paper, Energy efficiency and effective functioning of the devices that run on the cloud has been thoroughly analyzed and we have presented the strengths and weakness of various researches in each area.*

### **Depression Prevention by Mutual Empathy Training: Using Virtual Reality Gamification as a Tool**

Presentation - [Join now.](#)

4:00pm – 4:15pm

Graduate Student(s): Songqiao Yu

Research Mentor(s): Joy Li

*The increasing number of diagnosed anxiety and depression has been aggravated by the COVID-19 pandemic, in addition to social alienation in modern life. Therapeutic intervention for depression using serious games is gaining popularity in recent years. However, the prevention for depression among people with sub-health status has not gained enough attention, and the avoidance of relapse depression under post-pandemic social alienation is ever more challenging. This paper proposes a novel approach to*

*prevent depression and its recurrence through empathy training using interactive virtual reality game applications. Studies have suggested that the distortion of empathy of the patients is one of many causes of depression; meanwhile, the lack of empathy from social environment to the patients is another factor. Therefore, through gamification training in an interactive and immersive virtual environment, the concept of mutual empathy could be cultivated and fostered, consequently introduced to bridge the gap between intervention and prevention. The proposed study seeks to assist intervention by building mutual understanding and establishing healthy social connections. It reflects the feelings and struggles of both patients with depression and social support providers (family members, friends, or other people in the social network) through embodiment and engagement, in order to raise mutual understanding and empathy. Moreover, it trains the users to build appropriate empathy levels and construct better understanding on this mental disorder, thus it could be applied to prevent relapse or potential occurrence. The effectiveness of the game is assessed by several tailored measurement scales for internal and interpersonal reactivity. Neuroscientific methods can also be integrated to monitor the training progress. This study explores the possibility that VR games, as an empathy machine, can grow into a social network with interpersonal mutual and empathic support that benefits both prevention and intervention methods for depression.*

### ***Parkinson Symptom Simulation in Virtual Reality for Empathy in Medical Education***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Graduate Student(s): Songqiao Yu

Research Mentor(s): Joy Li

*Introducing empathy for patients with uncommon diseases in medical students has always been a challenge in medical education. Since the most recent decade, a downward trend in medical students' empathy levels has been observed. For diseases caused by nervous system disorders such as Parkinson's disease (PD), evidence has shown that it is harder for healthcare providers to acquire cognitive perspective-taking ability while lacking the necessary knowledge and affection about the disease, hence preventing them from providing the most appropriate caring to the patients. Fortunately, with the rapid evolution of technologies, it is possible to use advanced gaming devices as tools to improve teaching efficacy, enhance students' understanding of a specific disease and influence their prosocial behavior towards patients. Studies suggest that virtual reality (VR) game applications are effective in education due to its immersive interaction, sense of presence, and fully controllable virtual environment. This paper presents a study using a VR serious game to enhance medical students' empathy level for patients with PD. By engaging students in the simulated daily lives of patients with PD, we aim to let medical students have hands-on experience of the disease and thus facilitate their understanding of the symptoms and the empathy for patients. Data collection is embedded in the gameplay along with a scoring system. In addition, pre- and post- measurements on the empathy scale, attitudes change, and VR performance are used to assess the effectiveness of the virtual learning environment. By combining the expertise of the gaming field and the medical field, the application is able to convey professional and*

*accurate medical knowledge with advanced VR techniques and interactive contents to promote empathy. Medical school professors and students were involved in game design and playtest. The developed VR game is scheduled to be integrated into the medical program curriculum as a novel educational approach.*

## **Information Technology**

### ***PulMon-C: A Real-time Monitoring Framework of Pulmonary Function***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Graduate Student(s): Md Saiful Islam

Research Mentor(s): Maria Valero, Shahriar Hossain

*This project will develop PulMon-C, a real-time monitoring framework of pulmonary function to diagnose COVID-19 patients who are being self-quarantined at home. The tool will identify anomalies in breathe rate and predict pulmonary deterioration to raise alert for immediate actions. The uniqueness of the tool is using non-invasive sensors placed under-mattress that are able to communicate data about the respiratory signal. The customer segment of PulMon-C will be the diagnosed COVID-19 patients and healthcare providers. PulMon-C will assist with the remote monitoring of COVID-19 patients as an urgent need in the USA and will bring larger impact in delivering medical care for worsening conditions of COVID-19 patients timely without overwhelming hospital systems that have otherwise limited capacity and resources. The goal of the research is to perform the needed R&D for real-time monitoring of COVID-19 patients, develop and test signal processing techniques, and preliminary evaluation through end users and healthcare professionals.*

### ***r-LSTM: Time Series Forecasting for COVID-19 Confirmed Cases with LSTM-based Framework***

Presentation - [Join now.](#)

3:45pm – 4:00pm

Graduate Student(s): Mohammad Masum

Research Mentor(s): Hossain Shahriar

*The coronavirus disease 2019 (COVID-19) caused a pandemic outbreak affecting 213 nations worldwide. Global policymakers are imposing many measures to slow and reduce the rapid growth of infections. On the other hand, the healthcare system is encountering significant challenges for a massive number of COVID-19 confirmed or suspected individuals seeking treatment. Therefore, estimating the number of confirmed cases is necessary to provide valuable insights into the growth of the outbreak and facilitate the policy-making process. In this study, we apply ARIMA models as well as LSTM-based recurrent neural networks to forecast the daily cumulative confirmed cases. The LSTM architecture generates more precise forecasting by leveraging both short- and long-term temporal dependencies from*

*the pandemic time series data. Due to the stochastic nature in optimization and random initialization of weights in the neural network, the LSTM based model produce less reproducible outcome. In this paper, we propose a reproducible-LSTM (r-LSTM) framework that produces a reproducible and robust results leveraging the z-score outlier detection method. We performed five round of nested cross validation to show the consistency in evaluating model performance. The experimental results demonstrate that r-LSTM outperformed the ARIMA model producing minimum MAPE, RMSE, and MAE.*

### ***Secure Mobile Application Development with Data Leak Analysis Plugin***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Graduate Student(s): A B M Kamrul I Islam Riad

Research Mentor(s): Hossain Shahriar

*As the mobile devices and applications are being widely adopted and used, Mobile security, or more specifically mobile device security, has become increasingly important. Attacks through mobile apps have caused major data leak due to application vulnerabilities continue to occur. This kind of data leaks can be addressed and fixed in the application development process. Many developers may not be well aware of the vulnerabilities when developing mobile applications and may lack the technical support for detecting data leak analysis within the development environment. In this report, we discuss the need and development of a plugin tool for Android Studio for preventing data leak. We developed a hands-on labware where the plugin can be applied for detection of data leak through SQL injection. We also shared our ongoing experience of the labware integrated in a Summer 2020 course. The preliminary student feedback is collected and reported in this document.*

## **College of Humanities and Social Sciences**

### **Communication**

### ***Celebrity Worship and the Modern Fan***

Presentation - [Join now.](#)

1:00pm – 1:15pm

Undergraduate Student(s): Dorothy Corbett

Research Mentor(s): Laura Beth Daws

*With the rise of social media, it has never been easier to consume content about your favorite celebrity. The purpose of this research is to analyze the effect social media has on the extreme behavior of fans engaging in celebrity worship online. Through a content analysis of YouTube content related to extreme fan behavior as well as a series of interviews conducted with celebrity worshipers, this research indicates*



*that social media had notable effects on spending habits, health and wellness, body image, and social hierarchies within fan communities. The most interesting trend I found was the role that celebrity worship and social media usage have in contributing to consumerism and financial commitment that is seen as validating the passion a fan has for their celebrity of choice. By documenting their celebrity worship online, fans can prove themselves as devoted members of an in-crowd that values high spending on everything from concert tickets to exclusive merchandise. Additionally, celebrity worshippers are likely to exhibit the desire to achieve celebrity in some form or another. This could mean attaining notoriety through their respective communities as an elite member of the hierarchy, or it could mean recreating the beauty standards they see through the screen. This research serves as a starting point for more in-depth research concerning fan communities impacted by social media and the lust for celebrity fantasy.*

### ***A Journey of Success: Italy's Welcoming of Jeep into the FIAT Family***

Presentation - [Join now.](#)

2:30pm – 2:45pm

Graduate Student(s): Madison Griffin

Research Mentor(s): May Gao

*The following Theory Application Paper examined the unique cultural acquisition of Jeep by the Italian automotive giant Fabbrica Italiana Automobili Torino (FIAT) Chrysler Automobiles. The CELM cultural analysis model (Gao, 2013) was used to examine the culture, business environment, consumer lifestyle and mentality that allowed an “All-American” vehicle to find a new home in the Italian market. The use of the CELM model gives an in depth look at the culture of Italian business practices and what drives Italian consumers to participate in the market. The ultimate purpose of this research was to acquire the knowledge of successful tactics used by FIAT to merge an American brand into a European market. The information gained by this research is valuable in not only understanding the Italian market but how American products might become more easily accepted by Italian consumers. The adoption of the Jeep brand by FIAT worked only by finding ways to fit the new brand into the Italian culture, business environment, lifestyle, and mentality. The acceptance of Jeep into the FIAT famiglia can be an example to many American brands trying to tap into a culturally tight market.*

## **Foreign Languages**

### ***La situación de la Mujer en el Mundo Hispano***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Undergraduate Student(s): Monica Harris, Samantha Matthews, Jacob Boylan, Malachi Aldridge

Research Mentor(s): Robert Simon



Missing Abstract

## Geography and Anthropology

### ***A Synchronic Comparison of Linear Enamel Hypoplasia from Byzantine Crete***

Presentation - [Join now.](#)

3:15pm - 3:30pm

Undergraduate Student(s): Morgan Bendzinski

Research Mentor(s): Susan Kirkpatrick Smith

*Analyzing human dentition is useful in reconstructing past health patterns. Linear Enamel Hypoplasia (LEH) is a dental trait that tells biological anthropologists about patterns of stress in individuals. LEH are visible horizontal lines on teeth where the enamel stopped growing during a period of stress such as malnutrition or disease. Comparing frequencies of LEH between sites can demonstrate variation in stress episodes. In this study compared dentition from Chryssi to five other Cretan sites all which date to the Byzantine period (6-12th centuries AD). Chryssi had a significantly higher frequency of LEH than four out of the five sites it was compared to. This suggests that Chryssi experienced more or more severe stress episodes than most of the other Cretan populations during the same period. This is possibly due to the socioeconomic status of individuals, in addition to disease and malnutrition. Analyzing LEH tells us how much stress these individuals endured and in what form the stress occurred. Furthermore, it allows biological anthropologists to understand patterns of stress in individuals and whole populations during the Byzantine period.*

### ***Detecting Bacterial Species from Next Generation Sequencing Data Derived from Ancient Human Skeletal Samples***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Undergraduate Student(s): Ariel Owens

Graduate Student(s): Daisy McGrath

Research Mentor(s): Tsai-Tien Tseng

*This study aims to isolate and identify bacteria and single nucleotide polymorphisms (SNPs) found alongside Mycobacterium tuberculosis complex (MTCB) in silico. MTCB is a causative agent of tuberculosis (TB). Our secondary objective is to examine variations of TB, study its paleoepidemiology, and apply this information to present-day public health issues. This research utilized data from the Sequence Read Archive (SRA), number PRJNA422903. This dataset is comprised of DNA obtained from the remains of 28 individuals belonging to Neolithic-period populations. This DNA is being studied in silico through next generation sequencing (NGS), utilizing the following bioinformatics software tools with customized setting: Trim Galore! and Kraken2. We plan to implement a bioinformatics pipeline to pass further fastQ files through trimming with deprivation of the adapter*

*sequence, and Kraken2 will act as a filter allowing us to find unknown pieces of DNA sequences. Using NGS, we will be able to isolate and identify bacteria found alongside MTBC in silico to study the paleoepidemiology of TB prior to the usage of antibiotics. Due to advancements in technology, we will be able to identify more bacterial species and SNPs alongside MTBC than previous scholars in the field of paleoepidemiology. In conclusion, this approach broadens the potential scope of paleoepidemiology both to older, sub optimally preserved samples and to pathogens with difficult intrageneric taxonomy. These approaches could also be utilized in future disease diagnosis and control.*

### **Urban Food Policy, Planning, and Security: A Location Analysis and Potential Impacts of Creating Community Gardens in DeKalb County, GA**

Presentation - [Join now.](#)

2:15pm – 2:30pm

Undergraduate Student(s): Artis Trice

Research Mentor(s): Paul McDaniel

*As food insecurity grows in complexity, the methods used to combat it must also evolve. In the Atlanta metropolitan area, direct community engagement and partnerships have led to the creation of small community garden and urban agriculture operations on public lands. However, food insecurity continues to be a problem, particularly in low-income areas where resources are fewer, such as areas within DeKalb County, Georgia. This project seeks to understand ways in which integrating food policy and planning into existing green infrastructure can mitigate issues related to food insecurity in DeKalb County and considers the following questions: How can food policy and urban agriculture center the needs of diverse populations living in suburban areas in DeKalb County? How can local government and non-profits utilize existing resources to address food insecurity? How might location-allocation be used to identify sites best suited for urban agriculture and community gardens? The research occurs in two parts: literature content analysis of the environmental and social impacts that urban community gardens have on cities and metro areas, highlighting coordinated food policy and governance surrounding such gardens, and a GIS location analysis of the parks and greenspaces in DeKalb County to assess the potential for community gardens. GIS location analysis will yield the spaces most suited to support small-scale community agriculture projects*

## **International Conflict Management**

### **How to Support Students Who Parent Through Evidence-Based Practice/Research**

Presentation - [Join now.](#)

3:00pm – 3:15pm

Graduate Student(s): Karla Ramirez, Ann Chance, Nashay Lowe, Eliza Galvez, Julissa Tello

Research Mentor(s): Allison Garefino, Darlene Xiomara Rodriguez

*Does providing supports for students who are parents (student-parents) help them finish their degree in a shorter time frame, while improving their overall academic experience, helping them to overcome barriers that are not usually faced by traditional students? Student-parents have few supports from family. Most are parents before enrolling, more than half are first-generation college students, and almost one-third take 15 breaks from college. Almost 90% use public assistance, and the number and types of assistance increase upon enrollment. A study conducted at KSU in 2018, revealed 67% were married and 47% did not work, 33% worked part-time and 20% worked full-time. Many low-income parents may have some college but were unable to secure even a two-year degree. The Student-Parent Ambassador Program is a top-down/bottom-up approach impacting both ends of the community building pipeline. Consisting of a boot camp and support group, it provides evidence-based interventions tailored to student-parent's needs, connecting them with resources available at the university and successful student-parent ambassadors. The program utilizes a network of student-parent ambassadors collaborating with the Diversity Scholar, the WellStar Department of Social Work and Human Services Graduate Research Assistant and the Children & Family Programs to conduct a bootcamp orientation and subsequent drop-in activities. We collect demographic and other data of student-parents and conduct informal focus groups to ascertain student-parent needs. We expect to cultivate high-level student-parent champions who sustain the program by perpetuating systems of support and social capital. These champions will ultimately transform KSU into a family-friendly campus.*

## **Psychology**

### **College Students and Mental Health Services**

Presentation - [Join now.](#)

3:30pm – 3:45pm

Undergraduate Student(s): Naomi Katz

Research Mentor(s): Christopher T. Allen

*Mental health services (MHS) are a great resource provided by nearly all universities. College students' counseling use has been found to improve their mental health and academic performance in addition to student retention (LeViness et al., 2019). However, even with these known benefits, MHS remain a vastly underutilized resource at higher education institutions across the country (Center for Collegiate Mental Health, 2020). The current study surveyed 404 undergraduate students at Kennesaw State University and asked about their use of MHS, attitudes toward MHS, and perceived barriers to MHS use. Significant differences in use of MHS were found for class [ $F(4, 398) = 5.02, p = .001$ ] and major [ $F(3, 399) = 5.36, p = .001$ ]. Specifically, third-year students ( $M = .11, SD = .32$ ) and biology majors ( $M = .07, SD = .27$ ) were least likely to use MHS. There was a significant effect of sex for the following attitudes measures: psychological openness [ $t(402) = -5.73, p < .001$ ]; overall attitudes toward seeking mental health services [ $t(402) = -3.40, p = .001$ ]; and self-stigma [ $t(402) = 2.26, p = .024$ ]. There was also a main effect of race for self-stigma [ $F(4, 390) = 2.98, p = .019$ ] with Black students ( $M = 18.85, SD$*

= 5.79) reporting significantly higher scores than White students ( $M = 21.11$ ,  $SD = 6.53$ ). Past barriers were a significant predictor of MHS use [ $R^2 = .22$ ,  $F(16, 386) = 6.94$ ,  $p < .001$ ]. The most common barrier to seeking MHS in the past was not being sure if the problem was important/serious enough. The most common barrier to seeking MHS in the future was financial reasons. These results can be used to develop and implement pointed outreach and intervention initiatives to improve MHS use, and ultimately, student mental health.

