Spring 2023

# 2023- The Twenty-seventh Annual Symposium of Student Scholars

# 27th ANNUAL SYMPOSIUM OF STUDENT SCHOLARS

APRIL 17-21
2023

**Tuesday April 18, 2023**
**Oral Presentations and Performances**

**10:00am to 5:00pm**
**Check in at ALC 5500, Kennesaw Campus**

**10:00am-10:15am Session 1**

- ALC 2203: Elementary & Early Childhood Education
- ALC 3200: Robotics & Mechatronics Engineering
- ALC 4103: English
- ALC 5104: History & Philosophy

**10:20am-10:35am Session 2**

- ALC 3200: Robotics & Mechatronics Engineering
- ALC 4102: Mechanical Engineering
- ALC 4103: English
- ALC 5104: History & Philosophy

**10:40am-10:55am Session 3**

- ALC 2203: Psychological Science
- ALC 3200: Robotics & Mechatronics Engineering
- ALC 4102: Mechanical Engineering
- ALC 4103: English
- ALC 5103: Molecular & Cellular Biology
- ALC 5104: History & Philosophy

**11:00am-11:15am Session 4**

- ALC 1200: Chemistry & Biochemistry
- ALC 2203: Psychological Science
- ALC 3200: Robotics & Mechatronics Engineering
- ALC 4102: Mechanical Engineering
- ALC 4103: English

**11:20am-11:35am Session 5**

- ALC 1200: Chemistry & Biochemistry
- ALC 2203: Psychological Science
- ALC 3200: Robotics & Mechatronics Engineering
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: English

**11:40am-11:55am Session 6**

- ALC 1200: Chemistry & Biochemistry
- ALC 2203: Health Promotion & Physical Education
- ALC 3200: Electrical & Computer Engineering
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Industrial & Computer Engineering

**12:00pm-12:15pm Session 7**

- ALC 1200: Chemistry & Biochemistry

- ALC 2203: Nursing
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Computer Science

**12:20pm-12:35pm Session 8**

- ALC 2203: Nursing
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Computer Science

**12:40pm-12:55pm Session 9**

- ALC 2101: History & Philosophy
- ALC 2102: Communication
- ALC 2106: Theatre & Performance Studies
- ALC 2203: Exercise Science & Sport Management
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Computer Science

**1:00pm-1:15pm Session 10**

- ALC 2101: History & Philosophy
- ALC 2102: Communication
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Engineering Technology

**1:20pm-1:35pm Session 11**

- ALC 2101: History & Philosophy
- ALC 2106: Art & Design
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Engineering Technology

**1:40pm-1:55pm Session 12**

- ALC 2106: Art & Design
- ALC 4102: Molecular & Cellular Biology
- ALC 4103: Engineering Technology

**2:00pm-2:15pm Session 13**

- ALC 2106: Theatre & Performance Studies
- ALC 3200: Elementary & Early Childhood Education
- ALC 4103: Electrical & Computer Engineering
- ALC 4200: Chemistry & Biochemistry

**2:20pm-2:35pm Session 14**

- ALC 1200: Chemistry & Biochemistry
- ALC 2106: Theatre & Performance Studies
- ALC 3200: Elementary & Early Childhood Education
- ALC 4102: Mathematics

- ALC 4103: Mechanical Engineering
- ALC 4200: Chemistry & Biochemistry

**2:40pm-2:55pm Session 15**

- ALC 2106: Theatre & Performance Studies
- ALC 3200: Educational Leadership
- ALC 4103: Mechanical Engineering
- ALC 4200: Chemistry & Biochemistry

**3:00pm-3:15pm Session 16**

- ALC 2106: Theatre & Performance Studies
- ALC 3101: History & Philosophy
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Mechanical Engineering
- ALC 4200: Chemistry & Biochemistry

**3:20pm-3:35pm Session 17**

- ALC 2106: Theatre & Performance Studies
- ALC 3101: History & Philosophy
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Mechanical Engineering
- ALC 4200: Chemistry & Biochemistry

**3:40pm-3:55pm Session 18**

- ALC 3101: History & Philosophy
- ALC 3200: Civil & Environmental Engineering
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Mechanical Engineering
- ALC 4200: Physics/Chemistry & Biochemistry
- ALC 5102: English

**4:00pm-4:15pm Session 19**

- ALC 2106: Geography & Anthropology
- ALC 3101: History & Philosophy
- ALC 3200: Civil & Environmental Engineering
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Molecular & Cellular Biology
- ALC 5102: English

**4:20pm-4:35pm Session 20**

- ALC 2106: Government & International Affairs
- ALC 3101: History & Philosophy
- ALC 3200: Architecture
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Molecular & Cellular Biology

- ALC 5102: English

**4:40pm-4:55pm** **Session 21**

- ALC 3101: History & Philosophy
- ALC 3200: Architecture
- ALC 4102: Electrical & Computer Engineering
- ALC 4103: Ecology, Evolutionary, & Organismal Biology
- ALC 4200: Molecular & Cellular Biology

**Thursday April 20, 2023** **10:00am to 5:00pm**
**Posters and Visual** **Check-in at Convocation Center Floor**
**Arts Displays**

| | |
|---|---|
| 10:00am-10:45am | Session 1 |
| 11:00am-1:45am | Session 2 |
| 12:00pm-12:45pm | Session 3 |
| 1:00pm-1:45pm | Session 4 |
| 2:00pm-2:45pm | Session 5 |
| 3:00pm-3:45pm | Session 6 |
| 4:00pm-4:45pm | Session 7 |

**Friday April 21, 2023** **12:00pm to 5:00pm**
**Virtual Presentations**

# Bagwell College of Education

## Educational Leadership

***Grappling with Our Grief: An Exploration of the Impact of COVID-19 on the Experiences of First-Year College Students***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
2:40pm-2:55pm
Undergraduate Student(s): Sarah Hampton, DeCarlos Mckinney, Christopher Gardner, and Zoe Brown
Graduate Student(s): Cristen Canavino
Research Mentor(s): Chinasa Elue

*The challenges that have emerged in recent years have raised concerns about student attrition in higher education. The COVID-19 pandemic, social justice movements, and political climate have had unprecedented impacts on college students (Borgstrom & Mallon, 2022). One of the main issues is the increasing mental health crisis in higher education, which requires immediate attention (Lee et al., 2021). Additionally, students face significant challenges such as financial constraints, food and housing insecurity, and other obstacles that affect their college experiences (Duke et al., 2021). Freshman students may have unique experiences as their high school education may have been remote, hybrid, or in-person with varying security measures, complicating their college transition. First-year students may have experienced grief, loss, and trauma during the pandemic, requiring special attention to the resources and support needed to complete their degrees as we navigate this post-pandemic contexts (Sirrine et al., 2021). The lingering effects of pandemic-related trauma are still affecting the college experiences of first-year students and their ability to achieve academic and professional goals. Therefore, our research explored the lived experiences of first-year college students through a qualitative research design using focus groups. The research question explored in our study is: How or to what extent has grief and trauma from COVID impacted the educational journeys of first year students? The purpose of this research was to provide an important opportunity to investigate how to better support college students as they navigate college and find ways to support their success.*

## Elementary & Early Childhood Education

***Censorship in Early Childhood: Analyzing Banned Latinx Picture Books***

Oral Presentation (ALC 3200)
Tuesday April 18, 2023
2:00pm-2:15pm
Undergraduate Student(s): Jennifer Perez-Castellanos and Grace Soto
Research Mentor(s): Sanjuana Rodriguez

*Book bans have historically been used to limit the types of books that students have access to. The years 2021 and 2022 have given rise to book challenges and book bans in the United States. Much of the focus has been on young adult literature, but there have also been a growing number of children's books that are being banned. Using critical content analysis (Johnson, Mathis, & Short, 2017) this study examines Latinx children's picture books that have been banned in 2021-2022 in schools/school districts and that include Latinx content according to the Cooperative Children's Book Center. Findings from this study will provide information about the characteristics (language, topics, experiences) of picture books that have been banned.*

***Embark on a "Journey": A Case Study of Recruiting and Retaining Honors Students in Teacher Education Majors***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023
10:00am-10:15am
Undergraduate Student(s): Mary Watts & Misaki Onohara
Research Mentor(s): Stacy Delacruz & Ethel King-McKenzie

*Teaching is one of the most important jobs in society. A job that is not only about educating the next generation, but inspiring children to choose fields of interest. This means it is important to keep teachers engaged in their education and encourage them to take advantage of the resources they have access to. So why don't education majors always take advantage of their resources? We are going to investigate what motivates teacher education major students to apply for the Journey Honors College, and what prompts them to stay in the program. Nationally, teacher education programs in institutions of higher education are facing a decline in enrollment (Will, 2022). Does this declining trend apply to teacher education majors who are also in Honors programs in institutions of higher education? The experiences of these students at KSU will be studied using a case study approach. Our research will explore the reasoning behind why more freshman in teacher education majors do not apply for the Honors program at KSU (a survey was developed and sent to all freshmen education interest majors who were eligible for but did not apply for the Honors program), and we collected interview data from those freshmen who are a part of the Honors program on what recruitment strategies, continued support, resources, and other tools have kept them involved and helped them progress in the Honors program. Data is currently being analyzed and the findings will be shared.*

***Experiences of Latinx Pre-Service Teachers in the State of Georgia***
Poster #21 (Convocation Center)
Thursday April 20, 2023
12:00pm-12:45pm
Undergraduate Student(s): Brittany Aguilar, Libna Amaro, and Rosa Diaz-Jarquin
Research Mentor(s): Sanjuana Rodriguez and Paula Guerra

*This study examines the experiences of Latinx Pre-service teachers in colleges of education in the state of Georgia, a state in considered to be part of the New Latinx South. Aligned with critical scholarship, this survey study seeks to learn about what support pre-service teachers are receiving, what they need, and what barriers they encounter in their journey to becoming teachers. Results from this study suggest that colleges provide limited support for Latinx pre-service teachers. Implications for research and practice are provided.*

***Home in Intersectional Contexts: Content Analysis of Children's Picture Books***
Poster #12 (Convocation Center)
Thursday April 20, 2023
12:00pm-12:45pm
Undergraduate Student(s): Rachel Abrams
Research Mentor(s): Jinhee Kim

*Childhood is socially and culturally constructed (Kennedy & Bahler, 2017). Children notice various representations in books, and they affect how children see themselves and their self-esteem (MacArthur & Poulin, 2011). This study examined how children's picture books address gender representation, centering on girls associated with toys, clothes, and language use. We focused on how dominant whiteness is penetrated through girlhood regarding the protagonists' dolls. For the book selection, we used keywords to search for the books and narrow down the selected books; the keywords and phrases were 'family', 'home', 'gender', 'gender roles', 'toys', and 'dolls.' we initially searched for over 100 picture books. addition, through multi-layered book selection criteria such as publication years (from 2000 to the present), age levels (preK-5th graders), and fiction with human characters, out of our initial search of over 100 books, we selected twelve books for analysis based on our criteria. We analyzed the picture books through content analysis (Johnson et al., 2016) and illustration analysis (Keifer & Tyson, 2010). The analytic codes we identified were toys and dolls, family structures, stereotypes (meaning that these books either reinforced stereotypes or had content that challenged stereotypes), and parents' gender roles for girl protagonists. We found that dolls are employed to transmit "femininity and maternity" (Forman-Burnell, 2021) for girl protagonists. We also found that dolls function as the catalyst to deliver the discourses of (white) femininity and maternity in the selected books and that girls with diverse backgrounds are underrepresented. This study provides critical insight into what books teachers and parents would select and how they address gender representation to empower children. This study also suggests*

*that authors and illustrators of children's picture books should pay attention to the lack of representation of girls, especially girls with diverse backgrounds in picture books.*

***Women Suffragist in Elementary Education***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
2:20pm-2:35pm
Undergraduate Student(s): Emily Polaski
Research Mentor(s): Sohyun An

*A traditional narrative of women suffrage tends to begin with the Seneca Falls Convention of 1848 in which Elizabeth Cady Stanton and other activists gathered to discuss women's rights. From there, the story goes, Susan B. Anthony and many other white women waged a decades-long campaign, and finally in 1920, the 19th Amendment gave all women the right to vote (Cahill, 2020). This feel-good story is a vast oversimplification. First, the traditional narrative omits the influence of Indigenous women, whose power and status in their tribal nation had inspired the white suffragists. Second, the 19th Amendment applied to women of U.S. citizens only; therefore, it did not give voting rights to many Asian and Indigenous women who could not become US citizens until 1952 and 1924 respectively. The 19th amendment also meant nothing for most Black and Latinx women because the white power used various voter suppression tactics to keep them from the polls (Jones, 2020). Third, besides white women, there were countless women of color who actively fought for women's suffrage (Cahill, 2020). Fourth, racism was not uncommon in the suffrage movement a many white suffragists, for example, excluded Black women from joining their suffrage clubs (Jones, 2020). My research investigated whether the Georgia's social studies curriculum standards present this more complex and richer story of women suffrage. I used a content analysis method to analyze the official document from the standards and associated curriculum materials. The primary finding is that GA standards upheld the white-centric, traditional narrative. Research implications for teaching critical, accurate history of women's suffrage will be presented.*

## Inclusive Education

***Korean Dual Language Immersion Programs: Perspectives of Parents, Students and Teachers as Stakeholders***
Poster #8 (Convocation Center)
Thursday April 20, 2023
12:00pm-12:45pm
Undergraduate Student(s): Bridgett Stafford and Nicole Rivera
Research Mentor(s): Jayoung Choi

*While dual language immersion (DLI) programs are relatively new in the United States, they have been heavily researched. However, the majority of the research focuses on Spanish and Mandarin programs. Korean, as a less commonly taught language (LCTL) and a language with a different typography as English has not been thoroughly researched. Being a LCTL, there are possible cultural and social factors that influence the program. There are also concerns that because Korean has a different typography as English, it would take more time to learn and maintain, causing differing results from programs that share the English typography. Despite Korean DLI programs becoming more popular in recent years, the programs are still underrepresented and under researched. This study follows a new Korean DLI (K DLI) program at an elementary school in Georgia. As a K-DLI program, half of the academic instruction is in English, while the other half is in Korean. Some of the parents are of immigrant descent, while others are not. There are five K-DLI teachers and one Korean specials teacher. The program holds a very diverse population in each of the stakeholder groups. Each group is likely to have differing expectations for the program that are rooted in their social and cultural identities.*
*This study aims to better understand Korean Dual Language Immersion programs in the U.S., and how Korean as a language and culture particularly affects what and how the language is taught. We also explore how this particular type of instruction impacts the students and their academic performances.*

***Promoting Bilingualism in Ethnolinguistically Minoritized Children: Perspectives from Two Vietnamese Bilingual Coaches in South Korea***
Poster #9 (Convocation Center)
Thursday April 20, 2023
12:00pm-12:45pm
Undergraduate Student(s): Seongyo Gwon
Research Mentor(s): Jayoung Choi

*The dominant assimilation practice and policies in South Korea have translated into monolingual, Korean-only practices in all aspects of the society. Nevertheless, it is worth noting that the major recent government policies reflect an assets-based perspective on immigrant mothers' heritage languages (HLs) and their children's potential bilingualism. Since 2015, bilingual coaching services have been provided for multicultural families under the initiative called Bilingual Education Environment Fostering Plan. Bilingual coaches with immigration backgrounds educate the families about bilingual education, teach parents strategies about interacting with preschool children in their first language, foster a community for the families, and provide further guidance to families about bilingual. Given most children continue to be deprived of the right to acquire mother tongue in the South Korean context, initiatives like bilingual coaching program hold promise. Examining how it is implemented from the perspective of the practitioners could help sustain a well-intended program, which contributes to the children's bilingual and bicultural development. The current study aims to explore perspectives and experiences of bilingual coaches*

*who work at local Health Family Support Centers across South Korea. Data primarily collected from individual interviews with seven bilingual coaches from China, Japan, and Vietnam, and I focused on two Vietnamese bilingual coaches' perspectives. Thematic coding method yielded that the coaches emphasized the immigrant mothers' dedication to bilingual education as the most important factor in promoting bilingualism in the family. They also drew on their own experiences as immigrants in South Korea when coaching other families. While they found the work rewarding, they also pointed out challenges, such as heavy caseloads, not having expertise in early childhood education, and having to coach families in whose language they do not have proficiency. The ongoing research has implications for policies, programs, and practices for multicultural families and children beyond the South Korean context.*

***Uncovering Trilingual Development and Multilingual Literacy Practices in the United States: A Review***

Poster #10 (Convocation Center)
Thursday April 20, 2023
12:00pm-12:45pm
Undergraduate Student(s): David Posada
Research Mentor(s): Jayoung Choi

*Trilingual literacy practices in the United States have not been widely researched. When evaluating the benefits of trilingualism, most of the ongoing conversation has largely concentrated on theories of subtractive and additive bilingualism, which have been recently identified as inadequate to explain the complexity of literacy development in children who are born in a trilingual home. It is hypothesized that there is a staggering gap in how much is known about learning strategies and multilingual literacy instruction for trilingual children in the United States. Using the framework of language rights in the context of inclusive education, the proposed research aims to conduct an integrative literature review to report the existence of empirical studies devoted to understanding trilingual development and multilingual education. This review encompasses literacy practices from newborn children to adolescence and it is limited to education exclusively in the United States of America. Analysis and synthesis of primary sources will include empirical and experimental studies while theoretical literature will be excluded. Several databases will be accessed such as PubMed, Web of Science, and PsychINFO. Keyword generation will include multilingual, trilingual, child development, education, literacy, and United States. Considering that "families still live in a multilingual world of vanishing languages as many languages are dying while many others are being marginalized" (Skutnabb- Kangas et al., 2009), the goal of this research is to uncover the challenges that different groups with rich linguistic backgrounds experience as their multi-lingual repertoires are adversely limited by a persistent tradition of monolingual ideology in which the North American education system has been built despite its historical influx of cultural-diverse people.*

# Coles College of Business

## Information Systems & Security

***Analysis of Honeypots in detecting Tactics, Techniques, and Procedure (TTP) changes in Threat Actors based on Source IP Address***
Poster #1 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Carson Reynolds
Research Mentor(s): Andy Green

*The financial and national security impacts of cybercrime globally are well documented. According to the 2020 FBI Internet Crime Report, financially motivated threat actors committed 86% of reported breaches, resulting in a total loss of approximately $4.1 billion in the United States alone. In order to combat this, our research seeks to determine if threat actors change their tactics, techniques, and procedures (TTPs) based on the geolocation of their target's IP address. We will construct a honeypot network distributed across multiple continents to collect attack data from geographically separate locations concurrently to answer this research question. We will configure the honeypots to offer vulnerable services and collect log data from the services for analysis. This approach will allow us to aggregate log data about attacks against specific services commonly targeted by threat actors. After we complete data collection, we will analyze the data to gain insight into the TTPs used by the threat actors. The analysis will use collected attack data attributes such as IP origin, service type, and executables delivered along with other transport layer analysis techniques to provide metadata on threat actor TTPs. Once the analysis is complete, we will have a greater insight into threat actor activities and produce a list of items that firms can use to monitor, protect, and maintain their environments and to detect attacks earlier, along with taking appropriate defensive action to lessen or eliminate the risk associated with these attacks.*

***Formally Incorporating Family and Friends Medical Network in Treatment Protocols– A Conceptual Framework.***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:00pm-12:15pm
Graduate Student(s): Oghoreye Obazee
Research Mentor(s): Govind Hariharan

*When confronted with complex medical decisions, patients often consult with their close friends and family, especially those who are medical professionals within that network. Such consultations are not formally incorporated in existing frameworks for treatment and care but play a central role in trust in physicians and adherence to recommended medications and treatments. The aims of this paper are, first, to discover how an individual's family and friends' medical network, with a focus on medical professionals such as physicians, can be incorporated into the care and management of the individual (patient). Second, creating a protocol/conceptual framework that can be integrated into individual patients' Electronic Medical Records (EMR) is another reason for this inquiry. Furthermore, an examination of the possible benefits and an address of the ethical issues, conflicts, and challenges that may arise or can be encountered with incorporating a family or friend physician into a patient's management will be considered in this paper. Practical considerations in integrating informal medical consultations into the formal management of the patient will also be highlighted. The present enquiry is intended to be achieved via a search through the available literature on patient engagement and patients' health-seeking behaviors, especially as they seek medical advice or through informal consultations from friends and family members who are medical doctors or physicians. A conceptual framework will then be created and subsequently integrated into patient care. Future work will collect data to empirically validate the framework. Overall, this study seeks to contribute to the body of knowledge on patient care through its findings that will inform evidence-based practice and policy development.*

***Octoprint Server at Kennesaw State University***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:40pm-2:55pm
Undergraduate Student(s): Blair Dilbeck, Natalie Ajemian, Shota Yasuda, Rushana Rakhman, Beau Wilkins, and Rohit Gibson,
Research Mentor(s): Dominic Thomas

*Students and faculty belonging to the Kennesaw State Department of Information Systems and Security are creating Octoprint Server as open-source software for web-based 3D print farm and ecosystem management. Building upon the robust existing Octoprint open-source project, which provides a common interface to individual 3D printers, the project aims to help schools, libraries, and universities who wish to scale up and manage learning activities using 3D printing. Volunteers taking part in the project will do this by creating an accessible application that is easy to configure, provides key functionality they need, and works with typical conditions non-technical administrators must navigate in these organizational settings. Throughout its development, the project has encountered a number of roadblocks, notably the absence of technical confidence in student volunteers, the challenge of onboarding new individuals, as well as the intimidating scale and intricacy of the project. Participants aim to circumvent these*

*obstacles by creating accessible documentation and fostering an attitude of willingness to try to solve complex problems without a clear solution and learning from the attempts. This mentality has allowed the Octoprint Server Project to grow significantly in the two years following its inception.*

***Ransomware: Evaluation of Mitigation and Prevention Techniques***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:20pm-12:35pm
Undergraduate Student(s): Juanjose Rodriguez-Cardenas
Research Mentor(s): Hossain Shahriar

*Ransomware is classified as one of the main types of malware and involves the design of exploitations of new vulnerabilities through a host. That allows for the intrusion of systems and encrypting of any information assets and data in order to demand a sum of payment normally through untraceable cryptocurrencies such as Monero for the decryption key. This rapid security threat has put governments and private enterprises on high alert and despite evolving technologies and more sophisticated encryption algorithms critical assets are being held for ransom and the results are detrimental, including the recent Colonial Pipeline ransomware attack in 2021 that was responsible for a major U.S pipeline unable to function for days and being declared a state of emergency. This work reviews the components of ransomware attacks and the impact of ransomware followed by common defense techniques and their limitations.*

## Management, Entrepreneurship & Hospitality

***Why are Restaurant Firms Going Private?***
Poster #17 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Benjamin Buxton, Matt Hammer, Lauren Pederson, Juan Gonzalez, and Celina Duong
Research Mentor(s): Melih Madanoglu

*Access to capital markets is one of the key benefits of becoming a publicly traded company. However, previous research has shown that companies in more recent years have returned to the private sector rather than staying public after the initial public offering. While existing research found numerous reasons for going private, there is a limited number of studies that identify factors*

*that influence the shareholder returns of the decision to go private. This study attempts to uncover external and internal factors that affect shareholder returns. Our study includes U.S. restaurant companies listed under Standard Industry Codes 5810 and 5812 between 1997 and 2021. Thus, our final sample consists of 70+ firms. Data on going private transactions will be obtained from media outlets and SEC annual filings (10-Ks). Data for the dependent variable (shareholder stock returns) is available in The Center for Research in Security Prices (CRSP). Independent variables in our study are firm size, level of undervaluation, governance issues, executive team structure, board composition, managerial ownership, director independence, blockholders, and CEO duality. Regression analysis will be used to explain the variance in shareholder returns. This study expects that board composition and the executive management structure will emerge as essential factors beyond traditional variables such as firm size as determinants of shareholder stock returns. The findings of this research study can provide important implications for firm executives considering going private and private equity investors trying to identify the best target firms that can be taken private.*

# College of Architecture and Construction Management

## Architecture

***The Architectural History of Marietta, Georgia's No. 1 Engine House***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
4:40pm-4:55pm
Undergraduate Student(s): Rocky Insinga
Research Mentor(s): Marietta Monaghan

*The transition from volunteer-run to professional fire departments in mid to late 1800's America led to a dramatic shift in the architectural style of new fire stations. Marietta, Georgia's No. 1 Engine House, built in 1886, reconciled a heroic volunteer department with an architectural style influenced by the professional departments of its time in larger cities. Unlike many other historic buildings in Marietta, the No. 1 Engine House, which has a similarly long and venerable history, has been of little scholarly interest. This is likely due to its architecture resembling an ordinary commercial building rather than an integral part of an Antebellum town. This case study of Marietta's No. 1 Engine House was conducted by comparing historic local documents and photographs against general trends in American fire station design of the time. Towns are rarely shaped by their own needs. In this case, nationwide trends compelled the small town of Marietta to adopt an architectural style contrary to its own aesthetic needs.*

***Daylighting in Buildings: Investigating the Relationship between Daylight Levels and Building Compactness in House Types***
Poster #33 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Logan Smith, Joah Massey, and Andrew Welch
Research Mentor(s): Ermal Shpuza

*Daylighting of interior spaces is a key architectural design issue, which closely affects inhabitants' well-being and work efficiency. While the reduction of floorplate depth can potentially increase the percentage of daylit areas in buildings, it also leads to less compact volumes and more extensive building envelopes, which in turn affect a greater heat gain/loss through the envelope and more expensive buildings due to the higher cost of constructing the envelope. It has been shown that certain shapes of buildings can be easier to illuminate through natural lighting than others. The purpose of this research is to accurately identify the most*

*effective building shape and typology that achieves high levels of daylighting while satisfying the condition for compact volumetrics as related to lower energy transfer through the exterior walls and lower building construction costs. In so doing, the research aims to find affinities between two opposing trends in sustainable building design: increased daylighting and reduced energy for artificial lighting, cooling, heating, and the overall building cost. My research focuses on houses and compares this typology with other building types, which are investigated by other research team members. A large sample of houses is selected as best-practice examples from the book "Key Houses of the Twentieth Century". I measure the percentage of daylight strips in floorplates falling between the perimeter and 15', and between 15' and 30'. These percentages are investigated against the building compactness. The statistical analysis of the sample reveals clusters of buildings that perform best in the two opposed sustainability criteria. Using these conclusions, the research proposes normative guidelines of buildings, uses, and typologies that fit the most effective criteria to inform the future generation of architects and designers on how to build houses while minimizing artificial lighting to save on heating and cooling costs.*

***Daylighting in Buildings: Sustainable Design Strategies for Building Floorplates***
Poster #34 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Andrew Welch, Joah Massey, Logan Smith, & Esmerelda Zuniga
Research Mentor(s): Ermal Shpuza

*Buildings account for a significant percentage of global energy consumption, and finding ways to improve the efficiency of buildings has become a paramount topic in recent decades. Among the most substantial ways to improve the energy efficiency of a building is to manipulate the floorplate in ways that lets more natural light while reducing the energy loss or gain through the envelope. However, creating buildings that have more natural light comes with a greater construction cost due to longer envelopes. The goal of our research is to determine what aspects of floorplate design maximize the natural light entering a building and minimize the construction costs associated with the building. In my research, I have primarily analyzed a sample from the book, Key Buildings of the 20th Century by Richard Weston, since the book offers a variety of building typologies that would yield a diverse data set. I then measured the building floorplates in AutoCAD, and used a 0-15 foot and a 15-30 foot offsets to determine the area that experiences full natural lighting, partial natural lighting and no natural lighting. Once I determined these areas of natural lighting, I was then able to make graphical comparisons to other qualities of these buildings such as perimeter, height, facade area, number of floors, floor height, etc. to determine how buildings that maximized daylighting and minimized costs*

*accomplished this. Upon analysis, my most notable discovery is that the scaling of buildings plays a significant role in the optimization of the natural lighting within buildings, since a smaller building can have a smaller perimeter to floorplate area ratio and still have significant natural lighting, while a larger building would have to have a larger perimeter to floorplate area ratio to optimize natural lighting. Therefore, optimized typologies depend on the scale of the building.*

***Daylighting in Buildings: Sustainable Design Strategies for Building Floorplates***
Poster #35 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Joah Massey, Logan Smith, and Andrew Welch
Research Mentor(s): Ermal Shpuza

*Sustainable design and maintenance of buildings is a key issue facing our generation and generations to come since building material production, construction, operation, and maintenance — are responsible for more than 55% of global energy use. Our goal within this project is to discover building typologies that will lead us to achieve a more sustainable balance between the built and natural environments by employing the use of daylighting. Strategic design considering window arrangement, shading applications, and interior dimensioning is key in ensuring a building is properly lit while remaining cost-efficient. The problem with daylighting in most buildings is that the many building types are based on floorplates that are far too wide which hinders widescale daylighting. Meanwhile, the more we design buildings that are less compact and elongated the more we increase the overall construction cost due to the larger share of the envelope and the heat gain/loss through the envelope. The goal of the project is to find an optimal balance between nature and the built environment to exist in accordance with one another. Sufficient data collection relating to the benefits of certain typologies over others has been collected using AutoCAD files that have been scaled and measured and then put into graphical form in order to better display our findings. Comparative studies were conducted between the findings of my own along with my peers. The results proved telling first on the structure occupying our own campus, and subsequently sourced from Key Urban Housing of the Twentieth Century: 'Plans, Sections and Elevations' by author Hilary French. The proposed shape classification has consequently contributed an array of typological solutions, detailed shape analysis, and comparative studies.*

***A Divisive Community Design: Atlanta Public Investments and Residential Displacements***
Poster #26 (Convocation Center)
Thursday April 20, 2023

1:00pm – 1:45pm
Undergraduate Student(s): Honiya Jackson
Research Mentor(s): Pegah Zamani

*This research looks through a historical lens to inquire why there are dramatic differences between the north and south areas of Atlanta and how it is all connected to racial and wealth gaps in the city. Tracing what happened to the community in the past, the research seeks out why the Southside of Atlanta has many abandoned homes and is less developed than other areas of Atlanta. The study reviews these abandoned neighborhoods through a sustainable and equitable lens. Evaluating why the community could not combat gentrification, the research focuses on reasons such as; high poverty rates, lack of funding/mortgages for home ownership, and not being provided with the proper resources to thrive. Thus, the findings highlight the impact of discriminatory construction practices, the systematic absence of financial support and services to residents in specific areas of the city, and its effects on the public infrastructure level of stunted growth.*

***Stay-in-Place Formwork in Reinforced Concrete Applications***
Poster #13 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Jacob Gonzalez and Allen Yun
Research Mentor(s): Giovanni Loreto

*The last hundred years in architecture and civil engineering have been widely dominated by the use of concrete, which became the second most consumed commodity after water. The traditional use of rigid, flat formwork panels has defined reinforced concrete members as a uniform cross section, prismatic structural elements in both design codes and construction methods. These resultant shapes have become practically an inevitable conclusion for concrete constructions. The work of engineer, architect, and builder, Pier Luigi Nervi (1891–1979) was used as a precedent for the basis of the project. Nervi was an adjunct professor at the University of Rome and a prolific writer, who used formwork to define the ever-evolving relationship between building forms, techniques and materials. Seeing technique as preceding form, he examined structural elements that resisted the passage of time and outlasted building typologies and styles. Research was collected from both drawings and construction processes, and through them, a formwork similar to those that Nervi used was constructed. By following the works of Nervi's style, this presentation showcases the process of analysis and reconstitution of formworks that may reimagine how we use concrete in modern constructions.*

***Reforming Concrete: Mechanical Innovation in Sustainability***
Poster #7 (Convocation Center)
Thursday April 20, 2023

11:00am – 11:45am
Undergraduate Student(s): Blair Cunningham
Research Mentor(s): Giovanni Loreto

*Timber frame concrete formwork can generate as much as 40% of construction waste on a given project. This study proposes a method of concrete formwork construction that aims to improve the versatility and sustainability of concrete construction processes through the application of a novel concrete reinforcement system which reduces waste generated by current concrete formwork practices. By using fabric to build formwork and provide reinforcement the possibilities of design in concrete and cementitious materials are widened. 3D printed shear dowels are placed into the formwork to transfer tension loads out of the concrete and into the fabric. The dowel is designed to have a pressure fitted locking mechanism for easy installation. The dowels are pushed through the weave of the fabric and have four points of connection to prevent a concentration of force in any one point causing the dowel to fail. There were several design iterations to ensure the dowel was able to efficiently distribute the shear forces. These parts are meant to be manufactured through 3D printing further supporting the sustainability of this process by reducing material waste and energy input for manufacturing processes. It is also cost effective; the parts can be scaled easily, and materials can be changed based on strength needs and applications. Testing is primarily focused on Selective Laser Sintering (SLA) printed resin parts because this method produces isotropic products which eliminate concerns relative to loading balance for printing and installation orientation. The material chosen for this project is a high tensile strength resin with comparable elongation at failure to steel to avoid brittle failure. This product will be analyzed by stress simulation of the design using several material parameters and compressive load testing of beams constructed with this technique*

***Sustainable Food Systems in Community Development: Integrating Urban Food Security into a Growing Population***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
4:20pm-4:35pm
Undergraduate Student(s): Opal Giulianelli
Research Mentor(s): Pegah Zamani

*Sustainable food has become a frequently debated topic in recent years due to a consumer push for environmentally sustainable food. While some research works on improving the monoculture farm systems that are currently in use, others focus on expanding the definition of sustainable food systems. This research looks at those concepts of alternative food systems applied to a more*

*extensive city system. The goal is to create a theoretical site plan that could be implemented in emerging cities and other urban environments. This site plan combines the ideas of environmentally sustainable food development such as food forests, urban farming, and community gardens. This would represent one part of a larger sustainable food system that can be altered depending on the environment or the people it is serving. However, this research is being carried out with the southeast United States in mind and therefore may prove difficult to apply to other regions, especially those of radically different climates.*

# College of Computing and Software Engineering

**Data Science & Analytics**

***Classifying Variable Stars from Stellar Light Curve Data***
Poster #26 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Graduate Student(s): Ryan Parker
Research Mentor(s): Ramazan Aygun

*Due to advances in collection techniques, variable star light curve data is being produced faster than the existing curves can be classified. Automated classification has been attempted, but most endeavors use sophisticated techniques to extract high-level variables and many produce inconsistent results, often finding the greatest predictive impact from low-level variables. Here, several of the more successful methods were compared using these low-level features from the OGLE4 variable star catalogue. In addition, a probability-based, multi-level classifier was developed to increase classification accuracy of the underrepresented classes and improve user confidence. Random Forest and Gradient Boosting Trees presented the highest accuracy and the multi-level classifier outperformed even these. Not only could these models accurately predict the classes using easier-to-calculate variables, but the multi-level framework also increases this accuracy further and functions as a trustable system, rejecting low-confidence samples based on a user-determined confidence threshold.*

***OPERATION ENDURING FREEDOM: Improving Mission Effectiveness by Identifying Trends in Successful Terrorism***
Poster #30 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Dalton Shaver
Research Mentor(s): Susan Hardy, Austin Brown, Herman Ray

*This research examines how the characteristics of terrorist attacks predict the chance of an attack succeeding, where an attack is defined as successful if the intended attack type is carried out. Data from The Global Terrorism Database (https://www.start.umd.edu/gtd) was analyzed across three geographical missions within Operation Enduring Freedom: Trans-Sahara, Horn of Africa, and the Philippines. The three models were able to distinguish between successful and unsuccessful*

*attacks at 78.74%, 82.11%, 74.25%, respectively. Using predicted probabilities of success obtained from each logistic regression models, the medians were plotted to compare the characteristics of terrorist attacks across missions. The coefficients for each model were analyzed to compare the odds of success for each variable level to the odds of success of the reference level for that variable. Lastly, the coordinates for successful and unsuccessful attacks as classified by the dataset was plotted to explore spatial patterns in regional maps. Many insights were gathered through analyzing Operation Enduring Freedom missions. It is shown that terrorists are successful in their aims to terrorize. Attacks targeting private citizens, tourists, non-governmental organizations, and food or water supply, have the largest probability of success for the Trans-Sahara and Horn of Africa missions. The odds of an attack succeeding when it involves a barricade incident with hostages is 10,491 times greater the odds of an attack succeeding when it involves bombing. Suicide attacks in the Philippines raise the chance of success, in contrast to the other two missions. The predicted probability of success when explosives and firearms are used in the Philippines is lower than the Trans-Sahara and Horn of Africa. By determining the specific characteristics of attacks that produce the highest probabilities of success, the effectiveness of Operation Enduring Freedom can be improved by focusing counter-terrorism training and operations on the features that predict successful attacks.*

***A Random Graph Algorithm for Modeling Social Networks***
Poster #3 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Graduate Student(s): Ryan Parker
Research Mentor(s): Andrew Wilson

*A common goal in the network analysis community is the modeling of social network graphs, which tend to exhibit low average path length, high clustering, and a power law degree distribution. However, most existing attempts to do so fall short on one or more of these properties. Here, a novel approach is utilized, which uses an older algorithm over many iterations to generate the bulk of the nodes, as well as a modified version for the highly connected 'influencer' nodes. Several statistical expectations of the model were derived and compared to values calculated from simulations. The model, when tuned correctly, reasonably mimics the properties displayed by social network graphs. This algorithm not only provides a quick-performing method to model social network graphs, but also a possible alternative for modeling other types of graphs, given proper appropriate hyperparameter tuning.*

## Computer Science

***Advances in Bounding the Behavior of Neural Networks***

Oral Presentation (ALC 4103)
Tuesday April 18, 2023
12:00pm – 12:15pm
Undergraduate Student(s): Richard Borowski
Research Mentor(s): Arthur Choi

*Advances in Artificial Intelligence (AI), particularly in the form of deep neural networks, have revolutionized a diverse range of fields. As neural networks become more pervasive, the need to understand the boundaries of their behavior is becoming increasingly important. For example, can we formally guarantee that an autonomous vehicle will not violate traffic laws, such as reaching excessive speeds? Building on our prior results on bounding the behavior of individual neurons, we report progress on bounding the behavior of neural networks. In particular, we show how bounds on multiple neurons can be combined and propagated through a network of logical gates.*

***Analysis of Multi-Activation Layers in Neural Network Architectures***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
12:20pm – 12:35pm
Graduate Student(s): Jaskirat Sohal and Braden Stonehill
Research Mentor(s): Md Abdullah Al Hafiz Khan

*A common practice for developing a Neural Network architecture is to build models in which each layer has a single activation function that is applied to all nodes uniformly. This paper explores the effects of using multiple different activation functions per layer of a neural network to analyze the effects of the architectures' ability to generalize datasets. This approach could allow neural networks to better generalize complex data providing better performances than networks with uniform activation functions. The approach was tested on a fully connected neural network and compared to traditional models, an identical network with uniform activations, and an identical network with a different activation function for each layer. The models are tested on several problem types and datasets and analyzed to compare the performance and training time.*

***Automated Thought-to-Text Conversion Through Automated Brainwave Signal Annotation***
Poster #18 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Christopher Dargan
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Brain-Computer Interface (BCI) is a technology that bridges the gap in communication between the brain and external devices. When the brain activates clusters of neurons to perform a task, these groups of neurons fire together and generate a detectable electrical signal. These signals are captured through electroencephalogram (EEG), and the brain's electric activity (brainwave) signals help capture human thoughts to enable communication with people who have lost communication ability. Recent research focuses on predicting letters from invasive-brainwave signals (EEG) by transplanting EEG electrodes in the human brain. These predicted letters could be used to develop thought-to-text applications later. However, building a highly accurate thought-to-text application requires automatically segmenting continuous EEG signals and labeling each segment with a correct English alphabet letter. This work investigates the real-time segmenting and annotating of the brainwave signals with the corresponding English alphabet using non-invasive brainwave signals collected using a 14-channel Emotive headset. Emotive headset-collected brainwave signals are noisy due to the external surface-level contact with the headset; therefore, we filter these signals to remove noise and extract meaningful features that capture insights from the signal. We deploy a lightweight machine learning algorithm (e.g., support vector machine) to identify English alphabet letters in real time and display them in a user interface (UI) for a particular EEG signal segment. Our current approach detects a subset of the English alphabet with 64% accuracy. We plan to improve this current algorithm and develop a novel algorithm to detect words from the detected sequence of letters in the future. Our project assists individuals in communicating with others in the form of writing who suffered any brain damage.*

***Blockchain and Ethereum***
Poster #34 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Daniel Chen, Noah Dillard, Mathew Uliasz, and Parker Arneson
Research Mentor(s): Yong Shi

*Blockchain is a groundbreaking technology that is currently revolutionizing digital transactions, however, security risks remain a major obstacle to the mass adoption of this new technology. Security and safety issues could lead to significant financial losses and erosion of trust in blockchain technology, which is increasingly being used for monetary purposes. This research focuses on identifying and addressing solutions to security vulnerabilities in the Ethereum blockchain, a leading blockchain platform that enables financial applications, decentralized markets, gaming, and more. As the use of blockchain technology has become increasingly widespread across various industries, there is an urgent need to assess the security implications of blockchain and evaluate potential vulnerability risks. To assess the security vulnerabilities present in the Ethereum blockchain, this research utilized a combination of manual code review and*

*analysis of previous research on vulnerabilities, such as the OWASP Top Ten list. Using tools such as Remix for Solidity, existing smart contracts were examined to identify where improvements could be made to mitigate risks associated. The four specific vulnerabilities analyzed in our research were Cryptographic Failure, Security Logging and Monitoring Failures, Identification and Authentication Failures, and Security Misconfiguration. A demo smart contract is provided that simulates and provides solutions to the four aforementioned security attacks, as well as a site to host the modules in the case studies. Through this we have developed potential solutions to mitigate some of these major attacks. For example, there are creation detection techniques which are unregulated by patterns which can prevent Security Logging Failures, and the usage of generateKey and returnKey functions which can prevent Cryptographic Failures. By making these improvements in terms of security measures, the risks associated with Ethereum technology can be effectively minimized, ensuring a secure digital ecosystem and enabling the trust and widespread use of blockchain.*

***Classification and Comparative Analysis of In-Hospital Suicidal Behaviors of Patients Using Neural Networks and NLP Techniques***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:20pm-1:35pm
Undergraduate Student(s):
Graduate Student(s): Manohar Murikipudi and Abm. Adnan Azmee
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Suicide, an alarming public health, is one of the top 20 problems in the United States that leaves a lasting impact on families and communities. After a two years decline, a total of 47,000 people committed suicide last year. According to the US CDC report, a person expires every 11 minutes due to attempting suicide. Suicidal behavior information in the health records will help to understand the mental health situation of a patient. By identifying the patients who are ideating and are anticipating attempting suicide using the growing technology, physicians can help the patients' lives by keeping close monitoring. As part of the Phase-I of this project, we built a simple LSTM model on the extracted ScAN [1] (Suicide Attempt and Ideation Events Dataset) data, achieving 94.83% accuracy in predicting the Suicide Attempt (SA) and Suicide Ideation (SI) classes. In the next phase(s), we will apply complex and state-of-the-art model architectures, such as Capsule Neural Networks and EXAM-a three-layer architecture model, for classifying the suicide annotated data.*

***Detecting Bacterial and Viral Pneumonia in Chest X-Ray Images Using Deep Learning***
Poster #19 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm

Graduate Student(s): Burak Kure
Research Mentor(s): Md Abdullah Al Hafiz Khan

*This study uses a Chest X-ray dataset to apply deep learning models for pneumonia detection. The study assesses four well-known deep learning networks on the provided dataset: AlexNet, ResNet18, GoogleNet, and VGG16. We also investigate the utility of transfer learning for these models. Our results show that transfer learning significantly improves model accuracy, with ResNet18 achieving the highest test accuracy of 87%. We also consider classifying the X-ray pictures using Generative Adversarial Networks (GANs), which perform better than traditional classification algorithms. According to our research, deep learning and GANs have the ability to identify pneumonia rapidly and accurately, which could lead to more successful treatment and diagnosis.*

***Detecting Early-Stage Knee Osteoarthritis Using Deep Transfer Learning***
Poster (Microsoft Teams Link)
Friday April 21, 2023
1:40pm-1:55pm
Graduate Student(s): Lokesh Meesala
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Knee osteoarthritis is one of the most prevalent forms of the disease, and its diagnosis can be challenging, especially in its early stages. Imaging techniques such as X-Ray are commonly used to diagnose osteoarthritis, but the interpretation of these images can be subjective and prone to error, especially when detecting subtle changes. In this research, we aim to develop a deep learning network that can classify Knee X-ray images into 5 categories based on the presence and severity of osteoarthritis. We propose to use Convolutional Neural Networks (CNN) for a multi-class image classification. Our baseline model will be a CNN-based deep learning network, which will be trained on a dataset of knee X-ray images. Additionally, we will investigate the effectiveness of transfer learning by applying state-of-the-art CNN architectures such as ResNet, VGG, and Vision Transformers to the classification task. Transformers are a type of neural network architecture that have been highly effective in natural language processing tasks, and we want to explore their potential for image recognition tasks. Vision Transformers are relatively new in the field of computer vision. Unlike traditional CNNs, which rely on a hierarchical feature extraction process, Vision Transformers use self-attention mechanisms to capture global and local relationships between image features. While they have shown promising results in natural language processing tasks, we aim to investigate their potential for image classification tasks.*

***Face Mask Detection in Images Through Deep Learning***
Poster #1 (Convocation Center)
Thursday April 20, 2023

2:00pm – 2:45pm
Undergraduate Student(s): Andrew Hutchison, Aaron Cummings, and Alex Ingram
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Since the beginning of the Covid-19 pandemic, a highly infectious respiratory illness, across the world face masks have risen in popularity as an effective method to mitigate the transmission of the diseases. The heightened awareness of face masks has brought awareness to the effectiveness of enforcing mask policies past the mandatory face covering rules in public places of high transmission, such as in hospitals and assisted living facilities [1] due to high crowd densities or higher than average infected individuals. The increased number of individuals continuing to wear masks, as well as the stricter enforcement of mask polices in areas of high transmission have necessitated the further investigation and evaluation of mask detection systems to further curb the transmission of Covid-19 and any future pandemic. Faster and more efficient means of classifying faces wearing masks holds significant value in edge devices and isolated security systems. In this paper we conduct a review on several of the most popular image classification methods being used today and run a test to see how well they can classify human faces as "mask is present" or "mask is not present" in comparison to a new model designed by the authors of this paper. Additionally, based on the models' accuracy and efficiency, we propose which technique is best and should be used for those who seek to implement an accurate and fast mask-detection model for real world settings.*

***Identification of Suicidal Despair using Convolutional Long-Short-Term-Memory Network and Natural Language Processing (NLP) Techniques***
Poster #20 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Jaterien Walker, Kyle Hillhouse
Graduate Student(s): Manohar Murikipudi
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Suicide is a serious and complex issue affecting many individuals and communities worldwide. It can be a tragic outcome of various factors, such as mental illness, social isolation, and difficult life circumstances. Therefore, it is essential to recognize the warning signs of suicide and seek help for anyone struggling with suicidal thoughts or behaviors. Following this research, we utilize an in-depth overview of the suicidality of 500 anonymous Reddit user posts, which store the information in datasets via python. Within the dataset, the data is sorted by categories such as user, post, and label using the Columbia Suicide Severity Rating Scale (C-SSRS). For example, the label ranging from 0-4, with four being at the highest risk for suicide behavior and 0 being no suicidal ideations or plans, were observed in the Reddit post. Through our research, we wish to provide a safe environment for those at risk of suicide and help prevent these impactful actions by detecting these*

*suicide events using natural language-based machine learning techniques. We envision developing a Convolutional Long-Short-Term-Memory (CNN + LSTM) network to identify the suicidal risk category from Reddit Post. Furthermore, by providing such a program across platforms, suicidality can be decreased by a substantial amount, saving lives worldwide.*

***Identifying Mental Health Conditions from Social Media using Deep Learning***
Poster #21 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Bryce Wishart, Abm. Adnan Azmee, and Ibrahima Gueye
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Mental health issues are a continually growing concern within the youth and society today. With the age of technology, the presence of depression has become more prevalent among individuals. Social media can present a platform for one to express these emotions, exposing the presence of mental health issues like depression online. However, the detection of depression and other mental health issues from social media data is very challenging since the data amount is massive and the symptoms of depression vary for individuals. Deep learning, a subbranch of machine learning has shown promising results in detecting patterns from complex data sources. In our study, we utilized the potential of deep neural architecture to accurately identify depression from social media data. Our studies using Long short-term memory models (LSTM) and Convolutional neural networks (CNN) architecture-based models have yielded promising results in detecting depression. Our proposed model can efficiently and accurately detect depression from social media data. Accurately detecting the presence of depression will allow us to provide timely assistance to individuals who are suffering and help them recover from their condition.*

***Mental Health Survey Analysis & Prediction Using Deep Learning Algorithms***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:00pm-2:15pm
Graduate Student(s): Suresh Madineni
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Mental health is a major concern globally and identifying individuals who require treatment is crucial. This project uses Deep Learning algorithms, specifically DenseNet based on the Convolutional Neural Network (CNN) algorithm, to predict whether an individual requires treatment or not. The dataset used for this analysis contains demographic information and survey responses from individuals across various countries. The preprocessing involved imputing missing values, encoding categorical variables, and normalizing the data. Exploratory Data Analysis (EDA) and visualization were conducted to understand the dataset better. The*

*DenseNet model achieved an accuracy of 88% on the test set. The results of this project can aid in identifying individuals who may require mental health treatment, enabling early intervention and improved outcomes.*

***Net Hourly Electrical Power Output Prediction in a Combined Cycle Power Plant (CCPP)***
Poster (Microsoft Teams Link)
Friday April 21, 2023
2:20pm-2:35pm
Graduate Student(s): Krishna Gopi Reminisetty
Research Mentor(s): Md Abdullah Al Hafiz Khan

*The design and operation of thermodynamic power plants require a thorough understanding of the complex thermodynamic processes involved. Mathematical models have traditionally been used to analyze such systems, but these models often require a large number of assumptions and parameters to accurately capture the unpredictability of the actual system. As a result, the accuracy of the model may be limited, and the analysis of the power plant may not be as precise as desired. Machine learning and deep learning approaches have recently emerged as promising alternatives to traditional modelling techniques. In contrast to mathematical modeling, machine learning algorithms can learn patterns and relationships from data, without requiring a pre-specified model structure or set of assumptions. This can allow for more accurate and flexible predictions of system behavior. This project aims to develop an intelligent and accurate electricity prediction system using regression techniques. The objective is to build a deep neural network architecture that can accurately predict the electrical power output generated by the power plant, given a set of input variables. The model would be trained on a large dataset of combined cycle power plant which undergoes exploratory data analysis and data cleaning techniques prior to training. The performance of the developed system will be evaluated using metrics such as mean absolute error, mean squared error, and R-squared. By leveraging the power of deep learning, this system can accurately predict electricity production based on a range of input variables. This project has the potential to not only improve the efficiency of existing power plants but also aid in the development of new, more efficient ones. Ultimately, this project could significantly impact the energy industry and contribute to a more sustainable future.*

***Optimal Mobile-IoT Monitoring Solutions in LPWAN Technologies***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:00pm-1:15pm
Undergraduate Student(s): Mahimna Patel
Research Mentor(s): Ahyoung Lee and Hoseon Lee

*Low-power wide-area networks (LPWANs) enable long-range, low-power, and low-cost communication between devices, making them ideal for remote areas. LPWANs help monitor mobile objects, like livestock or vehicles, which can provide real-time data for improved productivity. However, challenges arise in providing reliable wireless coverage, avoiding signal interference or disconnection, and providing long-lasting battery-powered sensors. To address these challenges, LPWAN-enabled sensors, and mobile objects are essential in animal agriculture. Farmers can receive real-time data on the status of their livestock, crops, and equipment, leading to improved decision-making and more efficient use of resources. A vertical solution, using LPWAN technology and mobile objects, can provide comprehensive and accurate data on the health and behavior of livestock. Choosing between a static or mobile gateway depends on the specific application and requirements. A static gateway provides coverage for a particular area, while a mobile gateway can move with the connected device, providing coverage in a broader range of environments. In animal agriculture, a mobile gateway may be more suitable as it can follow the animals and provide continuous coverage regardless of their location. LPWAN technology and mobile IoT devices provide a practical and effective solution for animal agriculture by offering real-time data collection for mobile objects. As challenges with wireless coverage and signal interference are addressed, farmers can optimize their operations with the help of data-driven insights. LPWANs have the potential to revolutionize the industry further and improve animal welfare while increasing productivity. Therefore, this project is primarily focused on studying mobile sensor approaches to both static and mobile gateways of identifying the key characteristics of LPWAN applications, applying them to explicit requirements, and then deriving the associated design consideration for providing optimal mobile-IoT monitoring solutions in LPWAN technologies.*

***Predicting Malware Attacks with The Help of Machine Learning***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
12:40pm – 12:55pm
Undergraduate Student(s): Ibrahima Gueye, Abm. Adnan Azmee, and Bryce Wishart
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Malware has become a more widespread problem alongside the rapid growth of technology. Malware is any unwanted software placed in the system without knowledge or consent for performing malicious activities. Despite the implementation and adoption of novel preventative procedures, the number of malware attacks steadily rises every year. These attacks can spread through networks and disrupt any operation, leading to many cyber thefts, manipulated data, and most often than not, ransom. Unfortunately, many of the anti-malware systems that are available today are only able to defend the system from malware that is already identified. To address this problem for this research, we constructed deep learning models to estimate the likelihood of a computer will become infected with malicious software. Deep neural networks can process data in*

*a way that works similar to the human brain with very little human assistance to learn relationships between complex data. We envision that with the assistance of our deep learning model, we will be able to reduce the number of compromised systems significantly by predicting malicious activity before it happens.*

***Recommendation Systems: Fairness Matters***
Poster #33 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Bao Tran Ho
Research Mentor(s): Xinyue Zhang

*There is an increasing focus on fairness in recommender systems, with a growing body of literature on ways to promote fairness. However, this research is fragmented and lacks organization, making it difficult for new researchers to enter the field. Therefore, this survey aims to fill this gap by conducting a thorough analysis of the literature on recommendation fairness. This study focuses on the theoretical underpinnings of fairness in the literature on recommendations. In order to give a general overview of fairness research and to introduce the more complex situations and challenges that must be taken into account when studying fairness in recommender systems, it first presents a brief introduction about fairness in fundamental machine learning tasks such as classification and ranking. The survey will next address fairness in recommendations with an emphasis on taxonomy of current fairness definitions, common methods for enhancing fairness, and datasets for fairness research in recommendations. The study also discusses opportunities and problems in fairness research in an effort to further this field of study along with others.*

***A Study of IoT-Optimized Low Power Asset Tracking with Cloud-enabled LoRaWAN***
Poster (Microsoft Teams Link)
Friday April 21, 2023
12:40pm-12:55pm
Undergraduate Student(s): Fatima Salman
Research Mentor(s): Ahyoung Lee and Hoseon Lee

*The world of technology is expanding very quickly today, including technologies like cloud-based asset monitoring, but this makes it difficult to keep up with this technology's development and many other things. It is possible to monitor and manage your assets remotely with a cloud-based system thanks to its many features. The lifecycle of any commodity, including inventory, machinery, vehicles, and real estate, can be tracked using this kind of cloud-based system. Wide-area networks can be used to send data with the aid of low-power wide-area network (LPWAN) technologies like LoRa, SigFox, and NB-IoT. This project will examine traditional, cloud-based, LPWAN-based asset tracking systems while analyzing IoT-optimized asset tracking with Long*

*Range Wide Area Network (LoRaWAN) which is cloud-enabled. It also includes a number of case studies.*

***A Study of Optimal Parameter Selections in LPWAN-enabled IoT Environments.***
Poster #1 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Ricardo Vazquez
Research Mentor(s): Ahyoung Lee and Hoseon Lee