### ***The Impact of Reinforcer Preference and Variation on Response Rates in Preschool-Aged Children***

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Jason M. Aldridge

Research Mentor(s): Allison Martin

*In the field of Applied Behavior Analysis, tangible items (i.e. toys) are often used to help learners meet goals in academic, social, and adaptive living skills. While use of high preference reinforcers has been linked to improved performance, repeated use of a single item can cause satiation and reduce effectiveness. Using a variety of reinforcers can allow therapists to minimize these satiation effects (Bowman et al., 1997; Koehler & Iwata, 2005; Keyl-Austin et al., 2012). In the current study, we used a paired-choice preference assessment to determine high, medium, and low-preference items for 6 children (aged 2 – 7) with developmental disabilities. We presented each child with multiple, concurrently available felt boards on which they were taught to place a token. Each board choice corresponded with access to a particular item. We systematically examined the child's response rates when their response resulted in access to either a single high-preferred stimulus or a variety of medium or low preferred stimuli, hypothesizing that a variety of reinforcers, of either medium or low preference, would produce higher response rates than a single, highly preferred stimulus. Data collected in this study showed variable response allocation based on the individual, with some consistently allocating more responses to the high-preference response option and others allocating more to the variable response option as sessions were run. The results of this study will allow clinical practitioners to make informed choices about the use of reinforcers to better motivate learners to continue progressing towards treatment goals.*

### ***Investigating the Effects of Wording on Perceptions of Online Dog Adoption Advertisements***

Presentation - [Join now.](#)

2:15pm – 2:30pm

Undergraduate Student(s): Sarah Barker

Research Mentor(s): Allison Martin, Suma Mallavarapu, Angela Kelling, Megan Wilson

*Dog adoption advertisements provide important behavioral and physical information about each dog to potential adopters. As potential adopters increasingly use the internet to find their next pet (Workman & Hoffman, 2015), online adoption advertisements have become an important part of the pet adoption*

process. Online adoption advertisements vary considerably on dimensions such as length, content, tone, and formatting. Previous research has found that the wording of advertisements can impact adoption rates, with more analytic advertisements (those containing fewer social or storytelling words) raising the probability of a pet being adopted (Markowitz, 2020). To assess attitudes toward adoption advertisements, we surveyed 562 college students from three universities (Kennesaw State University, Georgia State University, and University of Houston-Clear Lake) regarding their opinions of fictitious adoptions advertisements. Each participant saw a basic advertisement and either advertisements with straightforward (to the point with few storytelling words) or cute (more descriptive with more storytelling words) wording. Students indicated what they liked and disliked, what stood out to them, and what challenges about each dog they gathered from the advertisements in a free-response format. We will perform a qualitative, thematic analysis of participant responses, analyzing the data to help to identify which aspects of the advertisements were most informative and likeable to the reader. Ideally this research can inform shelters of the best ways to write adoption advertisements to be more explanatory and appealing to potential adopters.

### ***A Comparative Study of Indian Americans' and Indian Immigrants' Perspectives on Colorism on the Basis of Beauty and Attraction***

Presentation - [Join now.](#)

4:00pm – 4:15pm

Undergraduate Student(s): Mary Thomas

Research Mentor(s): Ginny Zhan

*The current research studied cultural influences on colorism among three groups: American-born Indians, Indian immigrants, and recent Indian students/workers. A total of 36 male and female participants participated in the study. Their ages range from 18 to 82 with the most ages ranging from 31-43. The participants filled out an online questionnaire that asked them a number of questions on their opinions, perspectives, and attitudes towards skin tone and its role in perception of beauty and mate selection. Open-ended questions were also included to allow the subjects to express their own thoughts and ideas regarding the topic. The participants' demographics, such as, gender, age, education level, socioeconomic status, religious affiliation, the number of years they have lived in the United States, marital status, social group, and occupation were also collected. The data from the study were analyzed to compare findings among the three groups. The results suggest that culture may play a part in one's understanding of colorism, as well as their personal preferences and personal experiences regarding skin tone. The cultural influences on the priority level of skin tone for American-born Indians, Indian immigrants, and recent Indian students/workers is evident.*

**College of Science and Mathematics**

**Chemistry and Biochemistry**



### ***Model Calculations of H/D Isotope Substitution in Hydrogen Oxalate Anion Using the Normal Mode Analysis***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Undergraduate Student(s): Dominick Pierre-Jacques, Olivia Cochran, Dayana Salazar,  
Research Mentor(s): Martina Kaledin

*In this computational chemistry work, we describe ab initio calculations and assignment of infrared (IR) spectra of an intramolecular H-bonding system hydrogen oxalate,  $\text{C}_2\text{O}_4\text{H}^-$ . The study of H/D isotope effects can provide useful information on a proton's location inside a non-linear pathway. In  $\text{C}_2\text{O}_4\text{H}^-$ , a normal mode analysis was performed at the MP2/aug-cc-pVDZ and B3LYP/aug-cc-pVDZ levels of theory. Previous experimental studies suggest a frequency shift  $\sim 1000\text{ cm}^{-1}$  for the OH stretch mode upon the H/D isotopic substitution. Isotope calculations resulted in a shift of  $842\text{ cm}^{-1}$  at the B3LYP/aug-cc-pVDZ level of theory. The O-H stretch and bending modes are expected to undergo an anharmonic shift. As a result, the proton transfer absorption bands broadened over  $2800 - 3200\text{ cm}^{-1}$  range. The harmonic frequency of the OH in-plane bending mode in the hydrogen oxalate is  $1441\text{ cm}^{-1}$  at the MP2/aug-cc-pVDZ level of theory. We have located the transition state for the proton transfer between two oxygens in the hydrogen oxalate. The imaginary frequency for this vibration is  $1055i\text{ cm}^{-1}$  at the B3LYP/aug-cc-pVDZ level of theory. While the in-plane bending mode and O-H stretching mode are reported to dominate the proton transfer, our calculations indicate that the proton transfer can easily occur due to mode coupling.*

### ***Elucidation of the Combination Bands and Anharmonic Features in the Vibrational Spectra of $\text{C}_2\text{O}_4\text{H}^-$ and $\text{C}_2\text{O}_4\text{D}^-$ with Driven Classical Trajectories***

Presentation - [Join now.](#)

3:45pm – 4:00pm

Graduate Student(s): Dalton Boutwell  
Research Mentor(s): Martina Kaledin

*Hydrogen bonds are strong electrostatic interactions characterized by the anharmonic shift of vibrational modes of atoms involved with this intramolecular force. The low energy barrier of the H<sup>+</sup> transfer in hydrogen oxalate ( $\text{C}_2\text{O}_4\text{H}^-$ ), predicted to be  $\sim 2.98\text{ kcal/mol}$  at the MP2/aVDZ level of theory, allows for rapid proton exchange in the system and confounds the experimental vibrational spectrum of the molecule with broad spectral features in the O-H stretching region. The molecule is planar and exhibits several torsional motions among some of its lower frequency fundamental vibrational transitions. Because H-bonding and torsional motions often complicate the IR spectrum of a given system, there is a clear and present challenge to characterizing  $\text{C}_2\text{O}_4\text{H}^-$  with vibrational spectroscopy. In this study,  $\text{C}_2\text{O}_4\text{H}^-$  is simulated in a strong electric field, and classical trajectories are calculated using the Newtonian Equations of Motion to derive an accurate vibrational spectrum. At the MP2/aug-cc-pVDZ level of theory, we calculate the O-H stretch to be at  $\sim 3000\text{ cm}^{-1}$ , in reasonably good*

agreement with experimental results. The H in/out of plane bending modes are calculated to be 1390  $\text{cm}^{-1}$  and 950  $\text{cm}^{-1}$ , respectively, undergoing small anharmonic shifts as shown in the experiment. Although the experimental study did not detect lower frequency modes, the torsional modes are predicted to couple below the range that the experiment covered. Quartic Forcefield (QFF) based Vibrational 2nd Order Perturbation Theory (VPT2) calculations seem to agree with preliminary DMD calculations, predicting overtones at  $\sim 580 \text{ cm}^{-1}$  ( $2\nu_{14}$ ),  $\sim 830 \text{ cm}^{-1}$  ( $2\nu_{13}$ ), and a combination band at  $\sim 1703 \text{ cm}^{-1}$  ( $\nu_7 + \nu_9$ ).

### ***Phosphites as a Source of Organophosphates on Prebiotic Earth***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Undergraduate Student(s): Fatma Aldihri, Sarah Khweis, Ta'Nyia Heard

Research Mentor(s): Heather Abbott-Lyon

*Phosphorus is an essential element for life and is present predominantly as phosphate in biological molecules such as phospholipids and nucleic acids. Phosphate minerals, such as hydroxyapatite, are the most abundant phosphorus-bearing rocks in the geological record from the early Earth. However, phosphates require large amounts of energy to react in water and are highly insoluble. The mechanism of phosphate incorporation into life on the early Earth is an active area of research and is commonly referred to as “the phosphate problem”. In contrast, phosphites have phosphorus in a lower oxidation state, are more reactive, and are more soluble in water than phosphates. Our hypothesis is that metal phosphites may have been the source of organophosphates (i.e., organic molecules that contain a phosphate group) on the early Earth. If our hypothesis is true, metal phosphites must then be able to phosphorylate organic molecules under prebiotically plausible conditions. In order to test our hypothesis, we reacted metal phosphites with glycerol in slightly acidic, aqueous conditions while heating at 60–75°C to mimic the prebiotic Earth. Resulting products have been identified through phosphorous, carbon, and hydrogen nuclear magnetic resonance (NMR) spectroscopy. After confirming successful phosphorylation, the resulting organophosphites were oxidized to organophosphates via Fenton chemistry and ultraviolet (UV) radiation in the presence of  $\text{Fe}^{2+}$ . Preliminary results have shown that organophosphates do form in this two-step process and suggest that the cation paired with each phosphite influences the product yields. Currently, our experimental conditions are being optimized and experiments to determine quantitative product yields are being performed.*

### ***Method Development of Standard Dilution Analysis***

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Ethan Wagner

Graduate Student(s): Scott Richardson

Research Mentor(s): Marina Koether



*Standard dilution analysis is a novel analytic measurement method employing a combination of internal standard method and standard addition method. Standard dilution analysis has been successfully employed to determine heavy metal concentrations in consumer goods, as well as ethanol concentration in gasoline. This begs the question; can standard dilution analysis provide calibration curves with more precise figures of merit than the external calibration method for molecular targets? Ibuprofen standards and benzoic acid internal standards were prepared, as well as an “unknown” of ibuprofen at a known concentration to test for accuracy of the measurement. Ultra-high-performance liquid chromatography was employed to separate the internal standard benzoic acid from the ibuprofen due to the closeness of the lambda max for the two compounds. The mathematics behind the method and preliminary results will be described including struggles with pipet and volumetric flask precision and accuracy issues.*

## **Physics**

### ***Solid State Synthesis of Chiral Magnetic Alloys***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Undergraduate Student(s): Connor Quick

Research Mentor(s): Chetan Dhital

*The cubic magnetic alloys such as MnSi, FeGe, and MnSi crystallize in non-centrosymmetric chiral crystal structure. Due to the combination of non-centrosymmetric structure and the magnetism, these magnetic alloys lead to the discovery of new type of magnetic configurations called magnetic skyrmion in certain temperature and field ranges. Such magnetic skyrmions are considered to provide energy efficient and high storage capacity alternatives to currently used domain wall based random access memory. There are two major problems in this field of research: (a) availability of limited number of materials (b) working temperature below the room temperature. Therefore, we want to extend our investigation by making new materials that have the right crystal structure required for the formation of magnetic skyrmion lattice. For such, we have picked up 3 materials Mn<sub>3</sub>IrGe, CrGe and NdIrSi for investigation for the possibility of magnetic skyrmion. I will discuss about our ongoing effort to make phase pure materials using different solid-state synthesis method. The synthesis and investigations of such materials can lead to desirable properties and possible utilization of magnetic skyrmion lattice structures in real world technology.*

### ***Comparison of Microplastic Extraction Methodologies for Drinking Water Sludge***

Presentation - [Join now.](#)

1:00pm – 1:15pm

Undergraduate Student(s): Krystl Wood

Research Mentor(s): Marina Koether, Amy Gruss

*Microplastics have been found everywhere on earth including the Arctic Circle and pristine lakes but methods of analyses have not been uniform. In this study, the National Oceanic and Atmospheric Administration (NOAA) microplastic laboratory method for quantifying microplastics specifically designed for marine environments has been applied to drinking water and drinking water sludge samples. Alternatives for difficult or expensive steps were examined. For many of the experiments, the NOAA method was followed. However, for drinking water samples, density separation by NaCl versus ZnCl<sub>2</sub> was compared. For sludge sediment samples, the density separation which uses lithium metatungstate was compared between a short duration of 30 minutes to an hour, and a long duration of 1 to 2 days. Additionally, graduated cylinders were used instead of the density separator funnel, which was prone to clogging. The additional step of vacuum filtration was added before the microscopic examination. Based on preliminary visual inspection, a longer settling time for density separation with lithium metatungstate achieves better separation. Comparisons between outflow water samples separated with NaCl versus ZnCl<sub>2</sub> are currently being performed. Filtered samples will be analyzed under a stereo microscope by visual inspection or with an FTIR microscope for polymer identification.*

## **Molecular and Cellular Biology**

### ***Role of Ce EFN-4 in gustatory sensory ASE neuron***

Presentation - [Join now.](#)

2:15pm – 2:30pm

Undergraduate Student(s): Barrett Upton

Research Mentor(s): Martin Hudson

*During nervous system development, axons rely on guidance when growing. The molecules that help them grow are called guidance molecules and there is a specific family of them called ephrins. These membrane-associated ephrins work together with the cognate Eph receptors to help guide the axon development. Here, we are interested in studying the role of C. elegans efn-4 in axon guidance and the development of gustatory sensory neurons ASE. We crossed the transgenes of otIs3(gcy-7::GFP) and ntIs1(gcy-5p::GFP) into an efn-4 deficient mutant by following conventional breeding methods and imaging. Currently, Hudson and co-workers are investigating the pivotal role of the Eph receptors and ephrin ligands in gustatory neurons and chemotaxis.*

### ***Community Level Physiological Profiling of the Longleaf Pine Savannah Microbiome***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Undergraduate Student(s): Gavin Treadaway

Research Mentor(s): Ramya Rajagopalan

*Soil microorganisms secrete chemicals into their surroundings, which the root system will uptake and in return release root exudates, which usually consist of low-molecular-weight organic compounds. These*

*root exudates behave as signaling molecules and substrates for microorganisms to recruit beneficial soil bacteria to the plant root system, which will provide the plants with immunity to foliar diseases and pathogen infection. Studies have shown that bacteria on the root surface can protect aerial sections of the plant by promoting induced systemic resistance, a mechanism of increasing physical or chemical barriers of the plant. The longleaf pine is an endangered species of tree that once covered ~90 million acres of land that is now estimated to only cover 3% of that. Longleaf pines are slow growing but offer better resilience to climate change driven disasters like wildfires or droughts than the faster growing pine trees. My research involved characterizing the carbon-utilization profiles of soil microbiomes from fifteen soil samples collected from a long leaf pine forest region using BIOLOG™ EcoPlates with subsequent data analysis performed in R. Our data indicates that there are significant variations in terms of microbial activity between the soil samples. By analyzing phenotypic data about compounds utilized by the microbiome we can better understand the intricate relationship between the microbiome and the above-ground plant community as well as understand the optimum growing conditions for the trees for a better chance of establishing a thriving ecosystem.*

### ***Glide Another Day: Characterization of Wild Isolates of Predatory Myxobacteria***

Presentation - [Join now.](#)

3:15pm – 3:30pm

Undergraduate Student(s): Daniella Krakue, Juan Vasquez, Simone Dakare

Research Mentor(s): Ramya Rajagopalan

*Myxobacteria belongs to a group of predatory bacteria that are found in various soil environments. They are exceptionally unique microbes who use their gliding motility to move towards prey microbes and consume them. They also have the remarkable ability to produce secondary metabolites that have antibacterial, antifungal, antiviral, and antitumor properties. For this reason, they are of interest to us so that we can understand their abilities and apply them to discover their potential as a source of novel metabolites with potential therapeutic applications. Our methodology began by collecting soil samples from various sites around the country. We then standardized a multistep myxobacterial soil isolation procedure. In order to lure the myxobacteria from the soil, we conducted a V-Streak predation using E.coli as bait. Through this process, we were able to successfully isolate over 20 different strains of wild myxobacteria. In order to understand potential beneficial aspects of these strains, we sought to characterize them phenotypically and genotypically. The myxobacteria were analyzed phenotypically by performing gram staining, colony morphology analysis, metabolic profiling, and conducting crude predation assays against a varied selection of bacteria including: P. aeruginosa, S. aureus, E. coli, and B. subtilis. The myxobacteria were analyzed genotypically by conducting multiple PCRs with myxobacteria-specific primers. By characterizing our wild isolate strains, we can begin to understand what kind of bioactive compounds they are producing and then understand what bacteria would be most susceptible to the metabolites produced.*

### ***Effects of Neem Oil on Growth and Development of Aspergillus flavus in peanuts***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Undergraduate Student(s): Onachukwu Nwolisa

Research Mentor(s): Premila Achar

*Aspergillus flavus* is known to contaminate peanuts and produce aflatoxin which are carcinogenic metabolites. According to the USDA, more than \$1 billion is spent on infection and prevention. Currently there is no single method known to eradicate *Aspergillus* spp. in peanuts and the industry continue to face the aflatoxin problem. There has been an increased interest in use of plant based antifungal products which are environmentally friendly and do not pose the health risks. In our previous studies, essential oil (EO)s such as cinnamon, clove and thyme have been shown to display antifungal properties against *A. flavus*. This study evaluates the antifungal effect of Neem oil against *A. flavus* in peanuts. The Minimum Inhibitory Concentration (MIC) and Minimal Fungicidal Concentration (MFC) were determined by the plate diffusion procedure (Hadacek & Greger, 2000) by exposing *A. flavus* to neem oil at different concentrations. Filter paper disc impregnated with 500ppm, 1000ppm, 1500ppm, 2000ppm, and 2500ppm of neem EO were placed on 7 days old cultures on PDA and incubated at  $28\pm 2^{\circ}\text{C}$ . Experiments were repeated thrice, and untreated samples served as control. After incubation, the zone of inhibition (mm) was measured using calipers (Lopez et al., 2000). Increase in oil concentration increases zone of inhibitions and morphological changes in somatic structures. Mycelial growth is also expected to decrease and will be measured by weighing treated and untreated PDA plates. At the end of this study, we may conclude that Neem oil may offer potential as a biological control agent against *A. flavus* in peanuts.

### ***Does NeuroD Influence Formation of a Neurodevelopmental Circuit?***

Presentation - [Join now.](#)

3:00pm – 3:15pm

Undergraduate Student(s): Ellie Dobson, Julia Aguirre

Research Mentor(s): Martin Hudson

*NeuroD*, a basic-helix-loop-helix transcription factor found in humans, regulates neuronal differentiation and survival. Mutations in this gene have been implicated in multiple neurological disorders, creating an imperative for further study. *NeuroD* is deeply conserved across phyla. This allows one to investigate *NeuroD* function in simple organisms such as the nematode *Caenorhabditis elegans*, which has a *NeuroD* homolog known as *cnd-1*. Previous work in the Hudson lab revealed that *cnd-1* controls expression of another transcription factor gene, *ceh-5*, which is the *C. elegans* ortholog of human *Vax2*. *ceh-5* is expressed in the RME neurons and head muscles. In our study, we observed that *cnd-1* mutants have missing head motor neurons, as well as a limited range of head movement. This data was collected through observation of head neurons using the RME-specific fluorescent marker *unc-25p::GFP* in parallel with the pan-neuronal nuclear marker *prom-1::his-24::dsRED*. This suggests that

*cnd-1* may control a neurodevelopmental circuit required for normal neuromuscular synaptogenesis and head movement.

### **Efficacy of Volatile Organic Compounds as Treatment for Bats Affected with White-Nose Syndrome**

Presentation - [Join now.](#)

2:45pm – 3:00pm

Undergraduate Student(s): Whitney Jones

Research Mentor(s): Christopher Cornelison

*Pseudogymnoascus destructans*, the causative agent of white-nose syndrome (WNS), is a fungal pathogen implicated in the widespread mortality of hibernating bats across North America. Since its arrival to the United States in 2006, the pathogen has spread rapidly to 34 US states and 7 Canadian provinces. Researchers have been searching for disease management strategies to minimize the spread and severity of this fungal pathogen, as bats are an important aspect of a healthy regional and global ecosystem as insect predators and pollinators. Volatile organic compounds (VOCs), produced by a variety of microorganisms, have been found to exhibit antimicrobial properties against fungal pathogens such as *Ophidiomyces ophiodiicola*, the causative agent of snake fungal disease. Due to this observed antifungal activity, an *in vitro* experiment was conducted to explore the potential antifungal activity of VOCs against *P. destructans* mycelial growth. The experiment involved exposing mycelial plugs of *P. destructans* to various concentrations of VOCs and measuring the radial mycelial growth. One VOC, an azole compound, exhibited >50% inhibition of *P. destructans* mycelial growth when compared to the control.

### **Bioinformatics of *ngn-1* Transcription Factors**

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Claire Simms, John Marangakis

Research Mentor(s): Martin Hudson

The transcription factor neurogenin is required for multiple neurodevelopmental processes during vertebrate embryonic development and mutations in this gene are implicated in a variety of human neurological disorders. Despite this, little is known about how this gene controls nervous system development and function. Neurogenin is deeply conserved across phyla. As such, we can investigate neurogenin function in simple organisms such as the nematode *Caenorhabditis elegans*, which has a close ortholog of neurogenin, *ngn-1*. Previous work in the Hudson lab revealed that *ngn-1* mutants have striking axon guidance defects and high levels of embryonic lethality, suggesting that *ngn-1* is required for multiple developmental processes in *C. elegans*. Using the RNAseq dataset published by Packer et al. (Science, 2019), we are trying to determine what genes are required to activate *ngn-1* expression, and how that affects nervous system development and function. Using bioinformatic approaches involving



*Microsoft Excel, R, and SAS programming, we aim to narrow down which transcription factor genes are expressed in cells immediately before the onset of ngn-1 gene expression. These genes may have a role in controlling ngn-1 function, and ultimately may be candidate genes involved in nervous system disorders in humans.*

***Molecular Detection of Aspergillus flavus in Georgia peanut, variety Tifguard.***

Presentation - [Join now.](#)

1:00pm – 1:15pm

Undergraduate Student(s): Carolle Zolome

Research Mentor(s): Premila Achar

*Peanuts provide a good source of protein, minerals, and vitamins to consumers. The US peanut industry suffers great losses of nearly \$26 million annually due to contamination by Aspergillus species. In spite of strict control measures against Aspergillus species, the industry is still facing economic loss due to contamination by this mold. Poor storage of peanuts in commercial outlets can lead to infection by the mold, releasing aflatoxin which is carcinogenic. A number of DNA based techniques are currently available for identification of the fungal population. This research aims at identifying if peanut, the variety Tifguard which is highly recommended for use by peanut farmers by the United States Department of Agriculture (2008) and the first peanut variety known to be resistant to two difficult pathogens, the peanut root-knot nematodes, is also contaminated by A. flavus. Peanuts were incubated in petri plates with moist filter paper for seven days. Subsequently, the peanuts with unknown fungi were discarded and A.flavus were isolated and subculture on a Potato Dextrose agar. After incubation, DNAs was isolated using the DNeasy UltraClean Microbial Kit. Ribosomal DNA was amplified using PCR with universal primers, internal transcribed spacer (ITS)1 and (ITS) 4. Healthy peanuts served as control. Our expected results, using gel electrophoresis for ITS region of A. flavus, is 550-600 bp compared to the control. With completed data, we may be able to conclude if Tifguard variety, a commercial peanut used by farmers is not contaminated by A. flavus, a carcinogenic pathogen.*

***Exploring the Microbiome of Korean Industrial Kimchi Fermentation Products***

Presentation - [Join now.](#)

3:45pm – 4:00pm

Undergraduate Student(s): Cynney Walters

Graduate Student(s): Daisy McGrath

Research Mentor(s): Tsai-Tien Tseng

*Despite existing over millenniums, Kimchi, a historic side dish of Korean culture, has a cultivation process that remains poorly defined and difficult to control along industrial production lines. Traditionally, Kimchi is made through the process of fermentation, a chemical mechanism in which microorganisms convert sugars to alcohol or an acid. The variation in taste existing across different*

batches of identically prepared kimchi products supports the idea that the constituents of the kimchi microbiome are generally unknown. The primary objective of this research study is to identify novel phages from fermented microbiomes, specifically within the kimchi microbiome. Furthermore, novel phages could have the capacity to serve as biocontrol agents. The secondary objective of this research study is to identify all microorganisms on a species level to allow the public to fully appreciate the diversity of the kimchi microbiome. Next-generation sequencing (NGS), a tool used to sequence the genetic material of organisms, will be used to identify the kimchi microbiome and continue downstream bioinformatics. Our preliminary analysis on an NGS data set from Korean industrial kimchi products with NCBI accession number of SRX2725663 will be used extensively throughout our research. We utilized six software packages with customized settings in order to analyze the datasets: Kraken2, Trimmomatic, Velvet, Edena, BLAST, and Seaview. Kraken2 was used to distinguish novel sequences from previously characterized phages and bacterial hosts. After the identification of potential uncharacterized phages, researchers on the project may seek to develop the complete genomes of such phages. Additionally, researchers could use the generated databases from their bioinformatics pipeline to serve as a universally adopted protocol in the detection of novel phages. The utilization of this detection apparatus could reduce the pathogenic bacteria in food microbiomes.

### **Conserved Regions Mediate Interactions between Canonical NOX Domains**

Presentation - [Join now.](#)

1:15pm – 1:30pm

Graduate Student(s): Akua Acheampong

Research Mentor(s): Susan M.E. Smith

NAPDH oxidase (NOXes) are membrane-bound enzymes that generate reactive oxygen species (ROS) that play a role in immune response and signaling. Misregulation of NOXes is implicated in various human pathologies. NOXes contain a catalytic core comprised of a heme-containing transmembrane (TM) domain and a cytoplasmic dehydrogenase (DH) domain that binds FAD and NADPH. Several conserved regions at the interface of the TM and DH domains in eukaryotic NOXes have been suggested to mediate enzyme function and activity. In 2017, researchers successfully purified SpNox, a bona fide NOX homolog from *Streptococcus pneumoniae* and verified its NOX properties. SpNox's robust activity in detergent makes it an excellent model system for studying NOXes. Using the SpNox model system, we investigate the role of the conserved, putative interacting regions at the TM:DH interface on enzyme activity. To probe the TM:DH interface, we purify and verify activity of the separate domains; create mutations in the conserved regions at the TM:DH interface; design peptides based on the putative interacting regions to inhibit TM:DH interactions. We conduct mixing experiments involving one wild-type domain and one mutant domain, in which we monitor heme reduction via an absorbance spectrum (350nm-700nm). Using peptides based on the conserved regions, we perform mixing experiments in which we mix the peptides with separate, wild-type TM and DH domains and assess its effects on TM:DH interactions. Understanding interdomain interactions using SpNOX may reveal potential druggable sites in the human NOXes and contribute to drug discovery.



### ***Addition of Avian and Equine Tests Used for Microbial Source Tracking at KSU***

Presentation - [Join now.](#)

3:30pm – 3:45pm

Undergraduate Student(s): Mara Long

Research Mentor(s): Mike Beach

*Microbial source tracking (MST) attempts to identify specific animal sources of fecal contamination in the environment. While traditional fecal coliform enumeration can give a general measure of contamination, the specificity imparted by modern MST provides a more informative assessment of contaminants and their likelihood to affect human health outcomes. We have been developing a MST system that detects DNA biomarkers from the gram negative bacterial genus Bacteroides and the family Lachnospiraceae. They are strict anaerobes found in large quantities in the intestines of animals. Both bacterial groups cannot survive long periods outside of their hosts and are considered a good indicator of recent fecal contamination in environmental waters. Unlike E. coli or Enterococci, host-specific strains of Bacteroides and Lachnospiraceae exist. This can be attributed to their inability to proliferate outside of their hosts, resulting in a close relationship by which they evolve into species-specific strains. To this end, we have been developing Bacteroides- and Lachnospiraceae-based species-specific assays that identify the presence of gene sequences uniquely found in these bacteria that are associated with their corresponding host species. We have previously implemented three MST tests: human-specific, dog-specific, and total animal. Here, we attempted to add bird-specific and horse-specific tests to our collection. Our experiments confirmed the ability of each new test to detect their target genes, and at a level of detection and quantification similar to that of previously published results. We now have the ability to quantitatively assess the level of species-specific contamination in the environment using five MST tests: human, dog, bird, horse, and total animal. We hope to continue to add new species tests to our MST toolbox in the future.*

### **Ecology, Evolution, and Organismal Biology**

#### ***Anthropogenic Effects on European Starling Nestlings Growth and Cholesterol***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Graduate Student(s): Courtney Linkous

Research Mentor(s): Sarah Guindre-Parker

*Urbanization is a leading threat to wildlife, and anthropogenic habitat modifications may alter the resources that wildlife have access to. For example, urban centers may provide animals with abundant anthropogenic food sources, though these foods may be lower in quality than natural food sources. The*

*impact of living in urban centers on the growth, physiology and behavior of birds remains equivocal and can vary across species. We studied two free-living populations of European Starlings (Sturnus vulgaris); one at an urban farm (high human density) and one at a rural farm (low human density) in Kennesaw, GA. We monitored 100 nestlings across both sites and collected weight measurements to generate growth curves and collected blood samples to measure nestling cholesterol (index of dietary fats) and triglycerides (index of fattening rate). We hypothesized that urban nestlings will have slower growth rates, lower triglycerides, and higher cholesterol than rural nestlings. We also hypothesized that chick growth rates will be correlated to their behavioral coping style, where slower growing nestlings will have slower breathing rates and reduced struggling rates when handled. Future research will increase sampling at additional sites along an urban to rural gradient, examine parental behavior in selecting food sources for their nestlings, and assess additional indices of health and fitness.*

### ***The Relationship between Climate and Nesting Patterns in Two-Lined Salamanders Spanning the Northeast to Southeast United States***

Presentation - [Join now.](#)

3:00 pm – 3:15pm

Undergraduate Student(s): Jasmyne Blake-Sinclair

Research Mentor(s): Todd Pierson

*Two-lined salamanders (Eurycea bislineata species complex) are among the most ubiquitous amphibians in the Eastern United States. Because this group is geographically widespread and shows notable life history variation, it provides an opportunity to study the role of phylogeny and environment in shaping these differences. However, records of some important life history traits — such as clutch size and the date of oviposition — are scarce in the scientific literature. In this study, we gathered observations from published research, field notes, and citizen science databases like iNaturalist — a site where anyone can share natural history photographs and pinned geographical locations for other users to see. With the combined efforts of citizen scientists, we compiled >200 records of two-lined salamander nests and recorded data such as date, location, species, and developmental stage. We categorized development into three stages: 1) no visible embryonic differentiation; 2) some visible differentiation; and 3) late developmental stages (e.g., presence of dark pigment and eyes prominent), and we approximated a date of oviposition based off of published estimates of embryonic developmental time. We then fit a series of linear models to evaluate the relative importance of climate and phylogeny in predicting date of oviposition and clutch size. Among other trends, we found a strong negative relationship between mean annual temperature and date of oviposition, with records from the Northeast occurring much later than those from the Southeast.*

### ***Laryngeal Vocals in Old World Locals: Air Sacs Usage in Bonobos***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Graduate Student(s): Chelsea Trenbeath

Research Mentor(s): Jared Taglialatela, Anton Bryantsev, Lisa Ganser

*Except for humans, extant great apes have evolutionarily conserved lateral ventricular air sacs extending from laryngeal sacculles. Humans are the only species of Hominidae that lack this anatomical feature attached to the primary vocal apparatus. As we are the only species that produces spoken language, this association has led to hypothesis that the loss of lateral ventricular air sacs was necessary for the evolution of spoken language. However, why these sacs are conserved in all other hominids remains unclear. Computer modeling has indicated that air sacs may increase resonance properties, but there are no data from great apes indicating which vocalizations include the use of air sacs during their production. Previous studies are of radiological imaging, not apes actively vocalizing. In this project, we are gathering data on when great apes inflate laryngeal air sacs through noninvasive imaging during vocal production in bonobos (*Pan paniscus*). We are using high-speed digital audio/video recordings, frame-by-frame image analysis of the region of interest, and the difference in area between resting and vocalizations. We will then quantify and temporally correlated the inflation of laryngeal air sacs for multiple call types. These methods should be reproducible in a variety of settings, enabling data collection to test hypotheses regarding the putative function of laryngeal air sacs in extant great apes. Augmenting our understanding of the conservation of laryngeal air sacs in non-human great apes will strengthen hypotheses related to the loss of these sacs in humans and its relevance for the evolutionary origin of language.*

### ***The Evolutionary Origins of Autism Associated Genes and Their Role in Great Ape Socio-Communication***

Presentation - [Join now.](#)

1:30pm – 1:45pm

Graduate Student(s): Azeeza Abdulrauf

Research Mentor(s): Jared P. Taglialatela, Martin Hudson, Susan M.E. Smith

*Single nucleotide polymorphisms (SNPs) play a major role in socio-communicative behavior. For this study, the focus is on autism associated OXTR, AVPR1A, and FOXP2 SNPs, and the role they play in great apes. Prior research on the OXTR, AVPR1A, and FOXP2 SNPs show that they affect behavior skills such as understanding and controlling emotion, understanding the emotions of others, and communications skills. Great apes, such as bonobos, chimpanzees, and gorillas are the model, since they are our closest relatives in the animal kingdom capable of understanding complex communication. Each gene has at least two SNPs that are investigated in the three species. One of the aims for this study is to locate and align these SNPs between the three great apes and humans. The purpose of this aim was to assess what the reference and alternate alleles are for humans and see if the reference allele is shared amongst all four species. The aim was conducted using the UCSC browser. Each SNP was found in the alignment by using their rs numbers, and the reference and alternate alleles were documented. Initial results have revealed that humans can share the same reference allele as bonobos, chimpanzees, and gorillas; however, there are locations where humans differ from the great apes. More specifically, the*

human alternate allele is the reference allele for great apes. Research on how these genes affect the great apes would provide insight on how the SNPs affect socio-communicative behavior and genetic factors that influence great ape species differences.