*Low power wide area network (LPWAN) technologies are technologies/transmission standards capable of very long range, low bitrate transmissions with a low energy cost. LPWAN technologies can be used as a low-cost alternative to cell towers or other types of long-range RF communication, especially in remote locations where building such infrastructure would be difficult or expensive. LPWAN technologies can find use in applications such as such as Asset tracking, Agriculture, Aquaculture, communication in offshore or remote locations, and smart cities. There are some parameters of any specific LPWAN technology that determines how useful they are for some specific application, for example the coverage, transmission power, and data rate to name a few. Some technologies also have parameters that can be adjusted/calibrated specifically for their application. The purpose of this research is to determine which parameters are most needed for some applications, and which currently existing LPWAN technologies would most suit those required parameters. A study on the parameters of these LPWAN technologies, and which applications they suit the most, in addition to their limitations are discussed. Data of the capabilities of each LPWAN technology and the restrictions or requirements of the applications are collected. The paper will present a study comparing the emerging LPWAN technology with other solutions for applications. Potential use cases of LPWAN are also presented. The goal is that this paper will be a reference for choosing a technology depending on the application.*

***Supercomputer Architecture Exploration for Zettascale Computing***
Poster #5 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Gabe Livengood and Meghana Gotety
Research Mentor(s): Bobin Deng

*In 2022, humanity entered the era of exascale computing. Supercomputers are typically compared in terms of their floating-point operations per second (FLOPS). Exascale supercomputers are capable of reaching $10^{18}$ FLOPS (one exaFLOPS). To maintain the United States' leadership in high-performance computers, we must begin exploring potential system architectures for the next generation of supercomputers in the zettascale era. These new architectures will likely have to*

*address the decreasing rate of chip-level compute improvements through the application of novel designs. The Structural Simulation Toolkit (SST) is an open-source computer system simulator that provides parallel simulation and scalable performance. These qualities make SST a leading candidate for future High-performance Computer (HPC) architecture exploration through system design benchmarking. In this project, we first explore SST's code structure and development environment followed by the evaluation and comparison of various supercomputer system components with different configurations. Finally, we analyze and discuss experimental data. This project was completed with the help of KSU's HPC platform.*

***Using NLP-based RCNN to Detect Suicide Indicators in Social Media Posts: A Proactive Approach to Lowering Suicide Rates***
Poster #22 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Kyle Hillhouse and Jaterien Walker
Research Mentor(s): Md Abdullah Al Hafiz Khan

*Suicide has become a significant issue within our society over the past few decades, so much so that 13.42% of 100,000 people will commit suicide within the year. When looked at on a larger scale, this is a drastic amount of people dying, which could be helped or stopped. This is shown by the percentage of a 25% lower suicide rate after having voluntary talk therapy. With an issue that can be helped by talking to a trained professional, it is better to find the person before they have gone too far. This research that we are conducting will help create a proactive way to help determine people for depression. A proactive approach will help lower suicide rates and give medical professionals a better chance at helping people in need before there is a chance to commit suicide. There have been leaps and bounds in machine learning in recent years, and using different databases, we can train an ML model with Natural Language Processing (NLP) techniques to determine if someone is considering suicide. We can train it using a 500 anonymized Reddit post dataset that has all the posts labeled based on the post's relation to suicide. In this work, we propose to develop an NLP-based Recurrent Convolutional Neural Network (RCNN) to detect suicidal events such as suicide attempts and ideation. Using available word embeddings, we will represent Reddit posts as a feature vector and feed these features to an RCNN network to detect suicidal events. We envision comparing our model performance with traditional machine learning algorithms, such as Logistic Regression, Feed Forward Neural Networks, etc., to showcase the effectiveness of our algorithm.*

## Information Technology

***Addressing Challenges of Cybersecurity Education and Research***
Oral Presentation (Microsoft Teams Link)

Friday April 21, 2023
3:40pm-3:55pm
Undergraduate Student(s): Aryan Patel
Research Mentor(s): Shirley Tian

*Cybersecurity is a field of Computer Science that focuses on protecting networks, devices, and data from unauthorized personal or online attacks. It ensures the confidentiality, integrity, and availability of information, especially in the face of rising cyber threats such as data breaches, phishing, and malware. With the rapid expansion of the Computer Science industry, the knowledge of cybersecurity has become even more crucial for protecting online identities and data. However, educating others on cybersecurity is often limited, since most schools, before college, avoid teaching distinguishing topics such as cybersecurity. Instead, they rely on extracurricular activities such as clubs, competitions, and camps to teach cybersecurity to high school students. This limited approach is inadequate in the current climate, so this research aims to establish and supply schools with a cybersecurity curriculum that informs students about the importance of cybersecurity and how they can use class instruction to protect themselves online. The study does this by researching databases, articles, and informational videos to gather effective vocabulary, comparisons, and data on cybersecurity. It then uses online tools to create an established curriculum from the gathered information. Then, this curriculum is split into "Units" or subtopics of cybersecurity, and an exemplary unit created is the "Digital Citizenship" unit. The Digital Citizenship Unit, specifically, informs students how to become good citizens online by following online etiquette, being respectable, and avoiding cyber threats on the Internet. Lastly, the created content composes of lectures, videos, and review activities which help students understand unfamiliar cybersecurity concepts, correlate similar ideas, and prepare for assessments. Ultimately, this study aims to use these methods to create similar units to the "Digital Citizenship" unit to spread cybersecurity understanding efficiently. By doing so, the study hopes to ensure that future generations learn how to protect themselves and others in the growing digital world.*

***Data Analysis and Visualization in COVID-19 Worldwide Variants Study***
Poster #4 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Gary Xue and Abhimanyu Malik
Research Mentor(s): Chloe Yixin Xie

*Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is affecting the whole human society in different ways. SARS-CoV-2 infects the human via the interaction of the Spike Protein with the human Angiotensin-Converting Enzyme 2 (ACE2) of the host cells. As the SARS-CoV-2 Virus mutates, new variants emerge, which are more infectious and lethal than the 2019 strain.*

*Using data collected from the GISAID database on COVID-19 variants, we examined the 7 major variants: Alpha (B.1.1.7), Beta (B.1.351), Gamma (P.1), Delta (B.1.617.2), Epsilon (B.1.617.1), Zeta (B.1.525), and Theta (B.1.617.B). Among all countries, we narrowed our data down to six countries: Brazil, India, South Africa, South Korea, the UK, and the USA. China and Russia were not included due to the missing data reports for a period. After cleaning the data, we present the prevalence of each variant through visual representation using bar graphs, pie charts, and line graphs. We also compared the protein structures among different variants and observed the amino acid mutations on the Receptor Binding Domains (RBDs). Our analysis will examine the most prevalent variant and will look to explain any spikes in any country by looking at any policies implemented or lifted during the trend of the variant's infection rate. Our research will provide an important reference for future COVID-19 research or similar diseases.*

***Encrypted Malicious Network Traffic Detection Using Machine Learning***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:40pm-2:55pm
Undergraduate Student(s): Niklas Knipschild
Research Mentor(s): Liang Zhao

*The research project aims to find ways to detect malicious packets inside encrypted network traffic. In addition to this goal, maintaining user privacy is a priority. As encryption has become less expensive to implement more and more network traffic is encrypted. Currently, 90% of all network traffic is encrypted, and this trend is expected to increase. The creators of malware are employing various methods to ensure delivery of their malware, including encryption. One proposed method to combat this suggests implementing machine learning with various algorithms to analyze packet attributes to determine if they contain malware, without actually knowing what's inside the packet. These attributes may include the packet's type, size, sender and receiver addresses, resemblance to other packets, and trusted root certificate. To accomplish this, various algorithms such as XGBoost, SVM, Neural Networks, and RandomForest are employed. In addition, analyzing the trusted certificates of the packets has promise. Although analyzing the trusted certificate of the packet has a low success rate of around 70%, it has been observed that employing less successful analysis early in the machine learning process can improve the overall effectiveness. Unfortunately, no one has come up with an acceptable implementation that would be appropriate for real world use. Since even with a very high success rate of 99% when you consider billions of packets are being analyzed is not acceptable. Since even if you have combination of 1% of both false positives and negatives that is still many million errors. Current methods tend to be around 97% effective. As such, more research is needed to stay ahead of the attackers and defend our Cybersecurity.*

***Encrypted Malicious Network Traffic Detection Using Machine Learning***

Poster #20 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Ishitha Vallurupalli
Research Mentor(s): Liang Zhao

*In recent times with Covid 19, there has been an increase in digital usage due to social distancing. These have demanded an increase in security and privacy. As a result, past methods of detection of malicious traffic are not as effective. HTTPS and TLS encryptions being the types of protection, recent malware has been encrypted and disguised as normal traffic. Due to this, it requires decryption then detection, which is ineffective for immediate detection. Machine learning, a form of artificial intelligence that uses data to learn and improve, can be used for improved detection of malicious traffic. Due to the computer pulling the weight, it doesn't require a person to sit and monitor, which increases speed of detection, decreases expenses and increment accuracy. The goal of this research is focused on detection of encrypted malicious traffic without decrypting the files. Using already existing methods of traffic detection, like Random Forest, Neural network, XGBoost, it is hoped we further the detection accuracy and effectiveness in this study.*

***Encrypted Malicious Network Traffic Detection Using Machine Learning***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:00pm-3:15pm
Undergraduate Student(s): Khoa Nguyen
Research Mentor(s): Liang Zhao

*Recently, the amount of encrypted malicious network traffic masquerading as normal traffic of data has increased greatly. This poses a concern for the user's security and privacy. Moreover, malicious traffic rates have been reported to skyrocket during the COVID-19 pandemic. Therefore, we should adopt new methods to tackle such unpleasant traffic detection problems as soon as possible. Regular security solutions depending on common analysis like deep packet inspection have been proven to be less effective while detecting malware using machine learning–based solutions are becoming more popular. These solutions are believed to be less expensive, faster, and more secure since no traffic interceptor is required. However, current research papers cannot be compared and are quite unreliable since they use different datasets to train their models and the lack of well-recognized datasets and feature sets. Thus, the target of this research is to detect malware traffic flows by extracting new features from multiple popular public sources with well-known machine-learning algorithms such as KNN, XGBoost, and Random Forest. These are among the best machine learning algorithms that are expected to produce high (as high as 95%) malware-detected rates. The system will first extract relevant features including packet count, size, and protocol type. They will then be inputted into a machine-learning model for detection. The*

*model will be trained on a large dataset mixed with benign and malicious traffic to accurately detect the encrypted malicious traffic flows. Conclusions will discuss the malicious network traffic detection rates of different feature sets tested by multiple machine learning algorithms and the challenges that might occur in the process, including the need for high-quality training data and the possibility of encountering false positives and false negatives. Further research in this area will emphasize improving the model's detection rates and addressing these challenges.*

***IoT Consumer Labeling on Cybersecurity***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
4:00pm – 4:15pm
Graduate Student(s): Venkata Mamatha Gorantla
Research Mentor(s): Liang Zhao

*The fast growth of the Internet of Things (IoT) has raised worries regarding the security and privacy of linked devices. Implementing IoT consumer labeling for cybersecurity has been suggested as one answer to these problems. A standardized labeling system would be used for IoT consumer labeling for cybersecurity to notify consumers about the security characteristics of IoT devices. The device's security capabilities would be described in detail on the label, including the kind of encryption utilized, authentication processes, and other security precautions that have been put in place. Also, the label would provide details regarding any known flaws in the product as well as suggestions for consumer protection. Consumers and manufacturers would benefit from using IoT consumer labeling for cybersecurity. Consumers might make educated judgments regarding the products they buy thanks to the label's increased degree of openness. With the use of this information, customers might spot devices with robust security safeguards and stay away from those with known security flaws or insufficient security measures. Manufacturers would be encouraged to create and deploy strong security measures through the labeling system, improving the IoT ecosystem's overall security. Yet, there are several difficulties in applying IoT consumer labeling for cybersecurity. The creation of a thorough set of standards for the labeling system that fully addresses all potential dangers related to using IoT devices while being adaptable enough to keep up with the market's quick evolution is one of the challenges. There is also a requirement to make sure that the labeling system is universally accepted by both customers and manufacturers. Besides these difficulties, IoT consumer labeling for cybersecurity can increase the security of IoT devices and boost consumer trust in the IoT ecosystem. The installation of such a labeling system is worthwhile despite the obstacles still present because of the advantages of more visibility and improved security.*

***Ransomware Attacks in the Software Supply Chain: A Review of Attack Vectors, Defenses and Gaps***
Poster #25 (Convocation Center)

Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Corey Brookins, Ava Norouzinia, Asia Shavers, Miranda Dominguez, Marie Nassif, and Kenneth Burke
Research Mentor(s): Nazmus Sakib

*The proliferation of cyberattacks in the software supply chain domain is a pressing concern making them a formidable threat to software security and compromising its integrity and credibility which needs to be critically acknowledged and investigated. The lack of familiarity with the design and pattern of emerging attacks has contributed to the occurrence of several vulnerable software supply chain attacks in the preceding years. This project aims to conduct a comprehensive study of the various tactics and techniques employed by cybercriminals in this domain along with a focus on exploring the influence of software supply chain stakeholders' traits, limitations, and actions on the likelihood of a successful attack. Furthermore, this research also identifies the regulatory tools and protocols administrating software supply chains that assist in reducing an organization's susceptibility to these challenges. Using a rigorous methodology, we investigate the frequency, how, and where ransomware attacks occur. We review current defense techniques and gaps. The findings will provide valuable insights concerning the recent trends in disrupting the security and efficiency of the software supply chains and offer recommendations to researchers, organizations, and practitioners to remain cautious and proactive in their cybersecurity posture.*

***Stroad Efficiency and Walkability: An Intersection of Economy, Community Wellbeing, and Public Safety***
Poster #27 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Andres Villanueva
Research Mentor(s): Pegah Zamani

*Between 2010 and 2019, there has been a reported estimate of 1,160 pedestrian accidents in the Atlanta-Sandy Spring-Roswell Area. The rate of pedestrian-related accidents increases yearly. This research focuses on and analyzes design factors in urban design and how it impacts pedestrians' walkability, safety, and health in Sandy Springs, Georgia. The term "stroad" has been used to describe a combination of streets and roads found throughout many locations throughout the United States and Canada, including Sandy Springs, Georgia. These "stroads" have been considered dangerous and unsustainable for pedestrian and cyclist usage. Many cities in Georgia have made walkability and cycling a low priority as a means of transportation in favor of vehicle access. This has impacted many pedestrians from the Sandy Springs area who come from low-income backgrounds and/or don't have access to vehicle transportation. In cities like New York, Seattle, and San Francisco, there have been efforts to improve and expand upon sustainable*

*pedestrian and cyclist infrastructure. Data on the statistics and rates of pedestrian accidents/deaths and demographics most impacted was gathered through relevant articles and news reports. Data on urban design factors and their impact on walkability and health was gathered through relevant articles and books. After research was conducted, various methods of urban design, including road diets, easy access to public transportation, elimination of the left turn lane, and expansion of sidewalks, were common solutions in places that suffered the "stroad" problem. This research hopes to analyze these improvements as potential solutions for Sandy Spring's urban design and raise attention to the factors of urban design, the demographics most impacted, and its connection with pedestrian safety to a wider audience.*

***Survey on Sustainable Computing***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:20pm-3:35pm
Graduate Student(s): Viswa Narendra Reddy Panati
Research Mentor(s): Liang Zhao

*Smart technologies are everywhere and the advent of a smart world, from smart devices to smart cities is hastily growing to potentially improve quality of life. The features and services users of smart devices expect to rely on large amounts of data processed at data centers. Those centers potentially devour massive quantities of electricity and their expansion can be unsustainable due to an increased emission of greenhouse gasses. As smart technologies depend closely on such computing power their sustainability is crucial for a smart future. This paper explores the literature to: become aware of the troubles; categorize the demanding situations in addition to feasible solutions; discover how simulation and low-energy parallel scheduling algorithms can enhance computational sustainability.*

## Software Engineering and Game Development

***Camera-based Hand Tracking as Unrestrained Input System***
Poster #8 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Jessica Susanto and Timothy Walter Rush Jr.
Research Mentor(s): Henrik Warpefelt

*The use of hand motion-based input systems has become increasingly popular in recent years, with applications ranging from virtual reality gaming to hands-free computing. However, existing systems are often limited by physical constraints, such as the need for gloves or full-body VR*

*markers. In this paper, we present the development of a hand gesture-based input system that is not limited by these physical constraints. The Novel Game Design lab team has been researching on a way to use the built in camera on the Quest 2 VR headset and the sdk that Meta has provided for the public. These built-in cameras are designed to capture images of the user's hands, which are then interpreted by the algorithms to be hand and finger movements. The system does not require the user to wear any additional equipment or markers, making it more comfortable and realistic to use. In order to evaluate the effectiveness of our system, we made a game where the player is a wizard attempting to conjure spells with hand gestures. Initial testing indicates that the input system is effective. It's been very responsive and accurate.*
*However, there were some limitations regarding the position of the hand. The lack of a camera behind the VR headset meant that it was not possible to detect finger/hand gestures outside of the camera's peripheral view which resulted in occasional missed detections or incorrect tracking of hand movements. Despite this limitation, our findings suggest that the use of hand gesture-based input systems with the Quest 2 has significant potential in a range of applications. The system is able to function without the need for additional equipment or markers, which would often limit several players from being able to use a hand gesture-based input system. Future work could focus on addressing the limitations of the system by adding/developing a camera that faces the other half of the view (the back) that the current system isn't able to see.*

***Exploring Non-Player Character Types in Games: Enemies***
Poster #9 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Stephen Pangilinan and Joshua Whorton
Research Mentor(s): Henrik Warpefelt

*The aim of this study is to research the design criteria of different Non-Player Characters (NPCs) in games and examine how each game distinguishes different types of enemy NPCs. These can include normal enemies, minibosses, and bosses. While some games have noticeable distinctions between these enemy types, others make these distinctions less clear. We examined different enemy types across 10 different games; The Binding of Isaac, Enter the Gungeon, Risk of Rain 2, Crypt of the Necrodancer, Hi-Fi Rush, Sonic Frontiers, Elden Ring, Middle-Earth: Shadow of War, Hollow Knight, and Okami HD. In combination, these games provide a diverse set of perspectives on the different combat systems and thematics present in games in order to achieve a more holistic understanding of each type of game, as well as how they affect the progression and difficulty of a game. In all of these games, bosses contribute to the game's story as well as difficulty. We recorded 60-90 minutes of gameplay from ten different games to examine their use of enemies, minibosses, and bosses and gather qualitative data. The data was then analyzed using thematic analysis to identify the design criteria for each category of NPC.*

***A Method for Evaluating Player Experience with a Game Prototype***
Poster #7 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Emily Carol Espinoza & Anaiya Tucker
Research Mentor(s): Henrik Warpefelt

*Feedback is an important part of game development, but it is not easy to obtain due to the difficulty of measuring user experiences. In this study we report on a study design and methodology that we developed with current user experience surveys that serves to maximize the information we can elicit about user experience. This methodology consists of a pre-game demographics survey, gameplay, a post-game user experience survey, and a post-game interview. The demographics survey elicits the respondent's experience with and affinity for games. After this they are asked to play Relic, a game we have developed as a user experience test bed. The respondents then fill out a survey called the User Experience Survey. It measures the respondent's experience with certain aspects of gameplay. Shortly after, respondents are interviewed about their results to obtain specific information about the reasoning behind their answers. Initial pilot testing of the methodology indicates that although the methodology is time intensive to execute it will elicit the requisite data.*

***The Novel Game Design Lab***
Poster (Convocation Center)
Thursday April 20, 2023
10:00am – 5:00pm
Undergraduate Student(s): Joshua Whorton, Joel Metukmebong, Donovan McGregor, Stephen Pangilinan, TJ Rush, and Anaiya Tucker
Research Mentor(s): Henrik Warpefelt

*The Novel Game Design Lab studies how we can combine new technology and novel approaches to game design to create new and interesting gaming experiences. For this year's symposium, we will be exhibiting Relic 2D, a platform for a variety of studies, including studies of engaging minimalist narratives and game play, as well as player performance and accessibility issues. The overall aim of projects done using Relic 2D is to identify techniques and technologies that let developers achieve a high degree of playability and polish with less development time. We will also be showing preliminary work for TechnoWizard, a VR game aimed exploring how we can implement gesture-based interfaces for rhythm games and pushing the boundaries of interaction design for VR. Lastly, we will be exhibiting an arcade cabinet built for data collection and demonstrating games.*

# Radow College of Humanities and Social Sciences

## Communication and Media

***Connecting Food Through Social Media: A Case Study of Joshua Weissman***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
4:20pm-4:35pm
Undergraduate Student(s): Delena Phan
Research Mentor(s): Laura McGrath

*The world of social media provides a home for individuals to create and express themselves through various forms of platforms. The ability to post videos, pictures, blogs, etc. for viewers discretion helps content creators and influencers take advantage of the opportunities the new age has given them. Through time, the internet has evolved into a space for engaging in online connections through social media. The interaction amongst these influencers with their viewers could be based upon a plethora of topics such as music, food, or even games. This case study, in particular, examines the work of the food content creator and influencer, Joshua Weissman. It includes personal techniques used by the content creator to appeal to his mass audience and looks into his level of engagement made through these online platforms such as YouTube and TikTok. To investigate this topic, a qualitative content analysis and a rhetorical analysis were utilized to further this study.*

***Death Coping: Effects of Computer Mediated Communication in Final Conversations***
Poster #16 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Laura Flores Sanchez
Research Mentor(s): Emily Scheinfeld

*Research suggests death is a taboo topic and families underestimate the need to talk about final wishes, living wills, and other end of life (EoL) issues (Nickels & Tenzek, 2022; Omilion-Hodges & Swords, 2017, Prince-Paul & DiFranco, 2017). EoL conversations not only allow the wishes of loved ones to be met, mitigate unnecessary suffering, and can present an opportunity for a good death (Tenzek & Depner, 2017; Zadeh et al., 2018). EoL communication can also impact outcomes for family members and caregivers like personal growth allows family members to say goodbye, to connect, express love, and explore their own identities (Generous & Keeley, 2022; Keeley, 2007; Keeley & Generous, 2017; Shames & Barton, 2003; Yingling & Keeley, 2007). With the recent COVID-19 pandemic, it made it difficult to have in-person final conversations (FCs) due to the*

*possible spread of the disease. Countries, like Italy, adopted computer mediated communications (CMC) to enhance communication during the outbreak to help affected families with the emotional burden (Ingravallo, 2020). Therefore, the aim of this study is to explain the impact of final conversations when these are conducted through mediated channels on coping with death. Data will be collected from anonymous surveys using quantitative measures to assess independent and dependent variables, and to collect demographic information. Participants must be at least 18 years old, speak English, and have experienced the death of a parent in the last five years. With these results, we hope to highlight the importance of having a FC as it helps cope with the death of a parent, as well as how the channel of that FC impacts coping and other outcomes. Understanding these implications allows us to understand the role of FCs in a good death for survivors and advances the field of end-of-life communication.*

***Law and Legislation: Women Communication Challenges in Masculine Professions***
Poster #25 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Madelyn Pollien
Research Mentor(s): Robin Mathis

*This qualitative study discusses the experiences of women employed within the masculine professions of law and law enforcement. Women within these male-dominated professions find themselves facing communication challenges between themselves and their coworkers due to the masculine nature of their careers. The workplace culture and environment are heavily ingrained with masculine ideals and values, such as assertiveness and physical strength. In order to examine and record the work experiences of women in these fields, this study relies on in-depth qualitative data from interviews, surveys, and prior scholarly journals on related subjects. In addition to questions regarding experiences, this study delves into mentorship and advice between women employed in these fields and how they navigate and assimilate into the workplace based on communication methods.*

***Law and Legislation: Women Communication Challenges in Masculine Professions***
Poster #26 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Ariana Mitchell
Research Mentor(s): Robin Mathis

*This study focuses on life experiences and levels of communication of women employed in predominantly and traditionally masculine professions, more specifically within the different levels of law and law enforcement. Law enforcement is dominated by men, and therefore presents*

*challenges for women once they become involved. Research methods adopted include a combination of literature reviews and qualitative surveys and interviews from a diverse group of women. These women are employed within different levels of law enforcement in order to dive more in depth of communication challenges between these women and their male counterparts. Their experiences allows for a deeper study into advice and mentorship between experienced women and those wanting to enter this field as well as insight as to how these women assimilate into a predominantly masculine profession and their solutions to better communicate within this profession.*

***Motherhood and Law: Challenges Female Attorneys Face Regarding Maternity Leave***
Poster #27 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Andy Clark-Arhart
Research Mentor(s): Robin Mathis

*It is well known that women face unique, sex-based challenges in the workforce. Several scholarly texts have been published about the "motherhood penalty" that women in the workforce face for having children. This research focused specifically on the effects of motherhood and maternity leave policies for women in the legal field, making use of secondary data. Through this process, it was found that women who took maternity leave received less comparable support than their male colleagues. There was also data found to support the notion that having children "hinders" the career of female attorneys, at least in part, when it comes to advancing to partner status. Overall, data was found to support the conclusion that female attorneys who choose to have children - regardless of the stage in their career - face specific challenges and prejudices based on their decision.*

***Voices of Resilience: Women in Law Enforcement Navigating Communication Barriers***
Poster #29 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Emma Smalley
Research Mentor(s): Robin Mathis

*Women who work in law enforcement often face unique challenges in the workplace due to their gender, including a lack mentorship opportunities, difficulty with workplace assimilation, isolation, and gender-based discrimination. These challenges can have a significant impact on communication dynamics and create barriers to effective communication in a male-dominated workplace. Through literature review, qualitative interviews, and questionnaires, this study will gather data on women in law enforcement and their experiences with mentorship, assimilation,*

*isolation, and discrimination. The objective of this research is to identify the strategies used by women in law enforcement to overcome the challenges they frequently face. By understanding the unique challenges faced by women in law enforcement and the strategies they use to overcome them, this research can contribute to creating a more inclusive and supportive workplace for employees of law enforcement agencies.*

***Women in Law and Legislation***
Oral Presentation (ALC 2102)
Thursday April 20, 2024
1:00pm –1:15pm
Undergraduate Student(s): Kortney Martin
Research Mentor(s): Robin Mathis

*Gender inequality in the workplace is a pervasive issue that has received significant attention in recent years. Despite progress in increasing female representation in many professional fields, women continue to be underrepresented in positions of power and leadership. This is particularly evident in the lobbying industry, where historically, women have held and continue to hold lower positions than their male counterparts. This study explores a possible explanation for this in American society by examining qualitative data from peer-reviewed journals and interviews. Delving into research that examines characteristics of male and female lobbyists suggests that gender bias is a significant factor contributing to the underrepresentation of women in high-level lobbying positions. Female lobbyists reported feeling pressure to conform to gender stereotypes, such as being expected to prioritize family responsibilities over their careers. Historically, women are known to be "caretakers." Research suggests that this stereotype, alongside others, is a root cause for women to lack specific characteristics that male lobbyists possess and utilize. This study will identify specific traits that differentiate men and women and aims to correlate these traits with common stereotypes in American society.*

## English

***Animation and Fantasy in Film & Television: Three Women Writers Who Turned Fairy Tales into Reality***
Oral Presentation (ALC 5102)
Tuesday April 18, 2023
3:40pm – 3:55pm
Undergraduate Student(s): Montes Montes de Oca
Research Mentor(s): Anna Weinstein

*In the past decade, women screenwriters have found more significant success in the film and television industry. In the late 1990s and early 2000s, three women screenwriters dominated the industry, achieving global commercial success in genres that had previously been dominated by male writers. In this presentation, I will share details about the careers of Rita Hsiao, Fran Walsh, and Lauren Faust and will demonstrate how their contributions to both film and television broke barriers for women writers working in animation and live action fantasy. In this analysis, I present the timeline of each of these screenwriter's successes, showcasing the progression of their work from Hsiao's Mulan (1998) to Walsh's Lord of the Rings (2002) to Faust's My Little Pony (2010) television series. Specifically, this research will highlight the writers' thematic messages and audience reception of films and series. All three writers leaned on fairy tales and other pre-existing stories and reimagined them for contemporary audiences, specifically younger viewers. I will discuss the impact of their breakthrough films and series and demonstrate the significance of their work in a male-dominated industry.*

***Case Study: Emma Chamberlain***
Poster #18 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Victoria Vega
Research Mentor(s): Laura McGrath

*Micro-celebrities, in recent years, have been pushed into mainstream celebrity status through the use of social media and various forms of online interaction with followers. The increased instances of people rising to fame through social media has created deeper, parasocial relationships between said Internet micro-celebrities and their followings. To research this occurrence, the author analyzed social media content of a famous micro-celebrity and compared the content which received the most engagement while discussing why. Findings of this analysis revealed a pattern of content in which fans and followers felt connected due to the casual nature of the content and ability of the micro-celebrity to make fans feel like friends. This highlights the role of parasocial interaction in social media and reflects the power of such content and why it is effective.*

***Gender in Gina Prince-Bythewood's Love & Basketball***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:00pm-12:15pm
Graduate Student(s): MaKayla Tappin
Research Mentor(s): Anna Weinstein

*Gina Prince-Bythewood's Love & Basketball (2000) is what one could call a classic Black film. The love story between Monica Wright (portrayed by Sanaa Lathan) and Quincy McCall (Omar Epps)*

*is just as fondly remembered as When Harry Met Sally – one of Prince-Bythewood's inspirations. The relationship is made even more memorable for its unflinching portrayal of gender dynamics in the Black community: Monica is a hot-headed and ambitious tomboy whose childhood dream was to be the first woman in the NBA; Quincy has been the golden boy for most of his life, but he still struggles with his understanding what a real man is supposed to be like. In this presentation, I will analyze Prince-Bythewood's screenplay and explore the historical context of the film to paint a picture of how the Black culture of the 1980s and 1990s affected the film's view of gender relations in the community.*

***Pioneering Woman Screenwriters from the Silent to Early Studio Era***
Oral Presentation (ALC 5102)
Tuesday April 18, 2023
4:00pm – 4:15pm
Undergraduate Student(s): Jane Ramirez
Research Mentor(s): Anna Weinstein

*Women screenwriters have often been sidelined in the film industry, and have had to work hard to amplify their voices and their stories. In order to facilitate their recognition and due credit, the Women Writers of Film & Television project has had the privilege of researching and learning about women screenwriters that have greatly contributed to the film industry. For this presentation, I will highlight the work of several women screenwriters from the Silent to Early Studio Era who have had prolific and successful careers in the film industry. This era is particularly interesting because there were even more women screenwriters in this era than there are today. The women I will be talking about are June Mathis, Jane Murfin, and Eleanore Griffin. Though June Mathis is regularly talked about for her great contributions to film, Jane Murfin and Eleanore Griffin are not as often talked about even though their careers were greatly significant. I would like to share insights into the careers of these pioneering women screenwriters. I will highlight my discoveries of how they have paved the way for women screenwriters today, and why they should be remembered, even 100 years later.*

***Pre-Code Versus Contemporary Female Screenwriters: Working Towards More Authentic Depictions of Women on Screen***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:00pm-3:15pm
Undergraduate Student(s): Isabel Alford
Research Mentor(s): Anna Weinstein

*Even in the 21st century, movies have remained an integral part of American pop culture, and while methods of consumption have changed, millions of Americans still flock to theaters every*

*year. So why is it that, even in 2022, Americans are not proportionally represented in film? In today's world, there is a lack of adequate representation of women in film. While there may be more characters who are women than there were in the past, the depictions of women are not always the most accurate. The solution to this ever-present issue in the industry is hiring more women as directors, executive producers, producers, and/or writers, as this increases the likelihood of films portraying women more authentically. Although there were few in number, pre-Code female screenwriters such as Lorna Moon and Dorothy Howell wrote films with daring and realistic depictions of women during a time that was characterized by male dominance. This change from the status quo for female characters sent a ripple through the film industry that can be seen even in films today. Contemporary screenwriters such as Phoebe Waller-Bridge and Diablo Cody carry on the legacies of both Moon and Howell in that they too write more authentic female characters and challenge how society views women today. Although the stories in contemporary films may be different than pre-Code films, the women written by these female screenwriters are very similar and act as lifelines for young girls who are used to seeing the same stereotypical woman in every film they see. Although film has evolved greatly over time, unfortunately, the industry still struggles with its representations of women. However, it's screenwriters like Waller-Bridge and Cody who are trying to change this and are working upon the foundations the pre-Code female screenwriters built in the early Hollywood era.*

***She's Just Like Me! Women Role Models in Children's Books.***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:20pm-3:35pm
Undergraduate Student(s): Hannah Robertson
Research Mentor(s): Nina Morgan and Dan Paracka

*In the modern age, most countries are not against the thought of women in positions of power. In fact, many countries like America and Morocco encourage hiring women for esteemed positions (Mouline et al.). Why, then, do women consist of only about 26% of American politicians, 13% of Moroccan business leaders, and as little as 16% of STEM majors world-wide (Cahn; Mouline et al.; Shumelev)? Studies suggest that this discrepancy arises from the fact that, whether directly or subliminally, women are taught to believe early on that these positions are not options for them (Cahn; Shumelev). Regrettably, many children's books are guilty of encouraging this belief by portraying female characters as frightened or innocent supporting roles compared to their strong and goal-oriented male counterparts (Kortenhaus and Demarest; Adukia et al.). This presentation will address the often-discouraging portrayal of women in children's books around the world and compare its developmental effect on children with the life-long, encouraging effect of positive female representation in children's literature.*

***The Symbiotic Relationship of Screenplay and Storyboard: Arguing For the Crucial Role of Screenplay in Animation***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
11:20am – 11:35am
Undergraduate Student(s): Aaron Bell
Research Mentor(s): Anna Weinstein

*This presentation will focus on the relationship between screenplay and storyboard, the importance of each in pre-production of animated features, and the reasons behind a recent decline in usage of screenplays in the greater animation industry. When writing action into a screenplay, there is an importance to allow freedom and interpretation for the director and actors where reasonable. In film, this concept inspires gray area, but in the world of screenplays for animation, that area is even wider. How does one write for an actor who is fictitious? How specific is too specific for a medium in which everything on-screen is specified?*
*The animation medium is based in meticulous attention to visuals, controllable by its very nature in contrast to live action. This is why storyboards are often, if not always, used for animated productions. What information should the storyboard artist be expected to infer and what should they be given? In animated television, there is a rising movement away from "script-based" production in favor of "board-based" production, or writing within the storyboard process without a screenplay. While this has not yet been adopted in film, it does present the question: what function does a screenplay serve for animation versus a storyboard, and how can we write our screenplays to better serve that function for such a visual medium? This presentation will outline why a screenplay remains important to animation. In addition, the symbiotic relationship involving screenplays and their abilities to elevate or devalue animated visuals will be discussed.*

***Three Dimensional Black Characters: Women Genere Writers of Film and Television***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
10:20am – 10:35am
Undergraduate Student(s): Gabrielle Jones
Research Mentor(s): Anna Weinstein

*Black women are looked on to be strong in society, and on television, they are regarded in the same light. But what does a strong black woman like? How do they act? In what ways do we expect them to interact with society? And how do writers create these characters? This trope of the "strong black woman" is a caricature and when is it layered with depth and nuance in regard to strengths and weaknesses, it produces three dimensional characters. Audiences today are looking for these examples of three-dimensional characters that mirror their experiences. In this presentation, I will be exploring this phenomenon through Shonda Rimes characters Olivia Pope*

*from Scandal (2012-2018) and Miranda Bailey from Grey's Anatomy (2005-present) compared to Michela Coel's characters Tracey from Chewing Gum (2015-2017) and Arabella from I May Destroy (2020).*

***Trailblazing Women Screenwriters of Color***
Oral Presentation (ALC 5102)
Tuesday April 18, 2023
4:20pm – 4:35pm
Undergraduate Student(s): Nyla Allen, Jane Ramir, and Montes Montes de Oca
Research Mentor(s): Anna Weinstein

*Women have made significant progress in the writing, directing, and other fields of the film and television industries over the past few decades. However, despite these advancements, there are still many obstacles for female writers, especially women screenwriters of color. Through the Women Writers of Film and Television (WWFTV) digital humanities project, I have been collecting data on a variety of women screenwriters, including their contributions to the film and television industry, their struggles and victories, and the difference they have made in the representation of women in media. In this presentation, I will share details about the contributions of three significant female writers of color, including their accomplishments, the difficulties they overcame, and the ways in which they opened doors for those who followed. Lorraine Hansberry, Cheryl Duyne, and Channing Godfrey Peoples are groundbreaking women screenwriters who leaned into their own experiences to create complex female characters of color. Researching their work has encouraged me to someday create a film based on my own experiences.*

***Trusting Your Audience: Turning Children's Movies into Fiction for All Ages***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
10:40am – 10:55am
Undergraduate Student(s): Haley Hunt
Research Mentor(s): Anna Weinstein

*Why do some films remain timeless classics, while others are dismissed as mere childhood remnants? In this presentation, I will examine the psychological and narrative factors behind this question and argue how they intertwine to turn children's fiction into fiction for all ages. By treating an audience with respect and trusting children's ability to comprehend and emotionally engage with complex concepts, writers not only solidify their grasp on their target audience, but also appeal to the emotional core of those far outside of it.*
*I will begin by defining children's fiction and all ages fiction, then back up my thesis with psychological studies that examine the long-term effects of how we explain, speak to, and treat children and adolescents. Then, I will break down how works like The Muppet Movie (Frawley*

*1979) appeal to older audiences. I will end my presentation with a focus on how the most successful films focus on universal struggles and ever-present emotions that we feel during all stages of life.*

## Foreign Languages

***Transnational Proximity and Influences of K-Pop Culture on the Western World***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:40pm-3:55pm
Undergraduate Student(s): Sofia Aguilar
Research Mentor(s): Jee Hye Park

*The phenomenon, known as the "Korean Wave" or "Hallyu Wave", has been now more impactful than in previous decades because of today's globalization. K-pop culture has not only influenced the Western world but has also transformed South Korean culture itself by changing how Koreans approach the Western world. Through Korean TV series and films, this research explores how Korean pop culture has evolved and how its interaction with Western culture - more specifically with American culture - has influenced it. Through visual discourse analysis, this research analyzed chosen scenes of the films and aimed to understand the transnational proximity and influences of Korean pop culture on Western culture. The findings indicated that Korean local popular culture attracted global audiences while sharing common understandings through transnational proximity. The chosen Korean media included social and political issues and messages such as social classes, capitalism, single-parent families, and underprivileged people's lives, which are common in Western countries. Thus, this research suggests that despite the fact that K-pop culture does not demonstrate a strong cultural proximity with the Western culture, Korean local popular culture still has an impact on global audiences from Western countries. This research will discuss the future implications of using transnational proximity and K-pop culture to understand the popularity of Korean media among young generations from Western countries.*

***Using Corpus Analysis in Korean Popular Culture & Media for Autonomous Language Learning***
Poster #11 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Gabrielle Punzalan and Ciana Ruggiero
Research Mentor(s): Jeongyi Lee

*The Korean Wave ("Hallyu") has grown to become an influence on international pop culture. A variety of Hallyu content, including popular music, films, dramas, webtoons, etc., provides*

*multiple modes of text in diverse cultural contexts. These systematically or randomly collected texts are electronically stored as a "corpus" and serve as a valuable source for second/foreign language (L2) learning. As technology constantly advances, there are definite signs of a more fully integrated approach to technology-enhanced language learning emerging. New Web 2.0 technology has led to an explosion of interest in its use within language programs due to its convenient approach to autonomous learning that allows learners to embrace e-learning. Research has shown that these digital technologies support student-centered learning environments and contribute to language development. In the years following COVID-19, learning environments have been evolving to enhance learners' autonomy. The purpose of this presentation is to showcase how language learners can use a corpus-based linguistic approach to analyze a set of randomly selected text samples from a variety of Hallyu content by making a dictionary with entry words using available corpus tools to assess their uses and relative frequencies. This presentation is expected to contribute not only to learners' linguistic knowledge of culturally rich corpus data when they work with texts from Korean pop culture but also to their use of tools and techniques of corpus linguistics to discover certain rules of language use and linguistic patterns and their vocabulary knowledge of specific frequency levels, which is one of the best predictors of L2 reading comprehension.*

## Government and International Affairs

***EMP National Threat Profile***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
4:20pm –4:35pm
Undergraduate Student(s): Francis Micah Holston
Research Mentor(s): Stephen Collins

*Borne by hypersonic missile, a single ElectroMagnetic Pulse (EMP) weapon detonated in the atmosphere over Kansas would incapacitate the American electrical grid for 4-10 years, incur trillions of dollars in damage, and result in the death of 150-300 million Americans within the decade. Traversing a swathe of the atmosphere into which few detection devices peer and possessing the capability to dodge counter-missile measures, hypersonic missiles are characterized by their trajectory and maneuverability, distinguishing them from traditional ICBMs (which also travel at hypersonic speeds). Generated from a nuclear warhead, a High-altitude ElectroMagnetic Pulse (HEMP) blast, delivered via hypersonic missile, blankets the nation with high-energy photons, instantaneously frying all electronics – powered or unpowered – unless heavily shielded. Although phones, computers, batteries, and electrical circuits of all varieties irreparably overload and the supply chain critically fractures for years, humans emerge unscathed from the photon shower. Technically, the attacking nation (for instance, China) did not directly harm a single US citizen, only our technology, economy, and infrastructure. Americans either starve or kill each other as*

*society collapses, but China remains indirectly responsible for those deaths. Therefore, attempting to justify nuclear or conventional reprisal encounters moral, legal, and geopolitical objections. As "competition below the threshold of war," EMP attacks place America in an awkward quandary, especially since America lags dangerously "behind the curve" in its hypersonic capabilities, potentially preventing us from delivering a retaliatory EMP strike on China. Naturally, America must prioritize development of a hypersonic arsenal and harden existing electrical/digital infrastructure to withstand EMP bursts. Building upon Oak Ridge National Lab's most recent declassified EMP report, a 2012 Congressional hearing, and the two best real-world instances of an EMP detonation (1962 Starfish Prime Test and Soviet Nuclear Test 184), this inquiry examines the ramifications, recourse, and retribution associated with an EMP strike.*

## History and Philosophy

***Abolition Disguised as National Interest: Parliamentary Evangelicals and the Abolishment of the British Slave Trade***
Oral Presentation (ALC 5104)
Tuesday April 18, 2023
10:00am – 10:15am
Undergraduate Student(s): Carson McCullough
Research Mentor(s): Amy Dunagin

*Historians have considered a variety of possible reasons for the British Abolition of the slave trade, many of which labeled either focusing on economics, gaining popularity amongst the masses, or sheer Evangelical virtue as the cause. However, scholars often fail to consider the climate of war present in 1807 and how decisions related to the war greatly affected the profitability of the trade. Furthermore, it is often not acknowledged how the members of parliament involved in the said decision were staunch Evangelicals and subsequently abolitionists, as were those who associated with them. Men such as William Wilberforce and James Stephen were able to rally support for policies that were disguised as acts to defend national interests at a time of war, namely the reinstatement of the Rule of 1756 in 1805. In reality, these acts crippled the slave trade. The abolishment of slavery was a very important issue in Wilberforce's circle, which is also known as the "Clapham Sect". Despite popular interests among the Evangelical base and Economic factors, the manipulation of Parliament under the guise of national interest by the Clapham Sect served to be the most efficient and seemingly the most crucial factor in ending the British Slave Trade.*

***Aphra Behn and Mary Astell: Feminist Icons of Eighteenth-Century Britain***
Oral Presentation (ALC 2101)
Tuesday April 18, 2023
1:20pm – 1:35pm

Undergraduate Student(s): Deiah Brue
Research Mentor(s): Amy Dunagin

*To understand why Aphra Behn and Mary Astell stood out in the female literary sphere of the Eighteenth-Century in Britain, this paper will be examining the works of Aphra Behn and Mary Astell, as well as the criticism and reception of them as writers and their works during the long eighteenth century. Sex and gender had been evolving and changing in British society throughout history. Yet, the shift from two separate spheres of men and women in society began to intertwine faster than in the past. The work of Aphra Behn and Mary Astell is used as two examples to prove that they had created a space for the more well-known British feminists to grow from. By conducting background research on the historiography of British women's history of the eighteenth century it has been found that women had some freedoms in the home but not in public to the extent of their male counterparts. With this discrepancy between the two sexes, there have been notable women breaking the stereotypes of eighteenth-century women. Aphra Behn created a successful career off of plays that ranged from tragedies to comedies and in between. She prospered and became as well known as her male counterparts during the beginning of the eighteenth century when women were seen as mothers and daughters and nothing else. Like Aphra Behn, Mary Astell would gain notoriety through her writing, specifically writing to her female audience. Her work would consist of philosophies and advice pieces to women on issues such as marriage and self-sustainability without a husband.*

***Battle of Quiberon Bay***
Oral Presentation (ALC 5104)
Tuesday April 18, 2023
10:20am – 10:35am
Undergraduate Student(s): Armando Irizarry-Vazquez
Research Mentor(s): Amy Dunagin

*This project is about studying British history in the 18th century. This specific project talks about the Battle of Quiberon Bay. One thing that I would like to talk about with this battle is why Britain did not give this battle, which was a turning point, the major recognition that it deserves.*

***Changing Norms of Masculinity in England***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:20pm-12:35pm
Undergraduate Student(s): Corey Handley
Research Mentor(s): Amy Dunagin

*Britain underwent massive changes as it went from a European power to a world power, the society that formed on the rainy island would be subject to the rapid changes of industrialization and the Financial revolution as British ships began to export and import goods all over the globe from the Americas to India. This new environment allowed a new class of wealthy Britons to be made who owned trade goods, consumed luxury goods, socialized with women, and was an urban man of business. This contrasted shapely with the idealized rough, land-owning, independent man who denied luxury goods as they were effeminizing. This project aims to observe the changing norms of masculinity in England during this change and in the aftermath of the Financial Revolution and what socio-economic and religious conditions led to the radical change in what a Man was supposed to be. Most sources have thus far come from popular publications such as the Craftsmen and Fog Weekly where Patriots posted their ideas, opinions, and slander. Using this I aim to observe the change over time in norms of masculinity in England as the world got smaller and interconnected in a way never seen before.*

***Crime, Class, and Society in Eighteenth-Century England***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:40pm-12:55pm
Undergraduate Student(s): William Vaughn
Research Mentor(s): Amy Dunagin

*The eighteenth century is often thought of as the century that modernized Europe. The development and sophistication of global markets sent goods and ideas swirling around the world at unprecedented speeds. In Britain, the intellectual and philosophical writings of John Locke and Thomas Hobbes eroded and chipped away at the anachronistic elements of British society that had fallen into obsoletion. The tenants of Enlightenment values allowed for a revolutionary sophistication of English Common Law. For the first time in British history, legal developments began safeguarding the lives and property of lower-class British citizens. The last half century of historiographical thought has critically reevaluated previously held truisms of the British Enlightenment. These academic minds have pointed to the eighteenth century's rise in executable property crimes as evidence of eighteenth-century Britain's desire to protect only the upper echelons of English society. Does the number of executable property crimes detract from the humanistic ideals of the Enlightenment? How were the British poor granted protection under the law during the Eighteenth century? Using primary source manuscripts and new findings in eighteenth-century crime statistics, I intend to show how the English poor became the biggest beneficiaries of England's legal developments. I hope to provide a fresh and thoughtful analysis of this vital historical question by supplementing recent discoveries in eighteenth-century crime data with visceral first-hand accounts.*

***The Decline of Marriage in Eighteenth Century Britain***

Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:20pm-1:35pm
Undergraduate Student(s): Sara Peterson
Research Mentor(s): Amy Dunagin

*To many aristocratic women in eighteenth-century Great Britain, freedom depended on their husbands. If freedom and marriage went hand and hand many women grew tired of arranged marriages that resulted in a less-than-desirable life. As a result, the arranged and mercenary marriages of aristocratic society in Great Britain decreased. Many factors played into the decline of these arranged marriages, the Enlightenment for example brought new ideas of personal agency. Overall, the question I seek to answer through my research is why did these marriages that seemed to be an essential part of British society decline in popularity during the eighteenth century.*

***Fashion Fiasco Strikes England: An in Depth Look at The Industrial Revolution's Impact on Rural Women's Fashion***
Oral Presentation (ALC 5104)
Tuesday April 18, 2023
10:40am – 10:55am
Undergraduate Student(s): Riley Doyens
Research Mentor(s): Amy Dunagin

*My central question is; why did rural women's fashion change between 1760 and 1840 from simple pieces meant to be sturdy and cheap for agricultural and housework to complex pieces that reflected the changes brought about by the Industrial Revolution? A thorough investigation of primary and secondary sources has guided my research on the shifting paradigm brought about by the Industrial Revolution, such as increased female presence in factory settings and a move away from the traditional roles of women within a home. This change is measured by shifts in popular clothing styles, the types of fabric used, and the patterns used on fabric within rural communities. To fit within a changing society, women's fashion adapted to the change in an industrial setting to be more practical for factory work. Another shift in women's fashion comes from an economic standpoint, with women in the workforce the economy shifted to accommodate this change. In the factories where rural women would work, they were exploited as a cheap and expendable labor source. Many women thought the additional income from the job would bolster their families' economic standing, unfortunately, this did not occur. Before the Industrial Revolution, many rural women took care of gardens as part of their duties to provide for their families. Once women began working in factories, their gardens became neglected as the new economic advantage of a factory job was intended to boost their household finances to allow for the purchase of food and other necessary items. The wages women received from factory jobs did little to negate the cost of food*

*to feed their families and ended up causing their economic standing to fall. This economic shift for households is seen in the types of fabrics and the amount used to create clothing for rural women.*

***Forgotten Victims: The Euthanasia of the Disabled Under the Third Reich***
Poster #11 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Courtney Chester
Research Mentor(s): Jonathan Gentry

*Shortly after the invasion of Poland in 1939, the head of the state hospital near Munich, Hermann Pfannmüller, said, "It is unbearable to me that the flower of our youth must lose their lives at the front, while that feeble-minded and asocial element can have a secure existence in the asylum." This quote came only two months after Hitler ordered Karl Brandt to euthanize a disabled infant, marking the origins of what would become known as the Aktion T4 Program. The Aktion T4 Program sought to euthanize all disabled populations within Germany as a way of creating the perfect eugenically-fit society. There were survivors of the Holocaust; there were no survivors of the Aktion T4 Program. The only evidence that remains comes from the perpetrators themselves and those that lived near the facilities where the victims were killed. Was the T4 Program solely for eugenic purposes or was it meant to eventually broaden its targeted demographic to cleanse Germany of all groups deemed unproductive members of society, eventually leading to the elderly? In enacting the Aktion T4 Program, the Nazis were not just trying to remove those deemed eugenically undesirable, they were also trying to remove anyone from society that could not contribute to German society productively, a decision that they were aware would cause immense backlash from the public. Previous scholarship regarding the lives of the disabled has largely focused on the doctors and scientists that perpetrated these criminal acts, treating the actual victims of these atrocities as an afterthought. In bridging the connection between scientific and social history it helps to restore the voices back to an often-marginalized group by understanding the stigmatism that they faced and how they and their families reacted.*

***French Revolutionary Fervor and Its Manifestation in England and Ireland, 1790-1799***
Oral Presentation (ALC 2101)
Tuesday April 18, 2023
1:00pm – 1:15pm
Undergraduate Student(s): Jose Chirinos
Research Mentor(s): Amy Dunagin

*Beginning in 1789, France experienced massive political and social changes that sparked fear among the other monarchies in Europe that this revolution would spill into their borders and bring violence with it. Yet other people could see the French Revolution as an example of democratic*

*triumph to be followed. This study questions how those arguments were embodied across the British Isles and why revolutionary fervor among British people manifested differently from the rest of the continent, with a specific focus on England and Ireland. Historians like H.T. Dickson or Albert Goodwin analyze the role of radical democratic movements in England, such as the Friends of Liberty, and their history of activism as a threat emboldened by developments in the continent, leading to their quick and efficient suppression by the royal government from 1792 to 1798. Others - such as Eliga Gould and H.M. Scott - argue that after the American Revolution, the British government became more authoritarian, choosing to secure political and economic stability at home and control of its overseas holdings, backing away from affairs on the continent after 1783. Others more - like Sean Cronin and James Murphy - focus on Ireland's revolutionary moment as influenced by the French Revolution, from the formation of patriotic societies - like the United Irishmen in 1791 - to the outbreak of armed conflict against British authority in 1798 and subsequent suppression. Considering all this, and with the use of primary sources from figures like Edmund Burke, Thomas Paine, and Samuel Romilly from 1790 to 1799, this study concludes that the royal establishment's distance from European affairs and shift away from a populace with political agency helped it quell revolutionary fervor and maintain order, more efficiently in England than in Ireland, the latter being definitely subdued after a failed armed rebellion.*

***The Levellers and the Folly of Consolidated Power.***
Oral Presentation (ALC 3101)
Tuesday April 18, 2023
4:00pm – 4:15pm
Undergraduate Student(s): Benjamin Malik
Research Mentor(s): Amy Dungin

*Throughout the British civil war, a large portion of the forces under Cromwell identified as "Levellers" an ideological sect that believed in radically expanding voting rights, redistribution of land, and greatly expanding how many representatives would be involved in the government to help distribute power. But by the end of the British Civil War, they were cast out of all areas of power or had coalesced into the more conservative sect of the post-war government. The levellers had two very different evolutions, the first was a rural reaction to the aristocracy starting to enclose the common land and not allowing the lower classes to farm or hunt on it as they had for generations. Then several years later, the nickname was attached to the more progressive wing of the Cromwell army during the British Civil War. Then later, we see most of the leaders that hold influence within the Cromwell government and army are persecuted and imprisoned or exiled. How and why did the more conservative forces in the revolution attack more progressive sects and force them to come to heel and consolidate power, while the progressive Levellers fell apart and were swept under the tide of history? The Timeline and events leading up to the Levellers being removed from prominence has a striking note that reflects many populist movements of the past. The very drivers of the movement were women and those from the lowest classes. They were pushed*

*to the fringe of the movement, and power was consolidated into easily controlled and silenced upper-class men. This examination will show the weakness of the individual leader or small consolidated power population and the blatant advantages of a dispersed power system within a revolutionary movement.*

***On the Reputation of Robert Clive***
Oral Presentation (ALC 3101)
Tuesday April 18, 2023
3:00pm – 3:15pm
Undergraduate Student(s): Alex Gaskins
Research Mentor(s): Amy Dunagin

*The multinational East India Company is infamous for its imperialistic governance over its holdings within India, specifically Bengal, and for holding a notable amount of political power within Britain itself. Many of these accomplishments can be attributed to Robert Clive, whether it be in reference to the Battle of Plassey in 1757 or his close connection to the New Tories during the 1760s. While under Clive's leadership, the East India Company would bring huge amounts of wealth to Britain and in return be granted the support and approval of the British government to continue governing its holding in India. Despite this, Clive's reputation was bitterly divided during the height of his career within the East India Company as attacks from his political rivals, the radical Whigs, brought accusations of financial corruption and blame for the later-named Bengal Famine of 1769 upon Robert Clive himself. In this report, an analysis of Robert Clive's political connections, both allies, and enemies, as well as the actions taken by both parties, will be made to explain the question of why Robert Clive's reputation was divided during the latter half of his career.*

***Quaker Reception of Benjamin Lay***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:00pm-1:15pm
Undergraduate Student(s): Linda Ugoagwu
Research Mentor(s): Amy Dunagin

*The earliest records of Britain's involvement in the slave trade date back to as early as 1562, however it was only towards the early nineteenth century that faith was publicly used as a reason to denounce slavery. Benjamin Lay, belonging to the religious Quakers or Society of Friends often goes overlooked when studying the subject of abolition in Britain, however his relentless efforts may have had a monumental impact in bringing about this change, despite numerous and some rather uncanny attempts to silence him. This essay aims to inquire the reasoning behind Benjamin Lay being disowned by the Quakers twice in England, as they would later agree with his*

*sentiments, and when and why there was a shift in how he was received in both America and Britain, leading to Britain's abolition of the slave trade. Research will be gathered through various materials including primary and secondary source documents, analyzing the changes and continuities of Benjamin Lay's reception in Britain. These findings will allow us to better identify how religious and moral relationships correlate with one another regarding abolition, and understand how those who speak out against unjust acts within religion willingly tread a path that has the potential of altering one's life negatively despite feeling just in doing so, through analyzing Quaker reception of Benjamin Lay over a course of time.*

***Queen Anne's Favorites***
Oral Presentation (ALC 3101)
Tuesday April 18, 2023
3:20pm – 3:35pm
Graduate Student(s): Izzabella Barrett
Research Mentor(s): Amy Dunagin

*My topic will discuss the reign of Queen Anne of Great Britain during the early eighteenth century. More specifically, her relationships with Sarah Churchill and Abigail Masham. My central question is: Why did Whigs and Tories respond in such ways that made Queen Anne seem to be so influenced by her favorites that their relationships shaped the way of the nation and Queen Anne did not have policies of her own when it came to Queen Anne's relationships with Sarah Churchill and Abigail Masham? These relationships were regarded by both Whig and Tory politicians as relationships that could decide the fate of the nation. Some even called into question the nature of these relationships being sexual. During Queen Anne's reign, Sarah Churchill was her first "favorite" during this time, she had Whig advisors. However, once that relationship deteriorated and Sarah's cousin Abagail Masham became the new "favorite," Queen Anne changed her advisors to Tory politicians and started to favor Tory's political thought. Politicians did not believe Queen Anne had her own political ideas and was easily influenced by her favorites, which explained Queen Anne's sudden change in political favor. Queen Anne was not researched as her own person until recently; this paper adds to the historiography by looking at Queen Anne from a different perspective. I pull from a large number of primary sources from the Kennesaw State Library, GILexpress, Eighteenth Century Collections Online (ECCO), and Early English Books Online (EEBO). I conclude that Queen Anne did have her own political thoughts and was not as easily influenced as her contemporaries thought her to be. It can be seen in the rhetoric that morphed from the reign of Charles II to fit the supposed homosexual relationships that Queen Anne had.*

***The Role of Christian Morality in the Abolition of the British Slave Trade***
Oral Presentation (ALC 3101)
Tuesday April 18, 2023

4:20pm – 4:35pm
Undergraduate Student(s): John Neal
Research Mentor(s): Amy Dunagin

*Historical discourse has long existed around the causes behind the abolition of the British slave trade in the late 18th century, with the explanations of economic motivation and a buildup of moral capital most commonly being given credence in modern discussion. However, when examining the arguments made for abolition during that time one can see that morality rooted in Christian beliefs was a key feature of the abolitionists themselves, regardless of social or economic background. This project demonstrates the importance that Christian morality played in the struggle for British abolition of the slave trade, particularly in how it influenced people from all walks of life.*

***Tea Tables and the Domestic World: The Feminization of Tea in 18th Century Britain***
Oral Presentation (ALC 3101)
Tuesday April 18, 2023
3:40pm – 3:55pm
Undergraduate Student(s): Jay Bernal
Research Mentor(s): Amy Dunagin

*When thinking of the play activities of a young girl, tea parties might come to mind first while they could come last for a young boy. Tea parties, collecting fine china, and the etiquette surrounding teatime have all been associated with femininity, which is one of the several examples of "separate spheres" between men and women. In 18th century Britain, the separate spheres between men and women were being emphasized more alongside customs of politeness, ideals of luxury and its unvirtuous nature. These separate spheres of men and women also include consumption differences in tea and coffee, and the connotations between them both have emerged as early as the 17th century in Britain; however, greater disparities between the two are more visible in the 18th century British culture. This essay argues that a culture of domesticity and feminization was cultivated around tea while, in contrast, masculinity was emphasized in coffee shops due to the associations of sexual deviance and effeminacy in luxury with tea. I will examine the background and introduction of tea and coffee into Britain and explore the ways in which these associations were being made.*

***William Hogarth's Political Bias in the Print Series Humors of an Election***
Oral Presentation (ALC 2101)
12:40pm – 12:55pm
Undergraduate Student(s): Brittney English
Research Mentor(s): Amy Dunagin

*William Hogarth, a prominent political satirist, created a series of election prints entitled Humors of an Election to provide commentary on Whig politics of the 18th century, rather than an imprecise portrayal of the parliamentary atmosphere of 1754 in Oxford. Established literature on this topic has noted how Hogarth may have been politically ambiguous—however his themes of bribery and corruption may have driven the creation of the politically-charged election prints. Within examining the 1754 Parliamentary seat elections in Britain, as well as the artistic trends and other notable works of this time, research shows how Hogarth used these influences to create crude and unforgiving interpretations of Oxford election assemblies. Satirical caricatures, symbolism, and the dualism of political parties come together in harmony to create Hogarth's observation of corruption and distinction of Whig brutalism.*

## Geography and Anthropology

***Scan and 3D Print Outdoor Works of Art around the KSU Kennesaw Campus***
Visual Arts Display (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Rory Jones
Research Mentor(s): Uli Ingram

*We printed 3D models of various art pieces around campus to display artistic abilities and creations of our Kennesaw State campus community. The 3D models of art pieces on campus hold intrinsic value of our core ability to re imagine the world around us and contribute ideas to society. On Kennesaw State University campus, we have a culture that inspires students to innovate and involve themselves with the community. Our campus is beautiful because people from different cultures can contribute to art on campus. Kennesaw State University has accumulated artifacts from students and members of the community in the past thirty years. The art pieces on campus are essentially artifacts in the sense it symbolizes vast cultural meanings and design from multiple perspectives. The artifacts on campus represent the values of our culture on campus. Our mission is to spark involvement and innovation by replicating artifacts on campus in 3D models. We used geospatial devices and lidar technology to obtain point cloud data scans of artworks located on Kennesaw campus. We register and process this data in various 3D printing software to translate raw data into gcode to transfer to 3D printers on campus, thereby creating miniaturized artifacts.*

***3D Visualization of Fresh Water Landscapes at High Spatial Resolution***

Oral Presentation (ALC 2106)
Tuesday April 18, 2023
4:00pm – 4:15pm
Undergraduate Student(s): Tristan Bollenbaugh
Research Mentor(s): Ranbir Kang

*Communities at different spatial scales depend upon freshwater resources such as rivers, creeks, and streams. With increasing populations, managing these resources is becoming more challenging globally. Most agencies use various traditional surveying tools to manage these resources at local, regional, national, and international levels. Despite the accuracy of such data, these tools need an additional layer of high-resolution visualization and modeling. Therefore, this research focuses on high-resolution (millimeter-scale) data collection and presentation. A local stream in Western Illinois was surveyed using terrestrial LiDAR (laser scanner). The data was collected in a point cloud format and orthophotos along the full length of the stream. The Cyclone suite was used to import, process, and analyze the data. It was followed by developing the final deliverable of the 3D models of the stream valley. While being visually appealing, the results are directly applicable to various agencies because it offers millimeter-level information about the universe of stream valleys. Our method provides valuable management tools for various agencies.*

***Application of an Underwater Drone, Laser Scanner and 3D Printing in Water Research***
Poster #21 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Keely Gerety
Research Mentor(s): Ranbir Kang

*Stream networks are the groundwork for the hydrological system. Streams and small lakes serve as freshwater reservoirs for communities across the U.S., as well as providing recreational and aesthetic value. Streams help minimize flooding by accommodating extra water during heavy rainfall. Additionally, streams support complete ecosystems for varieties of aquatic life, but the underwater processes often go unnoticed to us. Therefore, it is essential to understand the geophysical conditions of streams. This project focuses on Frey Lake, a small anthropogenic lake located in Kennesaw, Georgia. Built around 1950, Frey Lake has an inflow stream that runs through Bozeman Lake and eventually empties into Noonday Creek. The study conducts a detailed analysis of geophysical environments of Frey Lake, with a focus on how Frey Lake effects the sinuosity of the lower order stream. Data will be collected using the Geneinno T1 underwater drone, then analyzed using Leica Cyclone's visual alignment feature. Conclusions will include lake bed roughness calculations and models along with figures of sinuosity and comparisons to similar streams.*

***Community Resilience: Conducting A Tornado Risk Assessment for Oklahoma City, Oklahoma***
Poster #29 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Chanice Brown
Research Mentor(s): Uli Ingram

*On May 20th, 2013, the Newcastle-Moore tornado carved a 14-mile-long path of destruction through Oklahoma City, McClain, and Cleveland Counties. This event led to the deaths of 24 people, more than 200 injuries, and at least 2 billion dollars in damages. Tornadoes like the Newcastle-Moore are sporadic and technological advances have provided an extra layer of protection against them. However, researchers have found that one of the best methods for bolstering the safety of a community when facing such severe weather threats is developing a hazard mitigation plan. As such, the focus of this particular project was to identify the risks posed to Oklahoma City under tornadic conditions using ArcGIS software. The research takes place in three parts: A historical analysis to pinpoint the locations of previous hazardous events, a network analysis to create service areas for critical facilities, and a spatial analysis to identify which city zones would be impacted today if a tornado of the same size as the Newcastle-Moore tornado were to touch down within the city. The results showed tornadoes tend to occur closer to the center of Oklahoma City, potentially making inner-city emergency and infrastructure systems more vulnerable. The study also indicated that if a tornado like the Newcastle-Moore touch down near the center of Oklahoma City, most impacted areas would belong to single-family homes and residential facilities like schools. While this information provides valuable insight for short-term tornadic disaster preparations, future research is needed to explore specific potential damage costs and losses.*

***The Impact of Sustainable Textile Education on the Behaviors and Attitudes of College Students***
Poster #31 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Minh Clark
Research Mentor(s): Vanessa Slinger

*Consumers are beginning to realize the adverse impacts of Textile production on workers and the environment, increasing the demand for sustainably produced clothing. OwlSwap is a sustainability initiative at Kennesaw State University promoting the use of secondhand clothing items with clothing swaps, a free closet, and several opportunities for environmental education. The purpose of this study is to analyze the behaviors and attitudes of college students regarding*

*the consumption of textile goods, and how they may change after being exposed to environmental education resources. Questions will pertain to an individual's consumption, the reasoning behind their purchasing decisions, and their feelings about unsustainable textile production. Before and after partaking in an interactive presentation about the sustainability of textile manufacturing and reuse data will be collected by means of survey and analyzed to test if a significant change can be correlated to a session of participation in environmental education.*

***Major Hurricanes with Landfall in Southwestern Florida: A Comparative Analysis in the Florida Keys***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
4:00pm-4:15pm
Undergraduate Student(s): Hanna Kozma
Research Mentor(s): Erinn Bariteau

*Hurricanes are natural occurring hazards, which impact earth, shape the landscapes, and influence human behavior, particularly in the Southeast coastal United States. Increasing surface and ocean temperatures influence hurricane hazards and potentially lead to disaster. This storymap will consist of climatology on hurricanes with a comparative analysis of Hurricane Irma in 2017, Hurricane Charley in 2004, and Hurricane Donna in 1960. By comparing the differences and impacts of these past hurricanes this analysis helps to better understand the ramifications of three similar hurricanes in terms of landfall location, intensity, and time of year. Hurricane data was collected and created into novel maps using ArcGIS Pro and ArcGIS Online to help visualize and compare hurricane tracks. After a comparative analysis of these three major hurricanes that made landfall in Southern Florida, this storymap will identify varied impacts on landfalling major hurricanes in Southern Florida and the Keys. By comparing these storms, we can also see if the impacts are intensifying into a greater concern. This investigation will not find a new way to track hurricanes or determine their destruction, but it will seek to understand similarities and differences that affect impacts like wind speeds, intensities, precipitation amounts, or economic damages.*

***Natural vs Synthetic Rooting Hormone's effect on Mulberry cuttings***
Poster (Microsoft Teams Link)
Friday April 21, 2023
4:40pm-4:55pm
Undergraduate Student(s): Christian Thomas
Research Mentor(s): Vanessa Slinger-Friedman

*Numerous research has been done on rooting hormones and which concentrations and natural alternatives are the most effective for various plants. In this study, we will be looking at natural*

*alternatives that one could find in one's urban environment either inside or outside. We tested these natural alternatives on hardwood fig cuttings. All cuttings grew in the same medium, which was composed of a 1:1 ratio of coco husks and perlite. We experimented with two natural alternative hormones, one control, and one synthetic hormone. Willow water and a mixture of cinnamon and honey served as our natural alternatives. As a result of this experiment, we wanted to see if these natural alternatives were equally or more effective as synthetic hormones, which can be expensive and not as sustainable. This experiment will help educate gardeners in urban environments about cheaper and more sustainable ways to produce successful cuttings.*

***Scan and 3D Print Outdoor Works of Art Around the KSU Kennesaw Campus***

Visual Art (Convocation Center)
1:00pm – 1:45pm
Undergraduate Student(s): Amber Solana
Research Mentor(s): Uli Ingram & Ranbir Kang

*3D printing is an evolving idea within the past few decades, and it has turned into something that is now accessible to almost everyone in society. Today, anyone can buy a 3D printer for 200 dollars off Amazon. The question is now, in what ways can we use 3D printers, whether it be for creating something useful or something creative. Additionally, Laser Scanners were not used by engineers until the late 1990's, which is another technology that is becoming more accessible. The purpose of this project is to scan 3D art sculptures around KSU Kennesaw Campus and convert it to a .stl format so we can 3D print them. These printed sculptures could be used in countless ways, for example, like using them as game pieces for a KSU themed board game. By using the Leica Geosystems Laser Scanner, we scanned each piece of artwork and uploaded it to the computers in the Geography Lab. From there, we used the cyclone platform to register the scans, which means to align all the scans, and then we cleaned all of the excess geography to leave just the statue. Once each sculpture was cleaned, we exported it to either CloudCompare or MeshLab to create a mesh to unify each point to create a printable sculpture, and then we exported it to the SD card to put in the 3D printer. During this process, the sculptures would not align correctly or would not export correctly, so multiple computer platforms were tested to see if they would fix the issues. Overall, multiple sculptures were successful during the 3D printing process, but some had to be re-worked. This is still experimental technology in today's times, but it's constantly evolving to where in the next decade, there will be no limits to our imaginations.*

***Universities in the United States Providing Different Clothing Based Resources to the Student Body***
Poster #32 (Convocation Center)

Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Lilly Colantuono
Research Mentor(s): Vanessa Slinger-Friedman

*OwlSwap Sustainability Initiative is most known for promoting sustainability through its on-campus clothing resources for students. This provides free casual, professional, and LGBTQ+ clothing assistance for Kennesaw State University students. For some, it may be a more sustainable option to get clothes, but for others, it may be the only option. The research collected will map out universities that have a campus clothing resource for students, and what kind of resource is provided, on a national scale. This includes free clothing closets, professional clothing for career fairs/interviews/jobs, clothing swaps, LGBTQ+-focused clothing resources, and RSO or student clubs centered around providing clothing to the student body. Examining the distribution of universities with clothing resources, and the type of resource can give an in-depth look into the demands of students and how universities are promoting student wellness and sustainability.*

## Psychological Science

***Assaying Stress Related Hormones to Study Emotions***
Poster #27 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Corene Fuller and Sahil Bardai
Research Mentor(s): Sharon Pearcey

*The Affective Neuroscience lab investigates the biological factors that are associated with elevated PTSD vulnerability. Using an Enzyme-Linked Immunosorbent Assay (ELISA), we assay saliva samples to quantify the amount of hormonal biomarkers. ELISA assay plates are covered in antigen coating that binds antibodies on the protein in question, Cortisol. The assay process involves several steps such as pipetting the saliva sample into the coated 96-well plate, adding buffers and protein conjugates, and incubating to allow for competitive binding to occur. There are several equipment that make it facile to run these assays such as the BioTek plate washer, BioTek plate reader, and the multichannel pipettes. The data from the assay is then used to understand the proportionality of stress hormones to behavioral and psychological responses. DHEA-S, or dehydroepiandrosterone-sulfate, and cortisol are both steroid hormones that have been found to have a solid connection to psychological conditions such as stress, anxiety, and fear. Cortisol present in the body is regulated by the HPA-axis and released by the adrenal cortex in response to a stress cue from the environment.*

***Avoiding Re-Traumatization and Healthcare Avoidance in Women with MRKH Syndrome***
Oral Presentation (15-min time slots) (Microsoft Teams Link)
Friday April 21, 2023
1:40pm-1:55pm
Undergraduate Student(s): Danielle Podolin
Research Mentor(s): Beth Kirsner

*Mayer-Rokitansky-Küster-Hauser Syndrome (MRKH) is a congenital disorder among biological females that is characterized by the absence or underdevelopment of the uterus, vagina, and cervix (Laggari et al., 2009). For most women, diagnosis does not occur until adolescence, usually in response to concern about not beginning to menstruate. This diagnosis is traumatizing for many women who have anticipated bearing children at some point in their lives, which is nearly unattainable with MRKH. Though this syndrome affects approximately one in 4,500 women, MRKH research is scarce, and most people have never heard of it before, including medical professionals (Morcel et al., 2007). It is not an uncommon experience within the MRKH community to be forced to explain what MRKH is when meeting with a medical professional. This and related experiences in the healthcare setting can be re-traumatizing and can lead to healthcare avoidance. The current study investigates the relationship between negative experiences within healthcare settings and subsequent healthcare avoidance. I tested three hypotheses: (1) people with MRKH experience re-traumatization at healthcare appointments, (2) this re-traumatization is a universal experience, not limited to the American healthcare system, and (3) people with MRKH experience more healthcare avoidance than the general population. A sample of 163 participants diagnosed with MRKH responded to an online survey. They named the psychological triggers associated with their diagnosis, rated the emotional impact of specified scenarios that may occur during medical appointments, and reported their levels of healthcare avoidance. Results highlight the ongoing psychological impact of an MRKH diagnosis by demonstrating the relationship between interpersonal interactions during medical appointments and subsequent healthcare avoidance.*

***The Big Five and Informant Behavior: Can Personality Predict when Students Snitch?***
Poster #17 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Cortney Calligan
Research Mentor(s): Jennifer Willard

*Snitching, whistleblowing, truth-telling, and reporting other's misconduct could all be considered informant behaviors. The Big Five traits, which include agreeableness, neuroticism, consciousness, extraversion, and openness, have been shown to predict an array of behavior, including workplace*

*whistleblowing. Bjorkelo et al. (2010) found that among employees, extraversion was positively related to whistleblowing and agreeableness was negatively related. We sought to extend this literature by exploring whether the Big Five traits predict informant behavior among strangers. This was done by examining college students' likelihood of snitching in response to a false accusation. Pairs of strangers (N = 114) participated in a study that was purported to measure communication via instant messaging. Participants completed the Mini International Personality Item Pool (I.e., Big Five; Donnellan et al., 2006). Afterwards, one participant from each pair was randomly assigned to play the part of a participant-confederate who cheats on a test and sends a text message plea for their partner to take the blame. Innocent participants were then confronted and questioned about the cheating. Results indicated 44% of participants informed researchers that they witnessed their partner cheating and 39% showed researchers the text message plea. After running two logistic regression analyses in which the Big Five traits were entered as predictors and informant behavior served as an outcome variable, we discovered that none of the traits were predictors of informant behavior (ps > .155). Although prior research found a connection between personality and whistleblowing, Bjorkelo et al.'s (2010) work was based on self-reported whistleblowing, whereas we observed actual informant behavior in real time. Thus, it is possible this measurement difference may account for the discrepancy. Given the importance of upholding ethical standards in the workplace and academia, future research should further explore the role of personality in informant behavior.*

***Cardiovascular Disease in the Active Service: Incidence Rates and Implications for Intervention***

Poster #5 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Sophie R. Vincent, Brian A. Moore, and Michael A. Schlenk
Research Mentor(s): Brian Moore

*Cardiovascular disease (CVD) is the number one cause of death in the United States. Common risk factors associated with CVD are obesity, hypertension, alcohol use, tobacco use, unhealthy diet, and physical inactivity. Other factors such as genetics, race, age, and gender also play a role in the development of CVD. Based on current literature, the increasing trend of obesity impacts even active-duty military service members who are paid to maintain their physical fitness. Due to the lack of literature surrounding incidences of CVDs in active service members, the present study provides insight into this topic. The present research conducted a retrospective cohort study using the Defense Medical Epidemiological Database to examine incidence rate trends of various CVDs and demographics among active service members between 2016 and 2021. The average incidence rates of CVDs in active service members decreased except for Angina. Specifically, Aortic Aneurysm and tear, atherosclerosis, peripheral vascular disease, stroke, and heart attack incidences decreased (-31.94%, -29.91%, -19.58%, -9.36%, and -3.49%, respectively). However, incidences*

*of Angina increased by 14.77%. The majority of CVDs were most frequently diagnosed among the demographics, senior commissioned officers, >40 in age, black, and married status. The decrease in incidences of CVDs warrants further investigation into the explanations for this decline and continuing implementations of the interventions impacting CVDs among service members.*

***Choices for Family Growth: Infertility to Adoption***
Poster #14 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Daezha Jackson and Meghan Salain
Research Mentor(s): Nicole Martin

*Of the many avenues open to families dealing with infertility, adoption is a potential path they can take. This study explored the early phases of decision-making when parents are faced with infertility adversity. Some families pursue adoption as an alternative to infertility treatment to grow their families due to medical intervention being expensive, posing potential health risks, and having low success rates (Park, Nicholas, & Hill, 2014). Adoption is often the last choice families make after they have exhausted all treatment options. We explored the decisions families made in relation to adoption after at least a year of not conceiving. Participants were 86 adults (72 female, 9 males; 5 other) who identified as a person or partner to someone facing infertility. They completed an online survey where they reflected on their infertility, medical interventions, relationship with their partner, the importance of support, and openness to adoption. Multiple regression analyses were conducted and identified the connection between openness to adoption and having older partners, supportive partners, and having tried multiple infertility treatments already. In evaluation of self-identified personality traits, those open to adopting were more open to change, worried that things would work out, and that they treated all races and religions equally. Families most open to adoption reported a year or more of infertility treatment. This, combined with a high level of support received from their partners, and an openness to change, were related to openness to adopt. Some families would not consider adoption, even after exhausting all medical treatment interventions. In sum, there are many paths toward parenthood, and in this sample, many families were open to the adoption process.*

***Comparing Brain Waves Before and After a Simple Task***
Poster #25 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Lamar LaTella and Alexis Newman
Research Mentor(s): Tim Martin

*This research explored the effects and interactions of the alpha, beta, and theta waves in young adults who are in recovery from substance use versus those who are not in recovery. The sample size consisted of 25 participants. The five participants in the recovery group were recruited from the KSU Center for Young Adult Addiction and Recovery. These consisted of young adults who are in recovery from alcohol or substance abuse, as well as other addictive behaviors. The other 20 participants in the control group were recruited from various psychology classes at the university. Resting state EEG was measured for eight minutes before and eight minutes after completing a simple task where participants monitored ongoing stimuli for a rare target stimulus. There was an interaction between groups and timepoints in the amplitude of the alpha wave. Participants in recovery had lower alpha than the control group before the task, but after the task their alpha power had increased while the control group did not change significantly. Additionally, beta waves when eyes were closed also had a significant interaction between groups and timepoints. Control participants decreased in beta power after the task, whereas beta power increased in participants in recovery.*

***Development of a Post-adoption Survey to Improve Dog Adoption Success***
Poster #9 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Hailey Fussell, Madison Martin, and Meighan Rueden
Research Mentor(s): Allison Martin and Suma Mallavarapu

*Each year in the United States, approximately 3.1 million dogs enter shelters, and nearly 400,000 are euthanized (American Society for the Prevention of Cruelty to Animals, 2023). As many as 20% of dogs adopted from shelters are returned within six months (Hawes et al., 2020). Dogs with behavioral problems are at particular risk for repeated shelter relinquishment and are more likely to be euthanized (Powell et al., 2021). These facts pose a significant animal welfare concern and underscore the importance of reducing relinquishment, encouraging retention in the adoptive home, and optimizing the adoption process. Previous research supports the idea that dog behavior is a significant factor in dog selection, the bond between a dog and its owner, and the ultimate success or failure of adoption. We developed a behaviorally focused post-adoption survey with Mostly Mutts Animal Rescue, the results of which will provide a framework for improved adoption processes and post-adoption support. The survey includes sections focused on the adoption process, adoption counseling, dog behavior, demographics, owner expectations, and fit between dog and owner. Shelter staff and volunteers will email the survey to dog owners within two weeks of adoption, with the goal of reaching owners during the period with the highest probability of shelter returns. We hope to use the results of this survey to promote adoption success by evaluating the efficacy of in-shelter behavioral assessments and training, identifying areas for improving the adoption process, pinpointing specific behaviors that impact adoption outcomes, and encouraging the use of post-adoption training resources.*

***Does End-of-Life Communication with Parents Impact Self-Esteem and Relational Satisfaction?***
Oral Presentation (ALC 2102)
Tuesday April 18, 2023
12:40pm – 12:55pm
Undergraduate Student(s): Ella Smith
Research Mentor(s): Emily Scheinfeld

*According to previous studies, death is taboo and families usually underestimate the dire need to talk about final wishes and wills, among other end-of-life (EoL) related issues (Nickels & Tenzek, 2022; Omilion-Hodges & Swords, 2017, Prince-Paul & DiFranco, 2017). Having EoL conversations allow final wishes to be better satisfied, alleviates needless suffering, and can allow an opportunity for a good death (Tenzek & Depner, 2017; Zadeh et al., 2018). Healthy EoL communication can also impact outcomes for family members and caregivers alike. For example, personal growth allows family members to say goodbye, to connect, to show love, and to explore their own identities (Generous & Keeley, 2022; Keeley, 2007; Keeley & Generous, 2017; Shames & Barton, 2003; Yingling & Keeley, 2007). Additionally, EoL conversations can reduce levels of guilt (Scheinfeld & Lake, 2019) and can contribute to personal growth (Generous & Keeley, 2022) and coping mechanisms following the death of a parent (Generous & Keeley, 2021). Therefore, the aim of this study is to explore the role of final conversations in a survivors' identity post-parental death. Data is currently being collected via convenience snowball sampling within a large southwestern city and university community. Participants will complete an anonymous online survey using quantitative measures to assess the independent and dependent variables, and to collect demographic information. From the results, we hope to show that having a final conversation that covers the survivor's identity is not only important, but also leads to higher levels of self-esteem and relational satisfaction. Understanding the role of final conversations in a good death experience for survivors advances the field of end-of-life communication. Moreover, these results may help healthcare practitioners in supporting families experiencing the end of life of their loved ones and help guide them through the bereavement process.*

***Drivers' Decision Making and Behaviors in Self- Driving Cars***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:00pm-3:15pm
Undergraduate Student(s): Katie Miller, Jimena Flores, Anna Lindsey, Brockton Miller, Lilee Atkins, Sara Maduro, and Sarah Weeks
Research Mentor(s): Kyung Jung

*To study the take-over performance by human drivers of automated vehicles, we developed an experiment that simulates an infant present in the vehicle. To determine how a baby present in the vehicle would impact the steering direction of Level-2 automated vehicles when approaching a T-intersection, we had participants drive a driving simulator. For the experimental group, we presented participants with knowledge that a baby was in the vehicle and a recording of baby sounds. The control group received an introduction to the study but did not receive any context of a baby present in the vehicle or baby noises. We hypothesized that by providing context to the participants that there was an infant in the backseat on the passenger side, they would be most likely to turn right. We also hypothesized that by providing context to participants that there was an infant in the backseat directly behind or behind to the right position on the driver's side, they would be more likely to turn left instead. To test this hypothesis, each participant was randomly assigned to a group in which we provided one of the three situational contexts: a baby present in the vehicle directly behind the driver, behind the driver to the right, or not present in the vehicle. We are currently collecting the data.*

***Effects of Background Music on Episodic Memory in Adults with Autism Spectrum Disorder***

Poster #31 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Savannah Cato, Beth Suranie, & Michelle Khandadash
Research Mentor(s): Sidni Justus

*Many regularly listen to music while doing a variety of tasks, including studying. Some research suggests background music may provide a supportive learning environment to aid memory. However, the literature is mixed, as these effects differ depending on the music type and type of memory being assessed. For example, emotions can be manipulated depending on the type of music playing, indirectly influencing a person's cognitive performance. Recent research found episodic memory benefitted from listening to stimulating background music in a sample of college students. What remains to be seen is if this benefit is unique to certain ages or populations. Autism Spectrum Disorder (ASD) is one of the most common neurodevelopmental disorders and is associated with episodic memory deficits. Music has regularly shown therapeutic benefits in ASD for a variety of tasks, but to our knowledge, no study has evaluated background music's effects on episodic memory in ASD. We propose that background music could stimulate cognitive functioning in ASD and ultimately lead to an increase in episodic memory retention. In this study, we test these ideas by evaluating episodic memory performance in the presence of background music (stimulating, relaxing, noise) in an online sample of adults with and without ASD.*

***The Effects of Personality on Post-Traumatic Growth***

Poster #29 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Alexa Brown and Ayanna Butler
Research Mentor(s): Tyler Collette

*The Anxiety Buffer Disruption Theory (ABDT) is an extension of the Terror Management Theory (TMT) that suggests that posttraumatic stress disorder (PTSD) is a result of the disruption of one's anxiety-buffering mechanisms. This disruption can lead to overwhelming emotions, hyperawareness of one's mortality, and wide-ranging reactions to traumatic events. The anxiety-buffer system mitigates the effects of potential terror, promotes posttraumatic growth (PTG), and comprises of three main components: cultural worldviews, self-esteem, and close personal relationships. The focus of this current study is to analyze what leads to the success of posttraumatic growth. We suspect that people may be more predisposed to PTG depending on the personality traits, such as those that can be measured by the Five Factor Model of the individual that has experienced the traumatic event. Discovering the traits that contribute to posttraumatic growth could potentially provide counselors, psychologists, and trauma specialists with insight that further develops methods and practices that assist in cultivating these attributes within their clients. Past research has shown those who score high on the scale of Neuroticism have a higher risk of developing PTSD (Cyniak-Cieciura et al.,2022), however, there has not been much research on the personality traits that would promote posttraumatic growth. To date, there is minimal relevant research that has directly assessed the relationship between personality and posttraumatic growth. Identifying these traits could direct the focus toward cultivating specific characteristics within the traumatized individual in hopes of creating a better outcome. This study aims to identify which Big Five Personality Traits are associated with posttraumatic growth. We hypothesize that high scores in openness, extroversion, and agreeableness will be primary characteristics of those who present more posttraumatic growth.*

***Effect of Substance Abuse on Evoked Response Potentials***
Poster #26 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Alexis Newman and Lamar LaTella
Research Mentor(s): Tim Martin

*This research examined the effect of substance abuse on the P2 wave of the evoked response potential, an index of attention. It was hypothesized that individuals in recovery from substance abuse will display lower P2 wave response. Participants were categorized by two preexisting groups, the treatment (recruited from KSU Center for Young Adult Addiction and Recovery) group and the control group. The treatment group was comprised of young adults in recovery from*

*alcohol or other drug abuse. The control group was comprised of college students who may or may not consume alcohol or other drugs. The CYAAR (treatment) group had significantly lower mean amplitude response to the target stimuli in comparison to the control group. The treatment group was found to have larger variance in mean scores than the control group. These results suggest that adults in recovery from addiction are less responsive to relevant stimuli. It is suggested that reduced attention span and problems recognizing relevant stimuli may be associated with risk for addiction. The use of alcohol or other drugs is potentially responsible for decreasing the amplitude response of adults even in recovery, indicated by the P2 wave.*

***Examining Differences in Psychological Capital, Burnout, and Work Engagement Among Women in Leadership Positions***

Poster #12 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Edwin Trejo-Rivera
Research Mentor(s): Israel Sanchez-Cardona

*Leadership behaviors are typically defined in masculine terms confirming women's disadvantages in attaining leadership roles. Female stereotypes are generally inconsistent with leader roles because of the expectation that women are communal (e.g., concern for others, sociability, and emotional sensibility) and that leaders are agentic (e.g., independent, instrumental, assertive). Research has indicated changes in gender stereotypes, in particular of women increasing in agentic traits over time. Identifying as androgynous (both masculine and feminine traits) has become desirable among women in leadership roles since the perception of success within the role stems from obtaining agentic traits. This fluid and flexible expression of their gender is related to positive leadership and well-being outcomes. However, limited research exists on how personal resources and work-related well-being outcomes fluctuate, considering women's identification with their gendered traits. This study examines the differences in psychological capital (PsyCap), burnout, and work engagement between women in leadership roles based on their femineity and masculinity traits. We collected data from 158 managerial women using a panel with Qualtrics across different job sectors in the United States. We used the Bem Sex-Role Inventory to measure identification with gendered traits (i.e., masculinity, femininity, androgyny, undifferentiated). One-Way ANOVA results indicated significant differences in PsyCap [$F(3,154) = 8.772$, $p < 0.001$, $\eta^2 = .145$], work engagement [$F(3,154) = 19.696$, $p < 0.001$, $\eta^2 = .277$], but not in burnout [$F(3,154) = 2.658$, $p = .050$, $\eta^2 = 0.049$] among the four groups of gendered traits. In general, participants who scored high in androgyny showed higher levels of PsyCap and work engagement. Our findings indicate that women in leadership positions that identify with a full portfolio of traits, not in the binary of men-masculine and women-feminine, show higher work-related well-being. This is relevant to continue reinforcing changes in organizational norms that reinforce and perpetuate gender differences and traditional gender role expectations.*

***Exploring the Interactions Between Cognitive Impairment, Depression, and Growth Mindset Among African Americans in the COVID-19 Era***
Poster #32 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Roger Otway
Research Mentor(s): Tyler Collette

*Depression is a common and complex psychiatric disorder that can affect people of all ages, genders, and backgrounds. It is currently characterized by persistent feelings of sadness, hopelessness, and lack of interest in life (Depressive Disorders, n.d.). Depression can have an impact on an individual's attitude in life such as their growth mindset. A Growth mindset is an individual's belief that their abilities can be developed and improved through effort and learning (Dweck, 2016). This way of thinking can lead to increased resilience, learning, and achievement. Another area that can impact depression and a growth mindset is cognitive dysfunction. Cognitive dysfunction refers to a range of difficulties in cognitive functioning, such as problems with attention, memory, and decision-making (Lam et al., 2014). This current study seeks to examine the influence of cognitive dysfunctions on the relationship between growth mindset and depression throughout the height of the COVID-19 pandemic. A total of N = 312 African American men answered a survey using Qualtrics. Results suggest that cognitive dysfunction fully mediated the relationship between growth mindsets and depression. Findings suggest that while developing a growth mindset is important for reinforcing a resilient perspective, reducing dysfunctional cognitions may be a necessary component of growth.*

***Factors that Affect Perceptions of Gig-Workers***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
4:40pm – 4:55pm
Undergraduate Student(s): Zed Carroll
Graduate Student(s): Lea Mobers
Research Mentor(s): Dianhan Zheng

*According to Pew Research Center, 16% Americans have earned money on online gig platforms such as Uber or TaskRabbit at some point. However, research on how consumers select gig workers is still mostly underexplored. The purpose of this study is to investigate the potential impact of a gig worker's gender and self-presentation in their profile picture on consumer perceptions and choices. Specifically, we propose that smiling and quality of profile picture in terms of professionalism positively influence consumers' perceptions on the gig worker's competence, trustworthiness, and the likelihood of hiring them for a task. We also propose that these two factors*

*will interact with gender, such that the positive effect of smiling is greater for female than for male workers, and the positive effect of professionalism is greater for male than for female workers. Lastly, we hypothesize that gender bias exists on gig platforms, such that male and female gig workers are more likely to be selected for tasks that are stereotypically aligned with their traditional gender roles. We conducted a 2 (gender: male vs. female) x 2 (smile: smiling vs. neutral) x 2 (professionalism: professional headshot vs. selfie) between-subjects experiment on Qualtrics to test our hypotheses. Eight fake worker profiles were created with different profile pictures to reflect the experimental manipulation. Undergraduate psychology students took an online survey where they were randomized to view one of the eight worker profiles. Additionally, we created one more worker profile that showed a smiling male in a professional headshot, which served as a comparison in each condition. We are currently in the process of data collection, which will be completed by December 2022. Data analyses will be completed by March 2023. Our findings will provide practical implications to gig workers regarding how to enhance their chance of being selected.*

***GPS Effect on a Take-Over Response from a Level-2 Automated Vehicle***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:00pm-2:15pm
Undergraduate Student(s): Michal Rhodes, Sarah Shields, Dan Sulhoff, Leo Molina, and Nick Williams
Research Mentor(s): Kyung Hun Jung

*Automated vehicles (AV) are becoming a highly popular technology that will flourish even more in the future. As easy as it is to become dependent, it takes a great deal of awareness to correct any mistakes that the vehicle might make. To observe how people react in level-2 automated vehicles when a silent failure occurs, we have created a concept that focuses on the effect that the navigating system has on take-over performance. Silent failure is when the level-2 automated vehicle malfunctions without notifying the driver. We hypothesize that, in a T-intersection, when the driver must perform the take-over of the AV to avoid a crash, they will turn the wheel in the direction of what shows on the GPS (Global Positioning System)/planned trajectory route. To test this, we used a driving simulator in which participants are told that there is a GPS showing their planned route on their windshield. We hypothesize that participants will avoid the crash by turning the wheel in the same direction that the GPS was taking the vehicle (e.g., GPS was heading right, and the participant turned the wheel right). We are currently collecting the data.*

***Investigating Conditioned Threat Responses and Alcohol Use Among College Students***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023
11:20am – 11:35am
Undergraduate Student(s): Erin Batarseh

Research Mentor(s): Sharon Pearcey, Ebony Glover, and Anna Rosenhauer

*Alcohol abuse and alcohol dependence in college students is an ongoing problem that has been associated with several different psychological disturbances and disorders. High alcohol preference has been associated with high fear-potentiated startle (FPS) magnitude in mouse lines, but alcohol consumption itself has hardly any effect on decreasing fear responses (Barrenha & Chester, 2007; Barrenha et al., 2011). There may be a relationship between overconsumption of alcohol and a predisposition to higher baseline FPS and fear learning in humans. It is hypothesized that students who report high alcohol consumption will also show amplified overall FPS responses in a fear conditioning paradigm. Participants were 71 college students at a southeastern university who received introductory course credit for their participation. Upon completing the Kreek-Mchugh-Schluger-Kellog (KMSK) scale survey for alcohol consumption, participants were then prepared for their participation in a fear conditioning paradigm. The fear conditioning paradigm is a pre-clinical model measuring fear learning and memory translated from fear conditioning paradigms used frequently in animal studies. It is composed of three blocks of fear acquisition where participants observe two conditioned stimuli: one paired with an aversive unconditioned stimulus (US) in the form of an air blast to the throat (CS+) and another not paired with the US used as a safety cue (CS-). Extinction is composed of four blocks and participants are presented with the CS+ and CS- without the US. Uniformly, participants who scored high in alcohol consumption startled higher to both conditioned stimuli in the paradigm compared to participants who scored low in alcohol consumption. Although the results were not statistically significant, there is a consistent difference in the magnitude of the startle response depending on participants' high and low alcohol scores.*

***The Impact of Discrimination, Community Support, and Class Modalities on Burnout in College Students***

Poster #22 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Caitlin Callahan, Adriana Williams, Kevin Toler, Sarah Weeks, Audrey Harris, and Maya Maqousi
Research Mentor(s): Meghan Bankhead

*What effects do class modality, perceived community, and perceived discrimination have on burnout scores in college students? Past research has found that students with more marginalized identities reported more instances of mistreatment and discrimination during medical school, which appeared to be associated with higher burnout (Teshome, 2022). Research has also shown that there is a positive relationship between community support and positive mental health (Hu et al., 2020). There is a gap in the literature in student burnout in association to these variables, which we plan to explore. The current study investigated the interaction of a student's class*

*modality, perceived discrimination (from faculty and peers), as well as perceived social support, and if this influences burnout scores. Students will receive a survey asking about their class modality (online, in-person, hybrid) and will also be asked questions from the Maslach Burnout Inventory, Everyday Discrimination Scale, and SC Perceived Community Scale. The Maslach Burnout Inventory is the leading burnout indication measurement (Maslach, 1997). The Everyday Discrimination Scale (Williams, 1997), published by Harvard University, is the original and still recommended scale for daily occurrences of discrimination. These scales will deliver data that allows us to quantify burnout, perceived discrimination, and perceived social support. We will be distributing a survey through Qualtrics which we plan will receive around 120 responses from students at Kennesaw State University. We hypothesized that students who feel more perceived discrimination will have higher levels of burnout and less sense of community. We also hypothesized that students who feel a strong sense of community will have lower levels of burnout and lower levels of perceived discrimination.*

***Impact of Hormonal Contraceptives and Childhood Trauma on Fear Conditioning***
Poster #28 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Abby Doster
Research Mentor(s): Sharon Pearcey and Ebony Glover

*Hormonal contraceptives (HC) are used by millions of women across the world for multiple purposes including effective contraception, regulating menstrual cycles, and relieving menstrual cramps. Bartholomew et al. (2022) found differences in fear learning between women taking HC, and women in the early phase of menstruation. Alternatively, differences in fear learning have also been associated with adverse life experiences like childhood trauma. Jovanovic et al. (2010) discovered that people who reported high levels of child abuse have an increased startle reactivity in adulthood and impaired fear inhibition. It is hypothesized that HC will interact with childhood trauma to increase startle and inhibit safety cue learning during fear acquisition. Data were collected from participants recruited from a southeastern university. The fear-potentiated startle paradigm is a preclinical model for PTSD risk. It measures fear conditioning using a conditioned stimulus (CS+) that is paired with an unconditioned stimulus (US), and a non-reinforced conditioned stimulus (CS-) that is never paired with an US during acquisition. Childhood trauma severity for participants was assessed using the Childhood Trauma Questionnaire (CTQ) and their reproductive status (HC use vs naturally cycling). Data were analyzed using a mixed-methods ANOVA. Although the overall interaction between reproductive status and childhood abuse was not significant, it appears that among women with a low level of childhood abuse, those who were using HC displayed higher startle reactivity than naturally cycling women. Additionally, when looking at women with a high level of childhood abuse, women using HC show learning deficits during fear conditioning and do not discriminate between the CS+ and CS- at the end of*

*acquisition. Understanding the interaction between HC use and childhood trauma and their impact on fear learning could provide new information for the advancement of PTSD treatments.*

***The Impact of Team Size on the Leadership Style and Psychological Capital of Women Leaders***
Poster #13 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Jennifer Garcia Arreguin
Research Mentor(s): Israel Sánchez-Cardona

*In recent decades, there has been a rise in women in leadership roles. The group environment may influence their leadership styles and their personal resources to deal with daily challenges. In this study, we focus on studying the different group sizes led by women to examine if the size of the group has any impact on the levels of women's leadership style (transformational, transactional, or laissez-faire) and psychological capital. This will give us a closer look at the type of work setting women express their leadership style best. We collected data from 155 women in leadership positions using a panel with Qualtrics across different job sectors in the US. Results showed that most of the women were transformational leaders, which previous research has shown to be the best leadership style. However, one-way ANOVA results showed no differences in the transformational (p=.063) or Laissez-faire (p=.464) leadership styles of women leading different team sizes (small, medium, and large). However, women who lead small groups showed significantly lower transactional leadership style compared to women who led larger groups. No significant differences were found when examining each of the components of psychological capital (p=.278). These results highlight that women in leadership positions use more transformational leadership behaviors and do not differ in personal resources regardless of their group size. Our findings bring us one step closer to understanding the work settings where effective leadership styles can be shown.*

***Mental Health and Self-Concept: Comparison of U.S. and Peruvian Students***
Poster #13 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Katherine Burgess & Tasi Levao
Research Mentor(s): Christine Ziegler & Gail Scott

*The purpose of the current study is to further investigate potential differences in mental health attitudes between cultures. Participants were university students from two diverse cultures/countries, the U.S. (Kennesaw State University-KSU) and South America (Universidad Peruana de Ciencias in Peru-UPC). Students were administered the Community Attitudes to*

*Mental Illness (CAMI) and Semantic Differential Scale (SD). The CAMI, (Taylor & Dear 1970), measures attitudes toward community-based mental health facilities. Osgood (1957) developed the SD, a Likert-based attitudinal scale, measuring self-concept. The survey was administered in 2021 as well as in 2022. Additional analysis will explore the relationship between demographics collected from the Atlanta and Lima university participants and scores on the CAMI and SD scales. The hypotheses were only partially supported with the main significant differences being between years of data and specific demographic questions.*

***Music and Memories***
Poster #15 (Convocation Center)
Thursday April 20, 2023
10:00am –10:45am
Undergraduate Student(s): Meghan Salain and Daezha Jackson
Research Mentor(s): Nicole Martin

*Music Evoked Autobiographical Memories (MEAMs) refer to the intriguing idea of music triggering an automatic recall of an event or moment in someone's life that corresponds with the music. Over the course of research about these memories, however, one common thread has become apparent and it's that of the "Reminiscence Bump Effect" (Platz 2015). Platz (2015) discussed how he saw that songs heard between the ages of 15-24 had a stronger relationship with musically evoked autobiographical memories than songs heard at any other age. This study sought to explore the concept of the Reminiscence Bump Effect and to see if we could find a more specific age range for the positively and fondly remembered music. A questionnaire was given to participants asking about background, such as demographics and generational identity. This survey then went on to ask participants to reflect and write about their memories tied to specific songs. The participants were asked what the song was, and they were asked to tell the memories associated with it, how old they were in these memories, and if the recall was automatic or manual. Participants were 179 adults (76% female, 21.8% male, and 1.7% nonbinary or other). When participants were asked how old they were in these memories, 38% of participants said they had memories with music occur between the ages of 16 and 20, 34% said it was between the ages of 5 and 10, and 19% said it was between the ages of 11 and 15. Analyses were run using SPSS, and significant correlations were found to uphold the Reminiscence Bump Effect.*

***Passenger Presence and Turning Direction***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:20pm-2:35pm
Undergraduate Student(s): Hyun D. Chung, Vanna L. Beach, Rafaella L. Abbud, Lauren K. Culbreath, and Bobbi C. Ayres
Research Mentor(s): Doctor Kyung Jung

*This study investigated how drivers react in the event of a car accident at a T intersection when there is a passenger present in the vehicle. We want to determine if the presence of a passenger will affect the driver's choice to take over the automated vehicles performance and either turn left or right to avoid a crash. The driver would be presented with this situation due to the silent failure of the automated vehicle. We hypothesize that the presence of a passenger and the non-presence of a passenger will affect which way drivers will turn to avoid a potential crash. Specifically, we hypothesized that participants would favor turning left when no passenger is present and turning right when a passenger is present. To test this hypothesis, we had participants avoid a crash at a T-intersection of a self-driving car in a driving simulator. We had participants drive with conditions that mimic passenger presence and use both hands when driving so the turning direction would be primarily determined by passenger presence. As a result, Placeholder sentence regarding findings, participants steered to the XX when the presence of a passenger was mimicked.*

***Perceptions of Substance Use as a Motivator to use Substances***
Poster #9 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Chloe Carr
Research Mentor(s): Erica Holliday

*Understanding motivations of young adults to initiate substance use is important to tailor prevention and intervention efforts to reduce risk of long-term consequences such as addiction and mental health disorders. Previous studies have shown that there is a genetic and social component to adolescent and young adult substance use disorders (SUDs). For example, a longitudinal case-controlled studies of both genders done by Yule et.al showed a strong correlation between exposure to maternal SUDs and an increase in SUDs in their children with and without ADHD. Other studies have shown the effects of parental use, social interactions, and brain development to conclude that those around substance use and receiving peer pressure from those who use substances will be at an increased risk (O'Brien and Hill, 2019). Articles by Arria et.al and King and Chassin showed through using data to represent a national sample and an ongoing longitudinal study that there are environmental factors that increase the risk of adolescent and young adult substance use. In households with lower levels of disciplinary action, lack of control, and decreased behavioral control there is an increased chance of adolescent and young adult SUDs with or without parental SUDs. However, a survey study by Hoth concluded that there was no connection between parent-child SU instead there was a higher correlation between peer substance use and adolescent and young adult SUDs. Though these studies prove that there is an increased chance of young adult SUDs due to parental SUDs there is a gap in the research in identifying how child SU and perceptions of SU are influenced by parental SU. Even though young adults*

*will develop a SUD due to their parents, some of their perceptions might change their perceptions to initiate substance use and needs further exploration.*

***Profiles of Resilience: Examining the Stories of First Responder and Military Families***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023
11:00am – 11:15am
Undergraduate Student(s): Kimberly Gomes
Graduate Student(s): Thomas Hodges
Research Mentor(s): Brian A. Moore

*Social support is a key factor in the development of resilience and is often derived from spouses and other family members. The current literature is limited in that there is no consensus about how resilience is defined and developed among individuals in high-stress occupations. Considering this, we aimed to interview military and first responder couples and examine how couples define resilience and navigate challenging experiences together. We collected five distinct family stories wherein a member of the dyad was in a high-stress occupation (i.e., law enforcement and military personnel). All participants completed screeners to determine eligibility for this study, provided additional demographics as a follow-up, and participated in semi-structured interviews that were between 40-90 minutes long. The study was approved by the KSU IRB# IRB-FY22-525. Participants reported examples of adverse experiences they faced including health-related issues, financial instability, family separation, and occupation-related stressors. Participants reported that their faith and sources of social support were essential in helping them overcome challenges. Most participants benefited from support from within their organization (i.e., leaders and peers) and from seeking help from others such as religious leaders and professional counselors. Aligned with the prevailing literature, the participants largely reported that resilience is an individual's ability to work through and adapt to challenges, and resilience is strengthened through exposure to stressors. The participants reported that the support provided to families in challenging times is key to sustaining healthy performance while serving in high-stress occupations. Future research should focus on refining the definition and components of resilience as described by this population to provide appropriate implementation of resilience-oriented interventions.*

***Promoting Future Orientation Among Youth Exposed to Violence***
Poster #2 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Amari Cody and Giselle Vazquez
Graduate Student(s): Paige Giddens
Research Mentor(s): Chanler Hilley

*Despite declining rates of community violence in the United States, violence remains a pervasive public health problem that disproportionately affects children. Violence exposure has been linked to a multitude of negative consequences on children's academics, behavior, mental and physical health, some of which have lasting implications. Future orientation is one of several positive "developmental assets" that may help to mitigate the risk of negative consequences associated with violence exposure. Although future orientation has been described in research in several different ways, studies typically find that youth who have higher general future orientation are better able to guide their current actions to achieve future goals. This poster synthesizes research from 11 research studies on future orientation among youth who have been exposed to violence. The authors qualitatively charted each study's major findings and practice recommendations. Recommendations to support the development of positive future orientation in the face of violence were generated based on the themes that emerged from coding prior studies. Recommendations broadly revolved around practitioners' views and beliefs, addressing the root problem (i.e., violence), connecting to multiple youth-serving systems, and specific mechanisms to promote future orientation. Given the goal to promote future orientation among youth who have been exposed to violence, the recommendations take into account trauma-informed strategies for working with youth.*

***Self-Esteem Stability's Impact as an Anxiety Buffer on Post Traumatic***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:20pm-3:35pm
Undergraduate Student(s): Quinn McKeever
Research Mentor(s): Tyler Collette

*Anxiety Buffer Disruption Theory (ABDT) explains maladaptive responses to traumatic events. Anxiety buffers such as our self-esteem help keep anxiety at bay when our mortality becomes salient. However, when traumatized individuals do not respond to mortality reminders in a psychologically healthy way (i.e., deploying their anxiety buffers in response) symptoms associated with post-traumatic stress disorder (PTSD) can develop. Self-esteem stability has repeatedly been shown to be a vital variable in psychological wellbeing especially for esteem related disorders such as depression. However, there is little research on the influence of an individual's self-esteem stability on PTSD. Adult participants (N = 303) completed a Qualtrics survey designed to assess anxiety buffers, PTSD symptomology, and stability of self-esteem. Germane to this study, the Rosenberg's Self-esteem Scale, which measured the participants attitude toward themselves, and the Self-Esteem Stability Scale, a cross-sectional direct self-assessment, were deployed. Regression coefficients reveal a negative linear relationship between Self Esteem and PTSD symptom severity, and Stability and PTSD symptom severity. However, general self-esteem had a greater impact on the overall model. The data supports ABDT as traumatized individuals showed lower self-esteem*

*indicating the self-esteem buffer may be disrupted. Stability doesn't make self-esteem a more effective anxiety buffer in the general population. In a second study with people who likely have PTSD, stability was a stronger predictor of PTSD symptomology than self-esteem alone. In this two-part project the difference in the effect of stability between PTSD and other psychiatric issues points to a unique characteristic of PTSD. The unique feature of PTSD symptomology compared to depression may be due to the difference in different overall self-esteem and its stability. This would support the idea of a unique feature of PTSD among other psychiatric disorders. Clinicians should consider the stability of self-esteem especially when comorbid diagnoses are determined.*

***Spirituality as a Buffer Between Traumatic Experience and Post-traumatic Stress***
Poster #30 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45 pm
Undergraduate Student(s): Treasure Evans, Emelyn Martinez, Alexa Brown, Quinn McKeever, & Ayanna Butler
Research Mentor(s): Tyler Collette

*According to the American Psychiatric Association, trauma can be defined as exposure to actual or threatened death, serious injury, or sexual violence, involving direct exposure, etc. As a result of experiencing trauma or a traumatic event, it can lead to symptoms consistent with a formal diagnosis of PTSD. PTSD can then arise from stressful events or situations "of exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone" (WHO, 2016). Anxiety buffer disruption theory (ABDT), suggests that posttraumatic stress disorder (PTSD) is a result of the disruption of one's anxiety-buffering mechanisms. This disruption can lead to overwhelming emotions, hyperawareness of one's mortality, and wide-ranging reactions to traumatic events. However, the anxiety-buffer system mitigates the effects of potential terror, promotes posttraumatic growth (PTG), and is comprised of three components: cultural worldviews (e.g., spirituality), self-esteem, and social support. In some cases, depending upon the threshold of the PTSD, traumatic experiences can lead to one experiencing a spiritual awakening. A spiritual awakening is a term given to describe a subjective experience in which an individual's ego transcends their ordinary, finite sense of self to encompass a wider, infinite sense of truth or reality (James, 1902/1985). Moreso, it has been seen recently within research that although trauma has been experienced there is still a relatively low prevalence of PTSD inn some due to "natural resilience", often related to a survivors' spiritual resources (Feurerstein, 1989; McClintock et al., 2016). A sample of N=300 individuals with above threshold PTSD symptomology (PCL-5 scores > 34) will be recruited via research panel to examine the relationship between spirituality, PTSD symptoms, and posttraumatic growth. Thus, we expect that individuals who have experienced a traumatic event who report higher spirituality will report lower PTSD symptoms and exhibit higher posttraumatic growth.*

***Using Mindfulness Training as an Intervention Tool to Reduce the Essentialist Bias***
Poster (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Treasure Evans, Avery Parker, Hanna Sexton, and Shamitha John
Research Mentor(s): Yian Xu

*Prior research has studied the mechanisms of socialization and how people interact. Social essentialism is the belief system that assumes people and objects have natural, distinct, and immutable characteristics. However, little research has shed light on how to reduce essentialist bias effectively and to alleviate its negative consequences in social life, such as prejudice against minorities, viewing members of other groups as less-worthy, or contributing to the construct of stereotypes. The current experiment aims to examine whether mindfulness meditation can reduce essentialist beliefs about social group members by raising awareness of the subjective boundaries imposed on the objective world and promoting an open mindset. We will recruit 100 KSU undergraduate students from SONA and randomly assign them to the mindfulness condition and the control condition. Essentialist beliefs will be measured by the social essentialism scale and the switched-at-birth task in four social domains (race, gender, political affiliation, and socioeconomic status). We predicted that mindfulness meditation would decrease essentialist beliefs about social groups and reduce support for boundary-enhancing social policies. The current research has important implications in using a low-cost, easy-to-implement intervention tool to combat the essentialist bias that people commonly uphold. Preliminary findings will be reported at the Symposium.*

## Sociology & Criminal Justice

***Quantitative evaluation of African American men with chronic illnesses using a Latent Profile Analysis***
Poster (Microsoft Teams Link)
Friday April 21, 2023
12:20pm-12:35pm
Undergraduate Student(s): Anicia Stewart
Research Mentor(s): Evelina Sterling

*Recent studies have demonstrated that African American communities have suffered a disproportionate number of COVID-19 cases and deaths. In 2020 alone, the virus reduced the life expectancy of African American men by over three years. African American men are particularly*