### ***A Reevaluation of the Phylogeography of the Chattahoochee Slimy Salamander (Plethodon chattahoochee) Using Next-Generation Genomic Data***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Undergraduate Student(s): Jadin Cross

Research Mentor(s): Todd Pierson

*The Plethodon glutinosus species complex is a group of large-bodied, lungless salamanders that are widespread across the eastern United States. Species in this group are morphologically cryptic and were originally delimited using allozyme data, but in most cases, the extent of contemporary gene flow between named taxa has not been rigorously evaluated. The Appalachian Mountains of northern Georgia are home to several members of this group—including P. glutinosus, P. teyahalee, P. chlorobryonis, and P. chattahoochee. P. chattahoochee has been found to be especially cryptic both morphologically and genetically as both intraspecific genetic variation and species boundaries within the P. glutinosus complex have been poorly defined in the past. Previous mitochondrial (mtDNA) data have suggested: 1) the potential paraphyly of P. chattahoochee with respect to P. teyahalee; 2) notable geographic variation within P. chattahoochee (informally described as Northern, Southern, and Western clades). In order to further define genetic diversity and evaluate species boundaries in P. chattahoochee, we collected and assembled next-generation sequencing (3RAD) data from >40 individuals of this species—spanning its entire geographic distribution, all mtDNA clades, and a hybrid zone with the more distantly related P. shermani—and representatives of four other species in the P. glutinosus species complex. We then conducted a variety of phylogenomic and population genomic analyses using the ipyrad genomic analysis toolkit on a high-performance computing cluster. Our results demonstrate the importance of multilocus genomic datasets for identifying gene flow among cryptic species, and we discuss their broader taxonomic implications within the P. glutinosus complex.*

### ***Soil Bacteria: Metabolic Diversity in a Wildlife Management Area***

Presentation - [Join now.](#)

3:30pm – 3:45pm

Undergraduate Student(s): Daniella Krakue

Graduate Student(s): Eric Duncan

Research Mentor(s): Paula Jackson, Nicholas Green, Ramya Rajagopalan

*This research is part of a larger study linking the soil microbiome and processes to the aboveground plant community. Soil samples were collected from six plots under closed canopy in the Sheffield Wildlife management area in the Piedmont ecoregion of Georgia in Paulding County. Two of the plots*

were located in the longleaf pine savanna where restoration of longleaf pine has been in place since 2010. Samples were collected in sterile plastic tubes at the center of each plot and 10 meters above and below the center. For each sample, soil pH and the concentration of nitrogen (N), phosphorus (P), and potassium (K), were determined. We found that overall soils were slightly to moderately acidic and NPK content was low to moderate. To establish the community level physiological profile of soil samples we used BIOLOG EcoPlates™ whereby soil samples were incubated in triplicate in plates containing 31 different carbon sources. Active metabolism was established spectroscopically by the development of a purple coloration and the data analyzed using statistical methods in order to generate a preliminary “metabolic fingerprint” of soil communities. Our results from metabolic profiles suggest that sites may host a diverse soil population or that the microbiota may use a wide variety of carbon sources. Combined with additional information on the taxonomic diversity of the soil microbiome and changes in the above ground community of plants, this research will broaden understanding of ecological processes and help inform management practices for the restoration of the endangered longleaf pine community.

### ***Quantification of Organic Matter Retention and Transport in Streams***

Presentation - [Join now.](#)

2:15pm – 2:30pm

Undergraduate Student(s): Maitri Patel, Adelaide Obo, Natahlia Robinson

Research Mentor(s): Troy Mutchler

Urbanization and land use changes affect the physical, hydrological, and biological characteristics of freshwater streams. Loss of riparian vegetation and increased impervious surface area can cause reductions in the quantity of leaf litter inputs from the watershed and more rapid transport downstream. As a result, urbanization and land-use changes may impact the availability of carbon for aquatic food webs. This study compared the quantity and retention of coarse particulate organic matter (CPOM; particles >1mm in size) in more urban and rural settings to evaluate the potential impacts of urbanization on stream food webs. Four locations, Noonday Creek at Kurtz Road, Noonday Creek at Shallowford Road, Peachtree Creek, and Raccoon Creek were chosen to be a part of this experiment. Each stream contained some woody and nonwoody debris, allochthonous materials such as leaves and insects, and autochthonous organic matter sources like algae and dead aquatic animals. Within each stream, coarse particulate organic matter on the stream bed was measured, and leaf litter export was estimated by tracking releases of Ginkgo biloba leaves. These leaves were specifically chosen because their unique shape distinguishes them from other leaves that reside within these environments. Stream aspects such as sinuosity, woody debris, riparian vegetation, and water velocity of the stream can affect CPOM accumulation and transport. Results will be compared across urban and rural locations to evaluate the potential impacts of watershed modifications on organic matter cycling.

### ***Do Urbanization and Weather Shape the Timing of Breeding in European Starlings?***

Presentation - [Join now.](#)

3:45pm – 4:00pm



Undergraduate Student(s): Emma Maltos  
Research Mentor(s): Sarah Guindre-Parker

*Each year, seasonally breeding birds are faced with a decision of when to initiate breeding in the spring. Because of year to year differences in environmental conditions, the phenology of animals — cyclic, seasonal events in a species' life cycle — varies across years. In light of climate change, understanding the factors that shape phenological decisions in animals is key to understanding they will cope with global warming. In this study, we will explore how urbanization, temperature and precipitation affect the timing of breeding in European Starlings (Sturnus Vulgaris) across the United States. We used a large community science dataset collected in North America to explore how different regional weather patterns and urbanization shape the timing of egg laying in this species. We will present results on whether urbanization or weather shape the lay dates of European Starlings. This study will provide important insight into how two of the largest threats to songbirds — urbanization and climate change — impact key breeding decisions and may thus affect populations.*

### ***Towards the Identification of the Soil Fungal Microbiome Community Associated with Longleaf Pine***

Presentation - [Join now.](#)

3:15pm – 3:30pm

Undergraduate Student(s): Joshua Inneh, Grace Krueger, Ian Thomasson, Geoffrey Eger, Fletcher Moon

Research Mentor(s): Paula Jackson, Thom McElroy, Heather Sutton, Joel McNeal

*This project is part of a larger study looking at the restoration of the Longleaf Pine (LLP) ecosystem in certain Wildlife Management Areas (WMA) in Northwest Georgia. Our long-term aim is to look for potential associations between the aboveground and belowground community structures as the complex system of feedback mechanisms between the soil microbiome, the rhizosphere, and the plant communities is not yet understood. Soil samples were collected from a total of six plots in the Sheffield WMA located in Paulding County. The samples were collected from north or south facing hillside plots except for in the savanna sites (an area actively being restored for longleaf pine), where samples were collected on east or west facing slopes. Soil was sampled at three locations per plot (at the center, and 10 m below and above the center of each plot). A total of 18 soil samples were collected, each in sterile tubes with screw tops. DNA was extracted from five subsamples per tube using a commercially available kit. We hypothesized that the soil microbiome would differ significantly in north versus south facing areas, as well as between the savanna LLP and other plots due to the difference in aboveground plant communities. Analysis shows that the fungal phyla of Ascomycota and Basidiomycota are predominant in all plots of sampled. Basidiomycota shows its greatest predominance in the center of each plot. The most diverse results were found in the savanna plots showing a significant amount of unclassified fungi present as well as Zygomycota.*

## ***Identification and Comparison of Arbuscular Mycorrhizal Fungi and Soil Microbiomes Between American Chestnuts and Surrounding Hardwoods***

Presentation - [Join now.](#)

4:30pm – 4:45pm

Graduate Student(s): Sean Davis

Undergraduate Student(s): Geoffrey Eger, Sarah Andrews, Ian Thomasson, Grace Krueger, Josh Inneh, Fletcher Moon

Research Mentor(s): Paula Jackson

*Background/Questions/Methods: Around 1904, with the introduction of the Chinese chestnut blight (*Cryphonectria parasitica*), native American chestnut (*Castanea dentata*) populations were decimated. In this study our goal is to provide new insights into mechanisms that may enhance blight resistance in *Castanea dentata* through the understanding of the interaction between the trees and their surrounding soil microbiome. For this we 1) used oral history and maps generated by the American Chestnut Foundation to document/confirm the location of individual specimens in our vicinity; 2) among individuals found, documented healthy versus blight infected individuals; 3) characterized putative differences in the soil microbiome with distance to infected and non-infected individuals, as well as between chestnut plants and hardwood neighbors. Soil samples were collected 1m north of the base of each chestnut tree and 1m from the base of one hardwood tree within 5m of the chestnut and aligned to one cardinal direction. DNA was extracted from soil samples using commercially available DNA extraction kits and outsourced for sequencing. DNA analysis is organized by genus in order to identify the species of fungi and other microbes that are present in each sample. Results/Conclusions: Thirty-two individual wild American chestnut trees have been identified for potential study, with a subset of six mature trees used for this study. Soil DNA extractions are currently underway to examine metagenomics of taxa present in the soil microbiome around the mature *Castanea dentata* trees. Of the thirty-two known trees, one is currently known to be infected with *Cryphonectria parasitica*.*

## ***Initial Assessment of Potential Relationships Between Plant Communities and the Soil Microbiome in Closed Forest and Longleaf Pine Restoration Sites.***

Presentation - [Join now.](#)

3:30pm – 3:45pm

Graduate Student(s): Sean Davis

Undergraduate Student(s): Ethan Mitcham, Ian Kennedy, Dylan Lemonds, Tyler Arnold, Megan Brooks, Bryce Coleman, Krista Stire, David Neubauer, Sean Trainor

Research Mentor(s): Paula Jackson, Heather Sutton, Aliya Donnell-Davenport (Reinhardt)

*Longleaf pine is an endangered ecosystem characterized by high levels of biodiversity. Our study took place in the Sheffield Wildlife Management Area located in the Piedmont ecoregion of Georgia in Paulding County. Fifty plots of 10 x 30 m<sup>2</sup> were setup on south or north facing slopes, some in covered forest, and some in an area actively being restored for the longleaf pine. All trees above 1.37 m were*



identified and had their diameter measured, and species diversity, relative density, dominance, and frequency were determined. Herbaceous plant cover percentages were recorded in select plots. Soil samples were also collected in sterile plastic tubes in six of the above-mentioned plots, at the center and 10 m above and below the central point of each plot. Plant species diversity was slightly higher in south facing compared to north facing slopes, and the soil microbiome suggests high levels of bacterial diversity and differences in fungal microbiome among plots. Our aim is to begin to determine potential associations between below and above-ground communities.

### ***The Effects of Provisional Rate on Offspring Growth in European Starlings***

Presentation - [Join now.](#)

1:15pm – 1:30pm

Undergraduate Student(s): Shelby Edge

Research Mentor(s): Sarah Guindre-Parker

Offspring rarely have a linear growth rate and many external factors may be to blame for this. They may be most sensitive to their rearing conditions when they grow most rapidly. Parenting and provisional habits are similarly inconsistent and may depend on various factors including the energetic state of the parent or the food availability in the surrounding environment. Though not previously linked before, the connection between parental provisioning efforts and growth and success rate of the offspring may be immense. This study focused on European Starlings (*Sturnus vulgaris*). The hypothesis tested was that rapid offspring growth may be connected and coincide with an increase in parental provisioning habits. Nest boxes were studied over a course of several weeks, and videos were filmed every other day to allow analysis of provisioning rates. Nestlings were weighed every other day to determine growth rate of the offspring. We will be studying the habits and rates of the parental provisioning as well as other factors such as sex of the bird and weather. These are known factors that affect provisioning habits in birds. We will be presenting results on whether parental provisional care affects the growth rate of the offspring. This will allow scientists to better understand the nonlinear affect that provisioning habits have on the offspring at different stages of development.