*vulnerable to COVID-19 complications due to higher rates of hypertension, diabetes, obesity, and cardiovascular disease. Other factors such as distrust in medical systems and lack of health insurance further compound these disparities. To address these issues, self-management programs have been developed by applied researchers. However, these programs have not been as effective for African American men as they have been for other groups. The goal of culturally competent self-management programs is to provide healthcare professionals with adaptable tools to improve the day-to-day lives of those in need. Additionally, the COVID-19 pandemic has highlighted the need for a specific module in self-management programs that address viral hygiene. Therefore, understanding the profiles of participants to determine those who were at most risk during the COVID-19 pandemic is crucial for improving the effectiveness of self-management programs and reducing disparities. The purpose of the current project was to quantitatively evaluate the profiles of African American men with chronic conditions during the Covid-19 pandemic. In particular, this study developed profiles for participants using a latent profile analysis to determine if profiles emerged around participants attitudes, knowledge, and behaviors during the pandemic. Model comparisons showed that a 3-cluster model best fit the data. Interpretations of these clusters reveal and unique set of profiles our team named "Positive Consistency", "Negative Consistency", and "No Consistency" groups. Those in the "No Consistency" group were more likely to display dysfunctional cognitions, higher stress, and lower perceived health quality. However, those in the "Negative Consistency" group were more likely to display signs of objective reduced health quality. Implications are discussed.*

## Technical Communication and Interactive Design

***Assessing Student Engagement with an Open Educational Resources in Technical Communications: A Case Study Using Google Analytics***
Poster #13 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Rory Weldon
Research Mentor(s): Jonathan Arnett

*The financial burden of purchasing course textbooks leaves many college students unprepared for class. One more reocurring solution to this problem is the adoption of Open Educational Resources (OERs), which have demonstrated similar educational value to traditional textbooks. However, it is still unclear how often and effectively students utilize these resources. This study seeks to address this gap by collecting data from Google Analytics on a free online textbook. These results suggest that while OERs may be a viable solution, more research is needed to understand how to better promote and integrate their use.The findings reveal that the majority of students did not*

*access the OER, with only a small number consulting it for exams or assignments, and an even smaller number accessing it regularly.*

***Designing a Virtual Reality Prototype for Designers: A Model for Accessibility Testing***
Poster #15 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Vignesh Mullaguru
Research Mentor(s): Laura Palmer

*Immersive virtual reality experiences have become increasingly popular and have been primarily used in gaming and media entertainment to integrate the virtual world into the real world. However, virtual reality has not been explored in an educational training context for designers as they design digital interfaces for accessibility and inclusivity. Research with VR "suggests that imagining oneself in the place of others—rather than taking the other's perspective—is less effective at inducing empathy and help. These findings have significant implications for interventions that seek to provide first-person experiences of marginalized identities" (Nario-Redmond et al., 2017, p. 326). In other words, better empathy for the human experience may be generated through VR experiences that help designers see issues in real-time. The topic of accessibility and designing for inclusivity is often discussed superficially and isn't prioritized by many designers and organizations. However, the available literature on using virtual reality as a tool to provide designers with real-time feedback on accessibility issues is limited. This study aims to bridge the gap by developing a high-fidelity prototype with different user interfaces that simulate different visual and motor impairments. The first phase of this research will present several interface prototypes that could inform the design of the VR module. Later, qualitative data will be gathered through interviews and usability testing with our research participants. Our hypotheses center on the idea that a virtual reality-based simulation would help designers increase their empathy and knowledge for users requiring designs that are accessible and inclusive. Our early findings indicate that designers are not educated about designing for accessibility; thus, it is overlooked. Consequently, many user interface designs do not consider how their designs may be used by differently-abled users.*

***Improving Student Success: How Student Success is Impacted by their Participation In Class and Online***
Poster #3 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Margaret Lokey
Research Mentor(s): Daniel Farr

*The purpose of this research is to examine the relationships between student success outcomes and their participation in class and in the online platform Desire2Learn (D2L). This IRB approved project analyzes students of a fully in-person Introduction to Sociology course. This class also makes significant use of D2L in its assessments and engagement with students. The data will be collected through an online survey administered to the students midway through the semester. Additional granular data about student behavior online will also be collected with individual approval. Currently, no data has been collected, but will by the time the KSU Symposium takes place. The findings of this study will provide insight into how students' grades are affected by factors relevant to their life and schooling. These results will provide insight into what may help improve student outcomes.*

***Lupus and Social Media Discourse: Exploring Organizational Priorities and Messaging***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
12:00pm-12:15pm
Undergraduate Student(s): Jenny Loveland
Research Mentor(s): Daniel Farr

*Social media, such as YouTube, is a highly accessed resource for those dealing with health conditions. A recent study found that over sixty percent of its participants had turned to YouTube specifically as a source for health information (Marar, Al-Madaney, and Almousawi 2019). The Lupus Foundation of America is one of the leading YouTube channels creating content about this specific health condition. Their catalog of videos addresses varied topics including patient issues, care providers, and medical-focused matters. This project employs mixed methods to analyze the content created by this channel. The findings from this data help identify the foundation's key priorities and common themes. This also highlights potential disparities among those impacted by lupus and helps identify underserved populations and limitations of the information conveyed. Using NVivo Qualitative Analysis software, selected videos were analyzed and coded using grounded methods. The videos demonstrated a wide range of subjects and experiences. Approximately 68% of videos subjects were women and 32 % were men. The majority of video subjects were identified as people of color. Videos were found to focus on the mental, physical, and social effects of lupus, frequently ending on a positive note. These findings demonstrate that the Lupus Foundation of America prioritizes viewer education on the social and sociomedical experiences of those with lupus, physical symptoms, life modifications those with lupus have made to adapt to the disease, and the importance of raising awareness.*

***More than Censorship: How Banning Books Reinforces Fear in our Society***
Poster #12 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm

Undergraduate Student(s): Chasidy Harris
Research Mentor(s): Joel Crombez

*Banning books is not a new phenomenon; in America state governments began banning books as early as 1850. It is well known that leaders ban books that challenge their beliefs and encourage dissent within their community. What happens when institutions (state and federal) ban books, and a population goes without valuable knowledge? Books do more than provide entertainment and knowledge they ignite ideas and inspire revolutions. Without these ideas, we can become stagnant as a society. Without these ideas, we could become dependent on our leaders, and the fear that they entwine in the community can be difficult to combat. This study aims to show how leaders use fear as a method of control and banning books that contradict their teachings and the fear they instill is a necessary act for them to keep their power. Fear is an unpleasant emotion provoked in response to an impending threat that motivates a defensive reaction to protect. In humans, fear is accompanied by a subjective sense of apprehension or, in more intense situations, dread. (Labar: 751:2016) Joanna Bourke said "Fear has been one of the most influential emotions in humanity's history." This study will review the acts of racism, prejudice, violence, hatred, and oppression resulting from fear being implanted in society and which public access to a variety of books could have led people to challenge the ideas of their leaders. Additionally, we recognize that literacy is a crucial component when considering this argument as books can be written and available for public consumption, but they only drive change when read and dispersed among groups of the oppressed. This study does not imply that books alone would have prevented these actions, but how their availability and if they are read could lead people to think for themselves and dismantle the fearful messages given to them.*

# College of Science and Mathematics

## Chemistry and Biochemistry

***Activity of MKNK2 Isoforms Studied by Phosphorylation with p38a-MAPK***
Poster #16 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Aamna Aijaz, Irina Padilla, and Kacy Smith
Research Mentor(s): Rajnish Singh

*Mnk2 is a protein kinase that is known to phosphorylate p38a-MAPK. Two isoforms of MNKN2 are known. Isoform A has been studied in detail, however, Isoform B, which is a splice variant and has a shorter sequence and is understudied. Both isoforms are differentially expressed in cancer cells with isoform A expressed much less than at normal levels, and isoform B being expressed at higher levels in cancer cells. The MKNK2 isoform A contains a MAPK binding site which gives the possibility of a binding site for p38a-MAPK. Whereas, the MNKN2 isoform B has been reported to have multiple tyrosine and threonine residues, showing potential to be phosphorylated as well. The purpose of this course based undergraduate research experience is to analyze both isoforms of MKNK2 to see which specific one is phosphorylated by p38-MAPK in order to better understand their function. Preliminary western blot experiment has been performed to ensure the specificity of antibodies for each isoform. A kinase assay coupled with western blotting will be done to study further the phosphorylation of both isoforms MKNK2 by p38a-MAPK. The in vitro kinase assay will use p38 as the enzyme and the purified, his-tagged isoforms as the substrates. The resulting phosphorylation should change the mass of the MKNK2 isoforms, showing the isoforms to be under 80 kD while the isoforms paired with p38a should be above 80 kD on the western blot.*

***Ab initio Calculations of Vibrational Spectra of Model Peptides***
Poster #17 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Katheryn Foust
Research Mentor(s): Martina Kaledin

*The function of biological molecules is closely related to their spatial structure and conformational dynamics. Therefore, understanding the structure and functions of small peptides contributes to gaining insight into the behavior of more complex systems. The peptide bond (-CO-NH-) is among the very important binding patterns in biochemistry. It links amino acids together, specifies rigidity to the protein backbone, and includes the two essential docking sites for hydrogen-bond-*

*mediated protein folding and protein aggregation, namely, the C=O acceptor and the N-H donor parts. Therefore, the C=O (amide-I) and N-H (amide-A) vibrations provide sensitive and widely used probes into the structure of peptides. In this work, we are testing the computational efficiency and accuracy of various computational methods and basis sets that will be used later to generate potential energy surfaces, dipole moments, and polarizability tensors. We evaluate the energetics and structural parameters of elementary peptide motifs and solvated hydrogen-bonded systems, such as formamide (FA), formamide dimer (FA2), acetamide (AA), N-methyl formamide (NMF), N-methyl acetamide (NMA), isolated NMA and solvated NMA+nH2O. This work is a first step towards the analysis of IR and Raman vibrational spectra of medium and large-size molecules using molecular dynamics simulations, where quantum vibrational methods were computationally demanding due to the high dimensionality of the problem.*

***Analysis of Gun Powder Using Principal Component Analysis, Infrared Spectroscopy, External Standard Method, GC/MS***
Poster #7 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Brandon Carr
Research Mentor(s): Christopher Dockery

*Gun powders are very volatile and explosive mixtures of organic and inorganic compounds. These powders were grinded up into an almost rubber material which can have infrared light pass through the mixtures and record the vibrational nodes of certain functional groups. These recordings were then be placed onto a principal component analysis chart to see any direct correlation among other gun powders and show eigenvalues of the substances within the powders. The powders were then dissolved in acetone, and injected into a chromatography machine, which separates compounds based on its mass to charge ratio. This instrument allows for deeper analysis into the eigenvalues present in each substance, and can point to the compounds of interest. These compounds were then standardized, and peak area values are found via the chromatogram given by the GC/MS which can give an external calibration equation for the compound. These calibration equations are key to approximating concentrations of the organic compounds that were found within the gun powders.*

***Antiviral-Cell Penetrating Peptide Conjugate as Leads for Targeting the Main Protease of SARS-CoV-2***
Oral Presentation (ALC 1200)
Tuesday April 18, 2023
12:00pm – 12:15pm
Undergraduate Student(s): Md Ackas Ali
Research Mentor(s): Mohammad A. Halim

*Peptides play an important role in the immune defenses of the host against several distinct types of infections. Hence, peptides represent a promising therapeutic approach for the treatment of SARS-CoV-2 infections. Temporin L, known for its antimicrobial characteristics, has an alpha-helical structure that has been found to interact with the cytoplasmic membrane and induce the formation of pores. In-vitro assessment of the Temporin L1 inhibitor was found to exhibit moderate activity against Mpro of SARS-CoV-2. Notably, the conformational analysis suggests that the rigid structure of Temporin L (TL) facilitates favorable binding to Mpro's active site. Here, we introduce a new approach to the design, synthesis, and characterization of the conjugation of Temporin L to various cell-penetrating peptides (CPP) inhibitors targeting the main protease (Mpro) of SARS-CoV-2. This conjugation can be able to enhance 4- to 16-fold antiviral activity. Our theoretical study of the SARS-CoV-2 Mpro suggests that the TL-CPP inhibitor can bind the active site of Mpro in the predicted manner. The structural insights observed from Molecular Dynamics (MD) simulations provide a clearer understanding of how the conjugate TL-CPP peptide inhibitor could interact with Mpro's active site. Liquid chromatography coupled with mass spectrometry (LC-MS) was used to characterize the peptide intermediates, demonstrating that experimental m/z values corresponded with theoretical m/z values. Subsequently, the results of our study provide crucial insight into the therapeutic approach of developing peptide inhibitors against the main protease of SARS-CoV-2. Furthermore, the findings of this study provide a groundwork understanding of the in-vitro main protease assay validation to identify the lead conjugate TL-CPP peptides targeting SARS-CoV-2.*

***Bis(difluoroborylamidinates) with Flexible Ethylene Bridges as Bifunctional Aggregation-Induced Emitters***
Poster #15 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Connor Welch
Research Mentor(s): Michael Stollenz

*4,4-Difluoro-4-bora-3a,4a-diaza-s-indacenes (BODIPYs) represent one of the most prominent classes of dyes, since they are ubiquitously used in protein and DNA labelling, photodynamic therapies, as luminescent tags, sensors, laser dyes, paint and ink compositions, as well as for electroluminescent devices. [1] This is because of their robustness in terms of photochemical stability, polarity and pH changes of their environment, in particular under physiological conditions. The versatility to introduce multiple functional substituents and ability of BODIPYs to strongly absorb UV-light while providing sharp fluorescence peaks, combined with high quantum yields make these dyes highly attractive for numerous applications. Closely related azaBODIPYs offer an additional N-donor atom in the bora-heterocycle that is susceptible to Lewis acids, which is particularly useful for chemical sensor applications. [2] Despite these manifold*

*advantages, BODIPYs and aza-BODIPYs tend to undergo aggregation-caused quenching (ACQ) through π-stacking that effectively lowers their quantum yields in the solid state. Amidinate ligands with various predominantly aromatic substituents allow the incorporation of an unsymmetrical scaffold for the triaza-BF2 heterocycle which is also substantially bulky and therefore beneficial to promote aggregation-induced emission (AIE) as well as increased Stokes shifts. [3] Our concept features a series of new polydentate bis(amidine) ligands LH2 featuring up to six N-donor atoms and a flexible ethylene bridge. [4] These bis(amidines) and Et2O·BF3 form novel tethered bis(difluoroborylamidinates) [L(BF2)2] that are highly emissive. Herein, we present a series of bis(difluoroborylamidinates) [L1–4 (BF2)2] that serve as efficient blue emitters both in solution (λmax = 398–444 nm) and in the solid state (λmax = 388–398 nm).*

***Chemical Synthesis of Enamelin Peptide for Tooth Enamel Mimetics and Repair***
Poster #23 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Amal Samih
Research Mentor(s): Mohammad A. Halim

*Enamelin is one of the crucial matrix proteins associated to the enamel development in teeth and primarily facilitates to grow the enamel surface. In oral health, the teeth are accessory organs that fulfill the roles of digestion and frame the face. The enamel is the hardest substance in the body, composed of proteins as it protects teeth from damage. Over time the enamel can wear down or lose its rigidity, causing discomfort in the mouth. By utilizing solid phase peptide synthesis, we aim to synthesize two important domains of enamelin proteins including Enapep 1, EMFEQDFEKPKEEDPPKAE (218-230) and Enapep-2, EISPPFKEDPGRQEEHLPHPS (571-591). The goal of this project is to understand how these domains strongly bind to the mineral such as calcium ion and involve in the mineralization and promote extreme crystal growth. In long-term, this research also aims to develop peptide-based aprismatic enamel for repair. Enapep-1 and Enapep-2 peptides were synthesized using the solid phase synthesis protocol. In this protocol, high swelling rink amide resin with a loading capacity of .6 mmol/g and 100-200 mesh size was used. After the peptide synthesis, the peptide-resin complexes were cleaved with 95% TFA, 2.5% H2O, and 2.5% Triisopropylsilane. The cleaved peptides were filtered and precipitated by adding cold ether. Then, the precipitate dissolved with 10% acetic acid and lyophilized overnight to form peptide powders. These peptides were characterized by liquid chromatography interfaced with mass spectrometry. The retention time of the Enapep-1 was 2.98 mins which indicated that this peptide is highly soluble and interacted less with the stational phase of the C8 column. Three intense peaks were detected at m/z 581.67, 775.17, and 1162.08 which correspond to [M+4H]4+, [M+3H]3+, and [M+2H]2+ change states, respectively. These experimental masses are exactly agreed with the theoretical masses.*

***Chemical Synthesis of Proline-rich and Glutamine-rich Peptides from Amelogenin for Biomimetic Tooth Repair***
Poster #24 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Amnah Alchalabi
Research Mentor(s): Mohammad A. Halim

*Dental caries and cavities affect nearly everyone and considered as major public health issues around the world. Dental demineralization occurred when tooth enamel is exposed to acid produced by cariogenic oral bacteria. Once damaged, enamel mineralization cannot be biologically regenerated as it is unable to heal and repair itself. Despite some risk and controversies, for preventing carries fluoride is used as a key ingredient. Peptide-based healing and repairing from Amelogenin protein received great attention for preventing dental caries and cavities. Amelogenin is the most abundant protein in tooth enamel and has a role in the development of enamel rods during the tooth development. The long-term goal of this research is to develop peptide based dental products including toothpastes and dental gels to repair early states of caries and cavities. In this study, two peptides, which are rich in proline and glutamine, from Amelogenin protein were synthesized using the solid phase peptide synthesis protocol. The synthesis of peptides was carried out on a CEM Liberty Blue peptide synthesizer utilizing rink amide resin, which has a loading capacity of 0.65 mmol/g and a mesh size range of 100-200. After peptide synthesis, a mixture of TFA, water, and TIPS was used to cleave the peptide from the resin support. Vacuum filtration was used to isolate the cleaved peptide, and cold ether was added to precipitate it. In LC-MS experiments, the proline rich peptide (LPPQPPLPPM) was eluted at 3.49 mins. Two strong peaks are noticed for this peptide at m/z 1085.65 and 543.58 which correspond to [M+H]+ and [M+2H]2+ charge states. The glutamine-rich peptide (QPQPVQPQPHQPMQP) was eluted at 3.49 mins and related peaks detected at m/z 1958 and 979 which correspond to [M+H]+ and [M+2H]2+ charge states. Future investigations will be carried out for remineralization of these peptides by adding calcium and phosphate ions.*

***Comparison of MKNK2 Isoform Levels in Normal and Cancer Cells***
Poster #17 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Vanessa Phan and Alexander Silva
Research Mentor(s): Rajnish Singh

*MKNK 2 is a gene that encodes for MKNK 2 kinase that exists in two different isoforms in the cell. MKNK 2a is responsible for the phosphorylation of eIF4E which is a eukaryotic translation initiation factor, but is mostly responsible for the phosphorylation of p38 - MAPK. p38 - MAPK*

*is activated through phosphorylation and once activated triggers the cell to go through apoptosis. The second isoform MKNK 2b, results through alternate splicing of the MKNK 2 gene through SRSF 1. MKNK 2b only phosphorylates eIF4E and not p38 - MAPK which is expected to take away a cells ability to go through apoptosis. This project was conducted for the CURE project of the 3512 lab and aims to compare the levels of the different isoforms in normal cells and cancer cells. This will be done using isoform specific antibodies on a Western Blot with cancer osteosarcoma cells and normal fibroblast cells which will be compared to normal kidney cell line. The isoform specific antibodies were tested against purified MKNK2 isoform proteins and found to be able to distinguish between the isoforms.*

***Design and Synthesis of Indolicidin and Temporin Peptide Analogues to Inhibit the Main Protease of SARS-CoV-2***
Poster #25 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Jack Cocoran & Hunter Hambrick
Research Mentor(s): Mohammad A. Halim

*The development of therapies to treat SARS-Cov2 is paramount to combat the continued persistence of the infection that has claimed the lives of 6 million people worldwide and continues to impact communities around the world today. Current vaccines have been found to lack longevity requiring numerous booster shots following the initial vaccination. The main protease (Mpro) of SARS-Cov-2, is responsible for converting viral proteins pp1a and pp1b into non-structural proteins used to construct the replisome and was found to be a suitable target for peptides. Compared to small molecules, peptide therapeutics are thus gaining increasing popularity as they are easy to synthesis, highly selective and have fewer side effects. In this study, various analogues were designed computationally from Indolicidin and Temporin L Peptides. The 3D model of the peptides was generated by PEP-FOLD3. Molecular docking was performed between the peptides and main protease of SARS-CoV-2. The selected analogues were synthesized using solid phase peptide synthesis protocol on the rink amide resin. After synthesis, the peptides are deprotected and cleaved from the resin using a high TFA cleavage cocktail. Next, the peptides are dissolved in 10% acetic acid and recovered by lyophilization under high vacuum. The purity of each peptide is evaluated by LC-MS using Agilent 1290 Infinity coupled with Thermo LTQ XL mass spectrometer. The experimental mass-to-charge ration of these peptides is agreed with the theoretical m/z. To assess the inhibition efficiency of the synthesized peptides, a protease inhibitor assay will be conducted.*

***Design and Synthesis of Peptides Based Sunscreen***
Poster #28 (Convocation Center)
Thursday April 20, 2023

11:00am – 11:45am
Undergraduate Student(s): W. Nolan Hale
Research Mentor(s): Mohammad A. Halim

*Sunscreen is a very essential product as it helps to protect our skin from the harmful effects of UV radiation from the sun, which can cause skin damage, premature aging, and an increased risk of skin cancer. An effective sunscreen should block the UV-B (280-320 nm) and UV-A light (320-400 nm) as UV-C lights are filtered through the ozone layer. Currently nanoparticles which scatter the UV lights and dye-based organic compounds which absorb the UV lights used as sunscreens. However, these inorganic nanoparticles and organic compounds pose potential toxicity and health risks. Recent research showed that some sunscreen ingredients degrade and cause skin diseases, impose neurotoxicity, and interfere with body's hormone. The goal of this research is to design and develop peptide-based sunscreen. Unlike current sunscreens, peptide-based alternatives would be biodegradable and non-toxic, posing significantly less of a threat to the human body and the environment. Therefore, a peptide which can block over the UV light from 190 nm to 400 nm would be an ideal sunscreen candidate. Three aromatic amino acids such as tryptophan, tyrosine, and phenylalanine were prioritized in such synthesis because they have the highest absorbance at 280-320 nm. There peptides were designed and synthesized combining a high number of aromatics, and some other amino acids in between them. Peptides were characterized by liquid chromatography and mass spectrometry to confirm their mass and purity. In addition, UV-vis spectroscopy experiments were conducted to obtain the absorption spectra of these peptides. Sunscreen X demonstrates significant UV light absorption from 320 nm to 190 nm while two other sunscreens Y and Z showed absorption at 190-230 nm and 250-310 nm. Future studies will be focused on designing peptides that can block UV light over 320 nm.*

***Designing Small Peptide Analogues to inhibit the Spike Protein of SARS-CoV-2***
Poster #26 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Grace Kurniawan & Ryan Faddis
Research Mentor(s): Mohammad A. Halim

*Since 2020, SARS-CoV-2 has affected millions of people. Many pharmaceutical companies have implemented vaccines and booster shots to decrease infection rate and increase the chance of to the studimmunity, but recent studies consider the use of antiviral peptides as well. Antiviral peptides can inhibit the spike receptor-binding domain of SARS-CoV-2 and can ease symptoms. The aim of this project was to synthesize the alpha-helix peptide analogues of human ACE2 and determine its efficacy against COVID-19. Various research showed that alpha-helix (AH) of ACE2 showed good inhibition efficiency, however, this peptide has a long sequence of 33 amino acids which is difficult to synthesis by solid phase peptide synthesis. Herein we have designed three shorter analogues*

*based on the C-terminal (CT), Middle (MT), and N-terminal (NT) of the alpha-helix peptide. A solid-phase synthesis protocol was employed to synthesize these peptides using CEM Liberty Blue Peptide Synthesizer. A high-swelling rink amide resin with loading capacity of 0.6 mmol/g and 100-200 mesh size was used for the synthesis. After synthesizing the peptide, the peptide-resin complex was cleaved using 95%TFA. The peptide solution was precipitated with cold ether, subsequently the peptide was dissolved with 10% acetic acid, and lyophilized overnight. The peptides were then characterized by liquid chromatography (LC) and mass spectrometry (MS) experiment. The LC experiment was performed using Agilent 1290 UPLC system using a C8 column. For CT peptides, three peaks were found at m/z 1937.75 Da, 969.50 Da, and 646.75 Da which corresponded to [M+H]+, [M+2H]+, and [M+3H]3+ charge states. The charge states of this peptide exactly matched with the theorical masses. Similar results are also observed for MT and NT peptides. Additionally, biological assays were performed to further show each peptides' effectiveness. At 100 uM, CT peptides showed 22.32% of inhibition efficiency while MT peptides demonstrated 31.04% of inhibition.*

***Effective Adsorption of Radioactive Iodine by Fabrication of Porous Composite Materials***

Poster #34 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Kaylee Funk
Research Mentor(s): Bharat Baruah

*Commercially available cotton fabric (CF), where each fiber contains nanopores and the hierarchical structure contains micro and macropores. CF is the ideal skeleton material, with high porosity and average elasticity. The above properties make this material with high absorption capacity characteristics. We hypothesize that chemically incorporating a porous metal-organic framework (MOF) into the porous CF material will create a highly adsorbent porous composite material. The MOF immobilization on CF will create a MOF@CF composite. This will be subsequently loaded with silver nanoparticles (AgNPs) on the MOF, creating AgNP@MOF@CF composite material. Such material will adsorb and fix molecular iodine as AgI@MOF@CF (based on this reaction, 2Ag + I2 à 2AgI). SEM, EDX, FTIR, and XRD techniques will be used to characterize the composite materials. The iodine adsorption experiment will be monitored by UV-visible spectroscopy.*

***Elucidating Raman Spectra of Molecules Through ab initio Classical Molecular Dynamics Simulations***

Poster #18 (Convocation Center)

Thursday April 20, 2023
11:00am – 11:45am
Graduate Student(s): Oluwaseun Omodemi
Research Mentor(s): Martina Kaledin

*A substantial advancement in the understanding of the Raman scattering behavior in complexes has occurred in the past decades, with various modifications for the Raman experimental technique, such as the development of Surface Enhanced Raman spectroscopy (SERS), spatially offset Raman spectroscopy, transmission Raman spectroscopy that permits the investigation of the vibrational Raman spectra directly complimentary to the infrared spectra. We developed and implemented polarizability tensor surfaces (PTS) fitted to the analytical form that utilizes more accurate methods MP2(many-body perturbation theory to the second order) and CCSD(T) (coupled-cluster) to run molecular dynamics (MD) simulations and identify and visualize vibrational motion. Three model systems H5O2+, N4H+, and CH4 are investigated using our techniques. Simulated vibrational spectra are compared to available experimental results to validate our theoretical methods. We also analyze anharmonic effects such as Fermi resonance doublet for the H5O2+ in the mid-range IR region, combination bands, and overtones for the N4H+ using driven molecular dynamics (DMD) method and evaluated computational efficiency of various PTS models for CH4. This work contributes to the better understanding of anharmonic spectral features in hydrogen bonded systems and facilitates detection of gas-phase molecules.*

***Evaluation of Biomimetic Antimicrobial Peptides Targeting the Main Protease of Sars-CoV-2***
Oral Presentation (ALC 1200)
Tuesday April 18, 2023
11:00am – 11:15am
Undergraduate Student(s): Ryan Faddis
Research Mentor(s): Mohammad A. Halim

*The Covid-19 pandemic has emphasized the urgent need for the development of effective and economical antiviral treatments. Sars-CoV-2, the causative agent of Covid-19, is a single stranded positive sense RNA virus that encodes for 29 proteins; one of which is the main protease (Mpro), a cysteine protease which plays a pivotal role in the proper cleavage of nascent viral polyproteins during replication. Mpro is a key target for inhibition in the development of therapeutic agents treating Covid-19; nevertheless, research and development of novel antivirals for known targets is still a time consuming and financially costly endeavor. However, molecular dynamics modeling has afforded a unique opportunity to quickly screen a great multitude of possible inhibitors without upfronting the cost of producing said inhibitors. Previously, our group utilized this technique to computationally screen a group of naturally occurring antimicrobial products against Mpro. These simulations yielded several viable peptide sequences which were expected to bind tightly to*

*the Mpro active site. Therapeutic peptides are synthetically accessible via Fmoc-solid phase synthesis and are known to have high specificity, thus possess the potential of being potent low-cost drugs. A strong peptide candidate (DRAMP18160) was chosen from the group of computationally screened peptides and subjected to a series of in-vitro analyses to determine its effectiveness at inhibiting the function of Mpro. By utilizing Förster resonance energy transfer based end point assays, it was found that DRAMP18160 displayed an IC50 value of 59 μM which further establishes the viability of natural product repurposing for widespread antiviral applications.*

***Expression of MKNK2 Isoforms in Cancer Cell Lines***
Poster #19 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Nicole Vaughan, Adyia Collier, Josh Harrell, and Avery Clark
Research Mentor(s): Rajnish Singh

*MKNK2 is a protein that has 2 isoforms (MKNK2 long(a), and MKNK2 short(b)). They phosphorylate and activate translation initiation factor eIF4E and have been implicated in some cancers. MKNK2a specifically is found to be downregulated in breast, lung, and colon tumors. There are cases where the MKNK2a to MKNK2b ratio changes in normal cell lines versus cancerous cell lines, such as breast tissue where there is found to be a lower percentage of 1:1 ratio in noncancerous cell lines versus cancerous cell lines. This research project was conducted as part of a Course-based Undergraduate Research Experience (CURE) within the CHEM 3512 lab course. The goal of this project is to determine if the two isoforms are expressed in cancer cell lines using western blotting. His-tagged MKNK2 isoforms were purified and the isoform specific antibodies were tested on the purified proteins. The antibodies are able to differentiate between the two isoforms and will be used to probe cellular lysates prepared from BHK-2 (Baby Hamster Kidney-21), Hep G2 (hepatoblastoma-derived) and U-2OS (Osteosarcoma) cell lines. Data from this study will provide useful information on endogenous expression of MKNK2 isoforms in cancer and help provide preliminary contributions for further studies.*

***Fabrication of Biodegradable Modified Wood for Future Application***
Poster #12 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Ridham Raval
Research Mentor(s): Bharat Baruah

*Current research demonstrates the delignification of natural wood (NW) by chemical treatment. In our research, the delignified wood (DW) is impregnated with bio-compatible and bio-degradable*

*polymer to create transparent wood (TW). Furthermore, we aim to modify the resultant TW to (i) fire-retardant wood with the addition of a metal-organic framework (MOF) and (ii) a TW with electrical conductivity by incorporating silver nanowires (AgNWs). Such modified wood (MW) would have tremendous potential in optoelectronics, energy storage, and biosensors. We characterize samples with FTIR, Raman, UV-vis DRS, XRD, EDX, and SEM.*

***Formal Expression of Lytic Transglycosylases SLBT and MLTG of Gram-negative Bacteria Pseudomonas aeruginosa***
Poster #31 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Benita Okafor and Portia Simpson
Research Mentor(s): Thomas C. Leeper

*Pseudomonas aeruginosa (p. aeruginosa) is a gram-negative bacterium notorious for causing infections of immunocompetent and immunocompromised cells and for its antibiotic resistance. The bacteria's cell wall can be severed by lytic transglycosylases (LTs), which are enzymes that cleave the peptidoglycan structures of bacterial cell walls. In p. aeruginosa, the bacteria consist of eleven LTs in its domain which fall under different families. This study focuses on two LTs out of the eleven in the domain for p. aeruginosa (SLTB1 and MLTG), as the expression of the enzymes must proceed successfully in order to conduct further investigation on the effectiveness of breaking down the peptidoglycan in the bacteria. The efficiency of the enzyme can be observed by the success of its inhibition of IVYP1, a protein that inhibits the activity of lysozyme. To measure the inhibition, the LTs endure protein preparation which initiates with a transformation, followed by protein expression and pellet homogenization, and concludes with protein lysis and purification. The resultant was tested to ensure the protein can be applicable for use in p. aeruginosa. Throughout gel-electrophoresis and several muramidase assays, the LTs show observation of success in inhibiting the IVY protein, thus providing the liberty for further examination of the enzymes.*

***Green Peptide Synthesis Using Environmentally Sustainable Deep Eutectic Solvents***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
2:00pm – 2:15pm
Undergraduate Student(s): Mahdi Ghasemi
Research Mentor(s): Mohammad A. Halim

*In last decades, peptide therapeutics received great attention over small-molecule medications, as they are highly selective, well-tolerated, and have less adverse effects. There are ~70 therapeutic peptides on the market, ~200 in clinical trials, and ~600 in the pre-clinical development stage.*

*Peptides can be synthesized by liquid phase as well as solid phase. Solid-phase peptide synthesis (SPPS) offer many advantages. SPPS is faster due to few steps, easy to separate excess reagents and by-products, and very cost-effective compared to the liquid-phase peptide synthesis. The whole SPPS processes significantly rely on the usage of sizable amounts of solvent. The solvent plays a pivotal role on swelling of resin, dissolving deprotection reagents, Fmoc amino acids, and coupling reagents and removing excess reagent and by-products through extensive and repetitive washing. The most common solvents used for solid phase synthesis are N,N-Dimethylformamide (DMF) and N-Methyl-2-pyrrolidone (NMP) which have reproductive toxicity. As hazard solvents represent 80–90% of the total waste in SPPS, hence, using green solvents or alternative ways to diminish or recycle solvents are of great interest. Deep eutectic solvents (DESs) have emerged as green solvents with superior properties over conventional solvents. DESs are more synthetically accessible with negligible vapor pressure, typically nontoxic, biodegradable, economical, and suitable for biological applications. In this study, we have synthesized a small tripeptide containing glycine-alanine-Serine (GAS) manually using DMF as control solvent and choline chloride (ChCl)-glycerol (Glyol) DES as an emerging alternative. The synthesis was performed in a syringe containing frit clamped above an Erlenmeyer flask used to capture access reagent and solvents. The mass spectra of the GAS peptides synthesized in DMF and ChCl-Glyol are determined by Thermo Scientific LTQ-XL mass spectrometer. Both cases, the peak obtained at m/z 233 confirmed the theoretical mass of the peptide. Formation of the sodium adduct is noticed in both cases.*

***Identifying the Mineral Source of Phosphorus-Containing Molecules in Space***
Poster #8 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Gabrielle O'Brien
Graduate Student(s): Tyler Davis
Research Mentor(s): Heather Abbott-Lyon

*Only a few phosphorus-containing molecules have been identified in extraterrestrial environments, but the mineral source of these gas-phase molecules has yet to be identified. The objective of this project is to identify the conditions that cause small phosphorus-containing molecules to desorb from the surface of schreibersite, an iron-nickel phosphide mineral. To determine these conditions, we place a sample of schreibersite in an ultrahigh vacuum (UHV, with a pressure of less than 1 x 10-9 torr) chamber and measure its ability to react with small molecules (e.g., H2O, CH4, andCO2) using reflection-absorption infrared spectroscopy (RAIRS). While preparing to run these experiments, we encountered and troubleshot many issues that arose. One problem we ran into was the pressure not being low enough in the UHV chamber. We leak tested using a quadrupole mass spectrometer (QMS), found no leaks that were larger than 2 x 10-9 torr, but observed many peaks corresponding to hydrocarbons. To correct this, we disassembled the chamber, cleaning the interior with acetone, isopropanol, and then methanol. We also checked for*

*metal shavings, loose pieces of fiberglass from the covering of our wires, and any other debris. Once everything was put back together, the pressure remained low enough to continue. Another issue we came across was the cooling of the sample. These experiments require temperatures of at least -173℃. This is crucial for small molecules to be able to stick to the surface of the schreibersite sample and to effectively model extraterrestrial environments like cometary coma and dense molecular clouds in the interstellar medium. To lower the temperature, we attached a cryogenic cooling system to the sample holder. The lowest temperature we've reached so far is -190.15℃ (83 K). Updates on sample imaging, RAIRS alignment, and preliminary data will also be presented.*

***Impact of Co-solvents on Deep Eutectic Solvents: A Combined Spectroscopic and PCA Investigation***

Oral Presentation (ALC 4200)
Tuesday April 18, 2023
2:20pm – 2:35pm
Undergraduate Student(s): William Bryant and Candy Kelly
Research Mentor(s): Mohammad Halim

*Deep eutectic solvents (DESs) have emerged as promising alternative solvents for various application including extraction, biocatalysis, and drug delivery owing to their unique physicochemical properties. Moreover, these solvents are less nonvolatile, nonflammable, nontoxic, biodegradable, and environmentally friendly. Compared to one component solvents, DESs are bicomponent which are formed by mixing hydrogen bond donors (HBD) and hydrogen bond acceptor (HBA) at a certain composition that exhibit a very large melting point depression. Heating and mechanical agitation are required to form these solvents. Although these solvents demonstrate lot of promise, industrial applications are limited due to their inherent high viscosity. In this study, two choline chloride (ChCl) based DESs including ChCl:Urea and ChCl:Glycerol were synthesized by mixing 1:2 molar ratio in a covered beaker heated at 80°C with constant stirring of 700 rpm until the transparent liquid was formed. In addition, we investigated the impact of water and methanol on the structure and interaction of pure DESs. The synthesis of the DESs were confirmed by IR spectroscopy. In ChCl:Urea DES, the stretching peak related to C=O group of urea was significantly broaden. Similar trend was also noticed for OH stretching. However, CH and OH stretching peaks in ChCl:Glycerol were shortened from the CH and OH stretching of glycerol. Both the Raman and PCA results showed that 1-5% cosolvents showed little impact on the component of DES, while 10-50% cosolvents significantly altered the structure and interaction of the DES components. Particularly in ChCl:Glycerol DES, the impact of water was random while the impact of menthol was consistent indicating that 30-50% cosolvents may break the pure DES interactions.*

***Impact of Substitution Position on the Photophysical Properties of Pyrrolidinone-Fused 1,2-Azaborines Chromophores***

Poster #4 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Adeline Boswell and Ra'Nya Malone
Research Mentor(s): Carl Saint-Louis

*Flat-structured boron-nitrogen-containing heterocycles with extended conjugated π-systems such as pyrrolidinone-fused 1,2-azaborines (PFAs) are in high demand in the material and imaging technology markets because of their unique features such as simultaneous tunability of fluorescence color, extraordinary thermal and photochemical stability, high fluorescent quantum yields, and large Stokes shift. The incorporation of diverse electronic moieties at position 2 on the isoindolinone hemisphere of PFAs have previously shown to induce modification of the electronic transitions energies in the non-flexible π-systems. Herein, we have synthesized a series of novel PFAs substituted at position 1 to investigate the consequence of different substitution positions on the photophysical properties. Our studies have revealed that substitution at position 1 resulted in red-shifted absorbances along with a reduction in molar absorptivity when compared to the analogs substituted at position 2. We have also observed red-shifted emission in all solvents when compared to other analogs.*

***Inhibition Binding Mechanism Simulation of Horseshoe Crab Peptides for Sars-Cov-2 Main Protease***
Poster #20 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Ryan McCall and Trinity Alamutu
Research Mentor(s): Rajnish Singh

*Horseshoe crabs were essential for the creation and testing of the coronavirus vaccines. The Sars-Cov-2 main protease is an essential tool for coronavirus's propagation through the body and its structure is distinct from human proteases making it a prime target for inhibition. Sars-Cov-2 protease is however catalytically similar to HIV, providing a potential ground for comparison. In this study for the CHEM 3512 lab, the three horseshoe crab anti-HIV oligopeptides from the Antimicrobial Peptide database were analyzed by simulating their binding interactions with Sar-Cov-2 main protease. The models were created in Hdock and then imported into Pymol in order to analyze similarities in structure and binding interactions. All three oligopeptides studied were predicted by Hdock to bind to the protease's catalytic site with the highest confidence scores for each at .7050, .7627, and .6411. The Hdock results as well as structural highlights shown in Pymol are discussed. Further study of these peptides' inhibitory potential is suggested, particularly AP00212 which showed especially promising results in the Hdock simulation.*

***Inhibition of the 3CL Protease of SARS-CoV-2 as a Promising Target for Antiviral Drug Treatment***
Poster #21 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Ta'Nyia Heard & Vy Dao
Research Mentor(s): Rajnish Singh

*In 2020, the global pandemic known as COVID-19, an infectious disease caused by severe acute respiratory syndrome – coronavirus 2 (SARS-CoV-2), sparked a race to find a suitable treatment for the rapidly spreading virus. SARS-CoV-2 contains single-stranded RNA with 14 open reading frames (ORFs). Two of these ORFs, 1a and 1b, encode for two replicase polyproteins: pp1a and pp1b. These polyproteins are cleaved by two proteases, known as papain-like (PL) and 3-chymotrypsin-like (3CL) proteases. The 3CL protease is the main protease of SARS-CoV-2, and plays a key role in viral protein replication. The protease contains a dyad of His41 and Cys145 that act as an active site to cleave polyproteins into smaller non-structural proteins (nsps). Antiviral drugs targeting the 3-chymotrypsin-like (3CL) protease of SARS-CoV-2 have been explored as a promising solution to combat coronavirus infections. Due to the 3CL protease showing similar properties to chymotrypsin, a serine protease, it is possible that chymotrypsin inhibitors could also inhibit the 3CL protease. In this theoretical study, three crystal structures of known serine protease inhibitors were investigated against the crystal structure of the SARS-CoV-2 3CL protease. Docking studies suggest that one inhibitor, R-elafin, appears to block access to the pocket containing the His41-Cys145 active site, showing potential inhibitory properties. Two other inhibitors will be studied to visualize the potential inhibition patterns on the 3CL protease. This study was completed through a CURE CHEM 3512L course. Throughout this course-based study, we applied our knowledge of protein inhibition to bioinformatics and structural biochemistry by visualizing crystal structures.*

***Investigating the Expression and Purification of Protein TTHA0508 in the Foundational Organism Thermus thermophilus HB8***
Poster #21 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Sara Hunihan
Research Mentor(s): Michael Van Dyke

*Foundational organisms are used in research to provide fundamental concepts or processes for further investigation. Thermus thermophilus is a foundational thermophile, an organism whose ideal temperature conditions are higher than other organisms. This investigation specifically studies Thermus thermophilus HB8 and the protein expression of TTHA0508 in E. coli Rosetta 2*

*strain (DE3) pLysS through bacterial transformations. The protein of interest, TTHA0508, is a transcription factor; a protein that contributes to the process of transcription and the overall gene expression of that organism. Primarily, this research analyzes the ideal conditions for TTHA0508 protein expression. Following the expression of the protein 0508, our transformant is used to find optimal conditions for TTHA0508 purification. The goal of investigating the expression and purification of TTHA0508 protein is to provide understanding for later research in Restriction Endonuclease Protection, Selection, and Amplification (REPSA) of Thermus thermophilus HB8. The protein TTHA0508 is symmetrical and contains two MeR family proteins, suggesting multiple unique gene interactions, unlike many transcription factors where the protein contains only one MeR family protein. REPSA of T. thermophilus provides information about what gene(s) TTHA0508 interacts with. The ideal protein expression procedure follows a bacterial transformation of the E. coli cells with the plasmid containing the TTHA0508 gene and inducing the cells using IPTG, a metabolite that inhibits a repressor protein on the LAC operon and thus induces expression. Continuing with the induced cells, purification entails suspending the transformed E. coli cells in a high sodium chloride salt solution and then a series of centrifugation and heat treatments. The results are analyzed through a series of protein gel electrophoresis and provide foundational information to further investigate the TTHA0508 transcription factor through REPSA.*

***Investigating the Impact of Water and Methanol on Deep Eutectic Solvents by Raman Spectroscopy and Principal Component Analysis***

Poster #27 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Candy Kelly & William Bryant
Research Mentor(s): Mohammad A. Halim

*Deep eutectic solvents (DESs) are promising versatile and sustainable green solvents alternatives to conventional organic solvents. DESs are two component-based solvents formed by molecular and ionic compounds acting as hydrogen bond donors (HBDs) and hydrogen bond acceptors (HBAs). They are typically mixed at a specific molar ratio to form the optimum number of non-covalent interactions among the constituents. However, high viscosity limits the application of these solvents. In this study, we have synthesized menthol-thymol (Men:Thy) and choline chloride: ethylene glycol (ChCl:Eg) DESs and explore the impact of water and methanol on these DESs. The formation of the DES was confirmed by FTIR and Raman experiments. Various amounts of water and methanol from 1% to 50% were added to the two DES systems to investigate the impact of the water and methanol content on the DES systems. Raman spectroscopy and principal component analysis (PCA) results showed that 1-5 % of water and methanol do not disrupt the Raman shift significantly for ChCl:EG DES. However, significant change is noticed while 10-50 % water and methanol were added to the ChCl:EG DES system. Nearly similar trend was observed*

*for Men:Thy DES system. Addition of 1% percent of water has no impact on the Men:Thy DES, however, adding up 5-50% water demonstrates a noticeable impact on DES and making them clustered together in the PCA. However, methanol has inconsistent impact on Men: Thy DES as indicated in the PCA plot. This study revealed that the low percent of co-solvents has less influence on DESs compared to the high content.*

***Investigating the Phosphorylation of Mnk2 Isoforms by p38 MAPK as a Potential Cancer Therapy Target***

Poster #22 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Monica Clayton, Liliana Ortiz, and Suzanne Nguyen
Research Mentor(s): Rajnish Singh

*A critical cell signaling pathway, known as the p38 MAPK pathway, responds to various extracellular stimuli such as inflammation and stress. Downstream effects upon activation of p38 MAPK lead to the phosphorylation of other proteins including the mitogen-activated protein kinase signal-integrating kinase Mnk2, which is involved in cellular process regulation of the proliferation of cells and protein synthesis. Mnk2 proteins have been included in cancer research studies due to their potential role in tumor growth and have been shown in the regulation of gene expression for the cell cycle and apoptosis. Studies have demonstrated that inhibition of Mnk2 leads to a suppression of tumor growth and therefore a cancer therapy target. Of the two known isoforms, Mnk2a acts as a tumor suppressor and is downregulated in some cancerous tumors, and Mnk2b has been found to be pro-oncogenic. The isoforms are splice variants and most studies have only focussed on isoform a. Very little is known about how isoform b functions. Previous research has been conducted demonstrating the phosphorylation of Mnk2a by p38 kinase, however the phosphorylation of Mnk2b remains unknown. To better understand the function of the two isoforms of Mnk2, in this project, we determine the phosphorylation of the isoforms by activated p38. This is an ongoing project conducted as a course-based undergraduate research experience (CURE) for the undergraduate course Chem 3512L. His-tagged MNK isoform proteins were purified using a nickel column. Two isoform specific antibodies were tested by western blotting and showed that the antibodies are able to distinguish between the isoforms. With this data, the CURE project will be concluded by conducting kinase assays using purified his-tagged Mnk2 isoforms and isoform specific antibodies.The phosphorylation of the two isoforms will be detected using western blotting.Results in this study will be the first on phosphorylation and potential activation of MNK isoform b.*

***A Mass Spectrometry Study to Monitor the Conformation Change of Protein in Deep Eutectic Solvent***

Oral Presentation (ALC 1200)

Tuesday April 18, 2023
11:40am – 11:55am
Graduate Student(s): Anusha Bhattarai
Research Mentor(s): Mohammad A. Halim

*Deep eutectic solvents (DESs), an emerging class of green solvents, are formed by mixing two components at a certain composition. DESs are considered biodegradable, sustainable, and non-toxic in nature. Most protein and enzyme solubility and reaction studies are performed in aqueous or organic solvents. However, DESs can affect the structure and dynamics of the protein and enzyme have yet to be explored. The aim of this study to explore the DES-induced protein and enzyme structural changes using mass spectrometry. In this experiment, Lysozyme and α-Lactalbumin are used as model proteins. Two different DESs including menthol: acetic acid and proline: urea were prepared for this experiment. The formation of DESs is confirmed by infrared spectroscopy. Initially Lysozyme sample was prepared at 10 μM concentration using LC-MS grade water. In addition, separately, protein samples were prepared with 1% -30% menthol: acetic acid and proline:urea DESs. Lysozyme in water showed the charge state distribution from 6+ to 13+ , in which the 9+ being the most intense peak. When 1% acetic acid was added to the Lysozyme solution, charged states distribution changed from 5+ to 13+, where the most intense peak noticed for 9+ . This indicates that the Lysozyme slightly folded by the interactions of acetic acid molecules compared to its native state. However, in 1% menthol: acetic acid DES solution, Lysozyme was more folded compared to water. In addition, the ion current of Lysozyme charge states is more noticeable in Men:AA compared to water. At 30% of menthol: acetic acid DES, the Lysozyme was slightly unfolded as the charge states distribution was shifted. However, the impact of amino acid-based proline:urea DES on protein structure and dynamics is very different in which the charge stated distribution of α-Lactalbumin was shifted to low m/z and adopted more folded states compared to water.*

***Modelling, Synthesis and Mass Spectrometry Characterization of Fusion Peptides to Inhibit the Spike Protein of SARS-CoV-2***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
2:40pm – 2:55pm
Undergraduate Student(s): Evelyn Karkalamudi
Research Mentor(s): Mohammad Halim

*The recent epidemic caused by COVID-19 left behind a devastating trail of destruction. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused millions of deaths and is still active today. While some drugs have been approved for covid treatment, peptide therapeutics proves to be a better, alternate solution. Peptides can act as inhibitors between the interaction of the S protein and the human angiotensin-converting enzyme 2. Based on previous research, certain*

*peptides have a high affinity for attachment to the SARS-CoV-1. In this study, we performed molecular docking, synthesis, and characterization of a small Fp4 (19 amino acids) and large Fp13 (34 amino acids) peptides to see if they similarly inhibit the spike protein of SARS-CoV-2. Fp4 is a beta-pleated sheet structure and a binding affinity score of -24.59 kcal/mol when docked against the heptad repeat 1 (HR1) domain in SARS-CoV-2. Fp13 is an alpha helix structure, with a binding affinity score of -252.18 when docked against HR1 showing a greater affinity to HR1 compared to Fp4. A solid phase peptide synthesis approach was utilized to synthesize the peptide on the rink amide resin. After synthesizing the peptides, the peptides were cleaved using 95% trifluoracetic acid to separate the peptides from the resin. The theoretical masses of Fp4 peptide were 1128.28 Da corresponds to [M+2H]+2 and 752.04 Da corresponds to [M+3]+3 which accurately matched with the experimental mass spectrometry data. For Fp13, the mass spectrometry results showed four peaks at 1836.42 Da, 1224.67 Da, and 918.34 Da correspond to 2+, 3+, and 4+ charge states and agreed with the theoretical masses. The synthesized peptides are now ready for an antiviral test. This test will determine the potency of the peptides and indicate if they can be used as a peptide therapeutic against SARS-CoV-2.*

***Optimization of the Extraction of Microplastics from Beach Sand***
Poster #14 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Victoria L. Claps
Research Mentor(s): Marina Koether

*Optimization of the NOAA method for extraction of microplastics from beach sand using a double extraction versus the original single extraction resulted in an increase from an average of 90/92% to 99/98% recovery of pristine/oxidized microbeads. The use of iron (II) in the oxidation along with peroxide provided no increase in oxidation of added pristine cotton. Repetitive oxidation is necessary but after 14 repetitions of oxidation, cotton was still present. Thus, as the cotton was added and not weathered from the environment, it was decided to stop at five oxidations. To clearly differentiate between cotton and microfibers, the use of a microscope is used rather than trying to oxidize it all away.*

***Peptide-based Antibiotics to Inhibit Pathogenic and Clinically Relevant Bacteria Strains***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
3:20pm – 3:35pm
Undergraduate Student(s): Fatemeh Ghasemi
Research Mentor(s): Mohammad Halim and Melanie Griffin

*Multi-drug resistant bacteria pose a threat to humans as they are responsible for infectious diseases. The development of this resistance can be as a result of multiple mechanisms: efflux pump activation, which reduces bacteria intracellular antibiotic concentration, poor antibiotic affinity as a result of a protein that protects the target site, or mutations that alter DNA and topoisomerase gene coding which changes the residues in the binding sites so the antibiotic cannot effectively bind. Small molecule-based antibiotics often induce harmful off-target effects and lead to therapy resistance on prolonged use. Peptide-based antibiotics, in contrast, are highly target-specific and thus induce less toxic effect compared to small molecule antibiotics. In this study, we employed molecular docking, synthesis, characterization, and antibacterial assay of L27-11 peptide. This peptide was synthesized in a solid support of a rink amid resin using CEM Liberty Blue peptide synthesizer. The solid support and peptide complex was cleaved with a high percentage of TFA, filtered and precipitated with cold ether. Lyophilization of the peptide was achieved in a freeze-drying condition at -50 °C after adding of 10% acidic acid and subsequent freezing of the sample. Liquid chromatography results showed that the peptide was eluted at 1.42 mins. Three intense peaks associated with [M+2H]2+, [M+3H]3+, and [M+4H]4+ charge states are found at m/z 815.08, 543.83, and 408.17, respectively agreed with the theoretical charge states. Various concentrations of L27-11 peptide were tested for antibacterial activity using a Kirby-Bauer disk assay on several bacteria strains, including opportunistic human pathogen Pseudomonas aeruginosa 01, model Gram-positive and negative, Staphylococcus aureus and Escherichia coli, respectively and the clinically-relevant yeasts Candida albicans and auris. Initial assays demonstrate peptide susceptibility by P. aeruginosa and C. albicans. A broader microbial screen and determination of the minimal inhibitory concentration using a broth dilution assay is underway.*

***Peptide Therapeutics Targeting the Estrogen Receptor Alpha in Breast Cancer***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
3:00pm – 3:15pm
Undergraduate Student(s): Kaylee Stone
Research Mentor(s): Mohammad Halim

*Breast Cancer (BC) is one of the most prevalent cancer types around the globe and the second leading causes of death (20.6%) in USA. According to CDC, in 2019, there are 264,121 cases reported in females for breast cancer in USA, which is significantly higher than the lung (221,097) and colorectal (142,462) cancers. Hormone receptor positive represents the vast majority (60–80%) in breast cancer. Estrogen receptor alpha (ERα), a nuclear receptor and ligand-activated transcription factor, plays pivotal roles in treatment and prevention of the majority of BC. ERα has five distinct domains: activation function domains (AF-1 and AF-2), DNA-binding domain (DBD), hinge (H) and ligand-binding domain (LBD); which is part of AF-2). The most important part of LBD is helix 12, which acts as a molecular switch between the active and inactive*

*conformation of the receptor. In recent years, somatic mutations in the LBD region of ESR1 gene were identified in patients who previously received the endocrine treatment. These mutations lead to constitutive ERα activity and lessen hormonal therapy efficacy. E380Q, L536Q, Y537S, Y537C, Y537N, and D538G mutations are frequently observed and highly resistive to the endocrine treatment. Tamoxifen and fulvestrant are currently available for endocrine treatment. Besides small molecules drug, peptide therapeutics are thus gaining increasing popularity as they are easy to synthesis, highly selective and have fewer side effects. We synthesized two known peptides which inhibit the ESR1, including AB:3 and AB:4 using Fmoc solid state peptide synthesis (SSPS) and characterize them by liquid chromatography and mass spectrometry. For AB:3, the most intense peak observed at m/z 950.00 corresponds to [M+3H]3+ whereas for AB:4 peptide the most intense peak detected at m/z 595.00, respectively. These results showed that the synthesis of these peptides is successful. Biological assay will be used to evaluate the efficacy of these peptides.*

***The Phosphorus Puzzle: Why Metal Phosphites Could Be the Missing Piece***
Poster #9 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Eleanor Boyle, Thomas Leyden, and Amelia Shengaout
Research Mentor(s): Heather Abbott-Lyon

*It is well understood that phosphorylation of organic molecules is a keystone mechanism toward developing early cell function. However, the source of phosphorous in prebiotic chemistry is under debate. Phosphate minerals were abundant on the early Earth, but they are highly insoluble. In comparison, metal phosphites are significantly more soluble. While they may not have been preserved in the geological record, there are several plausible pathways for their formation under prebiotic conditions. We hypothesize that metal phosphites were a major source of phosphorus. To test our hypothesis, we synthesized and characterized metal phosphites, containing the most abundant cations on the early Earth (Mg2+, Ca2+, Fe2+, Fe3+). Then we reacted the metal phosphites with glycerol or propanol and looked for phosphonylated organic molecules. (n.b., Phosphonylated molecules contain a phosphite (PO33-), and phosphorylated molecules contain a phosphate (PO43-).) In nuclear magnetic resonance (NMR) experiments, we observe the formation of glycerol-a-phosphite and glycerol-b-phosphite when CaHPO3 and glycerol react at 60oC. Experiments investigating the reactivity of iron (II or III) phosphite and magnesium phosphite are ongoing.*

***Potential Inhibitors for SARS-CoV-2 Main Protease***
Poster #23 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm

Undergraduate Student(s): Valentino S. Sorto & Maria Snyder
Research Mentor(s): Rajnish Singh

*Severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) was the cause of the coronavirus pandemic of 2019. Attempts to target this virus focus on the main protease (Mpro), as it plays a major role in the processing of polyproteins made from translated viral RNA. As a course-based undergraduate research experience (CURE) project, our group took advantage of known protease inhibitors from the University of Nebraska Medical Center's Antimicrobial Peptide Database (APD) to propose three protease inhibitors that have the potential to inhibit Mpro. Function of Mpro is dependent on a catalytic dyad between His41 and Cys145; this was a site of interest when analyzing potential inhibitors. Using Hdock and pymol, the theoretical interactions between these potential inhibitors and Mpro were analyzed and tabulated to determine the suitability for potential therapeutic use. The potential inhibitors investigated were 1YP8, P0C2A8, 2LYF, and 3OTJ. These peptides were hypothesized to be potential inhibitors of Mpro for the following reasons: peptides 1YP8, P0C2A8, and 2LYF are known protease inhibitors with anti-HIV activity, and HIV protease inhibitors have been shown to inhibit Mpro; 3OTJ is a known protease inhibitor that, due to its large size, could inhibit the substrate binding or enzymatic function. According to Hdock, the modeled docking scores were -205.75, -222.55, -213.42, and -321.83 respectively. A more negative docking score correlated with a higher possible binding model. And the confidence scores were 0.7531, 0.8102, 0.7805, and 0.9688, where roughly any number greater than 0.7 indicates that Mpro and the potential inhibitor are very likely to bind. Future studies would involve synthesizing these peptides to experimentally determine if these peptides bind, and their subsequent effect on the catalytic activity of Mpro.*

***Preliminary Results on the Optical Contact Angle of Plastics***
Poster #16 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Kelsey Starkey
Graduate Student(s): Dhimani Still
Research Mentor(s): Marina Koether

*The optical contact angle measurement determines the angle formed between the liquid-solid interface and the liquid-vapor interface as a drop of water is placed on a flat surface. These angles indicate the hydrophobicity/hydrophilicity of the surface. Surface changes due to oxidation will result in lower contact angles indicating increased hydrophilicity of the surface. Different plastics are expected to have different contact angles. Preliminary results will be presented showing the instrument used, the steps to acquire the contact angle and some initial results.*

***Preliminary Results and Optimization Efforts of Water Sampling of the Year Two Analysis for Microfibers in Lake Allatoona Water and Beach Sand***
Poster #21 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Abby Moen
Research Mentor(s): Marina Koether

*This multi-year study of microfibers in Lake Allatoona water and beach sediment is in year two. The current on-going efforts to optimize the procedures and current preliminary results will be reported. Year one results for water analysis indicated a potential for carryover between water samples due to the use of plankton nets. Year two sampling is thus being optimized to avoid such carryovers by using "hand pumps" which have been calibrated (for example: volume per stroke, time and stroke number to acquire 2.0 m3). The "hand pumps" pump the water into the 3-inch 250 um filters that collect the microfibers rather than the plankton nets. This eliminates one step in the extraction procedure. Year one results for the sediment samples were performed on sediments primarily from boat launch sites. Six, year-two, beach samples obtained at the start of 2023 are from the same water sampling sites as year one and two. Following a recently optimized extraction method (optimized since year one results), results from the first two of six, year-two, beach samples are reported. Comparisons are made to the year one results.*

***Probing the Effect of Nitrogen and Boron Doping on Structures, Properties, and Stability of C20 Clusters***
Poster #19 (Convocation Center)
Thursday April 20, 2023
11:00am –11:45am
Undergraduate Student(s): Ramsay Revennaugh
Research Mentor(s): Martina Kaledin

*Fullerenes are carbon molecules arranged in a closed hollow shell to form spherical-like structures. These clusters exist in various sizes, Cn, with the smallest being C20. C20, often when doped with other elements, has shown promise in creating new materials as a catalyst and as energy storage material. Here, we look at the existence of C20 doped with nitrogen or boron atoms using density functional theory (DFT). C20 is doped with one to three boron or nitrogen atoms, respectively, including the five different C18N2 / C18B2 isomers. We examine detection of these compounds using infrared and Raman spectroscopy. Our calculations show all real vibrational frequencies (positive values) for each molecule, indicating their ability to form stable compounds. The stability of singlet and triplet states of C18N2 and C18B2 isomers is also evaluated in terms of HOMO-LUMO gap. Our preliminary calculations show that the singlet states of C18N2 isomers are lower in energy compared to the triplet states, except of one highly symmetric isomer. This work*

*contributes to a better understanding of molecular structure of nanomaterials that can be used for adsorption of small gas-phase molecules, such as CO and NO2.*

***The Relationship Amongst Sleep, Gestational Weight Gain, and Insulin Resistance During Pregnancy***
Poster #13 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Ami Eho
Research Mentor(s): Katherine H. Ingram and Janeen Amason

*The Center for Disease Control and Prevention reports that 48% of pregnancies are affected by excessive weight gain. Gestational weight gain (GWG) is associated with adverse perinatal outcomes including insulin resistance, a precursor to type 2 diabetes. Short sleep duration and poor sleep quality are correlated with weight gain in general population but the relationship between sleep and weight gain during pregnancy is unclear. To evaluate how sleep duration or sleep quality affect GWG and IR during pregnancy. Primigravida women were recruited from a WellStar OB/GYN clinic during the second trimester of pregnancy (N=25; age= 27 ±4 years; pre-pregnancy BMI= 27 ±6 kg/m2). The previously-validated General Sleep Disturbance Scale questionnaire was used to determine quality of sleep (sleeping poorly, not feeling rested upon awakening, and not feeling satisfied with sleep) and quantity of sleep (too little sleep or too much sleep). Fasting blood glucose and plasma insulin were collected at approximately 25 weeks' gestation. Insulin resistance was assessed by the Homeostasis Model Assessment of Insulin Resistance (HOMA-IR= fasting insulin (mU/L) x fasting glucose (mg/dL)/405). GWG refers to weight gained from pre-pregnancy to end of pregnancy. A linear correlation between GWG and quantity of sleep (r = 0.550, p = 0.015) was observed, along with a non-significant trend between GWG and HOMA-IR (r = 0.408, p =0.053). No relationship was found between HOMA-IR and sleep quality or quantity. The results indicate that increased sleep duration is associated with GWG during pregnancy. Therefore, screening for sleep disturbances during pregnancy may be of clinical significance.*

***SCM 2000 - Course Based Undergraduate Research Experience: Determining the Kinetic Properties of Lactase from Generic and Brand Name Supplements***
Poster #24 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): AbdelFattah Abusarrar, Jessica Argueta, Bryce Armand, Adeola Batiste, Jensen Boyette, Irianna Brathwaite, Camille Brown, Karien Cannizzo, Stephany Chavez-Hernandez, Bracey Courchaine, Isaac Crane, Courchaine Garland, Brooke George, Ally Gomez, Feven Gudeta, Heavyn Hughley, Miriam King, Patrick

Kinsella, Mackenzie Lett, Sanaya March, Tori Mcduffie, Emily Miranda, Phoebe Offenberg, Ashley Thomas, Jade Valeris, and Toni Pearle Williams,
Research Mentor(s): Rajnish Singh

*Lactose intolerance occurs due to the body's ineptness at producing lactase- the enzyme responsible for digesting lactose into sugars. Because the body struggles to break down the lactose, it treats the undigested lactose as a foreign substance and rejects it. This commonly exhibits irregular gas/bloating, irritation in the small intestine, and/or diarrhea. A lactose-restricted diet or the use of lactase supplements are the two main forms of treatment for reducing symptoms. The former may entail avoiding meals containing dairy or using milk that has already had the lactose hydrolyzed by treatment with lactase. Commercially available lactase supplements can also be consumed along with dairy products. Various classes of supplements exist such as Lactaid, Lactase, Lactaid ultra, and Dairy Ease. All supplements contain a digestive enzyme known as lactase. This enzyme hydrolyzes the lactose in dairy products into two sugars: galactose, and glucose that are easier to digest and breakdown. A contour NEXT EZ glucometer will be used to measure the glucose released in the hydrolysis of lactose catalyzed by lactase in the supplements. The Vmax, Km, and pH profiles of generic Walgreens/CVS Lactaid and brand name Johnson & Johnson Lactaid will be determined using the glucometer.The significance of this project is to understand the biological and chemical principles of lactose intolerance in humans since lactose intolerance impacts many people across the world. This project will provide kinetic data on common lactase supplements and inform us on the efficiency of these supplements to treat lactose intolerance. It will also provide an easy way to measure lactase activity using a glucometer. As SCM 2000 students, we have learned about enzyme properties and how to work in a lab setting as a team member. We will also gain valuable experience on how to do chemical calculations, learn to use excel, make a poster, and practice public speaking.*

***Scorpion Venom-Based Peptides as Potential Therapeutics Against Bacterial Infections***
Oral Presentation (ALC 2102)
Tuesday April 18, 2023
1:20pm – 1:35pm
Undergraduate Student(s): Noam Lewit
Research Mentor(s): Mohammad A. Halim & Melanie Griffin

*Many human diseases worldwide are due to bacterial infection, and the current standard of care is antibiotic treatment. One of the biggest and most-pressing problems of the modern medicine is the rapid development of microbial antibiotic resistance. Antibiotic resistance is developed due to short generation cycles, mutation, and improper use of prescribed antibiotics. Without the development of new therapeutic solutions soon, bacterial diseases may become completely resistant to antibiotics and mortality and sickness will increase. Peptide therapeutics have grown popular over the past decade because of their wide applications in medicine and biotechnology. Therefore,*

*developing new effective and specific agents is urgently needed to provide alternate therapeutic molecules to treat bacterial infections. Antimicrobial peptides, isolated from living species, are potential broad-spectrum antibacterial agents. Scorpion venom contains a mixture of peptides and proteins with varied bioactivities and receives great attention due to their potential application in peptide drug design and development. In this research, scorpion venom peptides were chemically synthesized using standard Fmoc-based synthesis protocols and tested their antimicrobial activity against known bacterial and fungal pathogens. The synthesized peptides are purified and characterized by mass spectrometry. AVP1701 peptide was eluted at 4.9 min and showed two intense peaks at m/z 1130.61 and 585.8109 which correspond to [M+H]+ and [M+2H]2+ charge states, respectively. Moreover, AVP2053 peptides was eluted at 5.7 min and showed two intense peaks related to their masses. A highly concentrated solution of peptides (AVP1701 and AVP2053) in various concentrations of DMSO were tested against various bacterial infection diseases using the Kirby-Bauer Disk Diffusion Susceptibility Test. Bacterial inhibition with AVP1701 was observed against the opportunistic pathogen Pseudomonas aeruginosa 01 and Escherichia coli, a common intestinal inhabitant. Broth dilutions and an expansive screen of the peptides against other pathogens is underway which will determine the minimum inhibitory concentration.*

***Small Peptides Synthesis and Characterization to Target the 3-Chymotrypsin-like Protease of SARS-CoV-2***

Poster #28 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Jada Iseghohi
Research Mentor(s): Mohammad A. Halim

*According to CDC estimates, the United States has had the largest COVID-19 burden, with more than five million infections and 160,000 fatalities. The main protease, also known as 3-Chymotrypsin-like Protease (3CLpro) determines the virus's lifespan. The crucial step in virus replication in human cells is to cleave the polyprotein of the virus into its functional proteins. 3-Chymotrypsin-like Protease has three domains. The catalytic site, which is in a cleft between domains I and II, contains the histidine/cysteine catalytic dyad. The overall aim of this work is to synthesize and characterize small peptides to target the 3CLpro. In this work, we have selected small peptides including HIP 1121 [LLEYSL], HIP 80 [IISYEL], and HIP 29 [YSYEL] which acted as protease inhibitors for other virus. Initially these peptides were modelled by Pepfold and docked against the 3CLpro to obtain their binding affinity and interactions. Molecular modelling results showed that these peptides interact with the catalytic sites of the protease. Based on our computational findings, these peptides were synthesized using CEM Liberty Blue Microwave Peptide Synthesizer. After the peptide synthesized, the peptide was then cleaved using a cocktail TFA, H2O, and TIPS. The cleavage peptide was separated under vacuum and precipitated adding cold ether. This peptide was characterized by LC-MS. HIP 29 peptide was eluted in 3.10 mins.*

*Two peaks, corresponding to the [M+H]+ and [M+2H]2+ charge states, respectively, were seen at 337.75 and 674.42 Da. The dimer-related peak was also discovered at 1347.25 Da. It took 3.16 minutes to elute the HIP 80 peptide. Two peaks were noticed at 369.17 and 737.42. Which correlates to [M+H]+and [M+2H]2+ change states, respectively. Similar peaks are also observed for HIP1121. In future, these peptides will be used to perform biological assay to determine the inhibition efficiency in vitro.*

***Solid Phase Peptide Synthesis of Same Amino Acid Based Sequence***
Poster #22 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Aria Mokhtari
Research Mentor(s): Mohammad Halim

*Solid phase peptide synthesis (SPSS) and Boc/Fmoc orthogonal protecting strategy promoted the rapid synthesis of larger and challenging peptides. Moreover, this method opened a new avenue for automation in peptide synthesis. To synthesize a peptide in SPPS, three key steps need to be fulfilled: i) resin swelling, (ii) deprotection of the protected group, and (iii) coupling reaction to form the amide bonds. Although SPPS is routinely used for various peptide sequences, synthesis of same amino acid-based sequence is quite challenging due to missed coupling reaction and low yield. In this study, we attempt to synthesize and characterize same amino acid-based sequence peptide. Initially two peptides including alanine based 7A (AAAAAAA) and tryptophan based 7W (WWWWWWW) were randomly selected. For synthesizing these peptides, rink amide resin with a loading power of 0.6 mmol/g was utilized. Fmoc amino acids, main solvent DMF, deprotection solution of piperidine, activator N,N'-diisiopropylcarbodiimide and activator base oxyma were used for all synthesises. After the synthesis, the peptide was dried with DCM to remove DMF and cleaved from the resin using a cleavage cocktail made up of 95% TFA, 2.5% H20 and 2.5% TIPS. Ether was added but yielded no precipitate, so chloroform was used instead. The peptide was then centrifuged, frozen, and lyophilized. Peptides were characterized by Liquid Chromatography and Mass Spectrometry. Alanine based peptides was eluted at 1.02 mins and the most intense peak detected at m/z 515.42 Da corresponds to [M+H]+. In addition, a peak for dimer is noticed at 1029.17 Da. Tryptophan based peptide was eluted at 6.53 mins and the most intense peak for this peptide was observed at m/z 661 Da corresponds to [M+H]+. In addition, a peak dimer is noticed at 1320.67 Da. LCMS results showed that both peptides was corrected synthesized although with low yield. Further research will be focused to increase the yield and explore potential applications for these peptides.*

***Synthesis and Characterization of GHK Peptides and their Interactions with Copper Investigated by Mass Spectrometry***
Poster #23 (Convocation Center)

Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Sydney Carvalho
Research Mentor(s): Mohammad A Halim

*Tripeptide, GHK, has been observed to interact with copper in human blood plasma and forms GHK-Cu complexes that occur naturally and allow for the transfer of nontoxic copper ions into cells. These GHK-Cu complexes present in plasma aid in a variety of biological functions related to healing including promotion of healing of wounds, attraction of immune cells, blood vessel growth, and antioxidant and anti-inflammatory effects. Synthetically derived GHK-Cu complexes are frequently used in cosmetics that address repairing and anti-aging effects in skin. Nitrogen present in the amino acids glycine and histidine are responsible for the binding of Copper within the GHK-Cu complex. In this study, three peptides including GHK, GHKGHK, and GHKGHKGHK were synthesized via Solid-Phase Peptide Synthesis (SPPS) using rink amide resin. To synthesize a peptide in SPPS, three key steps need to be fulfilled: i) resin swelling, (ii) deprotection of the protected group, and (iii) coupling reaction in order to form the amide bonds. After the synthesis, the peptide-resin complex needs to cleavage using high percentage of trifluoracetic acid. Subsequently, peptide was precipitated by addition cold ether and recovered as power by lyophilization under high vacuum. The synthesis of these three peptides were confirmed by mass spectrometry which agreed well with the theoretical masses. For GHK peptide, peaks observed at m/z 341 and 171 corresponds to [M+H]+ and [M+2H]2+ charge states. For GHKGHK and GHKGHKGHK peptides, peaks detected at m/z 662 and 984 correspond to [M+H]+ charge state, respectively. Beside singly charge states, double charge states are also noticed for these peptides. Current studies are focusing on obtaining the copper interactions with these peptides.*

***Synthesis and Characterization of Snails Venom Peptide as a Potential Inhibitor of NMDA Receptors in Alzheimer's Disease***
Oral Presentation (ALC 1200)
Tuesday April 18, 2023
2:20pm – 2:35pm
Undergraduate Student(s): Caleb Griffith
Research Mentor(s): Mohammad A. Halim

*Alzheimer's Disease (AD) is a neurodegenerative disease which is affecting million people globally. In 2021, 6.5 million people in US alone spent billions dollar for their treatment. While there is no cure for AD yet, there are therapeutics in development to slow the progression of AD. The specific aspect of AD which this study focuses on is the inhibition of the N-methyl-D-aspartate (NMDA) receptor. Previous research has shown that, in AD patients, the overactivation of the NMDA receptor leads to an overabundance of Ca+ ions within the nerve cell. This activates digestive enzymes causing premature neuron death which leads to dementia. Memantine has seen use in*

*inhibiting NMDA which slowed the onset of dementia in AD patients. Additionally, cone snails venom peptides have shown potential in blocking the flow of ions through NMDA. In this study, computational screening of 41 Conus venom peptide against NMDA was conducted. Several peptides exhibited strong binding affinity with NMDA. Two peptides, 1M2C and 2I28, showed the binding affinity of -53.52 and -47.95 kcal/mol, respectively. These peptide candidates were synthesized using the standard Fmoc synthesis protocols by CEM Liberty Blue peptide synthesizer. Peptides' characterizations were then conducted by mass spectrometry. The linear peptide showed two strong peaks at m/z 858.83 and 1715.17 correspond to [M+2H]2+ and [M+H]+ ions, respectively which exactly matched with the theoretical values. Cyclic peptide was synthesized by adding 10% DMSO and stirred for 24-48 hours. Cyclization was confirmed by mass spectrometry which showed the removal of four hydrogen (mass shift by 4) from four cysteine residues and forming disulfide bonds between Cys2-Cys8 and Cys3-Cys16. The performance of these peptides will be evaluated with Alzheimer animal model. The obtained results can accelerate the rational design of snails' venom peptide inhibitors in the development of Alzheimer's Disease therapeutics.*

***Synthesis and Mass Spectrometry Characterization of Anticancer Peptides to inhibit the Epidermal Growth Factor Receptor***

Poster #36 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Emily Brown
Research Mentor(s): Mohammad A. Halim

*Cancer is a disease that dates to almost 3000 years ago when the first diagnosis took place. Ever since over one hundred types have evolved and continue to infest the systems of the human body. The protein epidermal growth factor receptor (EGFR) contributes to cell division and sustainability in the body. Mutations of this protein in cancer cells can lead to an overactive production that results in the uncontrollable spread of cancer throughout the body. Although various small molecules drugs are developed to inhibit EGFR, very less studies are focused on peptide therapeutics. In this study, we have modelled two peptides, performed molecular docking with EGFR and then synthesized and characterize by liquid chromatography and mass spectrometry. GE11 is a dodecapeptide that can specifically bind itself to the EGF receptor and target the cancer cell. An additional analog of GE22, was screened as well in this study since previous research had shown it had a higher direct uptake in comparison to the primary peptide GE11. The leading ranked model of GE11 had a binding affinity value of -99.89 kcal/mol and GE11-22 additionally had the same binding affinity score. This is not a surprise since these peptides have a difference in just one amino acid. These leading peptides were then synthesized by standard Fmoc synthesis protocols using the CEM Liberty Blue peptide synthesizer. Analyzation and later characterization of these peptides were performed using mass spectrometry. The peaks*

*shown for the GE11 peptide were at m/z 770.92 and 1540.67 which directly relate to the [M+2H]2+ and [M+H]+ charge states, respectively. GE11-22 peptide also showed similar charge states as the sequence are nearly same. In future, various cyclic and staple peptides will be synthesized and tested their performance by biological assay.*

***Synthesis of Anticancer Peptide targeting the Epidermal Growth Factor Receptor***
Poster #24 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Muhammad Behzad
Research Mentor(s): Mohammad A. Halim

*Epidermal Growth Factor Receptor (EGFR) is a transmembrane protein found within the cell interface belonging to a subfamily of receptor tyrosine kinases include EGFR (ErbB-1), HER2/neu (ErbB-2), Her 3 (ErbB-3) and Her 4 (ErbB-4). This protein is well known for its promotion and activation of key ligands that are responsible for cell growth, proliferation, and survival. When there is a genetic mutation it alters the structure of EGFR and causes uncontrolled cell growth, ultimately advancing to a tumor. Our aim is to design and develop an anticancer peptide therapeutic based on its ability to successfully bind to the EGFR membrane protein to prevent the progression of malignant and benign tumors. Based on the computational screening of 25 anti-cancer peptides, we synthesized two peptides during that resulted in having the strongest computational binding affinity to the EGFR protein. Solid phase peptide synthesis was applied, which began by swelling Rink Amide Resin. Cycles of deprotection and coupling were performed from the C' terminus to the N' terminus. After full peptide synthesis, we cleaved the peptide using TFA, removing the resin and sidechain protecting groups. Precipitation was then performed using cold ether. The purity of these peptides was tested using liquid chromatography and mass spectrometry. Our first peptide had a theoretical mass of 1172 Da. In mass spectrum, we obtained an experimental mass of 1171.67 Da. Our second peptide had a theoretical mass of 1383 Da while mass spectrometry of this peptide yielded in an experimental mass of 1382.77 Da. These findings indicate that both these peptides are successfully synthesized and pure. The inhibition efficiency for both these peptides will be evaluated via a biological assay which will be performed using cancer cell lines obtained observed using an anticancer in-vitro assay.*

***Synthesis of Linear and Cyclic Peptides to Inhibit the Aggregation of Alpha-Synuclein in Parkinson's Disease***
Poster #25 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Mya Chaari
Research Mentor(s): Mohammad A. Halim

*Parkinsons (PD) is a neurological disease that is caused by the buildup of Lewy bodies in neurons. PD is the second highest diagnosed neurological disease in the United States with 90,000 people being diagnosed a year. Alpha-Synuclein easily misfolds and is the main protein in Lewy bodies. Peptide therapeutics can be used to delay effects or even to cure the disease. In this study, 4554w peptide and its cysteine based cyclic derivatives was synthesized. The cyclic analogue of this peptide was synthesized in hopes of potentially finding a better candidate and furthering research since cyclic peptides are more stable compared to linear peptide. Standard Fmoc solid phase peptide synthesis protocols by CEM Liberty Blue peptide synthesizer were used to synthesize the linear peptides. Both peptide-resin complexes were cleavage using 95% trifluoracetic acid and heated at 42°C in the water bath for 30 mins. Peptides were filtered and precipitated with cold diethyl ether. Peptide characterization was then conducted with Mass spectrometry. The linear peptide shows two strong peaks at m/z 500.83 and 999.92 which correspond to doubly and singly charge states. Two cysteine amino acids was added in the N-terminal and C-terminal of 4554w peptide and cyclization reaction was performed by adding 10% DMSO and stirring over 48 hours. This would display a change in mass as cyclization results in the loss of 2 hydrogens while gaining a disulfide bond between cystines, which was supported with mass spectrometry results. Further research will be conducted on the interaction of these peptides with Alpha-Synuclein employing native mass spectrometry techniques.*

***Synthesis of Peptides to inhibit the Amyloid-β Peptide Aggregation in Alzheimer Diseases***

Poster #26 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Roger Brown
Research Mentor(s): Mohammad Halim

*Alzheimer's disease is the most common form of dementia. It is an extremely prevalent neurological disease, affecting 60-70% of the more than 55 million people worldwide who have dementia according to the World Health Organization. The CDC reported that an estimated 6.5 million Americans were living with Alzheimer's disease as of September 2022. By 2060, an amount estimated to increase to 14 million. Alzheimer diseases are related to the buildup of amyloid accumulations due to the aggregation of few specific peptides and proteins including Aβ peptides, α-Syn and Tau proteins. In the case of Alzheimer disease, clump peptide and protein undergo over production forming oligomers to large fibrils in neuron. This aggregation led to the formation of Aβ peptides extracellular plaques whereas tau protein accumulates as intraneuronal inclusion bodies and form giant tangles. Fibril's formation leads to synaptic dysfunction, neuron death, brain shrinkage and, ultimately, dementia. In this study, we plan to design therapeutics peptide to inhibit the aggregation and neurotoxicity imposed by Amyloid beta peptide. In this*

*study, we have synthesized two linear peptides (P1: KLVFF, and its reverse sequence P2: FFVFK) in a liberty blue peptide synthesizer using standard Fmoc-based synthesis protocols. The peptides then characterized using the Agilent 1290 UHPLC system equipped with a binary pump, a multisampler and a UV detector excitation at 214 nm. In addition, mass spectrometry experiment was performed using Thermo LTQ XL mass spectrometer equipped with a heated electrospray ionization (HESI) source. During HPLC experiment, both peptides eluted around 3.13 and 3.22 min and showed that the synthesized peptides are highly pure. The mass spectrometry peaks are detected at m/z 343.75 and 686.42 assigned to [M+2H]2+ and [M+H]+ ions, respectively which exactly matched with the theoretical values.*

***Turning Behavior of Human Drivers with Right Hand Placement on Steering Wheel***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:40pm-2:55pm
Undergraduate Student(s): Hannah J. Goodchild, Bayley D. Enlow, Tania M. Hubbard, Caroline F. Hutcheson, Morghan A. Lard, Billy A. Lewis, and A.J. Needham
Research Mentor(s): Kyung Hun Jung

*Examining human drivers' steering behavior during take-over response of Level-2 automated vehicles (AV) can have significant implications on crash prevention in the event of silent failure, what occurs when the AV does not release a take–over request (TOR) before a potential crash. We have developed a study that focuses on how hand-related instruction can affect navigation, particularly the speed and turning direction of evasive maneuvering while going straight through a T-intersection. We hypothesized that participants given a hand-related instruction of placing solely their right hand on the steering wheel will have quicker and more successful evasive maneuvering than the participants receiving no hand-related instruction. How right-hand placement influenced turning preference was investigated as well, with the supposition that predominantly right steering would follow. We are currently analyzing the data.*

***Tryptophan Zippers Peptides: Synthesis and Mass Spectrometry Investigation***
Poster #27 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Jaden Means
Research Mentor(s): Mohammad A. Halim

*Tryptophan zippers, also known as tripzips, are a structural motif that can stabilize the beta-hairpin conformation in short peptides. Additionally, they are the smallest peptides that can acquire a unique tertiary fold without requiring metal binding, unusual amino acids, or disulfide crosslinks. These peptides are spanned from twelve to sixteen amino acids in length and have four*

*turn sequences, they would be classified as monomeric and can fold cooperatively in water. In this study, we have synthesized two peptides, tripzip1 and tripzip2, containing 12 amino acids. These peptides were synthesized using the CEM Liberty Blue peptide synthesizer on a solid support of rink amid resin. Compared to liquid phase peptide synthesis, solid phase synthesis requires few steps, easy to separate excess reagents and by-products, and very cost-effective. After completing the peptide synthesis, the cleavage of the resin-peptide complex was achieved using high percentage (95%) of TFA and using water and TIPS as scavengers. By adding cold ether, peptides were precipitated. The synthesis of the peptide was confirmed by liquid chromatography and mass spectrometry. The two peptides, tripzip1 and tripzip2, displayed three strong peaks at m/z 537.00, 805.00, and 1608.75, which correspond to [M+3H]3+, [M+2H]2+, and [M+H] + ions, respectively, which was slightly higher than the than the theoretical mass of 1607.75. Further studies will be conducted to explore the structural features of these tripzip peptides using circular dichroism and hydrogen-deuterium exchange mass spectrometry.*

***Ultrasonic Assisted Emulsification Microextraction Analysis of the Gunshot Residue Diphenylamine***

Poster #5 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Alyssa Hampton
Research Mentor(s): Christopher Dockery

*Diphenylamine is a common organic compound found in gunshot residue. Detection of this organic compound is important in the forensic analysis of firearms. There are minimal methods for extracting organic compounds for firearms analysis. This project helps with producing new effective ways of extraction and producing more products in gunshot residue analysis. The technique used to help with the extraction enhancement of diphenylamine was Ultrasonic Assisted Emulsification Microextraction. An external standard calibration curve was produced by creating a simulation of fired bullets by dosing diphenylamine onto copper foil. Five standards were created at multiple concentrations and the limit of detection and limit of quantitation were calculated. The R2 for the given calibration curve was 0.9823. The limit of detection was found to be a concentration of 1.84 ppm. The limit of quantitation is found to be a concentration of 6.12 ppm. To apply the Ultrasonic Assisted Emulsification Microextraction, fired bullet casings provided by KSUPD and another student are soaked in a solution of 1-bromooctane and deionized water and placed in an ultrasonic bath. The use of Ultrasonic Assisted Emulsification Microextraction was selected from literature with the goal of improving the extraction efficiency of the organic compounds within the fired bullet casing. After sonication, the 1-bromooctane layer was extracted for analysis by gas chromatography–mass spectroscopy. From the results, the amount of diphenylamine is much smaller than anticipated, using this extraction method, and does not produce effective results. Using 1-bromooctane, ultimately causes the diphenylamine to be placed*

*in the background noise. The GC-MS was unable to produce any peaks in regard to diphenylamine. Therefore, further experimentation can be done to improve the method for extraction.*

***Understanding How Transcription Factors with Metallic Cofactors Contribute to Regulation of Gene Expression***
Poster #12 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Mya Stubbs
Research Mentor(s): John Barrows
Additional Faculty: Michael Van Dyke

*Transcription is the process of rewriting a stretch of DNA, called a gene, into RNA, which is then translated into a protein. Most organisms contain thousands of genes that each produce a unique protein with a specific function. The question is then raised, "what would happen if every gene were producing every protein, all the time?" The answer is self-destruction. So, there must be a way to regulate genes – an "off or on" switch. Transcription factors act as that switch. Transcription factors are proteins that bind to a specific DNA sequence to help activate or repress nearby genes. Transcription factors recognize and react to stressors in their environment to know when to bind or release from DNA. The DtxR, or diphtheria toxin repressor, family of transcription factors provide a prime example of eliciting a genomic response to environmental stresses. Typically, DtxR members bind a regulatory metal cofactor, often manganese or iron, to localize to DNA and repress the expression of genes involved in the uptake of their regulatory metal. In this study, we identified a genomic DNA-binding sequence for the DtxR transcription factor from the model organism Thermus thermophilus HB8. The DNA sequence identified was found in close proximity to a gene encoding for a manganese-dependent transporter (TTHA1941). By developing a novel, in vitro transcription assay, we showed that Thermus thermophilus HB8 DtxR represses TTHA1941 and that repression is dependent on manganese availability.*

***Un-Masking Hidden Phenotypes for PA14 IVYp1 and IVYp2 Knockout Strains by Observation of Tetracycline Sensitivity and Restoration of Resistance***
Poster #32 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Aamna Aijaz and Irina Padilla
Research Mentor(s): Thomas C. Leeper

*Pseudomonas aeruginosa (PA) is a gram-negative bacteria that is known for its adaptive antimicrobial resistance. Inhibitors of vertebrate lysozyme proteins IVY's are periplasmic proteins that are involved in the resistome of PA. They are deemed responsible for this resistivity, based on*

*previous findings that demonstrate a tetracycline-sensitive phenotype for IVYp1 knockout under growth conditions in parallel with cystic fibrosis lung environment. However, this resistivity has not been tested using standard laboratory conditions. The aim of this CSM mentor protégé funded project is to implement standard microbiological characterization such as Kirby-Bauer Susceptibility Test to provide qualitative results en par with Minimum Inhibitory Concentration assays to indicate tetracycline sensitivity of the IVYp1 knockout. Assessing these results from Kirby Bauer test, the minimum inhibitory concentrations for the knockout strains will be determined to obtain the minimum amount of antibiotic needed to limit the growth for wild type, IVYp1-, and IVYp2- strains of PA14. Ongoing studies to use complementation of IVYp1 inactivation loop by exogenously added peptide are being used to further indicate the sustainability of IVYp1. IVYp1-/- strain will be examined under the addition of a cyclic peptide consisting of six amino acids followed by MIC assays performed to evaluate if the phenotype TetR is restored through the exogenously added peptide advocating for the necessity and sufficiency of IVYp1 for maintaining the integrity of peptidoglycan cell wall, thus making it a potential drug target.*

## Ecology, Evolution, and Organismal Biology

***Statistical Analysis of the Relationship Between Protected Bird Species and National Parks***

Poster # 15 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Katherine Harmon
Research Mentor(s): Kevin Gittner

*The ecological diversity of Earth is majorly threatened by habitat loss due to the destruction by human intervention. The conservation status of all identified species are classified into nine categories of varying vulnerability as described by the International Union for Conservation of Nature's Red List. By understanding the vulnerability of specific species, scientists can work to maintain a viable and healthy ecosystem globally by instilling rules and regulations of observed habitats for threatened species. These habitats are identified by surveying potential locations for threatened species and determining the population size at each site. An example of one of these surveys may be found on an organization's website supplying global data, DataOne, which focuses on bird species in the French Broad River Basin of North Carolina during the summer months. Using the values in this data set, variables for both the protected status of the observed species and the national park status of the focused locations were created. This report utilizes statistical analysis to interpret the potential relationship between these two variables. A relationship is expected between the proportion of protected species observed in national parks and those observed outside of national parks. This result would verify that the protected bird species observed can be*

*found more often in national parks, signifying the importance of rules and regulations for these locations to maintain the survival of these species. Future research of these protected species could elaborate on their preferred habitat and instill the need to change the boundaries of national forests.*

***The Effect of Fire on Soil Respiration in Simulated Forests and Savannas of Northwest Georgia***

Poster #15 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Rebecca Senft, Kenadi Morgan, and Ash Chapman
Graduate Student(s): Collin Anderson
Research Mentor(s): Matthew Weand

*Soil respiration is the second largest source of carbon flux in the global carbon cycle and a major influence on ecosystem productivity and climate change. Soil respiration is the process of carbon dioxide (CO2) evolution from soil due to metabolic processes of soil organisms including plants, microfauna, and microbes. Soil respiration rates are influenced by factors such as soil temperature, moisture, structure, and organic matter content which vary by ecosystem and are impacted by fire. Fire's effect on soil depends on fire intensity and duration which are partly functions of fuel bed structure and composition. This study aims to investigate how fire influences soil respiration in two Georgia ecosystems, forests and savannas, that share fire as a natural disturbance, but differ in soil, microclimate, and fuel bed characteristics. We conducted two-way ANOVAs to compare soil respiration rates before and after fire in (1) forest and savanna soils and (2) forest soils with different fuel compositions. We hypothesize that low-intensity fire increases soil respiration by increasing nutrient availability to soil organisms but increasing fire intensity reduces soil respiration by killing soil organisms. We predict that fire will result in increased soil respiration rates in both ecosystems, but more so in savanna soils due to less pre-burn organic material. We also expect fuel beds burned with greater proportions of hardwood litter to reduce soil respiration rates due to slower rate of fire spread that increases soil temperatures. Soil type significantly affected respiration rate ($p<0.001$), but fire did not ($p=0.35$). Respiration rates increased in savanna beds but decreased in forest beds. Fire significantly decreased respiration in both pine-dominated and hardwood-dominated forest fuel beds ($p<0.01$) with no significant difference between fuel treatments ($p=0.74$). As fire increases on the landscape, understanding fire's effect on the carbon cycle is imperative for improved carbon storage management.*

***Effect of Removing Pityopsis Nervosa on the Soil Bacterial Microbiome of a Longleaf Pine Ecosystem***

Poster #25 (Convocation Center)
Thursday April 20, 2023

2:00pm – 2:45pm
Undergraduate Student(s): Olivia Walker, Rylee Shaw, Van Par, and Dylan Bennet
Graduate Student(s): Isabella Vahle
Research Mentor(s): Paula Jackson

*The longleaf pine (Pinus palustris) is an integral part of a diverse, endangered ecosystem in the Southeastern United States. Longleaf pines are better equipped to survive strong winds and droughts than other native species and are notable for their dependence on fire for successful regeneration and establishment. The herbaceous vegetation within this ecosystem provides suitable conditions for the longleaf pine by supporting a positive feedback loop with fire. The herbaceous community's importance is well known, but the microbial community associated with these key players is currently understudied. The aim of this study is to investigate the association between soil microorganisms and two important herbaceous species in the longleaf pine ecosystem, Pityopsis nervosa and Andropogon sp. Pityopsis nervosa is the most dominant herbaceous species in the montane longleaf pine restoration sites studied; this forb plays a major role in ecosystem maintenance by serving as fuel for low-intensity fires. Two longleaf pine restoration sites in North Georgia were chosen. Six blocks were randomly set up at each site, and each block contained four randomized subplots with one of the following treatments: control, removal of Andropogon sp., removal of Pityopsis nervosa, and soil disturbance. DNA was extracted using a commercial extraction kit, measured for concentration, and analyzed to identify bacteria inhabiting the soil samples from each sublot. Preliminary results of these analyses indicated that Acidobacteria and Actinobacteria were among the most abundant phyla of bacteria present in each treatment group. Acidobacteria is a keystone taxon known to regulate biochemical cycles and promote plant growth. Actinobacteria are widely distributed in soil and secrete enzymes involved in degrading chitin and chitosan, play roles in carbon cycling, and degrade plant residues. Additional findings will add to the knowledge of these key microbial groups inhabiting the ecosystem and interacting with dominant herbaceous species such as Pityopsis nervosa.*

***The Effect of Urbanization on Starling Egg Size and Parental Investment***
Poster #22 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Amberlee Cook
Research Mentor(s): Sarah Guindre-Parker

*Urban habitats can have lower abundances of food, negatively impacting wildlife. We studied whether birds inhabiting urban habitats show negative consequences via their investment in breeding. European starlings (Sturnus vulgaris) can inhabit a variety of habitats, from rural to peri-urban, making them an ideal study system for this research. In addition, their eggs fall along a wide range of mass and volume such that we can examine whether habitat type shapes investment*

*in egg size. Once the eggs hatch, starlings provide important parental care—such as sitting on the chicks for warmth, which is called brooding. We analyzed whether egg mass and brooding behavior differed for starlings from a range of habitat types, as well as whether starlings laying bigger eggs also provided more offspring care behavior. We found a significant difference in the amount of brooding behavior expressed by adults depending on their environment, indicating that habitat does play a role. In urban environments, female brooding was observed 3.3 percent of the time, while in rural environments, it was observed 8.6 percent of the time. We also found that egg size was greater in rural habitats than urban ones. However, there is no significant correlation between egg size and parental care investment. Together, these results suggest that urban habitats cause parents to decrease their investment in brooding at both the egg and chick stages of development. This research offers valuable information that can inform how we consider the effects of urbanization on starlings and other birds.*

***Environmental Drivers of Stream Invertebrate Communities in Georgia, USA***
Poster #23 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Benjamin Ducre and Victoria Garica-Belman
Research Mentor(s): Nicholas Green

*We investigated how stream macroinvertebrate communities of Georgia, USA, responded to natural and anthropogenic environmental factors at multiple spatial and temporal scales. The state of Georgia has approximately 70,000 km of perennial streams and rivers which contribute to the economic and environmental well-being of the state. Stream biodiversity can be an important indicator of watershed and stream health; therefore, our investigation focused on how different factors influence stream organisms at different spatial scales. To accomplish this, we integrated data from a state-wide biomonitoring program (Georgia Environmental Monitoring and Assessment System) collected from 2000 to 2018 with publicly available spatial data on numerous potential predictor variables. The dataset included >400 sampling sites throughout the state. We then used boosted regression trees (BRT) to identify environmental drivers of stream biodiversity while accounting for nonlinearity and interactions between predictors. Our results will identify the nature, scale, and intensity of human impacts on Georgia stream communities. This understanding will be critical for science-based watershed management as human land use intensifies (e.g., suburban and urban development) and these activities interact with pre-existing natural gradients such as elevation and latitude.*

***Environmental and Biotic Drivers of Disease Presence in Floridian and Puerto Rican Coral Reefs***
Poster #19 (Convocation Center)
Thursday April 20, 2023

12:00pm – 12:45pm
Graduate Student(s): Brianna Casement
Research Mentor(s): Nicholas Green

*We investigated environmental factors driving coral biodiversity and disease prevalence in the Florida Keys and Puerto Rico. Coral reefs face numerous threats related to anthropogenic pollution and climate change. Recent disease outbreaks within South Florida populations of stony coral (Cnidaria: Scleractinia) have been the cause of significant concern; however, the causes and factors underlying the spread of these diseases remain little understood. One hypothesis that may explain disease prevalence in these corals is the dilution effect, which states that as host communities become more diverse, pathogen prevalence decreases because pathogens will be less likely to encounter a suitable host. We tested the hypothesis that disease transmission among coral reefs is affected by coral colony community structure because more diverse communities may have lower disease transmission rates due to the dilution effect. We utilized publicly available coral monitoring data in conjunction with data on geographic, climatic, hydrologic, and other environmental variables to examine what factors might contribute to the transmission of these diseases. We used hierarchical Bayesian generalized linear mixed models (GLMM) to account for environmental factors and analyze the effects of species evenness on the likelihood of diseases being present. Coral status was driven by latitude, bottom rugosity, and depth. Across all coral species, disease prevalence was driven primarily by latitude and coral community evenness within each reef. Sites with greater species richness and evenness typically had lower disease presence, while sites with lower species richness and evenness were more likely to have diseases present. This finding supports our hypothesis that coral reef diseases among Floridian and Puerto Rican reefs exhibit a host dilution effect. These findings may provide new insight for management practices in these regions.*

***Environmental Drivers of Stream Invertebrate Communities in Georgia, USA***
Poster #23 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Benjamin Ducre and Victoria Garica-Belman
Research Mentor(s): Nicholas Green

*We investigated how stream macroinvertebrate communities of Georgia, USA, responded to natural and anthropogenic environmental factors at multiple spatial and temporal scales. The state of Georgia has approximately 70,000 km of perennial streams and rivers which contribute to the economic and environmental well-being of the state. Stream biodiversity can be an important indicator of watershed and stream health; therefore, our investigation focused on how different factors influence stream organisms at different spatial scales. To accomplish this, we integrated data from a state-wide biomonitoring program (Georgia Environmental Monitoring and*

*Assessment System) collected from 2000 to 2018 with publicly available spatial data on numerous potential predictor variables. The dataset included >400 sampling sites throughout the state. We then used boosted regression trees (BRT) to identify environmental drivers of stream biodiversity while accounting for nonlinearity and interactions between predictors. Our results will identify the nature, scale, and intensity of human impacts on Georgia stream communities. This understanding will be critical for science-based watershed management as human land use intensifies (e.g., suburban and urban development) and these activities interact with pre-existing natural gradients such as elevation and latitude.*

***Estimating Blue Carbon Stocks in Native and Non-Native Seagrass Beds of Jobos Bay, PR***

Poster #30 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Michael Chapman; Raven Winant; Kayla Gonzalez-Boy; Mark McCarthy; and Ángel Dieppa-Ayala
Research Mentor(s): Troy Mutchler

*Seagrasses are keystone species that support coastal biodiversity, but not all species of seagrasses provide the same ecosystem services. Although seagrasses occupy a small area of marine habitat, they provide many ecosystem services. They stabilize sediments, remove nutrients, provide habitat and food for diverse marine life, and promote carbon storage in sediments. Jobos Bay is the second largest estuary in Puerto Rico and contains salt marshes, mangroves, and seagrass beds. The native seagrass, Thalassia testudinum, is the most abundant seagrass in the bay; however, a seagrass species from the Indian Ocean, Halophila stipulacea, began invading in recent years. The impacts of H. stipulacea have not been well-studied, and it is not yet known if the invasive species is displacing the native species or growing only in areas that were previously non-vegetated. This study investigates the effect of the invasive species on carbon storage in Jobos Bay. If the native species contributes more detritus to the sediments but is being outcompeted by the invasive species, it will mean less organic matter is stored in the sediments as the invasion progresses. Between March 7-20, nine cores were extracted from four different habitat types: 1) a T. testudinum bed, 2) a H. stipulacea bed, 3) an unvegetated area, and 4) an area where an algal accumulation extirpated an H. stipulacea population. The cores were sliced in 1 cm increments. Slices were dried and combusted at 500 C to determine bulk density and organic carbon content. Patterns in the amount of carbon storage across the depths and habitat types will be compared. Estimates of carbon storage will help natural resource managers understand potential impacts of the invasive species on ecosystem services.*

***Evaluation of Variation in Salamander Body Condition Across Different Land-use Histories***
Poster #28 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Allison Vessell
Research Mentor(s): Todd Pierson

*Salamanders are key parts of both terrestrial and aquatic ecosystems. In some ecosystems, they occur in high biomass and play a vital role in the movement of nutrients as both predator and prey. Some studies evaluate the status of salamander populations by estimating population-level characteristics like abundance or demographic parameters, but these methods do not capture individual-level variation in salamander health and body condition. However, these individual-level measurements may be important for evaluating conservation management decisions. Here, we measured body mass, snout-vent length, and tail width of Blue Ridge Two-Lined Salamanders (Eurycea cf. wilderae) in the Georgia Museum of Natural History to evaluate whether salamander body condition—as measured using relative body mass and relative tail width—varied between males and females and between locations with different land use histories (i.e., natural, post-logging, or post-agriculture). The goals of our study were to 1) evaluate the validity of body condition metrics; and 2) help to further expand our knowledge of factors that influence salamander body condition. These objectives highlight the importance of considering extrinsic factors when assessing the health and fitness of salamander individuals. We present our preliminary results and discuss opportunities for future research in this system.*

***Examining the Effects of Non-Native Seagrass Species on Sediment Chemistry in Jobos Bay, PR.***
Poster #31 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Raven Winant and Michael Chapman
Graduate Student(s): Kayla Gonzalez-Boy
Research Mentor(s): Troy Mutchler and Mark McCarthy

*Seagrasses provide a variety of essential ecosystem services such as erosion prevention, carbon storage, processing water column nutrients, and providing food and habitat for endangered species. These services are invaluable to humans and must be studied to determine how seagrasses may be a link in achieving the overall goal of fighting climate change and preserving earth's coastal and marine ecosystems. Jobos Bay, Puerto Rico hosts a wide variety of marine habitats but is vulnerable to ecosystem damage from human activities. This research was conducted to investigate how the presence of non-native Halophila stipulacea impacts the nitrogen cycle, nutrient*

*availability, and dissolved ammonium pool in Jobos Bay. In March 2023, a total of forty-eight sediment cores were collected from four different habitat types across three different locations in Jobos Bay. Porewater was extracted from the cores and will be examined spectrophotometrically to determine porewater ammonium concentration and exchangeable ammonium concentration. An analysis of variance will be used to compare the concentrations of ammonium among the different habitat types. Due to higher refractory carbon composition in the biomass of Thalassia testudinum, more burial and less decomposition is expected in seagrass beds containing T. testudinum than those with H. stipulacea. I predict that this lower decomposition rate will be detected as lower sediment porewater ammonium concentration. Differences in porewater ammonium concentration associated with these species could indicate changes in the availability of nitrogen for microbial metabolism and nitrogen recycling within the ecosystem.*

***Identification of Parasites in Freshwater Fish***
Poster #32 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Angel Uchendu and Jamie Hungerbuhler
Research Mentor(s): Whitney Presser

*The purpose of this research project is to provide an identification guide for future researchers to be able to identify parasites in fishes. It can be hard to identify these parasites because they aren't easy to find so, a guide will be more helpful to identify them. We performed dissections on multiple species of fish to find the different kinds of parasites. We used stereo microscopes to detect parasites in fish specimens and then we took pictures of them to create the identification guide. We were able to get pictures of the parasites and organize them. We found the following parasites and included them in our identification guide about our: nematodes (roundworms), cestodes (tapeworms), monogenean trematodes (trematodes gill flukes), digenean trematodes (flukes), and acanthocephalans (spiny-headed worms). This research will allow people to help identify parasites easier and help students or researchers in the future.*

***The Impact of Chemical Pesticides on Protein Structure and Dynamics: A Mass Spectrometry Investigation***
Oral Presentation (ALC 1200)
Tuesday April 18, 2023
11:20am – 11:35am
Graduate Student(s): Mubassarah Munjirin Sazmi
Research Mentor(s): Mohammad A. Halim

*Pesticides are chemical substances that are used to kill pests such as insects, rodents, fungi, and weeds. Chemical pesticides have detrimental effects on the ecosystem, and human and animal*

*health. The purpose of this study is to use mass spectrometry technique to assess the impact of pesticides on protein structure and dynamics. Using charge distribution, MS can confirm protein folded and unfolded states. For a folded protein (native state), the mass spectra demonstrate few charge states mostly in the high m/z region; however, for an unfolded (denatured) protein, the mass spectra exhibit more charge state distribution in the low m/z region. In this study, heme containing Cytochrome C protein was used a model system to predict its structural changes on the addition of chemical pesticides. Various pesticides including Propanil, Bromoxynil, and Glyphosate were used for this study. When the Cytochrome C is prepared with water, mass spectra showed the charge state distribution from 4+ to 10+, in which 7+ is the most intense peak. However, when excess pesticides were added with cytochrome C, the charge state distribution is significantly shifted. When Propanil was added to the protein solution, charged states distribution changed from 6+ to 14+, where the most intense peak was noticed for 10+. This indicates that Cytochrome C is unfolded compared to its native state. However, when Glyphosate was added to the protein solution, 6+ to 9+ charge states were observed, which indicates that protein is still remained in the folded state. In the case of Bromoxynil, charge shifted from 6+ to 15+, where 9+ being the most intense peak. Similar trend was also observed when high concentration of pesticides was used. Therefore, propanil and bromoxynil pesticides significantly impacted the structure and dynamics of cytochrome C, however, such impact was not noticed for glyphosate.*

***Investigating the Impact of the Removal of Andropogon Virginicus on the Soil Bacterial Microbiome of the Longleaf Pine***

Poster #24 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Van Par, Dylan Bennett, Isabella Vahle, Olivia Walker, and Rylee Shaw
Research Mentor(s): Paula C. Jackson

*The Longleaf Pine (Pinus palustris), native to the Southeastern United States, is part of an endangered, pyrophytic ecosystem. The longleaf pine plays a significant role in the environment and is an important economic resource. It is currently considered the third most endangered ecosystem in the United States. Little is known about the microbial community within this ecosystem. The aim of this study is to investigate the effect of the removal of two dominant herbaceous species (Pityopsis nervosa and Andropogon sp.) on the bacterial soil microbiome of an area under restoration for the longleaf pine in the Piedmont region of Georgia. We focused on the effect of removing Andropogon sp., the second-most dominant grass species in the longleaf pine ecosystem. This species is notable for its ability to contribute to forest fires, which are necessary to the regeneration of the longleaf pine. Two longleaf pine restoration sites were chosen for this study. At each, six blocks were randomly set up containing four randomized subplots with one of the following treatments: control, removal of Andropogon sp., removal of Pityopsis nervosa, and soil*

*disturbance. Soil samples were taken from each subplot in each block and DNA was extracted from soil using a commercially available kit. Further genetic analysis was performed to identify the bacteria that inhabit the soil microbiome in each treatment. Preliminary results include the presence of Proteobacteria and Planctomycetes. Planctomycetes are a phylum of terrestrial bacteria that inhabit soil microbial communities and are most notable for their ability to go through anammox in the nitrogen cycle. Proteobacteria are well known for their role in carbon, nitrogen, and sulfur cycling in soil. These results indicate key microbial groups and their functions to better understand the relationship between microbes and the herbaceous species the longleaf pine relies on.*

***The ManhattAnt: Identification and Dietary Ecology of a Recently Introduced Urban Ant in New York City, Lasius emarginatus***

Oral Presentation (ALC 4103)
Tuesday April 18, 2023
4:40pm – 4:55pm
Graduate Student(s): Samantha M. Kennett, Todd W. Pierson, and Bernhard Seifert
Research Mentor(s): Clint Penick

*New York City has been the site of introduction for some of North America's most damaging invasive pests, from the chestnut blight to the Asian long-horned beetle. Despite these cautionary examples, there has been no formal research on a newly introduced ant species that was tentatively identified as a European ant species, Lasius cf. emarginatus. Since its discovery in 2011, L. cf. emarginatus has become among the most common urban ant species in New York City. This ant's discovery made national headlines and produced the memorable nickname the "ManhattAnt." Despite the ManhattAnt's prevalence and media attention, it has not been formally identified and there has been little research on its success in New York City. In contrast to other urban exploiting ant species, the ManhattAnt does not appear to be feeding on human food waste. Instead, we hypothesized that the ManhattAnt may be exploiting a novel urban niche space by feeding on hemipteran-produced honeydew in the canopies of urban street trees. First, to confirm the identity of the ManhattAnt, we used a combination of numeric morphology-based alpha taxonomy (NUMOBAT) and DNA sequencing to identify specimens collected in New York City. Next, to determine whether the ManhattAnt is foraging in the canopies of street trees, we compared the weights of ascending and descending workers foraging on street trees. Our morphologic and genetic data find strong support that the ManhattAnt in New York City is European ant species Lasius emarginatus. Likewise, our data comparing the weights of foraging workers supports our hypothesis that L. emarginatus workers are foraging in the canopies of street trees in New York City.*

***Measuring and Optimizing the Effectiveness of Radiocesium Remediation from Fukushima Soil***

Poster #5 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Brandi Lofton and Simran Patel
Research Mentor(s): Daniel Ferreira

*The meltdown of the Fukushima Daiichi Nuclear Power Plant in 2011 contaminated soil in a large area surrounding the plant with radiocesium (134Cs & 137Cs). Radiocesium adsorbed very strongly on the vermiculite minerals common to the soil in this region and has proven difficult to remove from the soil. Over the last five years, Dr. Ferreira has developed a remediation method that can successfully remove the radiocesium from Fukushima soil through the combination of ion-exchange and selective precipitation reactions. Previous attempts to quantify the effectiveness of this method were complicated by the fact that the digestion of soil samples for analysis using the Hot Block method yielded questionable data, likely due to incomplete digestion of the soil. A new method for the digestion of Fukushima soils has been developed using an Anton Paar Multiwave Go, which appears to digest the samples more completely. The analysis of cesium concentrations in samples digested using the microwave digestion method using Inductively Coupled Plasma Optical Emission Spectroscopy has resulted in much more precise data sets than previously collected. This higher quality data has allowed us to improve the mass balance of our resulting data (the amount of Cs after the remediation is much closer to the amount of Cs in the soil before it was remediated) and has also allowed us to more accurately compare the relative effectiveness of the four selective precipitation agents being considered for use in the remediation method.*

***Temporal Patterns in Tooth Morphology in Secondarily Aquatic Tetrapods***
Poster #20 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Evan Johnson, Elise Arias, and T'keyia Danials
Research Mentor(s): Nicholas Green

*We investigated how dental morphology has changed over time in secondarily aquatic tetrapods: vertebrate clades with terrestrial ancestors who evolved into fully aquatic or marine forms. Such clades include crocodilians, ichthyosaurs, mosasaurs, and cetaceans. Secondarily aquatic tetrapods are characterized by a myriad of morphological changes such as limb reduction, body streamlining, and sensory organ alteration. The teeth and skulls of extant and fossil cetaceans and crocodilians were examined using museum specimens and image repositories. We used ImageJ to measure the dimensions of the skulls and teeth. The results suggest that dental morphology was influenced by the body size and feeding method (observed or inferred) of each species. Crocodilian tooth shape was more affected by body size than by temporal patterns. Cetacean dental morphology diverged over time into two lineages, each characterized by the retention of teeth or replacement of teeth by*