### ***The Contribution of the Body, Pectoral Fins, and the Ribbon Fin to Turning Maneuvers of a Gymnotiform Swimmer***

Presentation - [Join now.](#)

4:00pm – 4:15pm

Graduate Student(s): Olivia Hawkins

Research Mentor(s): Chris Sanford

Turning maneuvers are ecologically important for fish as they are used for prey capture, predator avoidance, and navigating structurally and hydrodynamically complex environments. Most studies on maneuverability in fishes have shown that turning is achieved through body bending and the use of the

*pectoral fins. Few studies have investigated the drivers of turning in fishes with atypical morphologies such as the ribbon fin. To understand the drivers of turning in a fish with a ribbon fin, we filmed the weakly-electric Black ghost knifefish (Apteronotus albifrons) using high speed videography. We quantified the contribution of the body, pectoral fins, and ribbon fin during steady swimming, small turns, and large turns using 3D kinematic analysis. We find that most kinematic variables for the ribbon fin and the pectoral fins contribute to small and large turning maneuvers. To visualize the fluid perturbations caused by the ribbon fin during turning maneuvers, we used particle image velocimetry (DPIV). During turning, strong vortices form towards the middle of the ribbon fin. The current results suggest this control surface is essential for turning maneuvers in A. albifrons, thus highlighting the importance of investigating turning in fishes with atypical control surfaces.*

## **Statistics and Analytical Sciences**

### ***Do Environmental Toxins Predict Violent Crimes?***

Presentation - [Join now.](#)

3:45pm – 4:00pm

Undergraduate Student(s): Tyler Stahl

Research Mentor(s): Susan Mathews Hardy, Austin Brown

*Do chemical pollutants that persistent in the environment and bioaccumulate in the body affect human health and behavior? Could these Persistent, Bioaccumulative, and Toxic (PBT) chemicals play a role in the cause of violent crimes due to deterioration of mental and cognitive functions? In the past, Mercury, a PBT chemical, has been shown in salmon to be associated with aggression. Could similar aggression occur in humans exposed to mercury through a toxic spill? Two sources of data are utilized in this analysis. The Environmental Protection Agency's (EPA) Annual Toxic Release Inventory publishes data on toxic releases into the environment and includes the following variables: location, chemical, chemical type, and amount of chemical released. The 2013 report contains information on 73,868 toxic releases during 2013. The second source of data uses the Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race. This dataset includes information on 1,048,578 arrests of which 201,308 were for violent crimes. These two data sets were merged based on location to facilitate this analysis. Two questions are analyzed to compare the three toxic release categories in the EPA data: PBT, TRI (General EPCRA Section 313 Chemical), and Dioxin. Is there a relationship between the number of spills at a location and the number of violent crimes at the location? Is there a relationship between the amount of toxic chemical released at the location and the number of crimes at the location? In addition, are toxic chemicals more likely to be dumped in certain regions of the United States, and is the average amount of toxic chemical released the same for PBTs and TRIs? To investigate these relationships, nonparametric and parametric hypothesis tests will be used with post hoc comparisons. Stratified scatterplots and stratified boxplots will be used to display the findings.*

### ***Bias in Police Shootings: Is It Just an Opinion?***

Presentation - [Join now.](#)

2:45pm – 3:00pm

Undergraduate Student(s): Phuong Ho

Research Mentor(s): Susan Mathews Hardy

*The claims of racism have drawn public attention toward police brutality and its impact on minorities. Is this just an opinion or is there any statistical evidence? Recent studies from The Atlantic have investigated the average age and ethnicity of victims from police killings in 2015-2016. As an Asian-American, I am motivated to examine the issue of police killings among races and other demographics to find any bias that is present. Using the dataset of 2,204 victims of police killings (2015-2016) collected by The Guardian, I will examine the following variables for bias: age, cause of death, armed/unarmed, race/ethnicity, and gender. My analyses will consider the following questions. Is the average age of the victims different from The Atlantic's claim of 35 years old? Is the average age of a person killed by the police different for males versus females? Are younger victims more likely to be killed by a gun? Is the average age of the victims different for any ethnicity? Are minorities (Arab, Asian, Black, Hispanic, and Native American) more likely than Whites to be unarmed than armed? Do different ethnic groups or genders use the same weapons? Are females more likely to be unarmed than males? Considering race, is the less-lethal weapon of a Taser more likely to be used on one ethnic group than another? Similarly, is the lethal weapon of a gun more likely to be used on one ethnic group versus another? To investigate these questions, nonparametric and parametric hypothesis tests will be used with post hoc comparisons. Graphical displays, stratified boxplots, plots of confidence intervals, and correlation plots, will be used to display the findings. Answers to these questions allow the reader to decide if there is any bias in police killings and whether it's just an opinion or statistically supported.*

### **Eradicating Zebra Mussels: What Works?**

Presentation - [Join now.](#)

2:15pm – 2:30pm

Undergraduate Student(s): Elijah Davies

Research Mentor(s): Susan Mathews Hardy, Austin Brown

*The invasion of U.S lakes and rivers by the invasive species of zebra mussels called *Dreissena polymorpha* has caused catastrophic harm to the local ecosystem by reproducing and outcompeting native mussel species as well as harm to pipes leading into water sources by binding to surfaces and reproducing to the point that the mussels clog pipes. In addition, recreation areas must be closed due to the sharp shells making areas unusable. In the past, research has focused on individual molluscicides and their eradication of zebra mussels, as well as their effect on native flora and fauna. My research will contrast the effectiveness of four eradication chemicals across four temperatures from 7°C to 22°C. The four chemicals include two EPA certified molluscicides (EarthTec QZ and Zequanox) and two promising new molluscicides (Niclosamide and KCl), which have yet to be approved by the EPA. The questions considered include the following. Which molluscicide is the most effective over all*

*temperatures? How well do the EPA-registered molluscicides compare with non-EPA molluscicides? How does the duration of exposure to the chemical affect the eradication of zebra mussels? How do chemical molluscicides compare to biological molluscicides? Does the number of mussels killed depend on the combination of different durations or temperatures for the four molluscicides? These questions will be analyzed with parametric and nonparametric statistics with post hoc comparisons as needed. Graphical data displays of scatter plots and stratified boxplots will be used to convey the findings. Through an increased understanding of what helps to eradicate zebra mussels, we can prevent the fouling of water resources and the loss of natural ecosystems.*

### **Who is Next? Evaluating Factors that May Contribute to Heart Failure**

Presentation - [Join now.](#)

4:30pm – 4:45pm

Undergraduate Student(s): Davon Broadwater

Research Mentor(s): Susan Mathews Hardy

*Cardiovascular diseases are the number one causes of death globally, and for African Americans those risks are even higher. As an African American university student studying Biology, I am passionate about researching the diseases that affect my race. Current research states that behavioral factors such as obesity, tobacco use, unhealthy diet, and harmful use of alcohol should be avoided. I have chosen to research predictors of what helps patients survive if they already have heart failure. Heart failure develops gradually, where the heart becomes weaker over time and has trouble pumping blood to nourish the cells in the body. Data was collected on 299 patients with heart failure at the Faisalabad Institute of Cardiology. Is the survival rate better for patients with higher ejection percentages? Is the average serum sodium level a predictor of survival? Is there a difference in age or sex between patients who survived and died? Can anemia levels, creatinine levels, high blood pressure, platelet count, or sodium levels predict survival? Does smoking or having diabetes decrease chances of survival? My research also investigates the interrelationships of the variables predicting survival. Is the average ejection percentage lower than the normal range of 55% and above? Do patients with diabetes have a decreased ejection rate or lower platelet count? Is the average serum sodium the same for males and females? Does age play a factor in the levels of serum sodium? Is having high creatinine levels related to high blood pressure? Parametric and non-parametric hypothesis tests were used to analyze these questions. Statistical graphics, stratified box plots and scatterplots, will be used to convey the findings. Knowing the risk factors that predict survival and the interrelationships of those predictors, enables African Americans, and all people, to understand the potential benefits of reducing these factors.*

### **Marijuana Arrests in Toronto Canada: A Look into the Canadian Criminal Justice System**

Presentation - [Join now.](#)

3:00pm – 3:15pm

Undergraduate Student(s): Steven Tully

Research Mentor(s): Susan Mathews Hardy

*Marijuana related drug offenses made up fifty-eight percent of all Controlled Drugs and Substances Act offenses in Canada in 2016. On October 17, 2018, Canada legalized marijuana. As part of the efforts to legalize marijuana, descriptive statistics of single variables, like the age of the arrestees and the number of people arrested per year, were reported by the Toronto Star newspaper. The dataset analyzed in this research predates the legalization of marijuana and was collected from 1997 to 2002 on 5,226 individuals arrested in Toronto, Canada for simple possession of small quantities of marijuana. When an offender was arrested for possession of marijuana, they were either released with a summons, which summoned them to appear in court later, or they were held without release until their court date. Did the choice to release someone on a summons or not depend on the color of their skin? Did the sex, age, employment status, current citizenship status of the offender, year of the arrest, or number of previous convictions of the offender determine if they were released with a summons? Other questions that my research seeks to answer include the following. Did males and females have the same number of previous convictions? Did people of color have the same number of previous convictions as whites? Were the average ages of arrest the same for males and females? Was the average age of offenders the same for the years 1997, 1998, 1999, 2000, 2001, and 2002? These questions will be answered with parametric and nonparametric hypothesis testing. Graphical data displays, stratified bar charts and correlation plots, will be used to convey the findings. My results present an insight into the possible existence of bias in the Canadian criminal justice system enabling the justice system to consider if these biases are still present.*

### ***Cervical Cancer: Are There Ways to Reduce the Risks?***

Presentation - [Join now.](#)

1:15pm – 1:30pm

Undergraduate Student(s): Madelyn Dorn

Research Mentor(s): Susan Mathews Hardy, Austin Brown

*History has shown us that when caught early, cervical cancer is curable. Past research has found that the sexually transmitted diseases (STDs), herpes and human papillomavirus (HPV), have been associated with cervical cancer. In contrast, my dataset on 859 women has many more STDs and lifestyle choices compiled on 36 variables. The diagnoses in the dataset are many: cervical condylomatosis, vaginal condylomatosis, vulvo-perineral condylomatosis, syphilis, pelvic inflammatory disease, genital herpes, molluscum contagiosum, acquired immune deficiency syndrome (AIDS), human immunodeficiency virus (HIV), hepatitis B, HPV, and cervical cancer. In addition to the demographic variable on age, there are many lifestyle choice variables: number of sex partners, age of first sexual intercourse, number of pregnancies, smoker/nonsmoker, number of years smoking, packs/year smoked, hormonal contraception use, years of hormonal contraceptive use, intrauterine device (IUD) use, years of IUD use, and number of STDs. I will be investigating the following questions. Do sexual diseases predict cervical cancer? Does the number of years of IUD use, or the use of an IUD, predict cervical cancer? Does the number of years of smoking, or number packs smoked per year, predict cervical cancer?*



*Does the length of time using hormonal contraceptives predict cervical cancer? Does having greater than 3 pregnancies predict cervical cancer? Are older or younger women more prone to cervical cancer? These questions are analyzed with parametric and nonparametric hypothesis tests, with post hoc comparisons as needed. Graphical displays including scatter plots, correlation plots, and stratified boxplots will be used to convey the findings. Verifying previous findings, as well as finding my own, improves understanding of cervical cancer that may result in expediting diagnoses and increasing survival rates.*

### ***On the Front Lines of Fire: How Do We Save Their Lives?***

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Cathrine Jatta

Research Mentor(s): Susan Mathews Hardy

*The National Institute for Occupational Safety and Health (NIOSH) reports that the United States depends on about 1.1 million firefighters to protect its citizens and property from fire. NIOSH adds that approximately 336,000 are career firefighters; 812,000 are volunteers; and 80 to 100 die in the line of duty each year. NIOSH investigates each fatality individually for the cause and prevention. In contrast, my research will look at a complete dataset of 2005 firefighter fatalities and see if any of the following variables may predict firefighter death: age, cause of death, property type, type of duty (e.g. on-duty, training), and type of firefighter (e.g. career, volunteer, wildland). Some of the relationships I will investigate include the following questions. Does the type of firefighter predict the nature of death? Can the type of duty of the firefighter predict the initial incident that caused the firefighter's death? Can the nature of death, or the firefighter's age, predict the number of days in between incident and death? What are the most dangerous activities that the firefighters do? Do younger firefighters die from different incidents than older firefighters? Do career firefighters die from different incidents than volunteer firefighters? Does whether the firefighter was called to an emergency or non-emergency situation predict the initial incident that caused the firefighter's death? These questions will be analyzed with parametric and nonparametric statistics with post hoc comparisons as needed. Graphical displays including scatter plots, stratified boxplots, and correlation plots will be used to convey the findings. Through an increased understanding of relationships and predictors of firefighter mortalities, I seek to identify areas of training that are needed to reduce these tragedies.*

### ***Sources and Aftermaths of Pipeline Related Leaks and Spills***

Presentation - [Join now.](#)

12:45pm-1:00pm

Undergraduate Student(s): Justin Smith

Research Mentor(s): Susan Mathews Hardy, Austin Brown

*The escape of oil and other hazardous materials have been shown to pollute and destroy ecosystems. As an aspiring chemist, I am adamant about the secure handling and transportation of oil and other hazardous materials. In the past, researchers have concentrated on oil's high viscosity. Oil's high viscosity physically smothers wildlife, affecting their ability to continue critical functions such as respiration, feeding, and thermoregulation. My research focuses on the source of these oil spills, as well as natural gas leaks, for the purpose of risk assessment. In addition, I compare recovery efforts based on the cause of the leak/spill, the gas/liquid type, and the location of the leak/spill. The data set contains 2,795 pipeline-related leaks/spills reported to the Pipeline and Hazardous Materials Safety Administration (PHMSA) between 2010 and 2016. These records include: pipeline operator; pipeline name; general cause of incident; specific cause of incident; pipeline type; pipeline location; city, county, and state where the accident took place; type of hazardous gas/liquid; quantity lost; and associated costs of cleanup. Questions I sought to answer are: Is the recovery rate the same for different substances leaked/spilled? Is the recovery of oil onshore better than the offshore recovery? Is the recovery dependent on the cause of the leak/spill? Is the cause of a pipeline leak/spill related to a pipeline's location? Is the cost of cleanup the same for different substances leaked/spilled? I analyzed the data using nonparametric tests, such as tests on the median using the binomial distribution, the chi-square test of independence, Kruskal-Wallis, and a K-sample permutation F test with post hoc tests as appropriate. With answers to these questions, organizations like the PHMSA and the Occupational Safety and Health Administration (OSHA) may better understand where to implement safety measures and improve clean-up operations.*

### ***Are There Predictors of a Running Back's Success?***

Presentation - [Join now.](#)

4:45pm – 5:00pm

Undergraduate Student(s): Joshua Price

Research Mentor(s): Susan Mathews Hardy

*People who analyze football have concentrated in the past on a running back's 40-yard dash, shuffle, broad jump, vertical jump, and bench press measures. My research will test if the following variables can predict a running back's success in the NFL: height, weight, conference, offensive line ranking for their team, the running back's total yards for the season, their average yards for each attempt, the number of times the running back has entered the end zone for a touchdown that season, the running back's time average time behind the line of scrimmage (TLOS), the percentage of times the running back faces eight plus defenders in the box when attempting to run the ball (8+D%), and the number of times the running back attempted a rush. In addition, the running back's efficiency is calculated by taking the total distance a player traveled on rushing plays as a ball carrier, according to Next Gen Stats, per rushing yards gained. The lower the number, the more of a North/South runner. The data is recorded on 48 running backs with at least 48 rushing attempts in the 2019 NFL regular season. The questions considered include the following. Does the categorized offensive line rank predict that the running back will have more rushing yards for the season? Does the higher the 8+D% statistic predict that the running back will have fewer touchdowns? Does the 8+D predict a running back's efficiency? Does*



*the offensive line rank predict TLOS? Does offensive line rank predict that the running back will have more rushing yards? Does the running back's height predict a higher 8+D%? These questions will be analyzed with parametric statistics with post hoc comparisons as needed. Graphical displays of scatter plots and stratified boxplots will be used to convey the findings.*

### ***Death by Police: When "Protecting and Serving" Goes Wrong***

Presentation - [Join now.](#)

4:00pm – 4:15pm

Undergraduate Student(s): Hesper Mallis

Research Mentor(s): Susan Mathews Hardy

*The recent cases of law enforcement using lethal force in the United States have gained massive public attention. My dataset is from the Mapping Police Violence website. The website's focus was to create a heat map to display where police killings occurred most frequently. The website has a dataset with information on 7,664 deaths of suspects. The variables in the dataset include age, sex and race of the suspect; geographic location; alleged threat level; alleged weapon; cause of death; and criminal charges against the officer. In addition, the variables include whether the individual had a mental illness, was armed or was fleeing; whether video exists; whether the officer was off-duty; and whether or not the shooting was justified. The goal of my research is to examine the possible variables that could lead a police officer to kill someone. Do any of the variables listed above predict whether a police incident results in a killing? In addition, I will be looking at relationships between the predictor variables. Does sex or race predict whether the suspect is perceived as a threat? Are some ethnic groups more often killed than others? What variables predict that a person will flee from the police? What variables are associated with mental illness or drug use? Do any variables predict whether the victim was armed? These questions will be investigated with non-parametric and parametric hypothesis tests including post hoc comparisons. The findings will be summarized with stacked bar charts and stratified boxplots. Through heightened understanding of the relationships and predictors, I hope to identify ways to improve police training to prevent police incidents from turning into a killing.*

### ***Accidental Overdoses: Insights to Aid in Prevention***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Undergraduate Student(s): Annabel Nganga

Research Mentor(s): Susan Mathews Hardy, Austin Brown

*Having lost a friend six years ago to an accidental cocaine overdose, I am very passionate about spreading awareness of accidental drug overdoses that have affected thousands of families countrywide. According to past research, deaths resulting from opiates specifically have been on the rise, and a significant number of deaths in the United States for those below fifty years are caused by drug overdoses. Data exists indicating which states have more overdoses. The data set I will be using includes*

*variables on race, sex, age, drug with which person overdosed, location of the overdose, ultimate cause of death and year of the overdose. My research focuses on the following questions. What age groups are more likely to die of accidental drug overdose? What kinds of opiates are more likely to cause accidental drug-related death? Is type of drug (opiate and non-opiate) more likely to cause the accidental overdose? Is race related to the likelihood of dying of accidental overdose? Are males more likely to die of an overdose than females? Do males die at a younger age of accidental overdose than females? Does the location where the individual overdosed predict the type of overdose? Does the cause of death predict the age of the individual who died of a drug overdose? Where are the victims are more likely to die of accidental drug overdose? Are opioid overdoses more prevalent in recent years? Through increased understanding of relationships and predictors of drug overdoses, I seek to identify ways to reduce these tragedies.*