*baleen. Within the extant toothed whales, dental morphology exhibits variation in size but convergence of shape. The results of this investigation will shed light on patterns of convergent evolution in the secondarily aquatic vertebrates.*

***What's in a Fish? A Survey of the Parasitic Fauna of Four Cottus Species in Georgia***
Poster #32 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Arabella Reddish and Ester Shimon
Research Mentor(s): Whitney Preisser

*Cottus is a genus of nocturnal, predominantly freshwater fish that reside on the bottom of gravelly lakes and streams. There is a lack of knowledge pertaining to the parasitic taxa infecting the Cottus fish. Four species of Cottus were collected from freshwater streams in Georgia between 1999 and 2016, preserved in formalin and ethanol, and stored in KSU's fish collection. We necropsied approximately 50 fish to collect their parasites; the gills and organs were removed from the fish to scrutinize under a stereo microscope. We collected parasites for further investigation. In the Cottus specimens, we found nematodes, cestodes, acanthocephalans, and monogeneans. Our study is important because knowledge of the types of parasites that are infecting freshwater sculpins is extremely limited.*

***What's in a Fish? A Survey of the Parasitic Fauna of Some Etheostoma Species in Georgia***
Poster #33 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Anna Whitley and Emma Garcia
Research Mentor(s): Whitney Preisser

*Parasites are organisms that live either on or within a host and obtain their food at the cost of the host organism. Even though approximately forty percent of all known species are parasitic, parasites are extremely understudied. In particular, Etheostoma, a genus of small freshwater darter fish, have relatively few parasites recorded, and none in Georgia. This project aimed to examine multiple North American species of Etheostoma and report their parasites. A vast majority of the fish dissected contained nematodes, with some individuals also carrying trematodes, acanthocephalans, metacercaria (larval form of digenean trematodes), and monogeneans. Our results showed that Etheostoma species are a common host for nematodes, a phylum of roundworms commonly located in or encysted within the lining of the stomach and intestine. After surveying multiple scholarly article databases, we anticipate that our research would be the first known study of parasites for our species of Etheostoma fish in Georgia. This*

*knowledge would be particularly important for Etheostoma scotti, which is currently listed as a threatened species in Georgia. Parasitology is important for a multitude of reasons regarding conservation. Parasites affect host fitness, host population sizes, and biodiversity, and knowing what parasite species infect target hosts can help aid in the recovery of endangered species.*

***What's in a Fish? A Survey of Parasitic Fauna of Some Ictuluridae and Catostomidae Species in Georgia***
Poster #31 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Sarah Tumey and Kaleigh Jones
Research Mentor(s): Whitney Preisser

*Understanding the ecology of native fauna is important to monitor and improve ecosystem health. Parasites in native Georgian fish play a crucial role in the hosts' growth, reproduction, and behavior; changes in parasite-host equilibrium can cause increased disease and mortality in these fish species. The parasites most prevalent in many catfish and suckers (Ictaluridae and Catostomidae, respectively) are not well known, and without taking this information into consideration, scientists are not able to factor in these relationships when studying other aspects of the ecosystem. The purpose of this research is to collect and compare the different parasites found within Ictaluridae and Catostomidae specimens. We furthered this research by comparing these findings to previously collected data in neighboring regions in North America. Utilizing the collected specimens of several different Ictaluridae and Catostomidae species in the KSU collection, we conducted dissections of each specimen to collect as well as record the variety and number of parasites within each fish. We found different species of nematodes, monogeneans, copepods, cestodes, trematodes, and acanthocephalans in the specimens. Collecting and identifying these parasites is crucial in understanding the life cycle of the parasites and their interactions with the host specimen, this can support our understanding of the ecosystem dynamics and health of the environment.*

***White Blood Cell Make Up in Kellback Snake Offspring of Varying Maternal Size***
Poster #17 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Angelica P. McCoy
Research Mentor(s): Kevin Gittner

*The immune system is composed of various organs, systems, and other components with one of the most important being white blood cells. White blood cells are commonly separated into two scientific varieties, granulocytes and agranulocytes, which can be differentiated by the presence or*

*absence of granules in the cytoplasm once stained on a slide. There are three granulocytes and two agranulocytes, each with a distinct function and shape. The ratio of these may impact the effectiveness of this portion of the immune system, and multiple factors could play a role in this ratio, an example being the size of an individual. So, how does the size of a mother keelback snake affect the white blood cell count in their hatchlings? Previous studies in several different animals have investigated this question finding there may be a change in the makeup of white blood cells due to the increased surface area of larger individuals, the unique environments, the variation in diets, and numerous other variables unrelated to mass. The secondary data utilized in this study was originally collected by researchers at University of Sydney in 2016. They collected blood samples from 246 offspring of 49 mother keelback snakes. The dataset was condensed and modified for this report to include nine variables: the offspring's maternal ID, ID, sex, length, mass, percentage of granulocytes, percentage of agranulocytes, and the maternal mass ranking from largest to smallest. The current report observes the shift in the ratio of granulocytes to agranulocytes in relation to the maternal mass rank. This information could improve the studying and understanding of reptilian diseases and immune threats. Results from this study may be used to study the immune system of reptiles and many other animals along with advancing future conservation efforts.*

## Mathematics

***Confocal Imaging of Cell-to-Cell Interactions Between Myxococcus xanthus and Pseudomonas aeruginosa PAO1***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
1:20pm – 1:35pm
Undergraduate Student(s): Sarah Joie Beauvais
Graduate Student(s): Sarah Wilson
Research Mentor(s): Ramya Rajagopalan

*Micropredators are a significant selective force driving the evolution of bacteria including human pathogens. Studies in our lab and beyond have shown that M. xanthus can influence the chemotactic behavior of Pseudomonas sp and other gram negatives such as Escherichia coli. We have tested the predatory ability of a laboratory reference strain of M. xanthus DK1622 against P. aeruginosa strain PAO1. We have found that live cells persist despite predation. The present study employs modified high-content time-lapse confocal microscopy of motile biofilm surfaces to provide a clearer picture of the activity of individual cells within a swarm. An eYFP-tagged M. xanthus strain DK1622 and P. aeruginosa were grown in liquid nutrient media at their respective optimal conditions, then washed in buffer, and concentrated to a final concentration of 2x107 cells per mL for Mixed Cell Predation Assays or final concentration of 2x109 cells per mL for M. xanthus*

*2x1010 cells per mL for P. aeruginosa for Side-by-Side Spot Predation Assays. Mixed Cell Predation Assays consisted of 2 μL volumes of predator and prey mixed by pipetting and spotted on a partial starvation media agar pad and allowed to dry. Spots were then observed for 2hr by confocal imaging. Side-by-Side Spot Predation Assays consisted of two 2 μL spots of predator and prey placed 1 mm apart on a partial starvation media agar pad and allowed to dry. Using the Zeiss LSM 900 Axio Observer Confocal Microscope, multiple time-lapse videos and images were taken simultaneously in a 12-well plate at various times of predation for a 48-hour period. The spots were observed for several days and Z-stacks were taken at the junction where the myxobacterial front met the Pseudomonas spot.*

***Counting Arithmetic Progressions Among Perfect Squares***
Poster #33 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Travis Dunn
Research Mentor(s): Tsz Chan

*In this project, we shall characterize all the three term arithmetic progressions, (examples would be, a, a+d, a+2d, or 2, 5, 8) inside the set of perfect squares 1, 4, 9, 16, 25, … (a quadratic object). A three term arithmetic progression of perfect squares is n-a, n, n+b (formula) or 1, 25, 49 (example). We have also devised a method to count how many three term arithmetic progressions exist between two given numbers (i.e. 1-1,000,000). This has already been calculated and proven within mathematics, but for this project, we are using elementary number theory, which is much easier to grasp for non mathematicians. Pieces of elementary number theory used to reach our conclusion includes the "Inclusion-Exclusion" principle. At one point in our research, the formula includes too many numbers that are not the answer we are looking for. So we subtract from the formula to filter out correct answers, but by subtracting, we subtracted too much (-2 and -3 excludes -6), so we must add back what was accidentally subtracted twice.*

***Digital Picture to Minecraft Mural***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
4:00pm-4:15pm
Undergraduate Student(s): Branden Chen
Research Mentor(s): Min Wang

*Minecraft is a popular sandbox video game that allows players to create and build in a virtual world made up of blocks. With its open-ended gameplay and vast creative potential, Minecraft has*

*become a platform for various types of digital art and architecture. Can we make use of machine learning to make a real-world environment in Minecraft? In this presentation, we develop an algorithm that automatically builds a picture in Minecraft. The algorithm uses machine learning to convert the picture into a data sheet. Then a Minecraft automation library is used to convert the datasheet into a picture in Minecraft. Our presentation will go into further detail on the specifics of how this algorithm works, and the challenges we faced when building the algorithm.*

***From Benford's Law to Scientific Explanation***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
2:20pm – 2:35pm
Undergraduate Student(s): Eli Shlomo
Research Mentor(s): Irina Pashchenko

*This project investigates the first digit probabilities of real-world functions. Environmental data functions were sourced and transformed to contain statistically fair ranges. Then, the first digit probabilities of the functions were compared to the expected probabilities. Four different types of functions were compared, and each function had unique results. The analysis showed that Benford's Law can be used to verify the validity of data. Additionally, Benford's Law may be applied to identify the type of function that data is.*

***The Influence of Environmental Feedback on Ecological Competition.***
Poster #10 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Isabel Ouko
Research Mentor(s): Glenn Young

*Species occupying the same ecological niche must compete for resources and space. The competitive exclusion principle states that two species filling the same niche cannot coexist indefinitely; that is, one will always outcompete the other. Mathematical modeling offers an efficient method of studying the primary factors that determine which species survives this kind of competitive interaction. In this project, we examine the role of environmental feedback on ecological competition by analyzing a classic Lotka-Volterra ordinary differential equation (ODE) model that we extend to incorporate a simple model of the environment. We use a combination of analytical and numerical methods to study how the interaction between competing species with their environment stabilizes or destabilizes coexistence of the species. Our results offer insight into how real life environmental states influence ecological competitions.*

***Modeling the Effect of Education on E-Cigarette Use Behavior from Youth to Young Adult***
Poster #29 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Sydney Chittarath and Nick Vincent
Research Mentor(s): Pengcheng Xiao

*The purpose of this quantitative study is to determine which of the analyzed variables offered the greatest correlation between adolescents and the use of e-cigarettes and marijuana. The variables analyzed were obtained from the 2017 National Youth Risk Behavior Surveillance Survey (YRBSS) of the Centers for Disease Control and Prevention (CDC). The YRBSS is used to monitor young adolescents and examine the prevalence of health risk behaviors. Data was collected through a quantitative method which used a cross sectional study from the results of the YRBSS. Over 14,000 highschool students from across the United States in public and private schools were sampled. For this study, participants were asked a series of questions that may pertain to the health risk behavior of individuals. To analyze the data, logistic regression and principal component analysis coded through PYTHON were used to examine the significance amongst the YRBSS variables. For e-cigarettes and vaping, logistic regression results showed statistical significance for 6 variables: weapon carrying, gun carrying, physical fighting, marijuana use, and synthetic marijuana use. For marijuana use, logistic regression results showed statistical significance for 6 variables: age, weapon carrying, gun carrying, physical fighting, attempted suicide, and vaping use. There are clear correlations between substance usage and unsafe behavior. We want to identify the harmful effects of e-cigarettes and marijuana so that adolescents can be more informed on the effects the substances have on their physical and mental health.*

## Molecular and Cellular Biology

***Analysis of Molecules secreted during Myxococcal Predation on Pseudomonas aeruginosa***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
11:40am – 11:55am
Undergraduate Student(s): Rachel Buchli
Research Mentor(s): Ramya Rajagopalan and Mohammad A. Halim

*The search for alternative therapeutics is on the rise due to the threat of multi-drug resistant bacteria. One avenue of exploration to combat this issue is observing the hunting strategy of bacterial micropredators. One such micropredator is Myxococcus xanthus. This bacterium is a soil*

*predator with a wide prey range. Using Myxococcus xanthus as a predator, we observed a novel predation evasion behavior in Pseudomonas aeruginosa strain PAO1. P. aeruginosa is an opportunistic pathogen responsible for 10% of all hospital acquired infections. P. aeruginosa is also classified as an ESKAPE pathogen. These pathogens are the leading cause of nosocomial infections throughout the world, and most of them are multi drug resistant. This strain of Pseudomonas aeruginosa was originally isolated from a burn wound and exhibits resistance to multiple antibiotics. In an effort to gain a deeper understanding of this predation evasion behavior, we are using Liquid Chromatography Mass Spectrometry (LCMS) in order to see what products are excreted when P. aeruginosa is in predation by M. xanthus. Spots of Myxococcus and Pseudomona are spotted 1 mm apart on a bilayer agar with a porous cellophane layer between the two agar layers to prevent bacterial migration. After incubating, the cellophane layer is removed, and the agar underneath is cut out and mixed with 60:40 ratio of methanol and water in order to extract diffused compounds. The samples are then analyzed using LCMS. We expect that different compounds will be excreted by P. aeruginosa and M. xanthus when they are in contact with one another through a predation assay compared to when they are growing separately as controls. With further analysis to identify differentially secreted products, we hope to discover the mechanism behind the predation evasion behavior of PAO1.*

***Biocontrol Potential of Bacteriophage against Foodborne Pathogen Shigella***
Poster #10 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Chloe Tilton, Saony Galvan, and Olivia Bowers
Research Mentor(s): Jean Lu

*Shigella are a group of the bacteria that can cause the foodborne illness known as shigellosis, also known as bacillary dysentery. Most people with shigellosis have diarrhea (sometimes bloody), fever, and stomach cramps. It was estimated that each year Shigella cause 165 million cases and 1.1 million deaths globally. Due to limitations of currently used control methods and the appearance of multidrug-resistant strains of Shigella, alternative and effective control methods are needed to be developed. Bacteriophages (phages) have emerged as safe and promising biocontrol agents against bacterial pathogens. Phages are viruses that infect only bacteria. They do not replicate in foods unless their bacterial hosts are present. In addition, phages do not alter food color, odor, taste, and nutritional value. A novel Shigella phage (FShig-L) has been isolated. The host range study using spot test method showed that the phage is genus-specific. It is able to infect S. flexneri 2a, S. dysenteriae, and 2 strains of S. sonnei as well as S. flexneri 2b (the original host). The effectiveness of the phage infection against Shigella flexneri 2b was evaluated at 37°C in beef broth as a model food system (representing meats) at different multiplicity of infections (MOIs). The results showed that the phage infection at MOI 100, 10, and 1 resulted in more than 6-log (99.9999%) reduction in cell concentration within 2 to 3 hr, compared to the control. Regardless*

*of the initial MOI, the phage infection effectively killed off the host cells within 3 hr, indicating that the phage has high potential to be used as a biocontrol agent against Shigella in foods.*

***Distribution of Micropredators in the Longleaf Pine Soil Microbiome***
Poster #28 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Faith Arends and Eithar Mirghani
Graduate Student(s): Zaid Abuimweis
Research Mentor(s): Ramya Rajagopalan

*Bacterial micropredators of the soil, like their larger-scale counterparts, play a key role in shaping their ecosystem and are thus of particular interest from an ecological standpoint. An important micropredator to study are Myxobacteria. Myxobacteria are gram-negative rod-shaped social bacteria that hunt in wolf packs to lyse their prey and facilitate their growth. Myxobacteria are a potential source of novel antibiotics, therefore, the isolation of new strains is of great interest. We investigated longleaf pine soil as a source of novel isolates. The Longleaf Pine Ecosystem is an endangered ecosystem that is of crucial importance due to its ability to withstand the negative impacts of climate change. Conservation efforts are underway to protect the longleaf pine ecosystem and prevent its decline. The soil microbiome's health is critical in providing ecosystem services that sustain the environment.Whole microbiome sequencing of 48 soil samples obtained from the longleaf pine conversation region in Pauling County, Georgia, revealed the presence of myxobacteria in all samples. Using bacteria such as E.coli and multidrug-resistant P.aeruginosa as bait, we have isolated two novel myxobacteria from the soil, thus supporting the bioinformatics data. Apart from myxobacteria, 30 other groups of bacterial micropredators were also detected. We analyzed the distribution of Myxobacteria and Bdellovibrio, another micropredator, in the soil samples using "R" programming language. We found an inverse correlation in distribution between two groups at the genus level. This is interesting because Myxobacteria are external predators while Bdellovibrio are internal predators. This analysis could be expanded throughout the taxonomy from species to phyla. The use of "R" programming analysis could also shed light on the behavior of the unidentified myxobacteria through relationship analysis. Extensive research through "R" programming analysis and lab work isolation, could shed light on sustainability tactics and environmental factors that could prevent the Longleaf Pine Ecosystem's extinction.*

***Effect of Proteasome Inhibitors on the African Trypanosome***
Poster #2 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Portia Smith
Research Mentor(s): Amrita Sharma and Kojo Mensa-Wilmot

*Human African trypanosomiasis (HAT), also known as "sleeping sickness", is a parasitic disease caused by the protozoan Trypanosoma brucei. The disease can present a variety of symptoms including fever, headaches, muscle aches, and joint pain. As HAT progresses, it can cause neurological symptoms such as confusion, sleep disturbances, and seizures. If left untreated, HAT can be fatal. Current chemotherapy has serious side-effects and calls for new drugs to be discovered to help manage the disease. In the current study, we aim to repurpose proteasome inhibitors (bortezomib, ixazomib and MG-132) against T. brucei. The overall purpose of this study is to (i) determine the 50% proliferation inhibition concentration of each compound in a GI50 assay, (ii) determine the 50% delayed trypanosomal concentration of compounds in a cidal assay, and (iii) analyze the data to identify the most effective drug against T. brucei. The most active compound will be studied for its molecular effects in T. brucei, focusing on protein degradation pathways. This study will open avenues for "repurposing" an existing drug for possible HAT treatment, thereby abridging the drug discovery pipeline, but can also provide tool compounds for studying important physiological pathways in T. Brucei.*

***Endogenous levels of MKNK2 Isoforms in Normal and Cancer Cell Lines***
Poster #18 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Anthony Stefanie & Michele Diaz
Research Mentor(s): Rajnish Singh

*This is part of a Course Based Undergraduate Experience (CURE) for CHEM 3512L. MAP kinase-interacting serine/threonine-protein kinase 2 (MKNK2) has a tumor suppressant long isoform (A) and a pro-oncogenic short isoform (B) which have been established to both be naturally expressed in cells. MKNK2A functions by phosphorylating enzyme p38α, which causes apoptosis and therefore suppresses tumor expression. MKNK2B is not known to phosphorylate p38α and therefore does not lead to apoptosis of tumorous cells and is therefore seen as pro-oncogenic. Pilot studies have been done previously with the MKNK2A and MKNK2B isoforms where both were purified and subjected to a western blot using isoform-specific antibodies. This helped determine whether the antibodies were specific to their respective isoforms. It was found that each isoform-specific antibody was successful in being selective to their respective isoform. The purpose of this project is to establish the natural endogenous level of MKNK2A and MKNK2B in kidney and liver cell lines. The cell lines being tested are HEPG2, derived from liver cells, and BHK, derived from kidney cells, to be analyzed by western blot. Using isoform specific antibodies, the MKNK2A isoform should be visualized as a high intensity band in both cell lines when compared to the MKNK2B isoform due to being upregulated in normal cells. These results of western blotting will give a general idea of if non-overexpressed levels of MKNK2 are able to be significantly measurable in their natural cellular conditions.*

***Evaluation of Wild-Isolated and Commercial Strains of Lion's Mane Mushrooms for Spawn Production***
Poster #10 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Mark Sheehan and Zoe Putnam
Research Mentor(s): Christopher Cornelison and Kyle Gabriel

*Hericium erinaceus, commonly known as "Lion's Mane" mushrooms, are a type of wood-decaying fungus, noted for their choice-edible status along with unique medicinal benefits. Lion's Mane mushrooms have acquired growing interest from consumers in recent years due to their unique flavor and visual appeal, in addition to their potential neurological benefits. Despite the profit potential, local specialty mushroom farmers often fail to meet the demand for this mushroom due to difficulty in the production of consistent spawn. Strains of Hericium erinaceus are often slower growing and lower yielding than other commonly cultivated specialty mushrooms, and often will produce mushrooms on growth media prematurely, resulting in loss of product. Due to these challenges, cultivation trials were conducted using thirteen isolates of Hericium mushrooms, primarily Hericium erinaceus as well as another related edible species, Hericium americanum, to characterize their cultivation process for commercial spawn generation. Isolates were collected from mushrooms growing locally, as well as strains used in commercial operations, and are compared on growth rate and biological efficiency of mushroom production, as well as qualitative data on the strains pertinent to commercial cultivation, such as whether they form fruiting bodies prematurely. A variety of substrates were compared, including materials often used in commercial operations, as well as agricultural byproduct-based substrate blends, which allow mushrooms to be produced as value-added products from otherwise wasted materials. These experiments assess the efficacy of each strain's usage in a standard commercial setup, and data has shown that isolates collected by our lab have significantly outperformed commercial strains that currently are in usage. As this study is ongoing, future plans include determining ideal growing conditions for the highest-performance strains, as well as potentially conducting cross-breeding between high-performing strains to obtain desirable qualities for commercial production.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***
Poster #6 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Kone Fatoumata, Anya Kurup, Alex Lopez, and Holly Mason
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***

Poster #7 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Tatiana Maya, Andrew Milholland, Rosemond Ofori, and Gaby Pompa
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline*

*genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***

Poster #8 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Samari Simmons, Lauren Stiles, Anna Strobel, and Jeff Wang
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***
Poster #4 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Jennifer Aguilar-Maldonado, Sahil Bardai, Chelsea Beebe, & Natalie Buck
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***
Poster #5 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Destiny Crump, Laura Eblen, Apasha Frazier, and Estefany Garduno
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Examination of How Inappropriate Inheritance of Histone Methylation Affects Muscle Function***

Poster #6 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Halle Gary, Sundas Hassan, Soraya Hill, and Angel Jaimes
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of*

*MES-4 germline genes in somatic tissues and a range of severe developmental phenotypes. One of these severe developmental phenotypes is defects in body wall muscle morphology. As part of a curriculum-based undergraduate research experience (CURE) implemented in Developmental Biology (BIOL_4390K), students performed muscle motility assays to examine how low, moderate, and high levels of inappropriately inherited H3K4me2 affect muscle function. Data from this CURE will be integrated into ongoing research in the Carpenter Lab aimed at understanding how inappropriate inheritance of chromatin states affect normal development. Our findings will provide insights into how aberrant soma-to-germline transition leads to complex developmental phenotypes that overlap with human patients harboring mutations in these same enzymes.*

***Exploring New Reservoirs for Novel Bacteriophages with Therapeutic Potential Against ESKAPE Pathogens***
Poster #24 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Ross Wood
Research Mentor(s): Melanie Griffin

*A virus is an obligate, infectious nonliving particle of nucleic acid that replicates intracellularly via host DNA replication machinery, often to the detriment of the host. A bacteriophage is a type of virus that infects bacterial hosts, each having separate molecular tropism for a specific host. With rising antibiotic resistance in many medically-important bacterial pathogens, alternative methods for therapy will be essential for future treatment against these pathogens. One such therapy that holds promise is the use of bacteriophage. We seek to develop a high-throughput method of extracting bacteriophage from a given reservoir, including the environment or insects. Samples will be collected from tree holes around campus and subjected to filtration to remove "culturable" agents, which will serve as a viral source to infect specific bacterial hosts. In this study, we well use bacteria collectively known as ESKAPE pathogens (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, *and* Enterobacter *species) as they represent the leading global cause of hospital-acquired infections, and as many have developed antibiotic-resistance. The filtrate and host will be mixed in a molten top agar then poured onto a media plate to generate a bacterial lawn. If there are viruses with the specific tropism for the pathogen, after incubation the bacterial lawn will possess visible empty regions with dead cells known as plaques. Preliminary experiments demonstrate that* E. coli *and* P. aeruginosa *strain K have viruses that target and destroy the pathogens, as indicated by viral plaques. Isolation of these viruses via novel viral streak plating technique and molecular confirmation is currently underway. The search for more phage of other pathogens as well as the screening of the virome taken directly from mosquitoes collected from the environment is planned for later this spring and could reveal an untapped source of bacteriophage for potential phage therapy.*

***ESKAPing Antimicrobial Resistance***
Poster #18 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Tatiana Sidorova
Research Mentor(s): Melanie Griffin

*Antimicrobial resistance of numerous infectious agents, particularly of bacterial pathogens collectively referred to as ESKAPE (Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter species) and pathogenic yeast (Candida), is rapidly increasing. This poses a significant threat to human health as reports estimate that over 2 million Americans are annually infected with antimicrobial-resistant pathogens, and nearly 30,000 of these infections turn lethal. Therefore, there is an urgent need to develop new antimicrobial measures against these pathogens. Our lab, in collaboration with other KSU researchers (Halim: novel peptides and Haddow: novel bacteriophages), is seeking new ways for microbial control. This project specifically aims to establish the antimicrobial susceptibility and resistance profiles of the clinical and standard lab isolates of ESKAPE and Candida strains currently available at Kennesaw State University for use in microbial control studies. Using commercial multi-well antimicrobial plates, we will test 10-12 strains for susceptibility or resistance to up to 94 different antibiotics or antimicrobics. The clinical plate types to be used are specific to Gram-negative species, Gram-positive species, or yeast. A standardized microbial culture will be inoculated into the wells of the appropriate plate and incubated. Each plate will be visually inspected and scored for growth (qualitative analysis). Then, a SpectraMax multi-mode plate reader will be used to determine the optical density (OD) (quantitative analysis). For each strain, the qualitative and quantitative data will be correlated to determine the minimal threshold for the OD reading to be considered growth and therefore resistance. In this manner, the antibiotic resistance and susceptibility profile will be constructed for each of the strains. These profiles will serve as the basis for future research into the development and assessment of alternative antimicrobial measures, such as bacteriophages and antimicrobial peptides currently underway at KSU.*

***Generation of Clathrin(CLH) RNAi in T. brucei***
Poster #19 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Kyron Wicker
Research Mentor(s): Kojo Mensa-wilmot

*Trypanosoma brucei is a unicellular eukaryote parasite found in sub-Saharan Africa. T. brucei causes human African trypanosomiasis (HAT) (sleeping sickness), a disease that is deadly untreated individuals. Fexinidazole is one of the drugs used to treat HAT. Endocytosis is the engulfing of particles or fluids into cells via vesicles. Clathrin is an essential protein in the endocytosis pathway of trypanosomes. Clathrin is a scaffold protein comprised of three heavy and three light chains that coats intracellular vesicles during endocytosis. Other proteins such as AP2, dynamin, and actin are important for endocytosis. Trypanosome endocytosis differs from human endocytosis pathways. The process in T. brucei takes place at a specicalized region termed the flagellar pocket. Trypanosomes lacks adaptor protein 2 (AP2) compared to other eukaryotes. Also, dynamin is nonessential in T. brucei. This study contributes to the molecular and cellular biology of the endocytosis process in T. brucei. The purpose for this study is to gain further knowledge about the mechanism of Clathrin mediated endocytosis process in T. brucei. We proceeded with this study by constructing an RNAi (Ribonucleic Acid interference) construct, we first performed cloning of the CLH RNAi construct. Next, we transfect CLH-RNAi construct into SM-mSCARLET cells. Following, we performed selection and screening for positive CLH-RNAi transfectants. Lastly, we performed western blot analysis. After induction with tetracycline (24hr), there was a depletion in cell growth rate and observation of "Big Eye" phenotype in the flagellar pocket caused by the depletion of CLH protein. In conclusion, we observed that CLH is an essential protein in the T. Brucei endocytosis process. RNAi cell line was confirmed after CLH protein depletion was observed through western blot analysis (induction with tetracycline 24hr).*

***The Homeobox Gene ceh-27 is Required for C. elegans Embryonic Development***
Poster #23 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Enrique Rodriguez
Research Mentor(s): Martin Hudson

*Defects in nervous system development have been linked to multiple neurological conditions including autism spectrum disorder. Neurogenins are one of the earliest acting classes of pro-neural transcription factors. Mutations in human neurogenin1 have been associated with autism, strongly implying this gene is in the etiology of this complex polygenic disorder. Defects in neurogenin transcription/translation have the potential to contribute to autism phenotypes, creating an urgency for further study. Neurogenin is deeply conserved across phyla, allowing us to study its function using genetically amenable species such as the nematode Caenorhabditis elegans. Previous studies showed that C. elegans ngn-1/neurogenin is required for multiple aspects of nervous system development and function. However, the transcription factors that control ngn-1 expression have not been characterized.We used publicly available single-cell RNA sequencing data to identify transcription factors that may control cell fate in ngn-1 expressing neuroblasts. We found that the homeobox gene ceh-27 was expressed prior to the onset of ngn-1 expression,*

*making it a candidate ngn-1 "controller". ceh-27 encodes a homeodomain protein of the NK-2 class and is similar to Drosophila scarecrow and human NKX-2. We found that a deletion mutation in the ceh-27 gene led to 100% lethality, indicating that it is absolutely required for normal embryonic development. 4D time-lapse video microscopy of embryonic development revealed extensive defects during embryonic cell migration. Future work will investigate whether ceh-27 functions in a linear developmental pathway with ngn-1 can control nervous system development and function.*

***Identifying Candida Species Using Machine Learning***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
12:20pm – 12:35pm
Undergraduate Student(s): Christopher Boon, Katie Moerschel, Chelbie Mitchell, Aura Valter-Franco, Jan Strydom, and Jessica Fussell
Research Mentor(s): Christopher Cornelison

*The genus Candida is a vast collection of more than 200 species of yeast. Some of these are commensals that live harmoniously with the human body, while others are pathogenic and can cause various diseases. Discovered in 2009, C. auris is a pathogenic species of Candida that can rapidly spread in clinical settings and cause severe disease. C. auris is associated with increased morbidity compared to other Candida species and has a mortality rate of 30-60% in hospitalized patients when paired with other illnesses. Typically, Candida spp. are difficult to differentiate, and many diagnostic methods are prone to misidentification. Current identification methods involve germ tube, enzymic, and commercial automated tests or emerging molecular typing techniques. These methods are either time-consuming, require advanced lab equipment, or have a high misidentification rate for C. auris. This project focuses on developing a time and cost-effective diagnostic platform using accessible laboratory equipment. Our approach involves taking microscope images of cell cultures of Candida spp. and applying machine-learning algorithms to find morphological differences in species. We discuss two deep learning models that output a classification label given an image. The first, Artificial Neural Network (ANN) takes in continuous cell metrics processed from images, including cell area and cell circularity. The second, Convolution Neural Network (CNN) takes in image data and applies various filters to identify features of an image. Our previous work on binary-classification showed a precision of 80% between C. auris and C. haemulonii. With our ANN model on five species, we achieved 70% precision with several species. We will discuss these two deep learning models applied to five species of Candida, in seek of greater than 95% precision of all classes. This methodology allows for the adaptive identification of many Candida species and has the potential to be expanded to other micro-identification domains.*

***Identification of Novel Genetic Variants in Bonobo Genes Associated with Communication***
Poster #22 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Alek Hansen
Research Mentor(s): Martin Hudson

*Arginine Vasopressin Receptor 1A (AVPR1A), Forkhead Box Protein 2 (FOXP2), and Oxytocin Receptor (OXTR) are genes in which variants are frequently implicated in Autism Spectrum Disorder (ASD). These genes are also responsible for the control of many different social behaviors in humans, including pair bonding and language acquisition. Several studies have been conducted on how these genes impact humans, however, there are obvious limitations to human behavioral studies when genetic factors are considered. For this reason, a model organism that can be closely monitored and have its environment controlled is ideal for gathering evidence of genetic causes for behavior. Bonobos are one of humanity's closest genetic relatives, and their similar social behaviors make them ideal models for investigating these genes of interest. ASD-related Single Nucleotide Polymorphism (SNP) sites, previously identified from ASD studies in humans, were mapped onto the bonobo genome and Polymerase Chain Reaction (PCR) primers designed for each of the sites of interest. Buccal swabs were obtained from thirteen bonobos from two different facilities. DNA was purified from the samples and PCRs were run for each of the subject samples at each SNP site. Sanger sequencing was performed on the PCR products and the data was compiled and analyzed. We found that the ASD-related sequences at the SNP sites were conserved for all thirteen bonobos and showed no genetic variation. Additionally, novel SNP sites were found adjacent to some of the target SNP sites. The 100% conservation of ASD-related SNPs in bonobos suggests these regions do not tolerate any evolutionary variation. However, the variation seen in the novel SNP sites suggests some genetic plasticity in these ASD-related genes that may manifest in communicative behavioral differences in bonobo populations.*

***Intracellular Zinc Trafficking in Human Umbilical Vein Endothelial Cells During Noxious Injury***
Poster #6 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Ahsen Choudhary
Graduate Student(s): Abeeha Choudhary
Research Mentor(s): Eric Albrecht

*Maintaining and regulating intracellular zinc is a fundamental process critical to cell function. Hemorrhagic snake venom and other noxious injuries cause the reduction of tissue integrity,*

*production of reactive oxygen species. This project will investigate intracellular zinc mobilization during Crotalus atrox (western diamondback) venom stimulation. Disrupted intracellular zinc homeostasis that maintains high intracellular zinc can trigger mitochondrial dysfunction, increase oxidative stress, and cell death. Although more details are emerging, it is unclear if zinc is mobilized during cellular injury and if venom induced cellular injury alters the expression of metal binding proteins such as metallothioneins (MT) and/or metal transcription factor 1 (MTF1). This project will use advanced fluorescent microscopy to improve our understanding of zinc trafficking by examining intracellular cellular zinc movement with the fluorescent zinc probe, Fluozin-3AM. In addition, we utilized SDS-PAGE and Western Blotting techniques to monitor the protein expression of MT and MTF1 in after Crotalus atrox venom stimulation.*

***Investigating Risky Behaviors Associated with Bat Handling on Social Media***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
4:40pm – 4:55pm
Undergraduate Student(s): Ta'Nyia Heard, Abby Allen, Dianna Lopez, and Ashley Belinfante
Research Mentor(s): Andrew Haddow

*Rabies is a fatal, yet preventable viral disease that primarily affects the central nervous system and brain. In 2018, 4,591 cases of animal rabies were reported in the United States. Of these cases, bats accounted for 1,653 confirmed cases, and serves as the primary reservoir for rabies in the United States. Studies have shown that social media use positively correlated with risk taking-taking behaviors, such as substance use and distracted driving. In this study, the occurrence of risk-taking behaviors associated with animal handling (e.g. contact in the absence of personal protective equipment) on social media was investigated. Videos were collected from a major social media platform and risk-taking behaviors were recorded. Preliminary results showed a large number of videos exhibited potentially dangerous bat handling behaviors, especially the lack of personal protective equipment while handling animals. Our results show that social media may normalize behaviors that increase the risk of zoonotic pathogen spillover from wildlife.*

***Investigating Social Media Engagement Patterns Associated with Wildlife Handling***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
11:20am – 11:35am
Undergraduate Student(s): Dianna Lopez, Ta'Nyia Heard, Abby Allen, and Ashley Belinfante
Research Mentor(s): Andrew Haddow

*Zoonotic pathogen spillover events into human populations are an increasing risk world-wide. This is due to increased human interactions with wildlife involving direct contact with an animal. While historically persons have avoided encounters with wildlife associated with disease (e.g., bats), social media may be normalizing human contact with those wildlife species associated with zoonotic human pathogen transmission. In this study, we investigated those engagement patterns associated with videos on social media in the context of the presence of wildlife in a video, as well as those videos with persons handling wildlife with and without appropriate personal protective equipment. We found that those videos showing direct human to wildlife contact had a higher number of "likes" (i.e., positive reinforcement) then those without direct contact (i.e., those showing no human skin to wildlife contact). Our preliminary results indicate the presence of a trend showing that wildlife handling on social media may drive increased "likes" and could subsequently normalize and promote risky human/wildlife interactions.*

***Investigating the Risk Factors for the Reestablishment of Malaria in Georgia***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
12:00pm – 12:15pm
Undergraduate Student(s): Victoria L. Claps
Research Mentor(s): Andrew Haddow

*Malaria, caused by Plasmodium spp., is regarded as one of the most pervasive infectious diseases worldwide and is an ongoing public health concern. Malaria was historically a leading cause of death in the U.S. and was hyperendemic in the Southern U.S. Eradication programs in the twentieth century eliminated malaria in the U.S. However, since that time focal autochthonous transmission, typically associated with airports, has been reported. With the increase of global air travel and trade, airport malaria could become a public health concern in Georgia as it houses the world's busiest airport by passenger traffic, Hartsfield-Jackson Atlanta International Airport. This study identified risk factors for the introduction and establishment of Plasmodium spp. and presents mitigation measures to reduce the risk of malaria reestablishment in Georgia via Hartsfield-Jackson Airport.*

***Investigating the Role of Nutrients in Pseudomonas aeruginosa Responses to Predation from Myxococcus xanthus***
Poster #29 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Jaynie Adams
Graduate Student(s): Sarah Beauvais
Research Mentor(s): Ramya Rajagopalan

Myxococcus xanthus *is a rod-shaped bacterium that moves in swarms and feeds in social groups on their targeted prey bacteria. The bacteria seek out prey cells, surround them, lyse the cells, then consume the resulting nutrients.* Pseudomonas aeruginosa *is one such bacterium that* M. xanthus *hunts, albeit with limited success, as* P. aeruginosa *has unique responses to combat predation.* P. aeruginosa *is a pathogen that has been noted for being multi-drug resistant and can cause severe health complications in those it has infected. We have observed that nutrient status plays a significant role in determining the dynamics of* P. aeruginosa *response to predation by* M. xanthus*. Under partial starvation and starvation conditions, we have observed a unique flight response in* P. aeruginosa*, which helps it to evade predation successfully. In presence of nutrients, however,* P. aeruginosa *overwhelms the original area where the* M. xanthus *was spotted, appearing to go on the offensive against M. xanthus. We are investigating this flight vs flight response at the cell-to-cell level through the utilization of fluorescent confocal microscopy. Using mCherry fluorescent-tagged* P. aeruginosa *and eYFP-tagged M. xanthus to distinguish between the two bacteria, we will observe predation dynamics under partial and total starvation, and nutrient-rich conditions. We expect nutrient status to trigger differential signaling motility responses in the two bacteria, which will be further investigated with gene expression studies. We hope that this will lead to the formulation of novel therapeutic methods to combat the drug-resistant pathogen* Pseudomonas aeruginosa*, without the use of antibiotics.*

***Investigating the Role of Quorum Sensing in the Flight Response of Pseudomonas aeruginosa during Myxococcal Predation***

Oral Presentation (ALC 5103)
Tuesday April 18, 2023
10:40am – 10:55am
Undergraduate Student(s): Klaudya Hernandez and Ashley Ayala
Graduate Student(s): Josh Lummus
Research Mentor(s): Ramya Rajagopalan

*The World Health Organization has released a list of pathogenic bacteria in need of novel therapeutic treatments. Pseudomonas aeruginosa is included in the highest category of the WHO urgency list due to its multidrug resistance and being a leading cause of nosocomial infections. A multi-pronged approach is required to combat Pseudomonas infections, including search for novel antimicrobials and alternative control measures. 50% of antibiotics originate from bacteria, with Myxobacteria being a source of novel antibiotics. Myxobacteria are single-celled predatory soil bacteria that exhibit social behavior. They are known for their cooperative group behavior that allows them to hunt in "wolf" packs. When in a critical state of survival, Myxobacterial cells aggregate into compact clusters containing spores called fruiting bodies, which assists them in surviving starvation conditions. We have observed a unique flight response in Pseudomonas aeruginosa during predation by Myxococcus xanthus complete or partial starvation conditions. However, preliminary data from our lab has shown mutated strains that correlate to certain*

*quorum sensing pathways and motility-related genes in P. aeruginosa lack the flight response. It is important to note that quorum sensing regulates group behavior in Pseudomonas, making this a hard pathogen to combat. We will perform differential gene expression analysis using qRT-PCR in P.aeruginosa during Myxococcal predation and under solitary conditions. We hope to uncover the specific regulatory pathways involved in the mechanism of the flight-response. This information could potentially lead to alternative ways to counter the infectious Pseudomonas aeruginosa.*

***Live Imaging of Heart Function in Akirin and Simj Mutant Embryos***
Poster #30 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Belle Lea & Mia Jones
Graduate Student(s): Armeta Hadjimirzaei
Research Mentor(s): Scott J. Nowak

*Congenital heart defects are the most prevalent form of developmental abnormality in humans, present in approximately 1 in 100 live births. Many of these congenital heart defects are linked to genetic mutations, but the specific genes involved remain unknown. The Nowak Lab has identified a number of genetic loci that are critical for development of the embryonic heart, and is using the model organism, Drosophila melanogaster, the fruit fly, as a means to study the roles of these gene during embryonic development. In the fruit fly, the heart develops as a simple two chambered tube. The genes that pattern this tube are highly conserved from humans to flies, and by studying them in fruit flies, we can gain insights into their roles during human development. The Nowak Lab has identified the nuclear co-factor Akirin as a regulator of cardiac gene expression. Recent work in the Nowak Lab has also determined that Akirin likely works with the Nucleosome Remodeling and Deacetylase (NuRD) complex to regulate cardiac gene expression. Embryos bearing mutations in different NuRD subunits produce hearts that are misshapen, abnormally patterned, and have reduced numbers of cardiomyoblasts in the finished heart. The NuRD complex is a large multi protein complex that consists of over ten different subunits. My project examines whether one of these subunits, a protein called Simjoang (simj) plays a role during cardiac function. I am using live confocal imaging to record and study the heartbeats in akirin, simj double heterozygous mutant embryos. By studying the heart abnormalities in these mutants, I hope to understand the role for simj, and the larger NuRD complex, during heart formation.*

***Novel Collective Prey Evasion Response of Pseudomonas Aeruginosa PAO1 to Soil Micropredator Myxococcus Xanthus DK1622***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
1:40pm – 1:55pm

Graduate Student(s): Joshua Lummus
Research Mentor(s): Ramya Rajagopalan

*The search for alternative therapeutics is on the rise because of the threat of multi-drug resistant bacteria. Looking at the hunting strategy of soil based bacterial micropredators is one avenue of exploration. Myxobacteria are soil predators with a wide prey range including Gram-negative and Gram-positive bacteria, fungi, and archaea. We discovered a distinct and novel predation evasion behavior in Pseudomonas aeruginosa PAO1. P. aeruginosa is an opportunistic and nosocomial pathogen responsible for 10% of all hospital acquired infections. P. aeruginosa is part of the ESKAPE group, which are leading causes of nosocomial infections throughout the world, and they are often multi-drug resistant. When standardized concentrations of Myxococcus xanthus DK1622 and prey were spotted on partial starvation media, most prey displayed a three-log reduction in surviving cell counts following 48 hours of myxobacterial predation. However, under the same conditions PAO1 showed no reduction in surviving cells when compared to non-predation controls. Concurrently, we observed a retreat of prey cells at the junction between advancing M. xanthus front and the PAO1 spot, resembling a "fold." This distinct evasion response was not observed in another P. aeruginosa strain, PA14, nor in other closely related pseudomonads we tested. We also observed a multi-log reduction in prey cell counts of the pseudomonads following myxococcal predation, indicating that the flight response might be linked to successful predation evasion. Various mutants of the quorum sensing (QS) operon in PAO1 displayed aberrant phenotypes of this evasion response in crude predation assays. We will conduct standardized predation assays of the strains to more thoroughly investigate the link between certain QS and motility pathways in successful predation evasion. We will subsequently create knockout mutants in select regulatory pathways based on these results. We hope that this will eventually lead to the discovery of alternative pathways to better control and eradicate Pseudomonas aeruginosa infections.*

***On or Off? Using Protein Chimeras to Study Muscle Diversification***
Poster #3 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Angel Jaimes
Research Mentor(s): Anton Bryantsev

*Diverse, complex tissues fascinatingly arise from a single fertilized egg during development. Mechanistically, proteins known as transcription factors (TFs) orchestrate the developmental program. The DNA-binding domain (DBD) of a TF binds specific DNA sequences, while the transactivation domain (TAD) recruits regulatory molecules to activate, or inactivate, nearby genes. How the limited number of TFs enables the great variety of observed tissues remains unanswered. Our study, therefore, asked how diversity is controlled in muscle tissue. In the*

*embryo, all muscles are alike, but adult muscles differentiate into different types with unique properties and functions. We used the fruit fly, Drosophila, as a model system to study the regulation of the muscle gene Act57B. In fly embryos, Act57B is active in all muscles, but in adult flies, it becomes inactivated in many specialized muscles like flight muscles. MEF2 is a TF that activates Act57B in embryonic muscles. Interestingly, MEF2 is continuously present in all muscles, including flight muscles, where Act57B is inactivated. We hypothesized that during development, MEF2 somehow transforms from a positive regulator that activates Act57B to a negative regulator that represses Act57B. We used molecular cloning to replace the TAD of MEF2 with the TAD from another TF, Gal4. Using genetic reporter assays, we show that the new chimeric protein (Mef2::Gal4) can activate Act57B in cell culture. However, in flies, Mef2::Gal4 could not prevent repression of Act57B in flight muscles. Our results confirm that MEF2 is involved in the diversification of muscle tissue, but the mechanism of this action remains unknown.*

***Painting With Microbes***
Visual Art (Convocation Center)
4:00pm – 4:45pm
Undergraduate Student(s): Sydni Ladd, Zoey Knight, Sarah Chang, Tyler Hawk, Sebastian Vizuete, Juleva Doan, Melissa Plata, and Samari Simmons
Research Mentor(s): Ramya Rajagopalan

*Microbes are everywhere (ubiquitous) in nature: in soil and water, on dust particles floating in the air, on the surfaces of laboratory bench tops, and even on the hands of a microbiologist. They come in all different shapes and varieties. When it comes to microbes, they are like fingerprints. No two microbes are alike and are very diverse. When grown on solid surfaces like nutrient agar, bacterial colonies vary with respect to their size, color, shape (form), margins, elevation, optical properties and texture. Some are naturally pigmented, while others can be artificially induced to produce pigments. We studied the growth properties of a variety of bacteria in our Microbiology laboratory class. We will harness the different growth properties of bacteria to produce agar art as a way to showcase their versatile nature and their diversity.*

***A Major Regulator of Germline Transcription, LSL-1, Contributes to Developmental Defects When Histone Methylation is Inappropriately Inherited***
Poster #2 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Benjamin Nguyen and Sarah Blancher
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in the nematode, C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Maternal loss of SPR-5 and MET-2 results in ectopic expression of germline genes in somatic tissues and a range of developmental phenotypes, including a severe developmental delay. Using a combination of RNA-seq and ChIP-seq experiments, a recent study identified a major regulator of germline transcription, LSL-1, that turns on germline genes in the germline during development. From our own transcriptional analysis performed on C. elegans lacking SPR-5 and MET-2, we find that lsl-1 is significantly upregulated in somatic tissues. Together these data suggest that LSL-1 may be turning on germline genes aberrantly in somatic tissue and contributing to developmental delay. To test this hypothesis, we knocked down lsl-1 using RNA interference (RNAi) and found that the developmental delay in spr-5; met-2 mutants is significantly rescued. To take the next steps in this exciting project this summer, we will perform RNA-seq to identify the germline genes in spr-5; met-2 mutants that are dependent on LSL-1 and that contribute to complex developmental phenotypes including developmental delay. Our findings will provide mechanistic insight into how inappropriate inheritance of epigenetic states perturb germline versus somatic cell fate specification during embryonic development.*

***Microbial Commensal of Tri-colored Bats in Georgia and their Relationship to WNS Susceptibility***

Oral Presentation (ALC 4102)
Tuesday April 18, 2023
12:40pm – 12:55pm
Graduate Student(s): Jordyn Upton
Research Mentor(s): Christopher Cornelison

*Pseudogymnoascus destructans (Pd) is a fungal pathogen that has been circulating in North American bats since its initial discovery in 2006. Pd is the causative agent of white-nose syndrome (WNS), a disease leading to as much as a 90% decrease in some eastern United States bat populations. To date, there is no effective treatment for WNS, but microbiomes have come under investigation in other disease systems for their perceived connection with pathogen colonization and disease severity across taxa. To this end, our research will focus on characterizing the microbiome of tri-colored bats (Perimyotis subflavus) across transportation-based (i.e.: manmade bridges and culverts) and subterranean hibernacula. Tri-colored bats have been documented living in anthropogenic structures which maintain temperatures consistent with Pd growth*

*requirements, yet have not been classified as having WNS. Because built environments are correlated with altered host microbiomes, I aim to differentiate tri-colored bat microbiomes across these anthropogenic, transportation-based hibernacula and more traditional, subterranean hibernacula. By characterizing these microbiomes, I will identify microbes displaying anti-fungal properties, which will then be tested in vitro for anti-Pd activity. We will fill a gap in the knowledge of how bat microbiomes impact host survival while identifying microbial candidates for possible probiotic treatments. These treatments may be applied as a minimally-invasive disease management tool for treatments of bats to mitigate the effects of WNS on bat populations.*

***A Multicultural Microbial Masque***
Visual Art (Convocation Center)
3:00pm – 3:45pm
Undergraduate Student(s): Klaudya Hernandez, Jaynie Adams, Eithar Mirghani, Rachel Buchli, Ashley Ayala, and Faith Arends
Graduate Student(s): Sarah Joie Wilson
Research Mentor(s): Ramya Rajagopalan

*Painting with microorganisms is a tradition among microbiologists that has been around since the time of Alexander Fleming, the multi-talented scientist who discovered penicillin. The "paint" is alive and interacting with its environment to create art unlike the static medium used in traditional art forms. Microorganisms can change the color of their environment, add funky texture, and fluoresce under UV light. We will create an interactive art piece that harnesses the incredible potential of bacteria to explore cell-to-cell communication and showcase the diversity in our research group.*

***Screening Bacteria for Antagonism with Pseudogymnoascus destructans, the Causative Agent of White-Nose Syndrome***
Poster #11 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Elbin Jacob and Melis Akkan
Research Mentor(s): Christopher T. Cornelison and Jordyn R. Upton

*Pseudogymnoascus destructans (Pd) is a fungal pathogen that causes white-nose syndrome (WNS) in bats. WNS was first observed in New York in 2006, and can result in as much as a 90% mortality of bat populations. Pd spreads to bats at the onset of each hibernation season, however, Pd persists within the environment year-round. As Pd colonizes the bat skin, it results in significant tissue damage, waking up the bats, and resulting in premature depletion of energy reserves. As of now, there is no cure for WNS. The goal of my research is to identify a microbial species with potential to inhibit the growth of Pd in vitro. The microbe that this research focuses*

*on is Psuedomonas soli. This assessment will be carried out using contact-dependent and contact-independent assays method. This will be done through culturing assays testing the isolates inhibitory activity on both mycelial elongation and spore germination. The experiment is then observed over a 37-day time period, to identify whether or not the selected bacterial species inhibits the growth of Pd. The results collected will allow to identify whether it will be a possible candidate for WNS mitigation.*

***Screening Jathinobacterium lividum for antagonism with Psueudogymnoascus destructans.***
Poster #12 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Melis Akkan and Elbin Jacob
Research Mentor(s): Christopher T. Cornelison

*Psueudogymnoascus destructans (Pd) is a fungal pathogen that causes White-Nose Syndrome (WNS) in bats. The pathogen was first found in New York in 2006; by 2016 it had spread across much of North America. WNS disrupts the hibernation cycle, causing bats to wake prematurely and burn through their fat stores. This poses a huge threat, as they rely on torpor and their built-up fat reservoir to make it through the winter season. Researchers and managers alike theorize that there are potential probiotics that could inhibit the fungal load of Pd on bat wings, and reduce disease burden. Batrachochytrium dendrobatidis (Bd), a fungal pathogen affecting amphibians, has also undergone extensive studies looking for potential inhibitory probiotics. The isolate being tested against Pd in this research is Jathinobacterium lividum, which has been shown to inhibit Bd in vitro. Through contact-independent testing, I will observe Pd in a shared airspace with Jathinobacterium lividum, to see if it inhibits the growth of Pd over a 37-day period. The results will be used as a possible microbial mitigation.*

***Social Media Use May Normalize Unsafe Handling of Wildlife***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
4:20pm – 4:35pm
Undergraduate Student(s): Abby Allen, Ta'Nyia Heard, and Dianna Lopez
Graduate Student(s): Ashley Belinfante
Research Mentor(s): Andrew Haddow

*Rabies is a fatal virus originating from wildlife and can be spread to humans through the saliva of an infected animal. Approximately 59,000 people die of rabies per year worldwide. The United States reported five confirmed rabies deaths in 2021. In 2018, 92.7% of human rabies cases in the United States originated from interactions with wildlife, and during the same year raccoons*

*accounted for 30.3% of all reported rabid wildlife. Previous studies have shown that social media can influence trends and increase risk-taking behaviors. In this study, we investigated the occurrence of risk-taking behaviors associated with raccoon handling (e.g., contact in the absence of personal protective equipment) on social media. We found that 39.5% of videos showed individuals handling raccoons in the absence of proper personal protective equipment. Normalizing unsafe interactions with wild animals has the potential to increase the transmission of zoonotic pathogens.*

***SPR-5; MET-2 Maternal Reprogramming Cooperates with the Dream Complex to Regulate Developmental Cell Fates***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
4:00pm – 4:15pm
Undergraduate Student(s): Sandra Nguyen and Jazmin Dozier
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in the nematode, C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, it was demonstrated that SPR-5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a severe developmental delay. Data from the Petrella and Ahringer Labs demonstrates that members of the DREAM Complex, a transcriptional repressor complex that regulates cell cycle, also represses germline genes in somatic tissues through H3K9me2 promoter marking. This data suggests that the DREAM Complex and SPR-5; MET-2 maternal reprogramming may work together to prevent ectopic expression of distinct sets of germline genes, including MES-4 germline genes, in somatic tissues and developmental delay. To test this hypothesis, we knocked down Dream Complex members LIN-35, LIN-37, LIN-52, and LIN-9 in spr-5; met-2 mutants using RNA interference (RNAi). We found that loss of each of these Dream Complex members exacerbates the severe developmental delay that we normally observe in spr-5; met-2 mutants leading to a complete L1 larval arrest. Using RNA-seq, we further demonstrate that knocking down lin-35 exacerbates the ectopic expression of MES-4 germline genes in spr-5; met-2 mutant somas. Our findings provide mechanistic insight into*

*how evolutionary conserved transcriptional repressor complexes cooperate to ensure proper germline versus somatic cell fates during development.*

***Testing the Structural Properties of Ganoderma Mycelium***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
1:00pm – 1:15pm
Undergraduate Student(s): Caylin Nunez and Kit Thompson
Research Mentor(s): Christopher Cornelison

*When people think of mushrooms and fungi, they are often unsure on what benefits the root-like structures have or even what they are. Mycelium is the main body of the organism and mainly serves as a decomposer in the environment, however, the fibrous composition is very strong and has many properties that would be beneficial as construction materials. To determine suitability as a construction material we wanted to test the combustibility and strength properties of mycelia grown on bulk agricultural waste products (e.g. cotton gin byproduct, peanut hulls, saw dust, etc.). We tested the physical properties of mycelium from two different species of fungi: Ganoderma lucidum and Ganoderma sp miran lake. We constructed two 40 mm by 40 mm molds using a 3d printer in which 1.5 % Malt agar substrate that was innoculated with grain spawn from the two species will be allowed to grow. From there, we will take the mycelium tile and run a series of tests to determine the structural qualities. Additionally, we took the spent substrate blocks from the commercial production of oyster mushrooms to evaluate combustibility. The block did not ignite when a butane flame was applied for 30 seconds. What we hope to see from our experiments is that: the mycelium will prove to be strong and heat resistant enough to replace some of the existing fire retardants used in construction. We hypothesize that the dense mat of mycelium created by Ganoderma will be self-extinguishing and make a non-toxic replacement for existing products.*

***Zygotic Modulation of Inappropriate Inherited Histone Methylation Partially Rescues Developmental Phenotypes***
Poster #3 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Madison Yearwood
Graduate Student(s): Sydney Morgan-Benitez
Research Mentor(s): Brandon Carpenter

*Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset*

*the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Recently, it was demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a severe developmental delay. Recent studies in our lab have demonstrated that knocking down components of the Polycomb Repressive Complex II (PRC2) completely rescues spr-5; met-2 developmental delay, whereas knocking down members of the DREAM complex exacerbates the developmental delay in spr-5; met-2 mutants. These exciting findings suggest that different chromatin complexes can either synergize with, or antagonize, SPR-5; MET-2 maternal reprogramming. For these experiments we knocked down components of the PRC2 and DREAM complexes maternally in spr-5; met-2 mutants. Here, we are investigating the potential modulation the PRC2 and DREAM complexes further downstream, focusing on the loss in the zygote rather than at the maternal level. To do this, we knocked down MES-2 (PRC2 complex member) and LIN-35 (DREAM complex member) in L1 larvae by RNAi and found that the developmental delay in spr-5; met-2 mutants is partially rescued. This data hints that in the absence of SPR-5; MET-2 maternal reprogramming, targeting different chromatin complexes may provide a way to alleviate some of the severe developmental phenotypes that arise when histone methylation is inappropriately inherited.*

## Physics

***Damage to Nanoscale Semiconductor Wires from Ultrashort Laser Pulses***
Poster #10 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Younos Hashem
Research Mentor(s): Jeremy R. Gulley

*Cutting-edge optoelectronics increasingly use semiconductor nanowires. These nanowires are often made of semiconductor materials, which conduct electricity when excited, and can be millions of times thinner than a regular copper wire. Due to their structure, nanowires are extremely fragile, and they are vulnerable to incredibly short-duration—on the order of one femtosecond, or one millionth of a billionth of a second—laser pulses. However, the exact damage processes are not entirely understood for these novel quantum materials. In our research, we aim to understand when a nanowire exposed to intense fs laser light might fail and how to protect it from lasers of different colors and intensities. To this end, we simulate laser propagation through a GaAs nanowire and observe its post-exposure energy density and temperature. The propagation*

*simulations numerically solve the Maxwell equations for the electric and magnetic fields in the region of the nanowire, and interface with laser-material interaction code that models the behavior of excited electrons in the semiconductor. These simulations are programmed and run on computer servers at KSU. Prior to each simulation, we vary the color and intensity of the laser pulse and observe how these might affect the damage process. We find that, at specific combinations of these parameters, the wire's energy density and temperature exceed its melting point, which will cause irreversible damage to the structure. To provide an experimental test of our model, we also record the electric current generated by the process and any lingering electromagnetic radiation from the wire after the laser pulse's departure.*

***Design of a High Vacuum Chamber and Microwave Fabry-Perot Cavity Resonator Using Torispherical Cap Mirror***
Oral Presentation (ALC 4200)
Tuesday April 18, 2023
3:40pm – 3:55pm
Undergraduate Student(s): Varun Raghuraman and Siam Sarower
Research Mentor(s): Lu Kang

*A Balle-Flygare type cavity Fourier transform microwave (FTMW) sprectrometer is built by a Fabry-Perot cavity resonator in a high vacuum chamber. A torispherical cap will be used as both a mirror of the Fabry-Perot resonator and the tank head to close the vacuum chamber. This design can cut the costs of a vacuum system significantly. The effective dish reflector diameter, volume, and focus length of various torispherical domes are evaluated and discussed, including, but not limited to, DIN 28011, ASME standard, ASME high crowns (80/10, 80/6, and 90/8), and the noncoded tank heads. Gold plating will be performed on the dish surfaces to upgrade the conductivity, enhance the microwave reflectivity, and improve the corrosion resistance.*

***Wavelength and Intensity Dependence of Laser-Induced Damage in Semiconductors***
Poster #11 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Hannah Pinnock
Research Mentor(s): Jeremy Gulley

*An ultrashort laser pulse is a burst of laser light lasting for time scales of a millionth of a billionth of a second, or a femtosecond. Semiconductor solids, such as silicon, have electrical properties that fall in the middle of insulators and conductors. Some semiconductors, like gallium arsenide, are used as components in light sensors, and when exposed to laser light are subject to laser-induced damage. There are two physical mechanisms that initiate ultrashort laser-induced damage in solids: photoionization and uncontrolled growth in impact ionization (known as avalanching).*

*Photoionization also involves two mechanisms: multi-photon ionization and quantum tunneling ionization. We examine the laser-induced damage initiation dependence on laser wavelength (color) and field strength (energy). Our results suggest that multi-photon ionization alone does not sufficiently predict the onset of laser-induced damage, as is often assumed for ultrashort pulses. We include both multi-photon and quantum tunneling ionization through the unified ionization rate developed by Keldysh. This photoionization term is added to a simple impact ionization rate, making a single rate equation for the ionization yield that we solve numerically for many field strengths and wavelengths. The maximum ionization yield in each case is recorded and matched to laser-induced damage thresholds for permanent and temporary damage found in the published literature. We use these results to generate laser-damage "maps" to show experimentalists and designers of optical sensors an easy-to-use diagram of damage thresholds for different combinations of laser wavelengths and energies.*

# College of the Arts

## Art and Design

***But What is Troy: Art in Queer Mourning***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
1:40pm – 1:55pm
Undergraduate Student(s): Ian Lamasney
Research Mentor(s): Diana McClintock

*Death is something that everyone, regardless of any arbitrary divisions, will inevitably have to experience. For a variety of reasons, queer mourning is not practiced the same way that straight society does - it manifests as raw anger at the society around them. Deconstruction and queer theory perspectives reveals political, social, and artistic strategies that inform recent visual art practice. Examinations of the work of Felix Gonzalez-Torres and John Boskovich, informed by queer theory perspectives, highlight similarities in the process of queer mourning in the late 20th century. In addition, discussion of the tale of Achilles and Patroclus recorded in the Iliad will demonstrate the persistence of these characteristics in queer art since antiquity. Art has been made to reflect grief for millenia. Queer art made for mourning is filled with a white-hot rage, one that is not easily abated by tears and condolences. Queer mourning art stings, often because it is explicitly meant to.*

***Measuring Perceptions of Creativity Through Collaborative Experience***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
1:20pm – 1:35pm
Undergraduate Student(s): Logan Mossor
Research Mentor(s): Jonathan Fisher

*Many consider the world of visual art to be a strictly individualistic field; an individual sculptor sculpting or an individual painter painting. In fact, community and collaboration often aid the creativity of those working in the visual arts. Large scale artistic endeavors such as Yves Klein's "Anthropometries'' and Christo and Jean Claude's "Running Fence" required many people all working towards one artistic vision. My own experience as a collaborative artist has indicated to me that the creative efforts of a group of people can often be more inspired than that of a single artist. Having staged many collaborative art pieces, I have become curious as to exactly what impact collaborative art has on its participants. To investigate my inquiry, I plan to stage an ongoing exploration of participants' creative evolution while making collaborative art. Over a six-*

*month period, I will stage and document a controlled collaborative environment in which subjects will participate in a shared artistic experience; expressive wall painting in a site-specific setting. Before the experience, they will complete a questionnaire to determine their own perceptions of creativity. After participating in the collaboration, the subjects will receive a post-survey of the same questions. The surveys will be written acknowledging Rita Irwin's essay "Communities of A/r/tographic Practice" and Allan Kaprow's essay "Manifesto." Using the pre and post surveys, I will track the subjects' creative growth after each collaborative experience. These results will determine how collaboration in the visual arts impacts creativity. Further outcomes may demonstrate how this creative evolution is mutually beneficial to both the facilitators and the participants of a collaboration. This valuable data will inform my future creative endeavors, and further establish the significance of collaborative art in the visual arts community.*

## Theatre and Performance Studies

***"Defining a Woman": The Impact Galatea Served for Early Modern Period Women***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
2:20pm – 2:35pm
Undergraduate Student(s): Brisa Mendez
Research Mentor(s): Tom Fish

*Throughout history, women have been suppressed into the gender norms of a male dominated society. With all the theatre actors only being men, as well as the attendees being predominantly men, the Early Modern period was no exception. Even Queen Elizabeth I (1533-1603), a female in power, was faced with overwhelming criticism about her lack of "femininity." Seeing that she did not have children, the people deemed her less of a woman. Needless to say, John Lyly took inspiration from the society of his time and incorporated these elements into his play Galatea (1588). Lyly's play centers around two girls, Gallathea and Phyllida, who are sent to the woods by their fathers to save them from being sacrificed to Neptune. In order to hide their true identity, they dress up as boys, and both girls fall for each other throughout their journey together. This paper will be analyzing the main female characters in Galatea, exploring the gender politics between the play and English society in the Early Modern period. It examines specific historical moments of female empowering figures from the time period such as Queen Elizabeth I's and her cult-like following, in which they called her "Virgin Queen" by her choice of chastity for her country. It also dives into the art/literature from the period such as Peter Ruben's Diana and Her Nymphs on the Hunt to emphasize the role of goddess Diana's importance. By considering the play within its cultural environment, the paper highlights the impact Galatea had and currently can have by spreading awareness of social hierarchies and to foster female empowerment overall.*

***A Little Bit of Love in a World Full of Information: The Discussion of Mental Health Through the Rehearsal Process of Caryl Churchill's Love and Information***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
2:40pm – 2:55pm
Undergraduate Student(s): Cecillia Delanuez
Research Mentor(s): Tom Fish

*This project considers the representation of mental health in theatre with particular focus on the popularization of social media and its repercussions. Specifically, I will be discussing my creative research as a performer in the play Love and Information by Caryl Churchill, directed by Emily Kitchens at Kennesaw State University in February 2023. This play is compiled of around 57 short scenes that focus on social media and its effects on mental health. By examining the play and our rehearsal process, I will demonstrate how the production showcased what people can go through with different mental illnesses. Additionally, I will consider the dramaturgical material around the production, such as the post-show talk backs that were about social media and mental health. This paper explores how performances and rehearsal spaces can help start and guide a discussion around mental health and social media that we are dealing with today.*

***The Male Memory of Myth: Rewriting History in Greek Girls***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
3:00pm – 3:15pm
Undergraduate Student(s): Mercy Mondt
Research Mentor(s): Tom Fish and Margaret Baldwin Pendergrass

*This project investigates the impact that the hegemonic masculine perspective has on our modern memory of female characters from Greek theater, and how that informed and inspired my work in writing the play Greek Girls. This presentation will focus on the stories of three well-known female murderers from the Greek theatrical canon - Clytemnestra, Medea, and Agave who appear in a scene from Greek Girls titled "The Murderess Monologues". This research takes place primarily on the narrative level, as it is more concerned with stories than the ancient texts that contain them. However, the plays Agamemnon, Medea, and The Bacchae will be included in my analysis insofar as they are vehicles of memory from Ancient Greek culture to ours. I will also consider sources on the practices of Ancient Greek theater and how they encouraged and supported a hegemonic masculine perspective within the culture. My analysis will consider the ways in which the hegemonic masculine perspective of the culture is expressed through these plays, and how that perspective works to corrupt our modern understanding of these female characters. In support of my assertion that women deserve to be their own storytellers, I will analyze the mythological*

*stories surrounding memory and the act of remembering in Ancient Greece. As a culmination of this research, I will present an excerpt of "The Murderess Monologues" from my play Greek Girls.*

***Surviving the Rapids: An Exploration in Personal Narrative Solo Performance***
Performance (ALC 2106)
3:20pm – 3:35pm
Undergraduate Student(s): Jess Maillet
Research Mentor(s): Charles Parrott

*Purpose: This project experiments with structure and aesthetics to execute a personal narrative solo performance articulating the experience of addiction and recovery. Background: This performance is built out of work with Dr. Charles Parrott and his methods as described in his book: Alone Together. This specific project applies his methods to my own lived experiences and from that intersection of art and recovery emerges this personal narrative solo performance. Research Methods: The methodology was personal reflection and excavation to compose a personal narrative solo performance, illuminating the stigma of addiction and recovery. Orally composing and rehearsing, reciting, and evolving, pruning, and polishing the story until a cohesive, yet meaningful performance emerged. Expected Results: Ultimately, this project engenders a shared experience and connection to the audience.*

***"You Ain't my Mother! Yes, I am!": an Analysis of the Term "Mother" in the Queer Community***
Oral Presentation (ALC 2106)
Tuesday April 18, 2023
2:00pm – 2:15pm
Undergraduate Student(s): Connor Maguire
Research Mentor(s): Thomas Fish

*This paper will focus on queer linguistics and lingo and how it is appropriated in an effort to market to queer audiences. The presentation will focus on the usage of the word "mother" (a term with a slippery definition that is generally agreed upon to mean a strong, charismatic, mentor and leader). The word became popularized in queer spaces from its origin in 18th century England, to NYC's drag Ballroom scene of the 1980s, and increasingly in the last decade as a term commercially employed by straight creators, like Meghan Trainor, to market to queer audiences. Methodologically, my approach will implement strategies of both performance studies and linguistics illustrating what happens when that community emerges as a marketable group. I provide a close reading of sources like RuPaul's Drag Race and Paris is Burning to demonstrate*

*the term's relationship to queer found families and community, contrasting this with an example of appropriative use examining Meghan Trainor's 2023 song, "Mother." Ultimately, this project demonstrates how found family is created in the queer community through linguistic bonds, despite attempts to capitalize on the cultural identity of queerness.*

# Southern Polytechnic College of Engineering & Engineering Technology

## Civil and Environmental Engineering

***360 Degree Beamsteering into Ground for Wirelessly Charging Underground Sensors***
Poster #11 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Coleman Alvarez
Research Mentor(s): Hoseon Lee

*In this research project, we propose a new method for wirelessly charging sensors underground using a centralized transmitter station. Currently the issue is if sensors are placed in the ground, then there is not a straightforward way of recharging the batteries powering these sensors once they run out of power. The FCC regulations allow for a maximum Effective Isotropic Radiated Power (EIRP) of 52 dBm at 2.4 GHz, which translates to 158 watts of power. With 158 watts of power, it is feasible to charge the lithium-ion batteries that power these sensors underground. One of the goals of this research was to design a system that can remotely charge sensors in all directions. To achieve this, six 8x8 patch array panels have been configured in a hexagonal pattern to allow the system to transmit power in a full 360 degrees around the station. With this hexagonal pattern and the use of beam steering antennas, there is no need for a mechanical system to rotate the station. The panels have been angled downward by 45 degrees, to point the beams toward the ground and to improve the operation of the transmitter by reducing the unreachable areas in its operating zone. Each panel will have the ability to steer the beam in all directions. This will allow us to individually charge sensors in the ground in various locations. Electromagnetic simulation of the full assembly of the system has been conducted using antenna simulation software, and results verify its ability to steer the beams 360 degrees. This technology can be used to monitor soil conditions using underground sensors for agricultural applications as well as movement monitoring for homeland security and for monitoring seismic activity.*

***AI for Lighting Tunnels***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
3:40pm – 3:55pm
Undergraduate Student(s): David Garcia-Ramos
Research Mentor(s): Mahyar Amirgholy

*An abrupt change in lighting is a tremendous safety hazard for drivers in short tunnels (80 ft – 410 ft). While artificial lighting is required in longer tunnels regardless of the outside lighting conditions, road safety can be significantly improved in short tunnels by adjusting the artificial lighting accordingly with the lighting conditions outside. In this research, we develop an intelligent lighting system to adjust the artificial lighting inside the tunnel based on the instantaneous lighting condition outside. To this end, we use the data collected from 13 tunnels throughout Georgia to develop a power regression model, which can then be used to estimate the illuminance distribution in short tunnels. The proposed model is then validated using the results of a 3D finite-element simulation model. We use a machine learning approach to re-estimate the parameters of the illuminance prediction model based on the tunnel features, for example: tunnel type, geometry, and length. Using the portal/sky illuminance data from an optical sensor outside the tunnel, we can accurately predict the illuminance distribution and dynamically adjust the artificial lighting inside short tunnels. In addition to improvement in road safety, the proposed intelligent lighting system significantly reduces the consumption of electricity for lighting short tunnels, which justifies switching to solar batteries as a reliable electricity source in practice. Considering the high cost of manual assessment, wire installation, and electricity consumption off the grid, the proposed intelligent lighting system can save the Georgia Department of Transportation (GDOT) a significant amount of time and energy every year. The artificial intelligence model developed in this project will have broader applications in lighting short tunnels to enhance the safety of roads on the national scale*

***Analyzing the Effectiveness of Helmet Laws in Reducing Motorcycle Fatalities in the United States: A State-Level Study in 2020***
Poster #28 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Liz Furlow
Research Mentor(s): Sunanda Dissanayake

*Motorcycle fatalities are a significant public health issue in the United States. Motorcyclists are more vulnerable than other motorists and have a higher risk of injury and death in the event of an accident. To reduce the number of preventable motorcycle fatalities, some states have implemented mandatory helmet laws. However, the effectiveness of helmet laws in reducing fatalities remains a topic of debate. For this study, state-level data on motorcycle fatalities, motorcycle registrations, and helmet laws in the United States was collected for the year 2020. The data was obtained from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) database, the Federal Highway Administration's (FHWA) motorcycle registration database, and the Insurance Institute for Highway Safety (IIHS) website. Chi-square tests were conducted to examine the relationship between helmet laws and motorcycle fatalities and motorcycle registrations, with a significance level of $p < 0.05$. Data analysis was conducted*

*using Microsoft Excel. The chi-square tests on the data for both motorcycle fatalities and registration proved the statistical significance of this analysis. For motorcycle fatalities, the sigma value was 3.45 with a chi-square comparison value of 5.99, indicating a significant correlation between fatalities and helmet laws. Similarly, the sigma value for motorcycle registration was 3.35 with a chi-square comparison value of 5.99, indicating a significant association between registration and helmet laws. My study has several limitations, including the use of cross-sectional data and the exclusion of other potential variables that may affect motorcycle safety outcomes, such as road infrastructure and weather conditions. Future research could address these limitations and provide a more comprehensive understanding of the relationship between helmet laws and motorcycle safety.*
*Despite these limitations, my findings suggest that universal helmet laws are an effective way to reduce motorcycle fatalities at the state level.*

***Behavior Analysis of Cement Concrete with Combination of Waste Plastic and Glass***
Poster #19 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Mohamad Alamayreh
Research Mentor(s): M. A. Karim and Youngguk Seo

*The waste stream in our society contains abundant plastic and glass waste, which can be effectively recycled to reduce the waste volume and save landfill space. Several studies have demonstrated that recycling glass can lower air pollution by 20% and water pollution by 50%, while recycling waste plastic can help reduce greenhouse gas emissions and save energy. To explore the potential use of recycled plastic and glass in concrete mixes, a laboratory investigation was conducted. Different percentages of plastic and glass waste will be tested as fine aggregates in cement concrete mixtures to evaluate their performance in terms of resistivity and strength. The experimental data will be compared to control data. The testing will be conducted for curing periods of 7, 14, and 28 days to assess their behavior under various conditions. The optimum percentage of plastic and glass waste will be chosen based on the laboratory data. It is expected that the optimum waste content will provide at least equal to or better than that of control experiments and reasonable resistivity and workability. The use of recycled plastic and glass in concrete mixes can potentially reduce plastic and glass waste going to landfills and save costs associated with obtaining new raw materials. The study expects that correlations will be observed under different experimental conditions.*

***Behavior Analysis of Cement Concrete with Combination of Waste Rubber and Glass***
Poster #35 (Convocation Center)
3:00pm – 3:45pm
Undergraduate Student(s): Abdulaziz Alebra

Research Mentor(s): M. A. Karim and Youngguk Seo

*Glass and Rubber waste materials are valuable materials to use rather than throw which we have more than enough to use and recycle. Recycled glass and rubber materials can reduce and help major climate issues in our times based on the statistics reducing glass can bring down air pollution by 20% and also reduce water pollution by 50% as well as can reduce the use of landfill space. A laboratory study will be launched, and tests will be conducted following the ASTM standards, ASTM C143 for a concrete slump, and ASTM C31 for making and curing concrete specimens. Samples of cement concrete cylinders will be cast with different percentages of glass and rubber (5%, 10%, 15%, and 20%) replacing fine aggregate in the mix along with control samples to compare with. The tests will be conducted for a series of curing periods such as 7, 14, and 28 days. Using the experimental data an optimum amount of glass and rubber will be achieved that can be used in cement concrete mix. The optimum mix will provide at least equal to or better strength and reasonable workability than that of the control experiments.*

***A Comparison of Crash Factors between Georgia and the Southern District***
Poster #27 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Clarissa Freeman
Research Mentor(s): Sunanda Dissanayake

*Motorcycle crashes are particularly hazardous for those involved because of the lack of protection and high exposure. Between 2015 and 2020, there were 4,161 motorcycle crash fatalities in the Southern District (Alabama, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia). 609 motorcycle crash fatalities occurred in Georgia. 84 were among youth, making Georgia the third-highest state in the Southern District in motorcycle crashes and the second highest in terms of youth fatalities. The purpose of this research is to compare the factors contributing to these crashes in Georgia with those in other Southern District states. This paper relied on data from the Fatality Analysis Reporting System (FARS), a census that collects data from fatal crashes nationwide each year. Several factors are considered, including the crash classification, the time of the crash, the BAC levels of the drivers, collision type, and lighting factors. The analysis also considered motorcyclist laws for each state. Despite having many laws and requirements for motorcyclists in Georgia, it presented higher numbers of crashes over the legal BAC level, more collisions with moving vehicles, and more late-night crashes. It is crucial to consider these factors and recognize their impact on the safety of Georgia's youth and the overall safety of residents of Georgia and the Southern District.*

***Design of a Soft Hand Prosthesis for Amputees with a Deep Learning Vision-Based Manipulation System***

Poster #31 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Noah Clark
Research Mentor(s): Turaj Ashuri

*Roughly 185,000 amputations occur in the United States yearly, with the number of people living with amputations expected to increase to 3.6 million by the year 2050. To aid amputees with daily activities, researchers use the latest technologies and novel techniques such as myoelectric prostheses. These types of prosthetics are controlled by the electromyographic impulse of the user's muscles' nerves. However, control of myoelectric prostheses remains a challenge despite recent technological advances due to overuse injuries and device rejection by the amputee. Furthermore, distinguishing different muscle groups is a cumbersome process which inhibits widespread adoption. As a solution to these challenges, this research investigates the viability of implementing soft robotics and artificial neural networks to aid amputees with grasping objects. This system would use an embedded camera in the palm of the prosthetic to retrieve an image of the target object. Then, this image will be passed to a convolutional neural network which will identify the target object and determine the suitable grasp type. After a suitable grasp type is determined, the movement of the prosthetic will be controlled using a different neural network. This second neural network will be trained on data collected from finite element method, allowing for finely coordinated, autonomous movement of the prosthetic hand.*
*The expected outcome of this novel implementation of neural networks and soft robotics is an increased quality of life for people living with amputations by providing them with a prosthetic that will better reflect their desired actions and allow them to fulfill their daily activities. Furthermore, given the significant portion of people living with disabilities in our society, the results of this research is expected to be economically and medically beneficial by providing a basis for the widespread adoption and commercialization of myoelectric prosthetics.*

***Examination of Cement Concrete Mixed with Sewage Sludge Ash***
Poster #21 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Vu Nguyen
Research Mentor(s): M. A. Karim and Youngguk Seo

*A by-product of wastewater treatment sludge incineration, commonly known as Sewage Sludge Ash (SSA) is a waste material often seen going to landfills. Its usage as a construction material has been studied by various literatures where the material's beneficial effects was identified. Proper recycling of the material by integrating it into cement concrete mix will not only reduce the cost, but also increase its sustainability. This study seeks to examine the effects of substituting a portion*

*of the fine aggregate with SSA at different percentages (5%, 10%, 15%, 20%). Specifically, its influence on the strength, durability, and workability of the concrete mix. The mixes and well as the control samples will be tested at different curing period (7, 14, and 28 days) in order to better understand the strength. An attempt will be made to determine the optimum SSA percentage to replace fine aggregate that will yield maximum strength and reasonable workability. It is expected that the modified cement concrete mix with SSA will have the same or higher strength and workability than control cement concrete mix. It is also expected that there will be correlations of strength with resistivity.*

***Experimental Study of Cement Concrete Mixed with Combined Rubber and Plastic Waste Materials***

Poster #16 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Venkata Naga Sai Sravani Ambadapudi and Ibrahim Alamayreh
Research Mentor(s): M. A Karim and Youngguk Seo

*Rubber and plastics are common commodities in our society. We use them from our car tires to the plastic containers on our dining table. But what happens after they are used or broken? They go to the landfills! To reduce the burden on landfills, proper recycling of these materials is needed. Therefore, our team came up with a project to optimize the usage of these waste materials before they go to landfills. Several uses of plastic and rubber have been investigated in the literature. A laboratory investigation will be launched, and various tests will be conducted with different percentages of the combination of rubber and plastic waste (5%, 10%, 15%, and 20%) replacing the fine aggregates in the cement concrete mix. These tests will mainly be focused on tracking workability and strength. Control samples will be prepared and tested along with each percentage of rubber and plastic mix samples to compare workability and strength at different curing periods (7, 14, and 28 days). These samples will be water-cured; to better understand the cement concrete behavior when mixed with our waste combination of the two materials. Test data will be used to select an optimum amount of the combination of rubber and plastic to replace the fine aggregate that would provide the maximum strength and reasonable workability. The benefit of replacing the fine aggregates with recyclable rubber and plastic within cement concrete mixes would be a reduction of these waste materials that normally go to landfills and the cost savings along with sustaining virgin raw materials. It is expected that some content of waste, rubber, and plastic in the concrete mix will provide the same and/or higher strength compared to the control samples. It is also expected that there will be correlations for resistivity for any conditions.*

***Impact of Air Pollution Exposure in Latino Communities: An Equity-based Framework for Environmental Engineering***

Oral Presentation (ALC 3200)
Tuesday April 18, 2023
4:00pm – 4:15pm
Undergraduate Student(s): Finn Vital
Research Mentor(s): Pegah Zamani

*Hispanics make up the second-largest ethnic group after whites, yet these communities live in more polluted environments than their white counterparts and have higher rates of poverty. With low-income neighborhoods come unsafe and often hazardous environmental factors that harm the health of their inhabitants. Environmental engineering, a newer branch that combines civil and chemical engineering ideas, could offer a variety of different solutions to environmental issues relating to air and water pollution. In A Terrible Thing to Waste by Harriet A. Washington, the author discusses the cognitive damage environmental racism can have if left to fester and I will further explore the other effects on this specific group. Previous reports have found strong connections between race and pollution in a neighborhood, but fail to propose solutions to these issues. This research examines the effects of environmental racism and how that harms the health of Latino communities, as well as investigates possible solutions that environmental engineering practices can offer. To answer this question, I will gather data from previous relevant studies about environmental health and then analyze and compare to data from a more affluent and predominantly white area. The expected conclusions that this research would have include establishing a stronger connection between the environment and sociocultural factors of Latino immigrants and proposing how an exciting new field of engineering can aid in providing solutions to improve the life and wellbeing of these individuals.*

***Investigating the Severity and Rate of Occurrence of Motorcycle Crashes Across Different Land Uses in Georgia***
Poster #29 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Robert Edwards
Research Mentor(s): Sunanda Dissanayake

*In 2020, motorcycle crashes reached their highest number of fatalities nationally since 1975, when 5,579 motorcyclists were killed. Georgia, in recent years, has seen an increase in the number of fatal multi-vehicle crashes involving motorcycles. This would be indicative of the general trend and nothing more if the number of motorcycle crashes reported outside of urban populations did not increase—despite lockdown measures—by 1.7% in 2020. In this investigation, employing a thorough examination of the Georgia Department of Transportation's Crash Data (GDOT) compiled from the last ten years and the Fatality Analysis Reporting System (FARS) compiled from the last five years, conclusions will be drawn regarding location and the number of vehicles*

*involved as factors. This study makes evidence of data sheets by The National Center for Statistics and Analysis (NCSA), the National Highway Traffic Safety Administration (NHTSA), and the Georgia Governor's Office of Highway Safety (GOHS). In addition, graphed data of the annual numbers of crashes inside of Atlanta and the Metro Atlanta area vs. annual numbers of crashes outside of Atlanta and Metro Atlanta in Georgia from 2017-2021 is analyzed and applied in this research. The severity of crashes will be defined according to Georgia's KABCO scale and factors affecting higher severities will be identified. Microsoft Excel will be the primary tool used to sort cases by specific factors and determine any logical correlations. The findings of this will provide guidance on how to improve motorcycle safety in Georgia.*

***Investigation of Cement Concrete Mixed with Recycled Waste Slags***
Poster #20 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Matthew Henry
Research Mentor(s): M.A. Karim and Dr. Youngguk Seo

*Some industrial waste materials pose a problem to the environment in terms of treatment and disposal when they become a management burden for manufacturers and producers. Rather than being allowed to populate landfills, these waste materials can be recycled and reused as construction components in place of raw materials. This study will explore the use of locally recycled scrap metal waste byproduct (slag) in cement concrete and evaluate the resulting physical and engineering properties. The optimized use of scrap metal slag in cement concrete mix will help in waste management disposal costs and reduce the cost of raw materials for construction. A laboratory investigation will be conducted with steel slag replacing certain percentages (5%, 10%, 15%, and 20%) of fine aggregates by weight in cement concrete mixtures. Tests will primarily focus on evaluation of concrete workability, compressive strength, and surface resistivity. Control samples will be prepared and tested along with each waste material sample. Compressive strength and surface resistivity will be compared at curing periods of 7, 14, and 28 days. The goal of the study is to recommend an optimal ratio of recycled waste slags with which to replace fine aggregate in concrete mixtures to maximize environmental and economic benefit while avoiding unacceptable sacrifice to concrete strength or workability. It is expected that a certain replacement level of fine aggregate with waste steel slags will provide the same or greater compressive strength and similar workability compared to the control. Surface resistivity is not expected to show significant change with this replacement.*

***Microplastic Fate and Transport at Drinking Water Treatment Plants***
Poster #10 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am

Undergraduate Student(s): Emily Glenn
Research Mentor(s): Amy Borello Gruss and Marina Koether

*The prevalence of microplastics has become a growing concern in recent years due to their contamination of water in even the most remote locations. These concerns have begun to reach the public sentiment, shown by the addition of Senate Bill No. 1422 passed in the state of California which requires the State Board to adopt a definition for microplastics and requires the standardization of monitoring at drinking water treatment plants. However, further research is needed in order to understand the concentration and classification of microplastics at treatment plants. This research analyzes water and sludge samples at different stages of treatment to determine the effect that drinking water processes have on microplastic removal. In order to account for environmental contamination, control studies were completed with DI and air samples. The samples were analyzed using an adapted National Oceanic and Atmospheric Administration's marine sample protocol. The microplastics were counted under a 3.5X-180X Zoom Stereo Microscope. Preliminary findings show that microplastics are removed from within the drinking water plant at varying degrees of success; the data also conveys that microfibers are the most common type of microplastic observed. High concentrations were found in the drinking water residuals, either from removal within the plant, or through environmental contamination, which indicates microplastics may continue to cycle through the environment after receiving proper treatment.*

***A Smart Illicit Water Discharge Monitoring System***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:20pm-1:35pm
Undergraduate Student(s): Cole Myers
Research Mentor(s): Tien Yee

*The purpose of our research project is to develop an autonomous system that monitors illicit water discharge. Illicit water discharges are anything that enters our sewer system that is not uncontaminated stormwater. These discharges can constitute anything from improperly disposed of household chemicals to pesticides and fertilizers. These waste products have disastrous consequences for public health and the environment when they find their way into our streams and rivers. Currently, in Georgia, the major flaw with illicit water discharge detection is that it is done manually. This makes detection a problematic task due if the illicit discharge events are intermittent and gradual. In addition, because of spatial variability, it is a tedious task for stream monitoring teams to identify the source. This study attempts to design an illicit discharge system design for continuous monitoring. The current autonomous monitoring system is a mobile system, making it more robust to handle rough field conditions. An attempt will be made to demonstrate*

*the system live during the presentation. The system can potentially help in providing real-time feedback to stream monitoring teams and hence improve the surface water quality in Georgia.*

***Sustainable Use of Waste and Byproduct***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
1:00pm-1:15pm
Undergraduate Student(s): Jordan Blevins and Anna Santmier
Research Mentor(s): Jayhyun Kwon

*Quarrying rock requires several processes from mining to refinement that involves screening and crushing operations that result in aggregate fines, otherwise referred to as waste or quarry-by-products (QB). QB are aggregate particles of less than 1/4 inch in size that are most commonly produced during screening and crushing processes and then stock-piled as excess product. A survey conducted by the Federal Highway Administration set out to determine how QB were produced and where those QB were being utilized, but met a low response rate of 27% of quarries contacted. The survey indicated that the majority of QB is used effectively in agricultural lime and cement/backfill applications. Yet according to 55% of the surveyed quarries, more than 3,275,000 U.S. tons of QB end up stock-piled. An accumulation of waste and byproduct materials indicates a high demand for more sustainable applications and practices within the quarry-mining and construction industries. While the current state of knowledge demonstrates an understanding that wasted excess of QB is an economic and environmental problem, there is a minimal grasp on viable solutions. A majority of the data has been extrapolated to account for unresponsive contacts for previously conducted surveys, leaving a gap of valuable information at large. By applying previous practices of synthesizing data, this study intends to survey construction projects and quarries to gain information on QB usage in the state of Georgia. Our goal is to understand how the aggregate byproducts are being produced and where they are being recycled in order to gain a baseline of knowledge. We aim to synthesize our findings on QB production and usage into a comprehensive format to aid firms charged with transportation, construction, and other development projects to find sustainable methods of utilizing QB.*

***Using Hands-on Engineering Models as a Tool for K-12 Outreach Events***
Poster #11 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Audrey Yewo
Research Mentor(s): Amy Gruss

*Wastewater and waste management hands-on models are very important tools that can be used to develop an understanding of how we treat our water for everyday use. It is especially important*

*when we try to relay this information to younger students as a form of STEM outreach. These models allow for us to demonstrate very complex processes in a way that they understand and allowing them to see the importance of it. This research utilized hands-on models to explain environmental engineering concepts to 5th grades in the Atlanta Public Schools District as part of an outreach event. Instructional videos explaining how to use the models were created for the college volunteers to minimize the apprehension to outreach events. A reflective survey was provided to the volunteers after the outreach activity to understand how tools, such as hands-on models, can increase engagement and how community-engaged activities can change the attitudes and self-efficacy in college volunteers.*

## Electrical and Computer Engineering

***An Analytical Model to Quickly Estimate Battery Capacity and Predict the Remaining Useful Life of Lithium-Ion Batteries***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
2:00 pm – 2:15pm
Undergraduate Student(s): Michael Woodall, Braeden Arnold, Tanya Mudrik, Taylor Shurns
Research Mentor(s): Beibei Jiang

*With the increasing demand for high energy density and high-power density lithium-ion batteries for portable electronics and electric vehicle applications, the accurate real-time estimation of battery capacity not only provides a way to predict the remaining useful life of the battery quickly but also provides an early signal for battery degradation. This work chose the battery's internal resistance changes during each charge and discharge cycle as the evaluation parameter. The correlation between the battery's internal resistance changes and the deliverable capacity was investigated, and a battery equivalent circuit model was established to estimate the deliverable capacity and the remaining useful life of a battery. The model was constructed and validated based on experimentally collected data from more than 100 commercial lithium-ion batteries using the current-off method during the charging/discharging cycling and the electrochemical impedance spectroscopy. The equivalent circuit model also considers the material degradation mechanism during electrochemical reactions to simplify the solution for quickly predicting the deliverable capacity for a constantly changing discharging condition. This model can also be applied to provide early signals of battery degradation and estimate battery degradation mechanisms.*

***Design and Development of a Solar Module Health Monitoring Device***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023

3:00pm – 3:15pm
Undergraduate Student(s): Elijah Madaris and Christopher Baden
Research Mentor(s): Sandip Das

*Solar power has emerged as a promising renewable clean energy source and installations of solar panels are increasing sharply year after year. Monitoring the power output and health of solar panels is critically important to ensure safe and reliable operation of a solar power plant throughout its operational lifetime. In this project, we have designed and built a low-cost electronic device that is capable of measuring the electrical parameters of a solar cell or module. The device consists of a microprocessor with integrated analog-to-digital converter, a supercapacitor bank, current sense amplifier, and electromechanical relays. The microprocessor performs data acquisition through fast sampling of voltage and current, and intelligently controls the charging and discharging of the supercapacitors to trace the current-voltage characteristics of a solar cell in less than 10 seconds. Performance of our device is validated with standard laboratory measurement instruments. Our developed device has integrated Wi-Fi communication capability which allows it to directly connect to the internet and send the data to a remote computer. We developed a python program that runs on the remote computer enabling further data processing, analysis, and continuous remote online health monitoring of solar panels. Device design, fabrication, programming, and experimental data acquired on a polycrystalline silicon solar cell will be presented. Our device will facilitate remote and autonomous detection of anomalous characteristics of a solar panel operating in the field and alert the users or maintenance crews of utility companies to replace a faulty panel on time, thus improving system reliability and safety.*

***Development of a Wi-Fi Enabled Low-Cost Radiation Detection Device***
Poster #25 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Nicholas DeSpain, Jack Avant, Nathan Kirkwood, Dylan Webb, Davyn Armas, Arin Phadke, Alejandro Hidalgo, Anna Zharikov, and Akinbanji Ladipo
Research Mentor(s): Sandip Das

*Radiation detection devices are important in many applications, ranging from medical diagnosis equipments, environmental health and safety, to monitoring of nuclear power plants. We have designed and built a semiconductor diode-based low-cost radiation detection apparatus suitable for measuring high energy gamma radiation. Our system uses a semiconductor p-i-n photodiode as the detector and low-cost electronic circuit to process the nuclear pulses generated by the detector. The analog pulse detection circuit comprises of JFET input operational amplifiers and high-speed comparators. The analog circuit is then interfaced with a microcontroller for pulse counting and dose measurement. Our fabricated radiation detection system also has built-in wi-fi*

*capability to connect to a secured wireless network which makes it an ideal candidate for remote radiation monitoring. In this project, first we designed and simulated the electronic circuit using LTspice software. Then, we designed a printed circuit board (PCB) using EAGLE and fabricated it using a PCB milling machine. Following, we soldered the electronic components and built the complete prototype circuit on the PCB. The microcontroller is programmed using Arduino IDE which continuously monitors the radiation level and can activate an alarm when the radiation level surpasses beyond a programmed safety threshold. Finally, we have designed and modeled an EMI shielded enclosure with electrical feedthroughs using Solidworks. A sealed aluminum box was machined to attach the electrical BNC connectors and house all components inside the box. The detector, electronics, and a radiation source were then assembled inside the enclosure box to complete the system and perform experiments in the laboratory. The prototype device performance was tested under an Americium-241 source. We will present the details of our device design, simulation, fabrication and experimental results.*

***IoT Sensor Nodes***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
3:20pm – 3:35pm
Undergraduate Student(s): Luis Rivera, Anthony Lopez, and Juwan English
Research Mentor(s): Sandip Das and Sumit Chakravarty

*The ambient parameters inside buildings, like temperature, humidity, and illumination level are valuable information that can be used to optimally control HVAC and lighting systems. Such optimal operation can significantly reduce energy consumption and improve the energy efficiency of buildings. Conventional sensor systems either use batteries or wired power supply. Wired power connections are expensive and limit the mobility and locations where the sensors can be placed. On the other hand, battery powered devices require frequent manual battery changes. Not only do batteries hold the hassle of continuous maintenance, but if not recycled properly, they pose a threat to human health and the environment due to their toxic chemical constituents. This research involves designing and prototyping a self-sustaining batteryless IoT sensor system for indoor environment monitoring suitable for smart building applications. Our designed IoT sensor is self-sustaining which powers itself by harvesting energy from ambient indoor light. Alternatively, it can be powered using a remote infrared laser beam in the absence of ambient light. The built-in energy harvesting circuit integrates a solar cell, a DC/DC converter, and an energy storage capacitor. When the capacitor charges to a certain voltage, the low-power STM32 M0+ microcontroller wakes up and sends sensor readings to a hub. The circuit is designed such that discharge of the capacitor from its charged state gives enough time for the microcontroller to complete sensor reading duties, and then transmit the data using an infrared transmitter to a nearby hub. The Wi-Fi enabled hub then uploads the data collected from all sensors to the cloud, which is then analyzed and can be used to control HVAC, power outlets, and indoor lighting of*

*the building to optimize energy usage. We will present the circuit design, programming strategy, and the communication techniques used to develop this smart building IoT sensor.*

***A Non-Invasive Diagnostic Tool: Using Near-infrared Spectroscopy to Assess Microvascular Oxygen Metabolism in Muscles of Older Adults***
Poster #17 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Saba Mabood and Jaden Causey
Research Mentor(s): Paul Lee

*The natural aging process can cause progressive loss of muscle mass and strength in up to 20% of adults over the age of 65 . This condition is otherwise known as sarcopenia in the field of medicine. Sarcopenia leads to significant loss of mobility in older adults. The energy for skeletal muscle function primarily comes from oxidative metabolism. Adequate oxygen delivery to muscles is crucial to meeting the metabolic demand during day to day activities. Fortunately, we can gain meaningful insights on muscle health and function via regular measurement of the oxygen level. The project goal is to develop a light-based wearable sensor, utilizing NIRS technology, that can non-invasively and continuously assess the muscle health in older adults. An open source wearable NIRS cerebral health tracker - FlexNIRS - was utilized for this purpose and the results of test runs were verified. The eventual goal was to design a wearable sensor that will consist of miniaturized LEDs and photodetectors, analog circuits and microcontroller, and a bluetooth module for wireless communication. The compact form factor of the sensor will allow for attachment on forearm muscle or thigh for data collection during activity.*

***Observation of Brain Wave Frequencies During Human Attention Through Use of EPOX Flex EEG Brain Scanner***
Poster #6 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Alexander T. Hunt, Alexis Stoner, Christina Martello, and Daron Pracharn
Research Mentor(s): Cyril Okhio

*Attention is the process of focusing on a stimulus while filtering out external information. This reduces the influx of information into the brain enough to be understood and analyzed. Unfortunately, attention issues such as ADHD have become more apparent and problematic in recent years. Understanding how attention works and how to filter out irrelevant stimuli is key to improving methods of learning as well as for the treatment of attention disorders. There is an increase in brain activity in the Frontal and Parietal Lobes when a subject focuses upon specific*

*Stimuli. The purpose of our research is to explore methods of maintaining attention more effectively. We will place subjects in an immersive environment that fully captures their attention using virtual reality and analyze the impact. The research team will do this via (Electro-Encephalography) EEG scan, which is a method of reading brain wave frequencies by probing for voltage differences on the surface of the human skull. Our participants will be comprised of Kennesaw State University students, provided through SONA. Participants will be scanned using an EPOC Flex 32 channel headset and placed into an Oculus Quest 2 headset to play a game. The game Beat saber will be utilized as it provides a fast-paced environment requiring sustained focus with minimal distractions. Their game play and EEG brain waves will be recorded and cross referenced to compare changes to the attention observed. Through this method, we expect to further knowledge on attention and the effects of immersive environments. We hope to be able to further prove the known impacts of the attention on the brain, see the impact of physical activity on attention, and evaluate whether there is a significant impact on the magnitude of attention the subject can put forward in this environment compared to those used in previous studies.*

***Observation of Time on Alpha and Theta Brain Waves Implicated in Memory Recall Using Emotiv-14 EPOC X EEG Headgear***

Poster #7 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Raphael Freiberger & Daron Pracharn
Research Mentor(s): Cyril Okhio

*The process of memory includes Encoding, Storage, and Retrieval of information, and is mostly associated with the Frontal and Temporal Lobes of the Brain. The aim of this study is to investigate the impact of visual and audiovisual learning styles on information retention. The Design of Experiment involves presenting participants with a word list, generated using words with six letters or less, and monitoring their brainwaves, using Electro-Encephalography EEG Instrumentation, while participants attempt to recall as many words as possible, within a prescribed time. The focus is on Theta waves, which are linked to Recall, and Alpha waves, which are associated with Relaxation and inversely related to Cognitive performance. The study will also compare the effectiveness of Visual and Audiovisual Learning Methods ALM, using the Anne-Treisman Visual Search and Ericson Flanker tasks. The goal is to determine whether visual or audiovisual methods can enhance information retention and recall in educational settings. Future research may involve expanding the study design to include pre-test/post-test designs, and performance in Immersive Environments and Confined Spaces.*

***Portable Diffuse Reflectance Spectroscopy for Non-invasive and Quantitative Assessment of the Parathyroid Glands Viability During Surgery***

Poster #18 (Convocation Center)

Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Mark Romine, Alex Moazzen, and Katie Cho
Graduate Student(s): Linh Luong
Research Mentor(s): Paul Lee

*The parathyroid glands (PTGs) are responsible for the regulation of calcium levels in the blood by secreting a parathyroid hormone. This parathyroid hormone then regulates the body's absorption, storage, and secretion of calcium, which can directly affect the way muscles and nerves operate. PTGs are often at risk of damage, or accidental removal during thyroid surgeries, because it is challenging to identify PTGs and to determine their viability. Current methods of visual inspections are often subjective and blood panels have long processing times. Diffuse Reflectance Spectroscopy (DRS) may provide a solution for the noninvasive, rapid, and quantitative assessment of the viability of PTGs. DRS is a non-invasive technique that uses the reflectance properties of tissue to quantify the hemoglobin (Hb) and concentrations and tissue oxygenation. DRS consists of a white LED (wavelength 400nm – 700nm) for a light source, a compact spectrometer that records tissue reflectance and a fiber optic probe. In this project, we have built a portable DRS system and verified the performance of the prototyped DRS system. We have characterized a signal-to-noise ratio (SNR) on tissue simulating optical phantom and the computed SNR is around 40 dB as expected. Also, we have demonstrated that DRS can measure the change in oxygenation values in our blood phantom testing. These bench-top tests show that our protype is ready for human study during a thyroid surgery.*

***Raman Scattering and X-Ray Diffraction Measurements and Analyses of Zn O Thin Films Grown on Sapphire Substrates by Metal-organic Chemical Vapor Deposition***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
4:00pm – 4:15pm
Graduate Student(s): Ujjwal Purimetla
Research Mentor(s): Benjamin Klein and Zhe Chuan Feng

*The Raman Scattering (RS) characterization and X-Ray Diffraction technique was used to examine a series of Zn O thin films, grown on sapphire substrates using metal-organic chemical vapor deposition (MOCVD). In the current study, thin films of Zn O were grown in a custom-built Low-Pressure Rotating Disk MOCVD Reactor. The growth temperature ranged from 200 to 1000°C, and the growth pressure ranged from 5-80 Torr. A series of Zn O thin films with different thicknesses (10-230 nm) were grown on c-plane sapphire substrates to study the dynamics of Zn O growth. The samples were prepared with a constant O2 flow rate of 8348 mmol/min. Raman spectra revealed peaks at 99 cm-1 and 437 cm-1, corresponding to the Zn O crystallinity characteristics of E2 (low) and E2 (high), respectively. The Raman features from the sapphire*

*substrate were present in the specimen with revealed peaks at various other locations, including a strong peak at 416 cm-1and XRD measurement provided us with the crystallography of the structure. The XRD scan sizes were between 0.1° and 0.005° for wide and fine scans, respectively. The wide scan of the sample SK123 ZnO on ZnO shows XRD data of ZnO (0002), (0004), and (0006) features. The sample also showed the existence of Sapphire. More measurements and analyses of other Zn O epi-films were obtained with similar results. The high crystalline quality of these Zn O materials was confirmed by optical characterization measurements and The structural purity of ZnO in the Sample was confirmed by both techniques.*

***Raman Scattering Data Fitting using MATLAB for GaN Samples***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
3:40pm – 3:55pm
Graduate Student(s): Rachel Cooper
Research Mentor(s): Zhe Feng

*Raman scattering spectroscopy is a powerful technique for analyzing the vibrational modes of molecules. However, analyzing the resulting data can be at times challenging. MATLAB provides a range of tools and functions for data analysis, visualization, and modeling that are particularly useful for Raman scattering data. We review the basics of Raman scattering and describe how MATLAB can be used to fit spectra for GaN specifically the E2 (High) and A1 (LO) modes, interpret the results, and perform calculations for further information about the sample. From the results, electrical properties such as the carrier concentration of GaN can be achieved. Overall, we conclude that MATLAB is a valuable tool for Raman scattering data analysis, providing researchers with a powerful and flexible platform for exploring complex molecular systems.*

***Raman Spectroscopy and X-ray Diffraction of a Gadolinium doped Gallium Nitride Sample***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
4:20pm – 4:35pm
Undergraduate Student(s): Ikram Talukder
Research Mentor(s): Benjamin Klein and Zhe Feng

*For this study, we have analyzed and compared the Raman Spectroscopy and X-ray Diffraction of a Gadolinium (Ga) doped Gallium Nitride sample (2752-UGd) grown by metal-organic chemical vapor deposition (MOCVD) on a sapphire substrate. These samples have three layers, starting with a 400-500nm thick Ga:GdN layer, then a 2-micrometer thick intrinsic GaN layer which was grown on a layer of a sapphire substrate. The Raman data provided a detailed description of the homogeneity of the sample whereas the XRD measurement provided us with the crystallography*

*of the structure. The XRD scan sizes were between 0.1° and 0.005° for wide and fine scans, respectively. The wide scan shows GaN (0002) peak around 34°, GaN (0004) peak at around 72° and GaN (0006) peak at around 126°. The sample also showed the existence of Sapphire which, Sapphire (0006) peaks at around 41° and Sapphire (00012) peaks at around 90°. The fine scans seem to confirm the wide scan peaks. For the Raman spectroscopy, The GaN E2 (low) and E2 (high), the Raman spectra showed peaks at 147 cm-1 and 571cm-1, accordingly. The GaN A1(LO) reached its peak at roughly 739 cm-1. One Sapphire peak was around 416 cm-1, which should be recalibrated at 419 cm-1. Both Raman and XRD have confirmed the structural and crystalline purity of GaN in the Gadolinium-doped Sample.*

***Speckle Contrast Optical Spectroscopy to Assess Muscle Blood Flow for Monitoring Muscle Health in Older Adults***
Poster #19 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Jaden Causey and Saba Mabood
Graduate Student(s): Linh Luong
Research Mentor(s): Paul Lee

*Age-related reduction in muscle function and loss is present in up to 20% of adults over 65 years. In medical terminology, this condition is termed Sarcopenia. This loss of function significantly reduces mobility, and increases the risk of fractures in older individuals. Since the energy for skeletal muscle function mostly comes from oxidative metabolism. Adequate oxygen delivery to muscles is critical to meeting the metabolic demand during daily activities and exercise. Thus, continuous measurement of the oxygen level and blood flow in muscles provides important information on muscle health and function. Speckled Contrast Optical Spectroscopy (SCOS) is an optical based technique that measures speckled contrast with point sources at varying distances and detects photons that undergo several scattering. The SCOS system will consist of a lens, fiber-optic probe, charged-couple device (CCD) camera, and a near-infrared laser. The information provided by this technique is used to measure changes in blood flow. The project goal is to utilize a focusing lens within a SCOS system to assess speckle contrast and evaluate differences in data quality with and without the focusing lens. Through refining the SCOS technique, we aim to gain more accurate muscle blood flow information when assessing muscle health in older adults.*

***Structural and Optical Studies of GaN Grown on Si by MOCVD***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
4:40pm – 4:55pm
Undergraduate Student(s): Brady Wilson
Graduate Student(s): Manika Tun Nafisa

Research Mentor(s): Benjamin Klein and Zhe Chuan Feng

*GaN films grown on silicon have been explored as a wide bandgap semiconductor material in the past two decades. The X-ray diffraction (XRD) technique is used for the analysis of semiconductor crystal structures, whereas the Raman experiment allows us to understand the composition and homogeneity of the epitaxial semiconductor sample. In this study, four GaN thin films grown on Silicon substrates via metalorganic chemical vapor deposition (MOCVD) were examined. For two samples, we performed XRD measurements, while for the other two, we conducted Raman scattering measurements. In the XRD experiments, the wide scan and fine scan step sizes are taken as 0.1° and 0.005°, respectively. The XRD graph of the first sample indicates that the Si first order (002) is at ~28° and the second order (004) is at ~90°, and a weak peak at about 35° indicates the peak of GaN (0002). For the second sample of the XRD experiment, the Si (002) and (004) substrate peaks are oriented also at 28° and 90°, while the GaN (0002), (0004), and (0006) peaks are observed clearly. The first order of the GaN peak is about 34.6°, the second order is approximately 73°, and the third order is around 127°. We examined the Raman scattering under a microscope at room temperature on two samples with 5%, 1%, and 0.5% excitation laser powers, respectively. The first Raman experiment indicated peaks at 520 cm-1 for Si and 565 cm-1 for GaN crystallinity characteristics E2 (High) and A1 (LO), respectively. The Si, GaN E2 (High), and GaN A1 (LO) Raman spectra for the second Raman experiment exhibited peaks at 520 cm-1, 567 cm-1, and 734 cm-1, respectively. With these experiments, our study provides evidence via structural and optical characterization of the exceptional crystalline purity of these GaN on Si samples.*

***Sustainable Sensor Node for Smart Farming***
Poster #26 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Dashan Richards, Vandy Oudomsine, and Rodrigo Corral
Research Mentor(s): Sandip Das and Sumit Chakravarty

*This project is focused on the development of a low-cost and sustainable sensor node for smart farming that can be operational for years with little to zero maintenance. The developed device is designed to provide farmers with valuable real-time information and aid in maximizing crop yields by enabling automated smart farming. The heart of the system is a field deployable sensor node that houses multiple sensors to measure soil conductivity, pH, moisture, temperature, and humidity. The developed sensor node device has an appearance comparable with commercial solar LED garden light sticks. The enclosure is made from food-safe non-recycled high-density polyethylene (HDPE) which houses all electronics and sensors and protects them against the vagaries of the environment. The sensor node is coupled with the LoRa module to facilitate long-distance communication and transmit information to an online database. With integrated LoRa,*

*our node offers about 2 km of coverage in outdoor environments. In addition, our system has low power requirements and offers simpler network integration. Moreover, the sensor node is low-cost and easily configurable through firmware, which makes it feasible to be used not only in large-scale agricultural fields, but also usable in small-scale commercial farms, nurseries, and for private use, such as in the backyard garden of a house. The batteryless self-sustainable sensor node device has integrated solar cells on top and is equipped with an energy harvesting circuit and a supercapacitor for energy storage. An ARM-based microprocessor controls the whole system by managing the sleep and wake cycles, reading sensor data using SPI and I2C protocols, and transmitting the measured data.*

***Visual Sensor Fusion for Robotic Intelligence on Edge.***
Poster #34 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Edward Sadler, Justin Lukose, Olasubomi Rufai, and Sam Fernandes
Graduate Student(s): Tariq Walker and Guangyu Jiang
Research Mentor(s): Yan Fang

*Visual processing tasks such as detection, tracking, and localization are essential to the automation of unmanned aerial vehicles (UAV), robots, surveillance, and defense systems. However, these intelligent tasks become challenging in high-speed motion and limited computing resources, and low power supplies. This research focuses on exploring a brain-inspired framework to process the visual information from two complementary visual sensors, event-based cameras, and frame-based standard cameras, in a sensor-fusion style. Event cameras are a novel class of visual sensors that generate asynchronous events when the illumination of pixels changes in the field. Compared to standard cameras, DVS holds advantages in low latency (high temporal resolution, 10μs vs 3ms), high dynamic range (140dB vs 60dB), and low power consumption (10mW vs 3W). Thus, it is specialized to capture high-speed motion, which blurs a frame-based camera. The specific objective is to merge the advantages of both cameras to address the challenge of high-speed and energy-efficient visual processing with end-to-end closed-loop control for small robots and drones. In this work, we will demonstrate our current progress in designing the fusion framework for two visual tasks, tracking and SLAM, on drone and robot cars.*

***Wearable ECG Device for Arrhythmia Detection***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
11:40am – 11:55am
Undergraduate Student(s): Grant Burke
Research Mentor(s): Jeffrey Yiin