### ***Determining Malignancy: Can Mammogram Results Help Predict the Diagnosis of Breast Tumors?***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Undergraduate Student(s): Taylor Behrens

Research Mentor(s): Susan Mathews Hardy

*Even with advancements in treatment and preventative care, breast cancer remains an epidemic claiming more than 40,000 American male and female lives each year. The mammogram dataset that I am analyzing was initially compiled in the early 1990s by a team from the University of Wisconsin - Madison. Past research diagnoses breast cancer from fine-needle aspirates. My research focuses on predicting whether we can determine breast cancer diagnoses without the use of invasive procedures and, in particular, whether we can predict breast cancer based on mammogram data. Do measures of gray-scale texture, radius, concavity, perimeter, compactness, area, and smoothness of the tumor predict whether the tumor is malignant or benign? Are there relationships between these quantitative predictor values? Do these relationships differ for the two categories of tumors: benign and malignant? Some of my preliminary findings include that malignant breast tumors had a higher texture, higher radius, higher area, more smoothness, and more compactness than benign breast tumors. I will research the interrelationships among these measures. Does area, radius, or perimeter predict smoothness? Does area, radius, or perimeter predict texture? Does concavity predict concavity points? Do any of these relationships change based on whether the tumor is malignant or benign? To answer these questions, I use a variety of parametric and nonparametric analyses with corresponding post hoc comparisons. Stratified box plots and mean plots will be used to display these findings. Through study of the relationships among these measures and the relationships of the measures with malignant and benign tumors, clinicians may be able to create potential treatment plans without using more invasive procedures and predict whether more invasive procedures are warranted.*

### ***Market Research: How to Keep and Gain Customers***

Presentation - [Join now.](#)

3:15pm – 3:30pm

Undergraduate Student(s): Chris McCall

Research Mentor(s): Susan Mathews Hardy

*Customer-centered market research is essential to the creation and management of successful marketing campaigns. A company that understands their customers will be able to provide those customers with products and services that fit their needs better than the competition, and ultimately increase profits. My research focuses on a database containing customer information for a telecommunications company called Telco. Within this research, I will focus on a number of customer attributes including demographics, services provided, payment methods, contract lengths, monthly charges, and tenure with the company. Considering how these attributes relate to one another will give me a better understanding of how to market Telco's services to their current and future customers. My research found: senior citizens are more likely to purchase fiber-optic internet service than non-seniors; seniors are also more likely to purchase online security than non-seniors; seniors are more likely to purchase tech support than non-seniors; and finally, seniors are more likely to stay with Telco long term. Additionally, seniors end up paying an average of \$17.97 more per month for their services than non-seniors. Other findings include that customers living with a partner sign more long-term contracts and stay with Telco longer than customers living without a partner; and that longer tenure with Telco is associated with higher monthly charges. The methods used to investigate these relationships included both nonparametric and parametric hypothesis tests with corresponding post hoc comparisons. Stratified boxplots and 100% stacked bar charts will be used to display these findings. Seniors and two-person households are some of Telco's best customers. Services, shown to be preferred by these groups, can be marketed to all seniors and two-person households. Telco could also increase profits and length of customer tenure by creating marketing campaigns designed to attract more senior citizens and two-person households as new customers.*

### ***Opioid Abuse: Are Doctors Creating the Problem?***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Undergraduate Student(s): Nguyen Tran

Research Mentor(s): Susan Mathews Hardy

*Opioid abuse and overdose are serious health problems in the United States. Current research has concentrated on the treatment and prevention of opioid abuse. Using data from the Controlled Substance Utilization Review and Evaluation System (CURES) for California zip codes, my research focuses on the causes of opioid overdose by considering the relationships between the following variables within each zip code: population size, average number of prescriptions per doctor, percentage of people who receive opioid prescriptions, percentage of people receiving the same prescription drug from 3 or more doctors, average number of opioid pills per prescription and number of people receiving more than*

100 Morphine milligram equivalency (MME) per day. My research considers multiple relationships. Does an increase in population size in the zip code predict an increase in the average number of opioid prescriptions per doctor as well as an increase in the number of patients with the same prescription drug from 3 or more doctors? Does the proportion of people in the zip code who are prescribed more than 100 MME per day predict the proportion of people who receive the same prescription drug from 3 or more doctors? Does the proportion of prescriptions for opioid drugs and the mean number of opioid pills per prescription in a zip code predict the proportion of patients receiving the same prescription drug from 3 or more doctors? To investigate these relationships, nonparametric and parametric hypothesis tests will be used with post hoc comparisons. Stratified boxplots and scatterplots will be used to display the findings.

### **Why Does an Ex-Offender Reoffend?**

Presentation - [Join now.](#)

2:30pm – 2:45pm

Undergraduate Student(s): Jacob Rybak

Research Mentor(s): Susan Mathews Hardy, Austin Brown

What leads to an offender to go back to prison? Iowa has collected data tracking recidivism to evaluate the effectiveness of its programs for released offenders. This data set includes the following for all of the offenders: age groups, type of release (parole vs being discharged at the end of their sentence), race, sex, year of release, supervising district, original offense, and whether they recidivated. For the offenders who return to prison, the data set includes measures on days to return, type of recidivism (technicality or new crime), and what the specific offense was that caused their return. In the past, this data set was used to predict whether an offender will recidivate. My research focuses on investigating the interrelationships between the variables. I will use nonparametric and parametric hypothesis tests with post hoc comparisons. In addition, I will use statistical graphical displays to convey my findings. I approach this research through the lens of a person who was in the Georgia Department of Corrections from age 18 to 22. My personal experience and insights have given me a heightened understanding of the issues facing offenders released from prison. The relationships I will investigate include the following: Does race of the offender predict the days to return to prison? Is there a relationship between original offense and the returning offense? Do some original offense types return more quickly than others? How do the different release types affect whether an offender recidivates or the days to return if they do? Does sex predict whether an offender recidivates or the days to return if they do? Prison reform is complicated but if people, especially those of us who are ex-offenders, join forces to find solutions, more offenders will join me in being rehabilitated and reformed.

### **Anti-Vaxxers: Parents Fighting Science**

Presentation - [Join now.](#)

1:00pm – 1:15pm

Undergraduate Student(s): Katie West

Research Mentor(s): Susan Mathews Hardy

*Immunizing children helps protect the health of our community, especially those people who cannot be immunized. Yet, since 1996 after a study was released that linked autism to vaccinations, there has been a trend of parents refusing to vaccinate their children. What are the demographics of the parents who believe their children are better off without vaccines? By knowing where these parents live and what decisions they make for their children's education, counties and medical professionals can provide education and address their concerns. My research involves data on 116,141 kindergarten classes from 2000-2015 in California. The two vaccine exemption options in California from 2000 to 2015 were personal belief exemptions and personal medical exemptions. This data includes information on MMR, DTP, and Polio vaccination counts within each kindergarten class; where each class is located; whether each class is in a private or public school; how many students are in each class, and how many personal and medical vaccination exemptions are claimed in each class. Since there are different sizes of classes in the sample, the statistics used to analyze the data will be the proportion of students in the class that have those attributes. I answer the following questions: What is the relationship between demographics and vaccination rates? Which regions are vaccinating their children at a lower rate? Are the three vaccines given at the same rate? Or are some favored over others? Do public or private schools have more vaccinated children? How does California compare to the rest of the nation with regards to vaccination rates? Are the easier to obtain personal belief exemptions being used more often than personal medical exemptions? Through these answers, counties and medical professionals can help build a safer community.*

### ***Food Deserts: Hungry for Answers***

Presentation - [Join now.](#)

3:30pm – 3:45pm

Undergraduate Student(s): Lawren Cumberbatch

Research Mentor(s): Susan Mathews Hardy

*In 2010, the United States Department of Agriculture (USDA) reported that 23.5 million people in the United States live in food deserts. As defined by the USDA, a "food desert" is a neighborhood that lacks healthy food sources. This can be measured by distance to a store, number of stores in an area, individual-level resources such as family income or vehicle availability, and neighborhood-level resources such as availability of public transportation. Past research provides evidence that food deserts are especially likely to occur in communities heavily populated by minorities. As a Black Indian pre-med student aiming to join the world of healthcare innovation, I am passionate about factors that affect the quality of life for commonly disenfranchised communities. However, are there more factors than race to predict the demographics of where a food desert will occur? The Food Access Research Atlas provided by the USDA provides census tract information for the state of Georgia. I analyzed 1,965 census tracts with roughly 4000 people in each. Variables include population size, median family income, poverty rate, low vehicular accessibility, and demographics of seniors, children and ethnic groups. I will*



*investigate the following relationships. Are rural areas more likely to be food deserts? Are certain counties in Georgia more likely to be food deserts? Are low-income census tracts more likely to be associated with food deserts? Are the poverty rates and median incomes the same for census tracts that are classified as food deserts and not? The methods used to investigate these relationships included both nonparametric and parametric hypothesis tests with corresponding post hoc comparisons. Stratified box plots and stacked bar charts will be used to display these findings. Is there more than race to tell the story of food deserts? Insights into these relationships may foster new ideas to solve the problem.*

## College of the Arts

### Music

#### ***Narrative Ambiguity in Brahms Op. 38: An Argument for Multi-Movement Analysis***

Presentation - [Join now.](#)

1:15pm – 1:30pm

Undergraduate Student(s): Joseph Grunkemeyer

Research Mentor(s): Jeffrey Yunek

*In this presentation, I will show how the ambiguous ending of the first movement of Brahms Op. 38 is part of a single, multi-movement narrative in which persistent tragic signifiers, metric dissonance, and formal degradation will confirm an overall tragic archetype. Using literature on musical narrative from Cone (1974), Hatten (1994), and Almén (2008), this presentation will analyze the first movement in-depth and show that the movement contains a number of tragic signifiers, including pianto motifs, metric dissonance, and tragic key areas, that suggest a tragic archetype between two characters in a contentious relationship. However, this tragic reading is subverted with the arrival of the major-mode coda at the end of the movement. The major-mode coda does not definitively produce a comedic reading because of the tragic signifiers present within it. As a result, I extend my analysis to the next two movements to create an opus-level narrative, a level of analysis that has previously been done by both Kinderman (1992) and Hatten (1994). In my analysis of the next two movements, I show tragic signifiers and motifs that unite the piece into one connected narrative. The final movement prominently displays the earlier pianto motif, introduces pervasive metric dissonance, and contains massive formal degradation. These three aspects of the final movement, combined with an opus-level narrative, provide closure for the ambiguous narrative of the first movement and confirm a tragic narrative for the entire piece.*

#### ***The Evolution of Shostakovich's Compositional Style in his String Quartets***

Presentation - [Join now.](#)

2:45pm – 3:00pm

Undergraduate Student(s): Garrett Clay

Research Mentor(s): Edward Eanes



*Dmitri Shostakovich (1906-1975) was one of the most prominent composers of the Soviet Union all the way from his rapid rise to popularity at age 19 with his first symphony. He was generally loved by the Soviet public as well as internationally, but he also suffered a few denunciations that very nearly cost him his life under Joseph Stalin's intense scrutiny. As a result, he experienced numerous stylistic changes over the years, and many of these changes reflect the various highs and lows throughout his career. This analysis will show the changes in Shostakovich's compositional style—with a focus on his string quartets—regarding form, tonality, musical purpose, and emotions conveyed as well as historical context. The four quartets that will be analyzed are his String Quartets No. 1 in C major, No. 3 in F major, No. 8 in C minor, and No. 15 in E-flat minor, all of which present a wide variety of styles in order to appropriately demonstrate the drastic changes in style across the composer's career. What will be found is that his music generally grew more pessimistic as well as experimental and tonally ambiguous over time, and these changes reflect various periods of his life from his sarcastic and sometimes playful youth to his introspective and often nihilistic attitude during the final years of his life.*

## **Theatre and Performance Studies**

### ***Stepping Back in Time: Dance in 45 Plays for 45 Presidents***

Presentation - [Join now.](#)

2:30pm – 2:45 pm

Undergraduate Student(s): Antwanera Braxton

Research Mentor(s): Thomas Fish

*Dances that are specific to their time period, like the minuet, which appears in the play 45 Plays for 45 Presidents, need to be supported with extensive research to ensure that their authenticity is preserved in performance. The play, as a whole, is constructed of forty-five mini plays, one for each of the presidents in America's history. A few of the plays were musicals, ballets, or just plain dance breaks. Being that the production was done in 2019, and the dances were set in centuries prior, how does one make modern day choreography authentic to a show's time period? While working on Kennesaw State's 2019 production as the choreographer, I gathered an ample amount of research surrounding dance during the different time periods performed. Using my research, observation, and choreography, this paper will evaluate the eleventh play (the minuet dance) and the twenty-second play (nineteenth/ twentieth century dance styles) to inspect the cultural performance and movements during those different times, and how I implemented those aspects into my choreography.*

### ***The Demonization of the Other: How Casper van Senden Influenced Shakespeare's Othello***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Undergraduate Student(s): Ella Hite

Research Mentor(s): Thomas Fish

*In the modern era, Othello has been criticized heavily for its use of harmful, racial stereotypes, which were created to mainly “demonize an Other as a means of securing the self” (Bartels 454). This research will turn to early modern history in an effort to understand why Shakespeare chose to portray Othello in such a derogatory way. An important historical event to consider is Casper van Senden and the expulsion of Black Englishmen. In 1601, Queen Elizabeth I issued the decree: “Licensing Casper van Senden to Deport Negroes” in which she expelled all Black citizens (enslaved or not) from Great Britain. Othello was first performed 1604, only three years following. How did the deportation/trade of Black Englishmen by Casper van Senden impact the racial stereotypes used by Shakespeare in his play Othello? To answer this, my project combines an analysis of primary sources, early critiques, with reader response and critical race theory. Ultimately, the presentation will show how racist literature and art is the result of politics and societal norms. It will also educate and help to develop cultural sensitivity for directors, actors, and other creatives interested in producing Othello. Most importantly, my research encourages others to question racist literature/art and to push for a deeper understanding than the simple answer: “Those were just the times.”*

**COTA Collaborations: Towards Interdisciplinary Projects in the College of the Arts**

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Sarah Joseph

Research Mentor(s): Thomas Fish

*The College of the Arts at KSU is comprised of four departments that offer unparalleled education, artistry, and production. However, they are often function separately from each other. This paper outlines a vision of future collaborations for the college, recommending possible projects to collectively strengthen each of the departments. My research was conducted in a Senior Seminar course, including interviews and survey work within the college. It also stems from my own cross-disciplinary experience as Theatre major and Music minor. Ultimately, the paper will argue that both smaller level (student-lead) and larger level (COTA-lead) are desired and would benefit students and faculty. Further, it will make suggestions for how this might take shape, including a COTA-wide showcase or a concert-style musical. Based off my findings, collaborations among COTA would offer many benefits to each respective department/school and most especially to the students. By allowing more cross-over work in performances and presentation, for example, students would be able to network with a broader array of artists and peers. Collaborations would also foster respect and professionalism, open doors for more creativity and “thinking outside the box,” while also supporting the university’s R2 roadmap. In short, the possibilities are endless, and the potential is great for big, brave, and bold collaborations in the COTA.*

**Southern Polytechnic College of Engineering**

# & Engineering Technology

## Electrical Engineering

### ***Oral Minimal Model for Gestational Diabetes***

Presentation - [Join now.](#)

4:30pm – 4:45pm

Undergraduate Student(s): Sarah Peters

Research Mentor(s): Bill Diong

*Gestational diabetes is one of the most common issues that a pregnant woman encounters that could result in harm to both the woman and child. Due to this issue, the woman's glucose and insulin levels should be carefully monitored throughout her pregnancy to assess the need for prescribed diabetic medication to help regulate those levels. In this research, the objectives is to develop a MATLAB computer program of the Oral Minimal Model, which is a model that can be used to estimate a person's insulin sensitivity from an oral glucose tolerance test (OGTT) where plasma glucose and insulin levels are determined from blood samples collected from subjects at seven different time instants of 0, 10, 20, 30, 60, 90, and 120 minutes. As of this moment, the program has been completed, tested, and then applied to patient data collected by Dr. Katie Ingram's research team, producing some promising results on estimating their individual glucose effectiveness ( $S_g$ ), insulin sensitivity ( $S_i$ ), and rate constant ( $k_3$ ) characteristics.*

### ***Source Localization of Electroencephalogram (EEG) Waves with Convolutional Neural Network***

Presentation- [Join now.](#)

3:30pm – 3:45pm

Undergraduate Students(s): Terence Onyewuenyi

Research Mentor(s): Sumit Chakravarty

*This paper investigates the use of deep learning as a means for quantification and source localization of prioritizing electroencephalogram (EEG) waves for the purpose of detecting different eye states of human subjects. The Convolutional Deep Learning tool is trained to recognize EEG reading corresponding to a set of different eye movements as generated by watching different action scenes. The results also predict whether the subjects' eyes are open or closed. Source localization is performed next on the EEG data to focus on the different EEG components which primarily contribute to the activity. This was done by using a convolutional neural network to determine the brain region where the stimulation occurred. Finally, based on the selected region of primary stimulus of the brain as received by the EEG device, the residual EEG node data are removed as redundant. This significantly saves the*

*computation load of the machine learning as it performs on a reduced dataset, without compromising on its performance efficiency. Training a machine to detect the location of an EEG wave and the intensity of said wave would have many applications in the medical and industrial fields.*

## **Mechanical Engineering**

### ***Sterilizing Masks with UVC Light***

Presentation - [Join now.](#)

2:30pm – 2:45pm

Undergraduate Student(s): Christopher Focht, Josh Lummus

Research Mentor(s): Andrew Hummel, Ramya Rajagopalan

*This experiment focused on the construction and testing of a UVC light box and the treatment of facemasks with UVC light. Exposure rates were calculated and measured to ensure efficacy of the light box. Masks were contaminated with bacteria and exposed for set time intervals, after which the bacteria were collected, cultured, and counted. Early results show that the masks in the box had no bacteria survive past ten seconds. This research is ongoing with different bacteria strains and mask types.*

### ***Fracture Toughness and Ductile-Brittle Behavior of 3D Printed Polymers***

Presentation - [Join now.](#)

2:15pm – 2:30pm

Graduate Student(s): Christian Cook

Research Mentor(s): Cameron Coates

*This work investigates the difference in impact response of traditionally extruded vs 3D printed Polyethylene Terephthalate Glycol (PETG) and High Impact Polystyrene (HIPS). The effect of a machined notch vs a 3D printed notch, the effect of the raster angle, and the role of percentage infill is also examined. IZOD impact energies at various temperatures ranging from -500C to 500C are experimentally obtained for 3D printed and extruded specimens. The specimens tested included 25% infill 3D printed with machined notch, 25% infill 3D printed with printed notch, 100% infill 3D printed machined notch, 100% infill with 3D printed notch, extruded with machined notch.*

### ***Lifting Flow over a Cylinder as a Lift System***

Presentation - [Join now.](#)

3:15pm – 3:30pm

Undergraduate Student(s): Kyle Mello

Research Mentor(s): Cameron Coates

*The goal of this project is to conceptually design a lift system consisting of rotating cylinders that may improve certain flight characteristics when compared to conventional wings for a typical two passenger*

airplane. The functions of flaps, ailerons, lift to weight ratio and structural responses are considered. The cylindrical model is developed within CFD simulation software such that it generates the same lift produced by the wings of a Cessna 172 wings at cruising speed. Incompressible flow theoretical solutions are initially shown to compare favorably with the computational predictions for elementary cylindrical designs. The rotating cylinder aircraft generates the same lift as a Cessna 172 flying at 40m/s at an angle of attack of 2.5 degrees. Theoretical calculations and CFD simulation both show the rotating cylinders to generate a lift to weight ratio of 27.2, compared to the Cessna's 7.58. The main concern of this dynamic lift system is its structural integrity under constant rotation. At rotational speeds up to 350rad/s, the cylinders are well within their structural limits of resisting hoop and shear stresses. A dual shaft electric motor is used to power the cylinders to generate lift. The ailerons are replaced by using eddy current brakes to slow down the rotational speed of one of the cylinders, causing the aircraft to roll. The flaps are replaced by simply increasing the rotational speed of the cylinders.

## WellStar College of Health and Human Services

### Exercise Science and Sport Management

#### ***Plant-Based vs. Animal-Based Diet and Their Association with Metabolic Function***

Presentation - [Join now.](#)

4:30pm - 4:45pm

Undergraduate Student(s): Gwyneth Johnson, Andreana Henry

Graduate Student(s): Mara Bryan, Grace Alexander

Research Mentor(s): Katherine H. Ingram

*Diet is a lifestyle factor that influences metabolic health. Recent studies indicate that substituting red or processed meat with whole grains may reduce risk for type 2 diabetes. PURPOSE: To investigate whether metabolic health, assessed by insulin sensitivity and abdominal adiposity, is associated with a higher animal-based and lower plant-based diet. METHODS: Intra-abdominal adipose tissue (IAAT) was measured via ultrasound in 31 normo-glycemic women (ages  $20.9 \pm 2.4$  years, BMI  $28.1 \pm 3.5$ ) who completed ASA24 diet recall and food frequency questionnaire. Insulin sensitivity was assessed using Matsuda Index from a 2-hour oral glucose tolerance test. A diet scoring system was created for consumption of plant-based and animal-based food. Saturated fat (SFAT) was used as a marker for consumption of animal-based foods, and subjects were divided by median into High SFAT or Low SFAT groups. One-way ANOVA was used to test mean differences and correlation analyses were used to determine associations. RESULTS: ANOVA revealed a lower IAAT ( $2.9 \pm 1.1$  vs.  $3.4 \pm 1.1$ ), higher insulin sensitivity ( $15.7 \pm 10.4$  vs.  $8.5 \pm 4.4$ ), and higher % body fat ( $0.41 \pm 0.05$  vs.  $0.37 \pm 0.06$ ) in the Low SFAT group compared to the High SFAT group. When controlled for age and kcal, fiber ( $r=0.43$ ), protein ( $r=0.44$ ), and legumes ( $r=0.45$ ,  $p<0.05$  for all) had positive correlations with insulin sensitivity, while total plant foods ( $r=0.19$ ) and total animal foods ( $r=-0.27$ ,  $p=ns$  for all) had non-significant associations. CONCLUSION: While overall plant-based food consumption was not associated with*



*metabolic measures, insulin sensitivity was associated with an increase in fiber consumption, supporting the benefits of a higher plant-based diet. Though overall FFQ animal-based food consumption had no significant associations with metabolic measures, the Low SFAT group was more insulin-sensitive than the High SFAT group.*

***Age-Related Differences in Absolute and Relative Maximal Strength at Different Velocities***  
Presentation - [Join now.](#)

4:00pm – 4:15pm

Undergraduate Student(s): Michael Cooper

Graduate Student(s): Phuong Ha, Alex Olmos, Benjamin Dalton, Alyssa Bailly

Research Mentor(s): Garrett Hester, Trisha VanDusseldorp, Anton Bryantsev

*Introduction: Examining peak torque (PT) relative to muscle size provides insight on qualitative factors (e.g., fiber type composition, muscle activation) that are influential for maximal strength, yet data is scarcer for higher velocity contractions. Acceleration (ACC) has been proposed to be influenced by similar physiological factors. Purpose: To examine absolute and relative PT, as well as ACC at different velocities in young (YM) and older (OM) males. Methods: Healthy, YM (n=15, age=20.7±2.2 yrs) and OM (n=15, age=71.6±3.9 yrs) performed maximal voluntary contractions at 0°·s<sup>-1</sup> (isometric), 60°·s<sup>-1</sup>, and 180°·s<sup>-1</sup> using a dynamometer. Ultrasonography was used to obtain cross sectional area (CSA) of the vastus lateralis and rectus femoris. Peak torque (PT) was obtained at all velocities, and acceleration (ACC) was recorded at 60°·s<sup>-1</sup> and 180°·s<sup>-1</sup> prior to the load range phase. Relative PT for each velocity was calculated by dividing PT by CSA. Results: CSA was lower in OM (19%, p=0.001). Absolute PT was decreased at all velocities (27-38%, p=0.001 in OM while relative PT (22%, p=0.003) and ACC (11%, p=0.004) were decreased only at 180°·s<sup>-1</sup>. ACC was only correlated with CSA in OM (r=0.59, p=0.02). Conclusion: The smaller CSA in OM was less influential for PT at 180°·s<sup>-1</sup>, thus indicating the importance of other physiological factors for high-velocity strength. A higher contraction velocity was needed to reveal age-related differences for ACC, which is likely due to the greater duration of velocity development. Interestingly, ACC was moderately associated with CSA, but not relative PT.*

***Age-Related Reduction in High-Velocity Power and Myofiber Morphology and Composition***  
Presentation - [Join now.](#)

1:45pm – 2:00pm

Graduate Student(s): Benjamin Dalton, Kaveh Kiani, Phuong Ha, Alex Olmos, Alyssa Bailly

Research Mentor(s): Garrett Hester, Anton Bryantsev, Trisha VanDusseldorp

*Power is diminished more dramatically at higher contraction velocities in older adults. It has been suggested that this may reflect age-related changes in single myofiber morphology or composition. PURPOSE: To examine power, muscle activation, and single myofiber morphology and composition between young (YM) and older (OM) males. METHODS: Power, or torque × velocity, was recorded*

during isokinetic knee extensions at 60°·s<sup>-1</sup> and 180°·s<sup>-1</sup> in healthy, untrained YM (n=15; 20.7±2.2 yrs) and OM (n=15; 71.6±3.9 yrs). The relative increase in power from 60°·s<sup>-1</sup> to 180°·s<sup>-1</sup> was recorded for each participant. Electromyography amplitude of the vastus lateralis (VL) was normalized to its peak from a maximal isometric contraction to calculate muscle activation. VL tissue samples were obtained from a sub-sample (YM=13; OM=11) via microbiopsy and immunofluorescence was used to identify type I and IIa myofibers for subsequent analysis of cross-sectional area (CSA). Independent samples t-tests were used to compare groups and select correlations were assessed. RESULTS: Relative increase in power was greater in YM (159% vs. 115%; p=0.005). Muscle activation was similar between groups (p>0.05). Individual fiber type compositions and CSA were similar between groups (p>0.05), but type IIa:type I myofiber size ratio was lower in OM (-31.15%; p=0.002). Myofiber size nor composition data correlated with the relative power increase (p>0.05). CONCLUSION: OM had smaller type IIa myofibers relative to type I myofiber size, which may reflect age-related motor unit remodeling. Nevertheless, and albeit a smaller sample size, myofiber size nor composition were associated with the age-related diminishment in relative power increase.

## Nursing

### ***Risk for Postoperative Delirium Related to Comorbidities in Older Adult Cardiac Patients: Systematic Review***

Presentation - [Join now.](#)

1:00pm – 1:15pm

Undergraduate Student(s): Christian Briggs, Jade Preston, Mahdi Mofazali, Carolina Gomez  
Research Mentor(s): Mary Dioise Ramos, Jenna Shackelford

*Background/objective:* Delirium is defined as a sudden onset of confusion due to disruption in normal brain functioning. Although highly prevalent in post-operative patients, most significantly the older adult population, limited research exists explaining why its onset occurs. Due to its broadness, this study serves to determine what specific comorbidities contribute to the development of post-operative delirium in older adults after cardiac surgeries. *Methods:* Research was conducted through PubMed and EBSCO. The possible Boolean operators used were “cardiac or post cardiac surgery”, “postoperative delirium or confusion or cognitive decline” and “risk factors or comorbidities or chronic illness or healthy”. Studies were narrowed to a specific group of elderly patients and the occurrence of post-operative delirium after cardiac surgery in those with comorbidities. The following scales were used to determine level of delirium after surgery: DSM5, Confusion Assessment Method, MMSE, Richmond Agitation Sedation Scale, and the Delirium Observation Scale.

*Results:* Thirteen articles were selected for the study. The following comorbidities were identified in the studies: Diabetes mellitus, atrial fibrillation, depression, impaired olfaction, pre-existing cerebrovascular disease, pre-existing cardiovascular disease, insomnia, and frailty. *Conclusion:* Among all of the older adults studied, there was a strong relationship between comorbidities and the development of postoperative delirium.

### ***Exploring Telemedicine and Self-Management Practices of Transitioning Adults with Sickle Cell Disease***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Undergraduate Student(s): Jacqueline Easter

Research Mentor(s): Mary Dioise Ramos, Jenna Shackleford

*Background: Globally over 300,000 are born with sickle cell disease (SCD), over 100,000 children are in the US. SCD is an inherited blood disease that is associated with morbidity and early death. Despite the research to date on self-management practices for young adults, little is known how telemedicine can impact the quality of life of young adults with SCD. Objective: The aim is to evaluate the most recent evidence in the literature to determine how young adults with SCD use telemedicine as part of self-management to increase their quality of life. Methods: A systematic review of the literature in 3 bibliographic databases, using key search terms, sickle cell Disease, transition adults, self-management, telemedicine considering only articles published from 2015 - 2020. The Preferred Reporting Items for Systematic Reviews guideline was followed. Results: A total of 26 records were identified from the combined electronic searches, and 4 records were removed as duplicates. A total of 22 full articles were further assessed for eligibility, 13 articles met the review criteria. Self-management is central to transition adults with sickle cell disease; telemedicine services can close the gaps related to the challenges of self-management strategies. Conclusions: Telemedicine clinical practices can enhance self-management strategies and promote treatment plans that can improve quality of life for transition SCD adults.*

### ***Effects of Exercise Training on Lung Function and Quality of Life in Pediatric Patients with Asthma***

Presentation - [Join now.](#)

3:30pm – 3:45pm

Undergraduate Student(s): Mia Mantooth, Haley Hufstetler, Brittany Graffagnino, Taylor Clark

Research Mentor(s): Jenna Shackleford, Mary Dioise Ramos

*Background: Asthma is a chronic condition characterized by wheezing, shortness of breath, chest tightness, and coughing. Due to the widespread prevalence of asthma in pediatric patients, there is a need to understand the effectiveness of holistic treatment options on quality of life (QOL), including the use of physical activity and respiratory training, for pediatric patients diagnosed with asthma. Objectives: This systematic review aimed to evaluate the effectiveness of exercise training on lung function and QOL among pediatric patients diagnosed with asthma. Method: A systematic literature review was conducted using the databases PubMed, The Cochrane Library, and CINAHL to identify eligible studies. Studies were systematically retrieved utilizing a search strategy with specific inclusion*

*and exclusion criteria for studies. After full analysis and appraisal of the research, six studies were included in the final systematic review. Results: Data were analyzed from pulmonary function tests, questionnaires, anthropometric measurements, and severity of asthmatic symptoms following intervention of exercise training in pediatric patients diagnosed with asthma. Findings suggested improved lung function and QOL for pediatric patients diagnosed with asthma. The quality of evidence varied among the articles used, indicating a need for further research.*

*Conclusion: The systematic review demonstrates that participation in respiratory training and physical activity strengthens lung function in pediatric patients who are diagnosed with asthma. Overall, studies indicated improved pulmonary function, reduction in airway inflammation, and enhanced QOL.*

### ***Educational Effects on Self Care in Pediatric Type 1 Diabetes: A Systematic Review***

Presentation - [Join now.](#)

4:00pm – 4:15pm

Undergraduate Student(s): Donita Culda, Kaleigh Gerasimek, Hannah Shuman, Paris White  
Research Mentor(s): Jenna Shackelford, Mary Dioise Ramos

*Introduction: Type 1 Diabetes affects people of all ages including children, which requires large amounts of daily care activity by their caregivers until they are able to perform their own self-care. Family members are essential in providing care and maintaining proper Hemoglobin A1c levels in children. The aim of the systematic review was to evaluate the effectiveness of family centered education to improve self-care and self management for children with type 1 diabetes. Methods: An electronic search was conducted on PubMed and CINAHL using boolean phrases, with an initial search beginning in September 2020. Results: Thirteen quantitative articles were selected and appraised. Several educational techniques were used to educate about hyperglycemia and hypoglycemia interventions as well as daily maintenance intervention teaching. Generally, A1c levels were unchanged following intervention, but showed short term improvement of glucose control and a decrease in visits to the emergency department, hospital admissions, and length of hospital stay. Conclusion: This systematic review demonstrated that family or patient centered education in adolescents may be helpful in promoting self management of care in adolescents, but additional research is needed to determine if this intervention may improve overall self-care for children with Type 1 Diabetes.*

### ***Impact of Social Support in Quality of Life and Caregiver Strain among Older Adults with End-Stage Dementia***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Undergraduate Student(s): Dao Nguyen, Hien Ho, Tyesha Mapp  
Research Mentor(s): Mary Dioise Ramos, Jenna Shackelford

*Introduction: Family caregivers who take care of end stage dementia patient often experience high caregiver burden. This study aims to review the impact of social support affects caregiver strain and*

*quality of care of older people with end-stage dementia. Methods: The systematic review was done by using the PubMed and CINAHL database for the search. The strings of keywords included “dementia”, “social support”, “family caregiver”, “quality of care” in research databases. Results: A total 323 articles were chosen for literature review. However, 317 of them were excluded due to reviewing title and abstract, not included social support or community support or hospice, and not end-stage dementia. 5 articles were selected for the systematic review which included 3 qualitative studies and 2 quantitative studies. It was found that social support does have an impact on caregiver strain and quality of care. Conclusion: The effect of social support was beneficial in improving family caregiving strain and quality of care.*

### ***Effects of Exercise Interventions in Older Adults with Alzheimer’s Disease***

Presentation - [Join now.](#)

1:15pm – 1:30pm

Undergraduate Student(s): Rachel Sellers, Orasio Torres, Enrique Gaytan

Research Mentor(s): Mary Dioise Ramos, Jenna Shackelford

*Alzheimer’s disease (AD) is a progressive disease that destroys the neurons of the brain leading to memory loss and confusion. A systematic review of randomized control trials and quasi-experimental studies was conducted to answer the question “In adults with Alzheimer’s disease, how does exercise intervention compared to a sedentary lifestyle affect outlook on life?” Methods: Search of the bibliographic databases PubMed and Cochrane Library were used to identify studies published between 2015-2020 that studied the impacts of exercise intervention on patients with Alzheimer’s disease. 471 total articles were originally identified, but only five directly addressed the research question. Results: There are mixed results on the impacts of aerobic and postural exercises, with some improving quality of life and others having no impact on quality of life. Conclusion: Exercise interventions, including aerobic and postural exercises, may improve quality of life among patients with Alzheimer’s disease.*

### ***Family and Caregiving Strain in Pediatric Patients Leukemia***

Presentation - [Join now.](#)

2:45pm – 3:00pm

Undergraduate Student(s): Samantha Evans, Hannah Montondo, Eileen Vilceus

Research Mentor(s): Jenna Shackelford, Mary Dioise Ramos

*Background: Childhood cancer takes a mental toll on not only the pediatric patient, but on the entire family’s mental, physical, emotional, and social health states as well. When a child is diagnosed with cancer, the family must learn to adjust to their new life, learn about their child’s diagnosis, and adapt to positive coping mechanisms to best salvage their healthy lifestyle practices. Objective: Our aim was to explore research in regards to positive vs. negative coping strategies to begin to find the correlation between coping and caregiver’s health states and overall quality of life. Methods: Our systematic literature review was carried out by following the recommended guidelines of a PICOT question*



*formation, PRISMA guidelines, and search strategies methods. After reviewing five peer reviewed journal articles with mixed evidence type strategies found on PubMed and CINAHL, it was found that positive coping mechanisms had a lasting positive affect on parents and caregivers of children with a cancer diagnosis and treatment plan. Conclusion: Our findings indicated that there is an array of interventions, including increased education and available resources, that can take place to overcome the emotional and mental distress that comes along with a chronic illness. Keywords: Pediatrics, leukemia, family strains, mental health, coping mechanisms, positive coping, family anxiety, family stress, unhealthy coping, family quality of life.*

### ***Effective Communication in Healthcare***

Presentation - [Join now.](#)

1:30pm – 1:45pm

Undergraduate Student(s): Gabriela Reilly

Research Mentor(s): Christie Emerson

*Effective communication between interdisciplinary providers is a significant aspect of healthcare, and the level of efficacy, or lack thereof, can impact patient safety and satisfaction. One important problem that will be the focus of this project is the issue of ineffective communication in the interprofessional workplace environment at various hospital units. Major healthcare accrediting agencies have identified communication between staff members as a safety issue. This problem can only be resolved when all healthcare providers are in agreement with regards to patient health and specific interventions such as treatments and procedures. This project was a thorough review of the current literature and a proposal for the steps required for an evidence-based intervention. To improve this problem, the proposed intervention includes an increase in widespread and devoted use of consistent communication techniques, combined with a measure of documentation accountability between healthcare disciplines. Employing the use of these interventions will increase the likelihood of a timely and effective transfer of important information, as well as promote an increase in overall patient safety and satisfaction. There is always room for improvement in communication, especially in an industry where the lives and health of people are directly affected.*

## **Social Work & Human Services**

### ***Examining the Relationship between African-Americans and their Physicians***

Presentation - [Join now.](#)

4:15pm – 4:30pm

Undergraduate Student(s): Genesis Weever

Research Mentor(s): Darlene Xiomara Rodriguez

*For years, there has been a bad history amongst the relationship between African Americans and their fellow medical institutions. Many African Americans do not believe that medical professionals have*

*their best interest at heart. Oftentimes, their white counterparts may receive better care, even when they have the same condition. Many African Americans may even face barriers that their white counterparts will not experience and will be denied access to healthcare. This results in more deaths and critical illnesses of African Americans. In order to discover the underlying problem and a possible solution, a review of the literature was initiated. Using a literature matrix and reviewing peer-reviewed articles, information was gathered to determine what the underlying issue is regarding the relationship between African Americans and their healthcare resources. Using this information, a hypothesis was developed to address this issue, so that the relationship of African Americans and healthcare providers will improve. With an improved system, African Americans will be able to receive the proper healthcare that they need. Therefore, conclusions, based on a preliminary literature review is how African Americans perceive and experience interactions with healthcare providers and the medical field. This session will relay the process that has been undertaken to identify these sources and the preliminary observations.*

### ***Health Equity and Immigrant Populations: A Literature Review***

Presentation - [Join now.](#)

1:45pm – 2:00pm

Undergraduate Student(s): Tram Nguyen

Research Mentor(s): Darlene Xiomara Rodriguez

*Objective: Immigrants across the U.S. face many challenges when migrating, including achieving health equity. This literature review is focused on identifying patterns of health disparity among immigrant communities and making recommendations for policy and practice. Methods: Utilizing the following keywords: health equity, health disparity, immigrant, immigration, community and individual wellbeing, health equity framework, Latino, Asian, refugee, and undocumented communities within EBSCO Host Databases resulted in 56 articles that were published between 2002-2019. For the purposes of this paper, I examine the first decade (2002 to 2011) of sources, which equal 13 articles on the subject. The analysis of the articles was completed by using a literature review matrix. Results: Studies have shown that it is difficult for Hispanic and Asian immigrants to obtain health insurance. Among immigrant populations, there is also widespread lack of preventative and chronic health information. The most notable barriers are language differences, availability of health services, and the mounting costs for health care. These articles collectively demonstrated the important role one's immigration status and socioeconomic status have in determining one's health coverage. Conclusions: This literature review is part of a larger data-gathering project. The information obtained from this process, will not only inform a conceptual paper, but also how best to approach a community-based participatory research initiative to understand the health priorities of immigrant communities. Our aim is to make recommendations for policy and practice, which will inform the creation of a grant-funded Train-the-Trainer Program to improve health equity efforts among immigrant populations.*

### ***A Review of Grey and Academic Literature on Program Evaluations for Public, Private, and Nonprofit Sector Agency Use***

Presentation - [Join now.](#)

4:30pm – 4:45pm

Graduate Student(s): Eliza Galvez

Research Mentor(s): Darlene Xiomara Rodriguez

*Decision-makers, community members, and the general public want to ensure that programs are accomplishing their established purpose. Many methods can achieve this; however, the most effective way is through program evaluations. While there is plenty of information regarding program evaluations, little information is offered on what a program evaluation is from both a practitioner and an academic standpoint. This is essential information for organizations planning to have a successful program evaluation. We use Welcoming America, an Atlanta-based nonprofit organization engaged in a community-university partnership by launching the One Region Initiative in 2018. The national pilot is an effort to increase local immigrant integration efforts throughout the region. After two years of investment in this work, a formal evaluation is being initiated. However, before engaging in the evaluation process, the steering committee for this initiative, who are members from all sectors, need to have a shared understanding of what evaluation is. Thus, the purpose of this research is to inform how a program evaluation is structured and carried out from both standpoints, and how that can serve public, private, and nonprofit sector agencies and apply that knowledge for those who work with foreign-born, immigrant, and mixed immigrant families and communities. A literature review matrix was constructed consisting of 50 gray and academic literature about program evaluation. Utilizing the matrix method, themes and patterns were identified, including how practitioners and researchers discuss and engage in program evaluation. This informed the creation of a practitioner toolkit to guide community-members on the evaluation process to facilitate implementation. This toolkit will be used by the One Region steering committee to guide their evaluation efforts in 2021. During this session, participants will learn about program evaluation from a practical application and theoretical understanding, by using the One Region Initiative as a case study.*

### ***Understanding the Impact of Racism in Healthcare and How it is Affecting African American Women***

Presentation - [Join now.](#)

3:45pm – 4:00pm

Undergraduate Student(s): Magdalene Boadu

Research Mentor(s): Darlene Xiomara Rodriguez

*Healthcare is the most sacred part of every person's life and should be accessible. However, the experience for many is that "you either got it or you don't". A way to help "get it" is through workplace insurance, however, this is not accessible to many. This is especially the case for minority communities who cannot afford insurance plans, if and when offered by their employers, or other alternatives for accessing affordable health care. The terms "affordable and health care" are a paradox, for African American women. Because of this, it is very difficult to obtain coverage for basic needs, rendering Black*

women to choose their families' health over their own. The purpose of this session is to report on exploratory research using published articles regarding African American women's experience with the health care system. Research regarding their experience varies from personal stories to data surrounding similar death stories. Based on our initial exploration, there appears to be implicit and explicit bias against African American women, especially in prenatal and post-partum care. This may be a contributing factor as to why the pregnancy-related mortality ratio of African American women older than 30 was four to five times as high as it was for white women (CDC, 2019). Although we are at the initial stages of this research, there seems to be a connection between insurance coverage, health care access, and prenatal and post-partum care. There has been a growing number of deaths of African women giving birth and it is happening at an alarming rate. Birth although is very dangerous, compared to other races the numbers differ at a large sum and it is a concern for many. We surmise that this connection is deeper and is rooted in systemic racism in the country's health care system; a system that does not believe Black Lives Matters ... from conception.

### ***Best Practices in Volunteer Management for Cherokee Family Violence Center***

Presentation - [Join now.](#)

2:45pm – 3:00pm

Undergraduate Student(s): Andi Edwards

Research Mentor(s): Jennifer Wade-Berg

Volunteer programs have long been utilized by the nonprofit sector to meet growing societal needs in a cost-effective manner. However, many organizations remain unaware or resistant to volunteer management protocols that could potentially increase agency capacity and reach. Based upon existing research, industry best practices, and organizational changes needed in light of COVID-19, this project evaluates the importance of effective volunteer management as a capacity building exercise for nonprofits. The data collected were used to develop a volunteer management manual for Cherokee Family Violence Center (CFVC), a domestic violence service agency in north metropolitan Atlanta. The overarching research question examined was How does an effective volunteer management program impact operation of a nonprofit agency? Utilizing existing literature on volunteer management and retention, capacity building, and management practices along with a descriptive analysis of past CFVC volunteer surveys, a volunteer management manual was produced for the agency. The literature suggested it was important to create a manual that streamlined the volunteer onboarding process. Materials must also encourage volunteer investment by presenting opportunities for personal development and recognition. The manual centered around the operational needs of the agency and incorporates industry best practices and procedures. In the case of CFVC, the volunteer management manual can be utilized to present basic onboarding information and forms to individuals interested in serving this population, allowing volunteers to feel engaged from the beginning of their onboarding process. The project findings indicate that volunteer management is most effective when coupled with open communication, access to critical information, personal development opportunities, and rewards.

*As the needs of CFVC change, the manual should be updated to include policies and procedures deemed critical to agency, client, and volunteer health and safety.*

### ***A Social Media Marketing Strategy for a Collaborative Nonprofit***

Presentation - [Join now.](#)

2:30pm – 2:45pm

Undergraduate Student(s): Katherine Sullivan

Research Mentor(s): Jennifer Wade-Berg

*The Bartow Collaborative's mission is to have "a community of partnerships, with common goals addressing the challenges facing Bartow County's children and families" (Bartow Collaborative, 2018, para. 1). Social media began growing in popularity in the early 2000s and is now used for marketing to develop and share posts created about the organization to meet the goals and further the mission of the organization (ProLiteracy, 2020). "Utilizing various social media networks promotes increased traffic to your website, higher conversation rates, raised brand awareness, and improved and consistent communication and interaction with your organization's target audiences" (ProLiteracy, 2020, p. 2). The research question addressed is "how does social media marketing impact nonprofit organizations? This social media marketing strategy, constructed for Bartow Collaborative Inc., will be to promote the online resource directory that was created in 2017. A literature review was conducted of the best practices of social media marketing in nonprofit organizations, qualitative interviews, and quantitative surveys were conducted to understand marketing in use by other Collaboratives in Region 1 and the surrounding counties. From this, the aspects needed to create a successful social media marketing strategy were understood. This capstone project comprises the elements of marketing, social media, branding, market orientation, internal marketing, relationships, collaborations, promotion, and fundraising to create the social media marketing strategy to promote the online resource directory and the Collaborative. This will raise the community awareness of the online resource directory, so people know of resources available to them. Overall, marketing integrated with social media is a crucial aspect for nonprofits to be successful in the everchanging environment.*

### ***Using Social Media to Promote Awareness of HIV and AIDS in Children: Education and Community Resources***

Presentation - [Join now.](#)

4:30pm – 4:45pm

Undergraduate Student(s): Savannah Lawrence Barnett

Research Mentor(s): Jennifer Wade-Berg

*In this day and age, social media is critical to the success of a company whether it be for-profit or nonprofit. Eighty (80) percent of nonprofits use Facebook and 70 percent use Twitter worldwide which means that agencies who opt not to use social media are missing out on free to low-cost advertising and community engagement/ awareness (Domingues, Lopez, & Astudillo, 2016). No matter the business*



*model or tax status, the way a company gains social media attention stays consistent in terms of what to post, how often, and the overall aesthetic and graphics that go along with the posts. H.E.R.O. for Children, Inc. is a nonprofit 501 (c)(3) organization in Roswell, Georgia that is intending to expand their reach on social media (i.e., Facebook, Twitter, and Instagram) and shift the content from intimate interactions with current clients to overall public education of pediatric HIV/AIDS. The deliverable provided to H.E.R.O for Children, Inc. consists of social media post templates, a suggested posting schedule, relative hashtags to reach a broad audience, recommendations on next steps for the agency, and literature-based research to inform them on the nuances and algorithms of social media. The findings from the literature review and observations of social media trends support the notion that social media platforms are useful for promoting advocacy, growing a client base, increasing fundraising and stakeholder involvement, and destigmatizing HIV/AIDS in children. The deliverable will ensure posts are visually appealing, posting happens at specific times with potential to reach the greatest audience, and that the content is consistent with the mission/vision and engaging to the audience.*

### ***Children Coping with Domestic Violence***

Presentation - [Join now.](#)

2:00pm – 2:15pm

Undergraduate Student(s): Sammie Fairbanks

Research Mentor(s): Jennifer Wade-Berg

*According to the national domestic violence hotline (2020), domestic violence “(also referred to as intimate partner violence (IPV), dating abuse, or relationship abuse) is a pattern of behaviors used by one partner to maintain power and control over another partner in an intimate relationship” (National Domestic Violence Hotline, 2020). Domestic Violence is everywhere and unfortunately does not discriminate. Cherokee Family Violence Center is a nonprofit organization working towards ending domestic violence. Their mission is “to enhance the safety of those impacted by intimate partner violence through services that empower victims while advocating for a community standard of zero tolerance for violence in the home” (Cherokee Family Violence Center, 2020). The Emergency Shelter Director is looking to implement a new program to help children cope with the trauma that they have experienced as a result of domestic violence. Child advocates will meet with the children and implement activities that help with anger management and coping skills. The overall goal of this program is to assist children living in the Emergency Shelter cope with their current and past trauma caused by domestic violence. In order to achieve this goal, qualitative and quantitative data is gathered through interviews and questionnaires in order to establish a multi-disciplinary approach to children that have been affected by domestic violence. Through these questionnaires, the parents will be able to give an accurate description of how the child is responding to the program and how effective the child’s coping mechanisms are as a result of participating in the program. Through this program design, overall support, coping mechanisms, structure, health, and self-esteem will be enhanced and drastically improved.*