*Many deaths caused by cardiovascular disease, the leading cause of death worldwide, could be avoided if the underlying causes are detected. This can be done with electrocardiograms (ECGs), which has long been done in clinical settings. In recent years, these devices have been made small and cheap enough to be used by consumers outside of clinical settings. For example, the popular Apple Watch generates a signal that is similar to a single-lead ECG and detects Atrial Fibrillation (AFib), a condition characterized by irregular beating of the heart and is linked to an increased risk of heart failure and stroke, with high accuracy. The purpose of this study is to explore methods of creating wearable ECG devices and develop a machine learning model for detecting AFib. For developing the machine learning model, I used Convolutional Neural Networks on publicly available datasets for training. The expected outcomes are to build a proof-of-concept ECG device to obtain clean and useful heartbeat signals for further analysis and to achieve a high accuracy in detecting irregular heartbeats.*

***Wireless, Handheld Diffuse Reflectance Spectroscopy to Quantify Tissue Microvascular Hemodynamics***

Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:00pm-2:15pm
Undergraduate Student(s): Alex Moazzen, Mark Romine, and Katie Cho
Graduate Student(s): Linh Luong
Research Mentor(s): Paul Lee

*Diffuse Reflectance Spectroscopy (DRS) is a non-invasive optical method to characterize tissue optical properties for disease diagnosis and health monitoring. Two optical fibers are often used in a DRS system: one to deliver light to the tissue and the other to gather diffuse reflectance spectra, which provide quantitative details about the structure and composition of the tissue. The conventional DRS system, however, is expensive, bulky, and composed of fragile optical fibers and multiple electrical connections. Here we propose to build a wireless, handheld, and fiber-less diffuse optical spectroscopy system. Unfortunately, the diffusion approximation utilized for data analysis of the conventional DRS is no longer valid due to the non-contact configuration of the fiber-less DRS system. To analyze the collected diffuse reflectance spectra using the handheld spectrometer, we have built a reflectance lookup table (LUT) using Monte Carlo simulation. Also, we have conducted some tests using a blood liquid phantom that is made of water, intralipid, and bovine blood, simulating human tissues to evaluate our DRS system with our LUT to extract the phantom's oxygen saturation (SO2). The results show that portable spectrometer estimated SO2 values agree with the traditional DRS system. These results demonstrate that our handheld equipment can accurately estimate tissue oxygenation and hemoglobin levels, thus providing a mean of rapid quantitative tools assessing microvascular hemodynamics.*

***Wrist Intent Recognition System for Advanced Robotic-Assisted Stroke Rehabilitation***
Poster (Microsoft Teams Link)
Friday April 21, 2023
1:40pm - 1:55pm
Undergraduate Student(s): Paige Andrews, Sulav Bastola, and Inusha Aryal
Research Mentor(s): Coskun Tekes

*This project analyzes the data output of EMG (Electromyography) sensors applied to wrist movement. This project currently uses a device called the Mindrove armband. This device has 8 EMG channels. The goal is to create a model with the data in order to be used to advance rehabilitative assistance capabilities. This model will be used, eventually, to compare to recovering patients in rehabilitation, specifically stroke rehabilitation. The experimental data is collected by placing EMG sensors on healthy subjects and having them use a wrist rehabilitative device. We then collect the data from these healthy subjects and analyze it.*

***Wearable Near Infrared Spectroscopy for Noninvasive Assessment of Cerebral Oxygenation in Pediatric Sickle Cell Disease***
Poster #20 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Alex Moazzen, Andrew Boateng, Mark Romine, and Saba Mabood
Research Mentor(s): Paul Lee

*About 1 out of every 13 African American infants are born with the Sickle Cell Trait. Sickle Cell Disease (SCD) has a profound effect on the brain due to chronic anemia and abnormal perfusion. Indeed, the risk of stroke is 300 times higher than the general population. Assessment of cerebral oxygenation in SCD is important to screen the risk of stroke and monitoring of therapeutic effects. To address this need, the technical solution that we propose is a photonic device using functional Near Infrared Spectroscopy (fNIRS) that noninvasively measures oxyhemoglobin (oxy-Hb) and deoxyhemoglobin (deoxy-Hb) levels in the bloodstream. We have built our prototype fNIRS device that consists of an ESP-32 microcontroller with a built-in Digital to Analog and Analog to Digital converter channels (DAC and ADC), three Operational Amplifiers (two AD8655 and one OPA363), two LEDs for emitting light into the skin tissue, and a Photodiode for measuring the remitted light intensity. Oxy-Hb has a higher absorption rate at lower wavelengths, while deoxy-Hb has a higher absorption rate at higher wavelengths. Thus, we use 650 nm and 950nm wavelengths to accurately measure oxy-Hb and deoxy-Hb. Using the Beer-Lambert law, we can determine the changes in oxygenation between the two. We are currently conducting performance tests on a set of optical phantoms mimicking biological tissue optical properties. This bench-top*

*verification demonstrates that our prototype can noninvasively track the changes of tissue oxygenation level and will be ready for further validation on human subjects in the future.*

## Industrial and Systems Engineering

***Assessing Flight Performance for Gamers and Non-Gamers Using a Flight Rubric***
Poster #16 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Jeffery Felshaw, Jelan Jose, and Asia Douglas
Research Mentor(s): Awatef Ergai

*The need for pilots is growing as it is estimated that by 2032, international aviation will be 80,000 pilots short. Research studies have proven that video game experience correlates with better performance in cognition and hand coordination tasks. Studies have also proven that video game experience correlates with better performance scores in flight simulators. However, these studies have a small sample size, therefore they lack generalization. This study intends to solve whether prior video game experience impacts novice pilots' flight performance by using a larger sample size and a flight simulator. The participants are undergraduate students at KSU and were put into groups solely based on their video game experience: play video games or not. Before using the flight simulator, the participants were given an introductory video to watch to learn the basic controls. Subsequently, they piloted the simulator to get used to the simulator for five minutes. Then, they were asked to fly in a straight and level heading for thirty seconds. A camera recorded the dashboard so their performance could later be evaluated based on how much they deviated from the target metrics on a 1-5 scale for the altimeter, airspeed, attitude, and heading indicators. Two coders coded the flight recordings of the participants separately using the rubric. The interrater reliability of the coders was satisfactory (Kappa = 0.826). Additionally, initial results (based on 8 participants) show that gamers performed better overall than the non-gamers, however, this result isn't statistically significant (p-value = 0.53). Additional data will be collected to confirm the initial results, which may assist with designing and developing an accelerated training path for pilots.*

***The Effect of Gaming on Novice Pilot's Gaze Patterns***
Poster #4 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Tristan McMichael, Danae Benefield, and Aidan Archulet
Research Mentor(s): Awatef Ergai

*Studies have shown that people with significant gaming experience have improved perceptions and coordination skills. Those with gaming experience have displayed improved performance in flight simulators compared to non-gamers. However, the pre-existing research consists of studies with small sample sizes. For this study, we recruited students and grouped them into either gamers or non-gamers. Both groups received initial training on basic operations and controls of an aircraft. After the initial training, participants were allowed a five-minute practice flight. Finally, students were asked to fly a straight and level mission where they maintained a consistent altitude, heading, and attitude. During this task, the participants wore eye-tracking glasses to record what controls and screens their eyes were attending to. The eye tracking data will be processed using iMotions software. Data on the gaze patterns such as saccades, fixation location, and dwell times will be analyzed and compared across the two groups. We expect to see a significant difference between experienced gamers vs novice gamers.*

***The Effect of Mental Demand on Body Postures***
Poster #30 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Rodrick Adams
Research Mentor(s): Valentina Niño

*How we perceive our work has a profound relationship with how our body reacts to help facilitate the performance of our tasks. This is an observational study of the experiment in which participants performed tasks under four different conditions (baseline, interruptions, time, and alarm) and used NASA-TLX (NASA- Task Load Index) scores to assess their mental workload for each condition across six dimensions: mental demand, physical demand, temporal demand, effort, performance, and frustration level. We juxtaposed their NASA-TLX score with corresponding REBA (Rapid Entire Body Assessment) scores while standing and RULA (Rapid Upper Limb Assessment) scores while sitting to determine the effect of the perceived workload on their respective body postures. The results of the experiment proved that the higher the perception of the task, measured by the NASA-TLX score, the more of an effect it has on the body postures. The preliminary discoveries of the observed data found that body postures were most affected by the condition in which alarms were applied for both sitting and standing activities. However, when the participants were grouped by sex, there were noticeable differences in which dimension had the most substantial effect on RUBA and RULA scores. This study seeks to understand the most robust relationship between mental workload dimensions and body postures.*

***Fluoride Varnish Time Studies***
Poster #22 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm

Undergraduate Student(s): Emily Rodriguez-Jacobo and Tyler Mason
Research Mentor(s): Robert Keyser and Christina Scherrer

***Research context:*** *Dental decay is an important and ongoing public health concern and impacts children from low-income households and from racial and ethnic minorities at higher rates than the rest of the population. As young children are much more likely to visit a primary care provider than a dentist, including appropriate and effective preventive oral health services (POHS) at pediatric well-visits has the potential to dramatically improve children's oral health. Fluoride varnish (FV) application is one such POHS for which insurance programs will reimburse for children in the primary care setting, yet only a small minority of physicians apply FV. The most common barrier cited is lack of time during a well-visit.* ***Research goal:*** *The goal of this project is to remove the primary process flow barrier (lack of time) currently dissuading physicians from providing FV during pediatric well-visits.* ***Research methods:*** *Our research team conducted on-site visits at six pediatric clinics in Georgia to collect videos of FV treatments among FV providers. We performed time studies on each video to determine both the total standard time for the overall fluoride varnish treatment process as well as the actual time to apply FV to children's teeth. Regression analysis was employed to develop a predictive model for estimating total FV treatment time based on significant predictor variables, such as age, gender, provider, and clinic.* ***Results:*** *Our results show that it takes less than 2 minutes, on average, for the overall FV treatment process (i.e., opening the FV packet, positioning the child, talking to the child and parent(s), etc.) after obtaining parental consent, and less than 30 seconds, on average, to apply FV during a 30-minute well-visit.*

***Implementation of Sustainable Lean Practices in Preventive Maintenance through Root Cause Analysis***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
11:40am – 11:55am
Undergraduate Student(s): Ryan Lee Waltman
Research Mentor(s): Parisa Pooyan

*The increasing demand for green, economically efficient, and environmentally and socially sustainable resources has imposed an essential need to limit the consumption of petrochemical-based reserves and substitute them with renewable ones. Systems approach, as one of the first attempts at sustainable development, aims to minimize an organization's adverse environmental and social impact while maximizing its systems' economic output. As such, the integration of green concept that aims to eliminate environmental waste combined with lean notion that strives to reduce non-value adding waste provides a potential approach to collectively improve environmental, economic and even social performance of organizations through the so-called Triple Bottom Line (TBL) strategies. Our objective in this research is focused on implementing a*

*conceptual model targeting the three pillars of sustainability by applying the Lean-Green-Sustainable (LGS) tools such as Root Cause Analysis (RCA), Total Productive Maintenance (TPM) and 6R. Data was collected from a major manufacturing corporation in the appliances industry; then organized and vetted based on their relevance to the LGS tools. Results show a strong correlation between the economic impact of the TBL and TPM, with an aggregate annual savings of $37,170 in labor costs and 190 hours saved in non-value-added time. Similarly, environmental and social factors had an impact with empowering workers and lowering environmental waste. As such, the LGS practices such as 6R, Poka-Yoke, and TPM contributed towards environmental sustainability while 5S, Standard Work (SM), and Visual Management (VM) contributed towards economic and social sustainability to collectively facilitate the company's goal of achieving the Triple Bottom Line.*

***Industrial Decarbonization through Efficiency Improvement in Steam Systems***
Poster #1 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Christopher Spencer
Research Mentor(s): Amin Esmaeili and Javad Khazaii

*Steam systems are major parts of many manufacturing processes due to steam's non-toxicity and low-cost production as well as its high heat content. A published report by Kaman Industrial Technologies has stated that around 81% of total fossil fuel consumption in pulp and paper manufactures, 57% of total in food processing facilities, 42% of total in chemical processing entities, and 23% of total in petroleum refineries are associated to the steam system. These ratios can be directly converted to the estimated carbon footprint of the steam systems. Therefore, the steam systems efficiency improvement can be considered as one of the major steps toward industrial decarbonization. This research paper and poster presentation is conducted by the members of Industrial Assessment Center (IAC) at Kennesaw State University (KSU). In this study, we have investigated and suggested improvements for the identified non-efficient practices at few of the Georgia's small- and medium- sized textile manufacturers. As the steam systems consist of four distinct elements generation, distribution, steam usage; and recovery condensate, we have organized our findings based on these elements. Our findings suggest that approximately 6-8% of total steam fossil fuel consumption during generation and 2-3% of total fossil fuel consumption during distribution and condensate recovery can be avoided with implementation of few cost-effective improvements. Moreover, in this study, we have discussed the implementation of microturbine for combined heat and power (CHP) systems. Based on our findings, textile manufacturing facilities are excellent candidates for this efficient and clean approach of generating on-site electric power and useful thermal energy from a single fuel source such as Natural Gas. Based on the US Department of Energy CHP Technical Assistance Partnerships (CHP TAPs)*

*program, cogeneration provide a cost-effective, near-term opportunity to improve United States energy, environmental, and economic future.*

***KWAD (KSU all Weather Aerial Drone)***
Poster #33 (Convocation Center)
10:00am – 10:45am
Undergraduate Student(s): Logan Westra, Andrew Garwacke, Austin Arnold, Nick Farinacci, Eva Sanchez, Tamara Mateos Villar, Aizia Travis, Kwesi Onumah, Fon Saliki, and Ahmed Hamza
Research Mentor(s): Adeel Khalid

*This project, named "KWAD" or the "KSU allWeather Aerial Drone", was commissioned by Ultool, LLC to the KSU Research and Service Foundation with the overarching objective of creating a lightweight drone capable of capturing HD video during all-weather operation. The conditions of all-weather operation were defined as follows: the craft must be operable in rainfall of 1" per hour and wind speeds of up to 20-25 mph. In addition, a global minimum safety factor of 2 is required in order to ensure the structural integrity of the system in extreme weather conditions. Potential mission profiles as suggested by Ultool, LLC include autonomous inspections of naval ship hulls, topological mapping in high moisture areas such as caves or geysers, search and rescue operations, emergency transportation of medical supplies, and wildfire investigation. In addition, it has been recommended to use many 3D printed parts in the design, with the purpose of increasing the ease of servicing the craft. The timeline goal for the project is to have a working prototype that fits the design requirements by May the Eighth; the last day of KSU's spring semester.*

***Motivations, Intentions, and Beliefs among Active and Non-Active Blood Donors***
Poster #23 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Jadesola Bamidele
Research Mentor(s): Robert Keyser and Lin Li

*The aging baby boomer blood donor base, coupled with decreases from younger age groups, is an ongoing public health concern and impacts all people in need of blood transfusions regardless of gender, age, racial, or ethnic backgrounds. Results from a large, cross-sectional 2016 National Health Interview Survey study in the U.S., the 18-24 age group yielded the lowest percentage of past-year blood donations, with blood donations from males being more common than from females. There is an urgent need to successfully recruit a younger generation of sustainable blood donors to complement and eventually replace the aging WWII and baby boomer generations (ages 60+) of donors. The objective of this research is to learn motivations, intentions, and beliefs among*

*active blood donors towards donating blood in the 18-39 age group. A Qualtrics survey, which includes ten Theory of Planned Behavior (TPB) 7-point Likert scale questions among four constructs (Attitudes, Subjective Norms, Perceived Behavioral Control, and Intention), was administered electronically to active blood donors in a database from MEDIC, a large, regional blood center. Results include an overall computation of Cronbach's , which indicates a good level of inter-reliability; that is, how closely related a set of items are within each construct. We also developed a regression model to predict donors' intentions to donate blood based on several predictor variables, such as demographic factors, when they first donated blood, how often they donate blood, etc.*

***A Performance Comparison between NASA-TLX and SURG-TLX Workload Measurements***
Poster #14 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Isabella Duque
Research Mentor(s): Luisa Valentina Nino

*Mental workload has gained attention in the workplaces since technology has recently become more common. Mental workload is a concept with multiple dimensions, such as stress or time demand, that includes qualities about the task, the operator, and the workplace environment. NASA-TLX and SURG-TLX are mental workloads measurement tools. The NASA-TLX is currently the most used tool to measure workload and is a questionnaire of six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration. The SURG-TLX is a recently developed tool that measures mental workload in the medical field, especially in the surgery area. It also consists of six dimensions: mental demands, physical demands, temporal demands, task complexity, situational stress, and distractions. It is important to know that SURG-TLX has the additional dimensions of complexity, situational stress, and distractions dimensions. The objective of this research is to analyze the data of thirty-two participants in a study where they were exposed to external psychosocial factors that generated different levels of stress, mental, and physical reactions. The NASA-TLX and SURG-TLX were used to measure those reactions. The data collected from the two tools will be compared to explore strengths, weaknesses, similarities, differences, and correlation, and to determine if SURG-TLX and its dimensions are more appropriate to use in future research in the medical field.*

***Planned Behavior and Blood Donation Intention Study***
Poster #24 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Teba Al Karwe

Research Mentor(s): Robert Keyser and Lin Li

*The decline in blood donations from younger generations and minorities, coupled with an aging baby boomer donor base, presents an ongoing public health concern. Blood transfusion is a crucial service of health care systems, contributing to saving and improving millions of lives every year. However, the shortage of blood donors threatens national supplies in many countries, including the United States. The aging population, increasing life expectancy, and rigorous donor screening criteria have contributed to an imbalance between increased levels of care and demand for blood products and the supply of blood. Furthermore, seasonal blood shortages during holidays and winter months are common. The shortage of blood donors is a global problem, and continual recruitment of donors is critical to ensure the availability of blood products for those in need, especially during times of crisis. This project aims to support a larger study effort of recruiting and retaining young blood donors in the 18-39 age demographic. Collaborating with MEDIC Regional Blood Center, our focus for this project is to design and prototype a mobile app that helps recruit new blood donors and retain existing donors. We plan to conduct surveys to collect data on blood donors' perceptions of mobile apps and identify factors/features that help improve the blood donation experience. Our results reveal desired social media apps and other preferences described by survey participants.*

***Solar Energy Onsite Generation Potentials for Industrial Decarbonization***
Poster #2 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Maya Muammar
Research Mentor(s): Amin Esmaeili

*Onsite electricity generation from low (or no) carbon alternative energy sources are rapidly growing as a solution for industrial decarbonization. Among the renewable sources, the option of solar energy has gained momentum in recent years, specifically due to significant reduction in the cost of solar photovoltaic panels, and therefore better return of investment (ROI). Moreover, in the manufacturing facilities, due to the large energy consuming systems, the onsite generation and then the onsite consumption opportunity will eliminate the electricity transmission losses as well as increasing the reliability of the energy supply chain during the unexpected events. Despite these mentioned benefits of solar energy and the recent renewal of federal 30% Investment Tax Credit (ITC), there is yet no wide-spread plan for the implementation of solar panel projects in Georgia's small and medium-sized (SME) manufacturing sector.*
*In an effort to introduce to the owners and managers of the SME manufacturers and aware them of solar PV benefits, the Industrial Assessment Center (IAC) at Kennesaw State University has initiated multiple research agendas to conduct site-specific studies and analysis. These research papers and poster presentations depict the benefits of solar panel projects by quantifying the*

*potential cost and carbon footprint reduction on various manufacturing sites. Here as an instance, the hourly power demand of an automotive part manufacturer, located in Georgia, has been compared side-by-side with the potential future supply of solar power, that shows as high as 40% cost reduction can be achieved with ROI of 9 years for the solar panel's installation. Then, a sensitivity analysis wasperformed to quantify the potential impact of future changes in electricity purchase prices. Also, the impact of changes in the rate schedules were discussed. Rate schedules are used by electric utilities to calculate the monthly electricity $ charges for their customers. Keywords: Solar Energy, Cost and Emission Reduction, Carbon Footprint, Industrial Decarbonization, Manufacturing.*

## Mechanical Engineering

***3D Printed Lab Equipment for Mechanical Vibrations Courses***
Poster #2 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Galilea Rosas Guzman
Research Mentor(s): Ayse Tekes

*Students struggle to comprehend challenging concepts introduced in the engineering courses since the theory is highly mathematical such as mechanical vibrations offered in the mechanical engineering program. Also, unlike other engineering courses, students have to wait for a semester to take the associated lab resulting in loosing students' interest. To help students visualize the concepts taught in the mechanical vibrations, we designed a vibratory mechanism to demonstrate fundamentals.*

***Actuation of Corkscrew Swimming Motion in Soft-Millirobots at Varying Frequencies***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
2:20pm – 2:35pm
Undergraduate Student(s): Jordan Scurry, Jessica Trinh, and Christophe Bulang
Research Mentor(s): Dal Hyung Kim

*Soft-Millirobots have many applications in the biomedical field which is why they are commonly researched. The objective of this study is to control the locomotion of Soft-Millirobots by using 3D Helmholtz coils to rotate a magnetic field at different frequencies. The Soft-Millirobots used in the study are all roughly 3 mm long, 1 mm wide, and 0.3 mm thick and comprised of a composite polymer combined with ferromagnetic particles for the head and just the composite polymer for the body. The robots are all magnetized along their major axis and then placed into a 30 x 30 x 10 mm*

*clear chamber. There, the millirobots are subjected to a rotating magnetic field oriented in a cone shape at various frequencies and observed over 200 Hz by a high-speed infrared camera. The rotating magnetic fields create three different types of locomotion in the soft robot when tilted at 15 degrees: a rolling motion appears frequencies ranging from 1 to 10 Hz, a transient motion appear at frequencies ranging from 10 to 30 Hz and a corkscrew motion at frequencies ranging from 31 to 50 Hz. As the tilt angle of rotating magnetic field increases, the cone shape becomes shallower and, all three locomotion types begin to occur at lower frequencies. Within the study, we successfully demonstrated the rolling motion caused by the rotation of the robot about its minor axis, and the corkscrew motion caused by the rotation of the robot about its major axis. While simultaneously demonstrating that the tilt angle of the cone shaped magnetic field plays a crucial role in controlling locomotion of the swimming soft bodied robot.*

***Behavior Imaging System of Fruit flies (Drosophila melanogaster) in a Standard Food Vial***

Oral Presentation (ALC 4103)
Tuesday April 18, 2023
2:40pm – 2:55pm
Undergraduate Student(s): Oluwatobi Sanni and Matthew Ackerman
Research Mentor(s): Dal Hyung Kim and Anton Bryantsev

*Fruit flies (Drosophila melanogaster) have long been a model organism in behavior studies due to their relatively simple nervous system and ability to exhibit complex behaviors. These insects have been utilized in research to study a range of behaviors, including circadian rhythms, learning and memory, aggression, courtship, and social behavior. However, one challenge in studying fruit fly behavior is the difficulty in long-term imaging due to the automated imaging system of their fly food vials. Previous methods have involved the use of specialized chambers for imaging, which proved impractical for long-term observation since the flies cannot survive for multiple days without food. The objective of our project is to develop a behavior imaging system for fruit flies in a standard food vial (culture vial) to enable long-term observation. The standard food vial used in fruit fly research is a clear plastic cylindrical tube filled with a semi-solid nutrient medium at the bottom and topped with a foam stopper to prevent the flies from escaping while allowing air exchange. We designed our imaging system for the standard food vial using a machine vision camera and a near-infrared (NIR) light-emitting diode (LED). To account for the cylindrical shape of the tube, LEDs were placed on the top and bottom of the vial for dark-field imaging without hard light reflection. A machine vision camera was placed to image multiple vials at once. The camera produces a sequence of images, subtracted from a background image and binarized for blob analysis, thereby recording the position of each fly in each frame. To produce a track of each fly, we assign a fly from one frame to be the same fly in another frame. These tracks can then be analyzed for general activity, expressed as a single value for the swarm.*

***Biomimetic Locomotion of a Hexapod Robot Based on Fire Ant's Gait Motion***
Oral Presentation (Convocation Center)
Tuesday April 18, 2023
3:00pm – 3:15pm
Undergraduate Student(s): Kalev Martinson, William Marks, and Erick Yu
Research Mentor(s): Dal Hyung Kim

*The development of biomimetic hexapod robots has generated significant interest due to their potential to navigate uneven and cluttered environments. However, the previous research on these robots has been limited in exploring how to control them when they are damaged during missions. To address this gap, the objective of this project is to expand the existing research on biomimetic hexapods by studying the changes in ant gait motion that result from leg loss and implementing those changes in a robot. To achieve this goal, a walking robot simulator was developed and modeled with consideration of the constraints of scale, mass distribution, motor weight, and leg lengths. The timing of the injured ant's leg liftoff and landing was analyzed and programmed in the robot. Two unique movement patterns, the broken tripod gait and wave gait, were identified as a result of this analysis. The robot's performance was assessed under both patterns, with stability observed while walking in manually programmed wave and tripod gaits with six legs. However, when one leg was removed, the robot was unstable. The biomimetic five-legged gaits were also observed to be unstable when leg timings were mimicked without consideration of the center of mass. Incorporating the center of mass mimicry is expected to improve the robot's walking stability. By exploring how to control damaged hexapod robots, this project expands the potential applications of these robots, making them more versatile and robust in challenging environments.*

***A Claw Mechanism Built by Thermally Actuated Muscles***
Poster #13 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Rihan Mammen, Kyra Maldonado, Bethany White, Christina Wills, and James Balbuena
Research Mentor(s): Jungkyu Park

*The goal of this research is to find an application for more affordable supercoiled polymers to combat the high budget required to work with more recently developed actuators used in artificial muscles. By using cheaper materials such as nylon fishing line and conductive thread, we can recreate advanced actuators that consist of Carbon Fiber Nanotubing (CNT) for a fraction of the cost. Materials such as silver paste and graphene were introduced to aid conductivity as well as heat dissipation. After sample creation, our team was designated with the task to create a simple mechanism that used a system of the sample artificial muscles to measure its effectiveness. A claw*

*mechanism was designed, placing the polymer coils in similar positions to where the muscle threading in our fingers is located to emulate human fingers. Gears were used at the base of each arm of the claw to allow the arms to move in sync, without needing multiple muscles to coordinate them separately. To activate the muscle, a small current can be run through the coil, signaling it to contract as needed. We then used an Arduino Uno R3 kit, and a code was created that programmed an Infrared Light Remote (IR remote) to connect to a breadboard and Arduino board, allowing us to signal electrical circuits to turn on or off remotely. Currently, LED lights are temporarily substituting the artificial muscles' placement in the circuit system. When the LED bulbs are on, it simulates the artificial muscle receiving a signal to contract. Buttons were mapped to the IR Remote to control each light individually, allowing us to command each separate muscle on the mechanism as needed. With further development, artificial muscles will replace the LEDS, and the mechanism will fully function.*

***Design and Development of Remote Operated and Soft Biomimetic Amphibious Mud Skipper (A.R.O.M.S.)***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
10:20am – 10:35am
Undergraduate Student(s): Rafel Juarez; Sungchan Cho, Ulysses Lupercio, Kevin Tran, Lucas Schwenck, and Connor Talley
Research Mentor(s): Ayse Tekes

*In this study, an amphibious, remotely operated, soft biomimetic locomotive mechanism is presented that can reliably travel over rough terrain and various material mediums. The design of this mechanism is inspired by the mudskipper, consisting of two compliant fins arms, a central body, and a compliant tail, utilized to travel on both land and water surfaces. The parts of the biomimetic robot are 3D printed using thermoplastic polyurethane and polylactic acid to sustain its contact with the ground in a unique way. The proposed design utilizes four servo motors to consistently move two soft fin arms to overcome obstacles. Each compliant fin arm is actuated in a swiping motion by a single servo motor in the horizontal plane, however, the fins are designed to move the robot vertically when they deform due to the friction interaction with the ground since the compliant fins are 3D printed at a diagonal angle. When forces are applied in opposite directions on the top and bottom of the fins, the fins are formed into vertical blades with an increased height that can lift the main body of the mechanism off the ground. The load increases the traction on the fins and allows the robot to move forward and backward as the fins stride across a surface. This angled geometry also allows the fins to reset to their initial position without causing backward translation. All the electronics are modified to be waterproof so that the robot can travel on a water surface without the hazard of shorting. Additionally, MATLAB Simscape model of the robot is created to optimize the link lengths and analyze the motion behavior.*

***Design and Fabrication of an Infrared Imaging Setup for Solar Cell Defect Detection***
Poster #23 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Mason Valles, Maya Muammar, Ben Goldberg, Vincent Phan, & Omarion Edwards
Research Mentor(s): Sathish Gurupatham & Sandip Das

*Solar panels consist of solar cells that use the energy of the sunlight to produce an electric current and output electrical power. Solar cells may contain defects that are created during the manufacturing process or can develop new defects after production while operating in the field or during transportation. Detection of these defects and monitoring the health of solar panels are extremely important since defects reduce cell efficiency and can jeopardize the operation of a solar panel. A common type of defect is microcrack which are often not visible to the naked eye or a regular camera. Infrared (IR) electroluminescence imaging technique has the capability to detect these micro-cracks, and in some cases other types of defects. Commercial electroluminescence (EL) experiment setups are very expensive. Our research project is focused on the design and fabrication of a low-cost infrared electroluminescence imaging system to test silicon solar cells. For this research, we have used a digital CMOS sensor-based camera since they are cheaply available and have the capability to capture some portion of the infrared spectrum. The digital camera was modified by removing its infrared-blocking filter and retrofitting an NIR pass filter. The experimental setup consists of the modified camera with a lens, optical filter, a regulated power supply, and aluminum extrusion mounting hardware. A regulated power supply unit injects a current into the solar cell, and a python program controls the camera and the experimental setup. The python program acquires the infrared image directly to a computer and then presents it to the user for visual inspection. Our in-house built EL imaging setup can be used to detect microcrack defects and help to sort good quality solar cells.*

***Energy Storage Systems Using 2D Carbon Based Nanocomposites as Electrodes***
Poster #1 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Jake Irvin, Ava Giffen, and Jacob DiLeonardi
Research Mentor(s): Ashish Aphale

*Different allotropes of carbon, such as graphene and carbon nanotubes, have the potential for use in applications such as clean energy storage systems, aerospace, and energy conversion. In this work, the development of graphene-based nanocomposites (GNCs) for use in an ultracapacitor is investigated. GNCs can be used in ultracapacitors because of their superior electrochemical properties providing superior energy storage performance. Device miniaturization is also possible*

*to facilitate a vast number of applications. In this experimental work, GNCs will be synthesized using an electrochemical deposition technique and the performance of the electrode will be evaluated using various electrochemical studies in the presence of an aqueous electrolyte. Distinct Faradaic and non-Faradaic charge transfer mechanisms will be investigated using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), and galvanostatic charge-discharge (GCD) studies. Results of different rates of deposition during synthesis and their effect on performance will be presented. The role of different substrates, electrolytes, and their effect on the performance of the device will be discussed. Mechanisms of charge storage and transfer between the electrolyte and GNC surface will be presented.*

***Graphene Oxide-based Supercapacitor for High-performance***
Poster #1 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Ben McKinney, Beth Woldesus, and Sonnett Kowalski
Graduate Student(s): Duy Pham
Research Mentor(s): Ashish Aphale

*Electrochemical energy storage involves the conversion between electrical energy and chemical energy, which is based on electrochemical reactions that occur at the interface between two materials, typically an electrode and an electrolyte. The increase in energy demands and the environmental consequences of using fossil fuels has become an ever-expanding concern. Electrochemical storage systems have provided a possible solution through the use of supercapacitors devices. In this work, a nanocomposite electrode using graphene oxide and polypyrrole (GO/PPy) was synthesized using electropolymerization processes. Synthesized GO/PPy films are used as electrodes for the application of supercapacitors to study the effects of graphene oxide on polypyrrole and its performance. Electrochemical methods such as cyclic voltammetry (CV) and Electrochemical Impedance Spectroscopy (EIS) are used to evaluate the electrode performance. Various performance matrices such as energy storage capacities, ohmic resistance, non-ohmic resistance, and Warburg resistance, which reflect the charge transport and charge storage behavior, will be discussed.*

***Modeling and Simulation of Compliant Mechanisms in MATLAB Simscape***
Poster #3 (Convocation Center)
Thursday April 20, 2023
12:00pm – 12:45pm
Undergraduate Student(s): Matthew Woodbine, Ethan Kessie, and Spencer Cline
Research Mentor(s): Ayse Tekes

*Compliant mechanisms are the mechanisms that transfer the input force, displacement, or torque from one point to another through the deformation of its compliant members and flexible body rather than the joints such as ball bearings. They have superiorities over the traditionally designed mechanisms such that since they can be designed and manufactured as a single piece using injection molding or additive manufacturing, they are light weighted, and no need for assembly and have no friction loss. Thus, the compliant mechanisms have better performance and accuracy and find application areas in the design of locomotive robots, grippers, medical robots, and microelectromechanical (MEMs) devices. Despite all the advantages, deriving the mathematical model of compliant mechanisms is much more challenging compared to traditional rigid body mechanisms as the complexity of the design increases. Although there are several methods available to find the load-deflection curves of flexible members such as pseudo rigid body modeling (PRBM) and the first and second of the Elliptica theory, they are limited to the simple geometries including fixed-free, fixed-guided, and fixed-fixed buckling beams. In this study, we present the design, modeling, and simulation of several compliant mechanisms in MATLAB Simscape. We adopted two approaches: the model can be created using the Simulink library blocks or by importing the cad model and then introducing the flexibility using discrete beam elements. We created the models of a fully compliant five-bar mechanism including 4 rigid bars connected by large deflecting flexure hinges, a compliant dwell mechanism incorporating buckling beams, a slider, and a rail, and a compliant bistable mechanism consisting of 6 rigid bars, a slider, and fixed-free flexible beams. The Simscape models not only provide kinematic insight but also visualize the displacement and motion of each mechanism in the mechanics explorer.*

***Molecular Dynamics Study for Tritium Adsorption on Novel Materials***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
3:40pm – 3:55pm
Undergraduate Student(s): Jason Viscardi, Benjamin Robinson, and Asher Flanagan
Research Mentor(s): Jungkyu Park

*In this study, novel materials will be researched, and their potential uses for tritium control. 12 studies have been collected on various materials that give a solid foundation for future research that will be conducted regarding tritium control. All these studies used molecular dynamics simulation (MDS) to generate results. The first paper found from a university in Crete, Greece discussed pillared graphene to store hydrogen in a novel 3D carbon nanostructure in which pore size and surface area can be adjusted to suit the need. This was the first of several studies that aim to arrange the graphene in such a way that hydrogen isotopes like tritium could be stored. Studies found in Massachusetts, California, Japan, Taiwan, China, Greece, Germany, Spain, and France show some similar methodologies of using MDS to create models of how tritium or deuterium can be safely stored or captured as the molecules move around in a specific environment. A simulation of interest conducted in Sandia National labs shows the diffusion of Hydrogen through aluminum,*

*highlighting the importance of novel solutions to this problem and how difficult it is for these isotopes to be stored using standard methods. We are collating all these methods and techniques made by other institutions and labs to create models that can be used in any scenario within reason. The method of choice for this type of research is to use an MDS software called Large-scale Atomic/Molecular Massively Parallel Simulator or LAMMPS to create functional models of what occurs within a reactor. This is the preferred practice when conducting this research as creating physical models can be expensive and require extensive safety equipment. The future of this research will be to find ways that these and more novel materials can be used to create advanced filtration and extraction methods from existing sources such as active nuclear reactors and be able to store hydrogen isotopes for extended periods of time.*

***Motion Analysis of Closed-Chain Soft Robots in MATLAB Simscape***
Oral Presentation (ALC 4102)
Tuesday April 18, 2023
10:40am – 10:55am
Undergraduate Student(s): Anthony Delaughter, Parker Wood, Majazz Allah, Nathan Jones, Richard Woods, Connor Talley, and Vijay Shah
Research Mentor(s): Ayes Tekes

*Soft robots have received great attention due to their inherent properties of imitating the bionic motion we see in nature. Robots incorporating soft members deform when subjected to loading with enhanced motion capabilities and possess a simple manufacturing process compared to their rigid counterparts. However, despite their superiorities, it remains a challenging task to obtain the dynamic model of complex soft robots. In this study, we designed several closed-chain soft robots and developed the physical models as a single piece using a dual extruder 3D printer and created MATLAB Simscape models with a mask to enable the user interface so the user change geometry and material properties. The Simscape models of soft robots are validated through image processing.*

***Optimization of Metallic Interconnectors for Clean Energy Power Systems***
Poster #3 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Mason Cox
Graduate Student(s) Duy Pham
Research Mentor(s): Ashish Aphale

*The need to eliminate carbon emissions coupled with intensified energy demands have led to an intensified research and development activities in clean energy technology. Taking advantage of fuels such as green hydrogen, solid oxide fuel cells (SOFC) power systems can serve as a potential*

*energy conversion system. SOFCs combine O2 from air and H2 gas to generate electricity, consequently producing water (H2O) as the only byproduct of the electrochemical reaction. SOFCs typically have an operational temperature in the range of 500-900C and generate electricity without the requirement of recharging, so long as the fuel is supplied. A single SOFC cell contains a porous cathode electrode where oxygen reduction reaction takes place (ORR), a porous anode electrode where hydrogen oxidation reaction (HOR) occurs. A dense electrolyte separates the anode and cathode, and an interconnect (IC) is placed on both electrodes that acts like a current collector. ICs are fabricated using chromia-forming alloys due to their high electrical conductivity and robust resistance to oxidation and corrosion. Oxidation of behavior of these alloys and their influence on the electrical property of oxide scales under complex SOFC operating atmosphere largely remains unknow. This experimental research work is focused on understanding the oxidation behavior of select commercial chromia and alumina forming IC alloys measurement of resistivity at elevated temperatures and the calculated time and temperature-dependent ASR will be presented. Implications of oxidation and corrosion of alloys at high temperatures under complex gas atmosphere and their effect on the electric conductive pathway will be discussed. Applications of this research pertaining to transportation, residential and commercial systems in energy storage and conversion and study its effect on the area-specific resistance (ASR) under SOFC operating conditions. Experimental details regarding the technologies will be presented.*

***Russian Soldiers Exposed to Radiation at Chernobyl***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
3:20pm – 3:35pm
Undergraduate Student(s): Ava Giffen
Research Mentor(s): Eduardo Farfan

*On 23 February 2022, the Russian President, Vladimir Putin, announced Russia's plan to invade Ukraine to put an end to Nazi ideology in Ukraine and stop the genocide of ethnic Russians living in Ukraine. The following day, 24 February 2022, Russia began its attack from three different fronts (North, South, and East). In the north, the Russians entered through Belarus towards Kyiv, the Capital of Ukraine. The Russian soldiers occupied the Chernobyl Nuclear Power Plant and various areas of the Chernobyl Exclusion Zone. Specifically, the Russian forces took control of Chernobyl Nuclear Power Plant Unit 4, the same reactor that caused the 1986 Chernobyl Disaster. This accident released large amounts of radioactive materials into the environment that have been measured to outweigh that created by both atomic bombs released in Japan at the end of World War II. These high levels of radiation have made the area surrounding the site of the blast inhabitable and Ukraine has since designated an "Exclusion Zone" surrounding the site. This area, spanning 30 km around the plant, is only accessible for maintenance and work reasons and otherwise is uninhabited to prevent the public from exposure to the remaining radiation. The*

*Russian soldiers set up their military equipment and troops on a campsite located just over 3 km from the Chernobyl Nuclear Power Plant Unit 4. This study collected information on radiation exposure to the Russian soldiers and compared them to the claims being made that over 70 soldiers were hospitalized for radiation exposure. The actions made by the soldiers during their occupation of Chernobyl were analyzed to support the claim that the soldiers were not exposed to enough radiation to develop acute symptoms. This study summarizes the Russian soldiers' radiation doses and the corresponding level of radiation sickness.*

***Soft Robots for NASA***
Poster #30 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Johnston Ejoga and Emilio Quintero Castaneda
Research Mentor(s): Turaj Ashuri

*While self-operating technology has been improved and self-driving cars can operate with the help of many variables autonomously on roads, what happens when there are no variables, and a robot must operate on tough terrains without being helped by external variables such as signs and markings? A robot operating by itself independently from other factors can lead to more space explorations. The purpose of this research is to design a robot that can navigate independently through rough terrains using only its sensors and without any help from the user. During the research, a soft robot is assembled using soft novel materials from a 3D printer. Using soft materials helps the robot to easily navigate through the rocky terrains that other planets have. The soft robot is then programmed to operate autonomously with minimal interaction with the user. The robot has many types of sensors such as infrared light, and an ultrasonic module that helps the robot track any obstacles in the way. All the sensors run through an Arduino microcontroller, which acts like a brain for the robot. The brain is composed of many nodes that send information to each other and a main node. The main node is the master node, which acts like a receiver and publisher and it sends information to the different sensors creating a service between them. The final design of this project is an autonomous robot that is fabricated using soft materials, and it is programmed using an Arduino microcontroller to go over complex terrains independently and without any help from the user.*

***Soft Robots for NASA Space Exploration***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
2:20pm-2:35pm
Undergraduate Student(s): Monish Patil
Research Mentor(s): Turaj Ashuri

*In the realm of space exploration, our study delves into the thrilling world of soft robotics. Specifically, we focus on the utilization of a resilient and pliable material known as TPU. By conducting experiments, we aim to scrutinize the intricate ways in which different printing methodologies can alter TPU's properties, allowing us to create soft robot prototypes that can adeptly navigate through treacherous terrain. In addition to fabricating the soft robots themselves, our research seeks to address the crucial issue of controlling these machines. Through a series of rigorous tests, including the utilization of various control techniques, such as sensors and actuators, we aim to develop a control system that can efficiently handle complex tasks such as collecting valuable scientific data and navigating through the most unforgiving of environments. Our findings suggest that soft robots possess exceptional potential for space exploration, given their remarkable ability to withstand unpredictable circumstances while providing a more efficient and safer mode of operation when compared to their rigid robotic counterparts. We believe that our work holds great significance in the development of autonomous systems that can endure extreme conditions and offer valuable insights to human explorers. Additionally, TPU, as a material, shows tremendous promise for further research and refinement. In summary, our research represents a significant breakthrough in the field of soft robotics for space exploration, where we are poised to revolutionize the way robots operate in space. By combining the unique properties of TPU with advanced control systems, we can develop robots that can function independently in space, providing unparalleled insights into the mysteries of the universe. With this newfound knowledge, we eagerly anticipate the exciting opportunities that soft robotics will bring to space exploration in the future.*

***Using Low-Cost Hands-On Equipment and Virtual Lab for Teaching and Learning Mechanical Vibrations***

Oral Presentation (ALC 4102)
Tuesday April 18, 2023
11:00am – 11:15am
Undergraduate Student(s): Kevin Tran and Britt Walker
Research Mentor(s): Ayse Tekes and Tris Utschig

*Engineering students struggle to comprehend the abstract topics introduced in the mechanical vibrations courses since the content is highly mathematical and the course is delivered in a traditional lecture format without physical demonstration. In such cases, the instructor presents the topic and continues with in-class examples while students become passive learners. Although traditional lectures allow the instructor to teach many topics in a limited time, research shows it's ineffective in enhancing student learning. On the contrary, active learning promotes student engagement through interactive group discussions, problem-based learning, and learning by*

*doing. This study presents the design and development of two low-cost, portable, and 3D-printed laboratory equipment to demonstrate the fundamentals of vibrations. The first equipment consists of two 3D-printed springs attached to the slider housing a disk driven by a dc motor. Four loads can be attached to the disk to create unbalanced forces, demonstrating the rotating unbalance concept. A noncontact tachometer and ADXL 335 accelerometer are utilized to read the disk's speed and record the cart's acceleration. The second equipment is a 3 DOF rectilinear setup comprised of three carts, a rail, and 3D-printed translational springs to demonstrate the effect of spring length on stiffness. The springs can be connected to each other by magnets to emulate the combination of springs in a series form. System identification can be performed through free response data collection using ADXL 335 accelerometers. All parts are 3D printed using polylactic acid, and polypropylene filaments. Various springs are designed by changing the thickness and material type so each student team can work at a different setup. In addition to the low-cost lab equipment, we also developed virtual labs of the same equipment in MATLAB Simscape to simulate and animate the proposed designs so students can work at home at their own pace.*

***Various Techniques on Electrochemical Polymerization of Polypyrrole (PPy) to Enhance Energy Storage Capacity***
Poster #2 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Jake Irvin, Jacob Dileonardi, & Ben McKinney
Graduate Student(s): Max Thompson & Duy Pham
Research Mentor(s): Ashish Aphale

*Energy storage systems such as ultracapacitors (UCs) have gained popularity due to their combination of high power density and long cycle life. The ability of UCs is to store charges electrostatically which results in much faster charging and discharging times, unlike other systems such as batteries. UCs are comprised of two electrodes that sandwiches a porous separator. Factors such as electrical conductivity, surface area, stability, and cost play important roles in materials selection. Carbon based materials such as activated carbon, graphene and carbon nanotubes are used due to high electrical conductivity and surface area, while metal oxides and conducting polymers are used due to their high capacitance and stability. In this research, electrodes prepared using conducting polymer, polypyrrole (PPy) is electrochemically deposited to determine the optimal performance of energy storage density. The UCs performance is measured using various techniques such as cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS), as well as surface and chemical characterizations. UCs are ideally suited for applications such as electric vehicles, renewable energy storage, and electronics.*

## Robotics and Mechatronics Engineering

***Advanced Biomedical Laboratory (ABL) Synergy with Communication, Robotics, and IoT***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
11:00am – 11:15am
Undergraduate Student(s): Steven Steele & Jorge Diaz Rodriguez
Research Mentor(s): Razvan Voicu

*Commercialization, development, and implementation of the Internet of Things (IoT) devices are accelerating. Developing low-cost, wireless, and wired devices that can communicate and sense has drastically improved all areas, including medical, manufacturing, transportation, home & office, military, and commercial. IoT notions provide numerous benefits, including enhancing logistics, monitoring, and autonomous actuation control. Thus, opening the door for more timely medical assistance in medical practices and preparation in chemical, biological, and biomedical laboratories. This paper introduces a strategy to develop an automated biomedical laboratory using IoT concepts and devices. The article presents distributed automation for individual components and a centralized directive for the autonomous assembly of various designs.*

***Biomedical Sensing - A Sensor Fusion Approach for Improved Medical Detection and Monitoring***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
11:20am – 11:35am
Undergraduate Student(s): Ammy Ovando, Ricardo Ramirez, and Steven Steele
Research Mentor(s): Razvan Voicu

*Enhanced technological advancement in computation, communication, and sensing has dramatically changed the dynamics of modern medicine. Advancing preventive medicine is paramount to a sustainable improvement in the quality of life and life expectancy. On-body sensors provide continuous measurements for healthy and ailing individuals leading to faster recovery and more timely detection of illnesses. Novel sensor designs and sensor fusion for preventive monitoring can provide extensible benefits, including a better understanding of ailment progression, treatment optimization, and patient feedback through data analytics and visualization. This article presents the development of an ex-vivo sensor fusion system to track a person's muscular condition. The embedded system provides a significant benefit by notifying users of particular events in real time.*

***Development of a Fish Robot Equipped with Novel 3D-Printed Soft Bending Actuators***
Oral Presentation (ALC 3200)

Tuesday April 18, 2023
10:00am – 10:15am
Undergraduate Student(s): Steven Steele, Jorge Diaz Rodriguez, and Sharun Sripathy
Research Mentor(s): Amir Ali Amiri Moghadam

*This paper reports on design and fabrication of a novel soft fish robot. Application of soft actuators for the fish tail will generates continuum bending motion which resembles the natural motion of the fish. However, most soft actuator mechanisms are complex and have low efficiency. Thus, to address this issue we have developed a 3D printed soft bending actuator which can be actuated with an electromotor. The basic design idea of the soft bending actuator is explained, and iteration of the design showed to create the desired motion for the soft tail. The soft actuator has been successfully integrated with fish body and it has been shown that the fish can swim.*

***Development of Robotic Hand with Novel Soft 3D Printed Actuators***

Oral Presentation (ALC 3200)
Tuesday April 18, 2023
10:20am – 10:35am
Undergraduate Student(s): Kyra Magee and Mingxuan Yu
Research Mentor(s): Amir Ali Amiri Moghadam

*In the biomedical field, robotics is used to emulate the movement and dexterity of human hands for many purposes such as prosthetics. However, traditional rigid-body robotic hands tend to be heavy and inflexible, which causes difficulty in manipulating irregularly shaped objects. Soft robotics hands address these problems by being more adaptable, lightweight, and safer. However, most soft robotic hands tend to be fragile, inefficient, and weak. Although, soft actuators have immense potential to improve their dexterity, control, the force produced, and versatility. This project offers a solution to this issue by developing a 3D-printed robotic hand using modern soft robotics methods and novel actuators. The soft actuator consists of three components: layers moved by an electromotor; spacers between these layers; and soft skin encasing the moving layers. The bending of the moving layers will cause a sheer force that is the actuator's force output. The spacers and the soft skin ensure that the moving layers remain the same distance apart during motion. Initial prototyping involved improving the efficiency of the design by 3D printing models and measuring the bending angle and force output. Preliminary results showed that the actuator can bend up to 180 degrees and can produce the force necessary to grasp small objects. This novel method of actuation is efficient, robust, and can have many practical applications in industry. Future research goals will involve developing control methods that allow the robotic hand to complete various motions.*

***Energy, Compute, and Communication optimized system of dynamic V2X enabled mobile robot swarm for work zone safety***
Poster #4 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Kaleb Key
Research Mentor(s): Billy Kihei & Yusun Chang

*Battery performance is a critical factor in determining the viability of a robotic system. This becomes increasingly evident in the case of a robotic swarm where success is dependent on robust system performance across several mobile robots. In this paper, we explore different battery optimization approaches for the application of a robotic swarm dictating safety in a work zone/construction environment. With the growing complexity of robotic performance, several systems must be accounted for. Therefore, we consider the characteristics and power draw of motors and a computational platform that additionally operates computer vision tasks, along with the Pure Pursuit tracking algorithm.*

***Improving Quality of Life Using ICT, IoT and AI (HONET)***
Oral Presentation (ALC 3200)
Tuesday April 18, 2023
10:40am – 10:55am
Undergraduate Student(s): Charles Koduru
Research Mentor(s): Muhammad Hassan Tanveer

*Autonomous robots can be assigned with various tasks such as moving payload, analyzing terrain, and capturing data in an environment. For an Autonomous Mobile Robot (AMR) to execute such tasks the robot (Hussarion ROSbot) will require efficient algorithms and techniques to reference its current location. The robot is relative to surrounding obstacles in its predetermined path. The conducted research study explains the coordinated method used to successfully allow a robot to identify its position in the environment (Gazebo Simulation) and avoid obstructions with increasing velocity - contingent on nearby surroundings. The results show multiple robots individually tasked with distinct roles, while incorporating an obstacle avoidance function used to avoid both static and dynamic obstacles. Such results can be used in the applications of a high-capacity warehouse environment.*

## Engineering Technology

***Creating Sustainability Within Prosthetics Using Hemp and Recyclable Materials***
Poster #30 (Convocation Center)

Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Wisdom Tonge
Research Mentor(s): Ricky Garner

*Our world is rapidly declining due to factory-made materials that seemingly can't be reused or disposed of properly. Globally, around 72% of plastics are sent to landfills, this is due to the history that started the concept of recycling. The concept of recycling [reuse] materials was first introduced in 1031 by the Japanese culture. This concept started to gain traction during the industrial revolution to make the population feel better about the increasing decline of Fcrthe planet. It was also to make the general population believe that they are helping save the planet when in all actuality those materials were going to the landfill alongside garbage. goes According to the timeline of sustainability, the Industrial Revolution is the largest reason for the Earth's rapid decline. The purpose of this project is to be able to bring awareness to the lack of funds for amputees, as well as to show people that "non-recyclable plastics" also have a reusable use in different fields. What is stopping factories from reusing all materials or making materials that can be reused? The last purpose of this research is to help improve the process of creating more advanced and sustainable prosthetics. The use of natural materials such as hemp, as well as using unused plastics and materials that are factory-made. Also, using less metal for lighter materials, more advanced designs, and an easier disposable process. Overall, reusing materials, as well as using natural materials cuts the prosthesis materials down by 50%, making the prosthetic more affordable for the consumer. This process will also allow for less pollution and lower toxic metals use.*

***Soft Robots for NASA Space Explorations***
Poster #34 (Convocation Center)
10:00am – 10:45am
Undergraduate Student(s): Chebet Ngeny and Jenn Price
Research Mentor(s): Turaj Ashuri

*Robots are an essential part of space exploration, and NASA has been relying on them for decades to help get people and equipment into space. With the help of these machines, humans have been able to explore far beyond our planet's atmosphere and into deep space. Robotic rovers that are currently in use often get stuck on planets they are exploring, and they need help fixing the issue. For example, Spirit got stuck in soft sand on Mars in 2009, and InSight's solar panels got covered with dust, and it eventually died without a power source in December 2022. One possible solution to this problem is to use new materials and actuators to perform space operations on unfamiliar and constantly changing terrains. These robots serve as the primary space explorers who will send vital information to scientists before any potential human exploration. The use of soft robotics provides new opportunities for space exploration. It can eliminate some of the limitations of previous rovers, making them more efficient in exploring different areas of space. The primary*

*focus of this research is to create and control a soft-bodied robot that can adapt to different environments. Various 3D printed designs and autonomous systems made with Robot Operating System (ROS) 2 will be used to achieve this goal. The brain of the prototype will be constructed using ROS 2 and a microcontroller such as Arduino or Raspberry PI, and the body will be 3D printed using materials similar to soft biological material. The result will be a prototype that can navigate simulated terrains and make decisions without human interference or supervision. The prototype is expected to navigate simulated terrains and make decisions without human interference or supervision. It will also be able to interact with other objects in the simulated environment, such as picking up objects to analyze and sending pictures and data of the objects back to the user.*

***Soft Robots for NASA Space Exploration***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
1:20pm – 1:35pm
Undergraduate Student(s): Jelan Womack
Research Mentor(s): Turaj Ashuri

*Technology allows humans to accomplish things faster, more efficiently, and it allows us to accomplish things that would be otherwise impossible without technology. As our society progresses, more complex problems and goals arise that require new innovations. Space exploration is an example of a field that grows with each technological innovation. This research project proposes the use of soft robots for space applications. Soft robots are designed to flexible and mimic human or animal behaviors to accomplish unique tasks. To begin designing these robots, our team had to first learn programming. Programming is the "brain" of the robot and the hardest part of making the robot. Our team used Robot Operating Systems (ROS) to program the different tasks and behavior of the robot. After making the "brain," we used 3D printing to print the body of the robot. After developing the "brain" and body, we couple them to create an integrated system. We use an Arduino microcontroller to control the different parts of the robot such as the motor and sensors. We test our robot to make sure it meets the requirements and operates in harsh environments with minimal dependency on the user. Our final design is an autonomous robot that is able to navigate independently and detect objects to avoid a collision.*

***Soft Robotics in NASA Space Exploration***
Oral Presentation (ALC 4103)
Tuesday April 18, 2023
1:40pm – 1:55pm
Undergraduate Student(s): Hunter Harkins
Research Mentor(s): Turaj Ashuri

*Exploring space has always been extremely risky and treacherous for human astronauts. This is the reason why in recent times, robots have instead been sent for space exploration purposes. An issue with most robots, however, is that it is hard for them to navigate in chaotic and ever-changing environments. A potential solution to this is using soft robotics. Soft robotics is a subdivision of robotics that is involved with the development of robots that can move like biological creatures. The purpose of this research is to better understand and develop soft robots that are able to withstand harsh environments and give information to humans. Therefore this project will be contributing to the community by making a tool for which explorers can use before venturing out in person. To gain further insight into the development of soft robots that can be used in difficult terrain and harsh environments, especially those in outer space, we will begin designing a soft robot. The first step is using 3d-printing technology to develop a body for the robot. The body will be designed with soft robotics in mind. That is to say that the design will have certain resemblances to biological creatures in order to have a more sophisticated movement. The next step is to use a microcontroller, Arduino to be specific, to actually code the robot. The primary language we will be using is Robot Operating System 2, otherwise known as ROS 2. After this, we will model the robot in a simulator to see its reactions to said harsh environment. The expected final result of this project is a prototype that has the capability of being useful in extreme environments. This research goes over the steps necessary to understand and build soft robots with the intent on exploring harsh environments in space.*

# Wellstar College of Health and Human Services

## Exercise Science and Sport Management

***The Feasibility of Using 3D Motion Analysis in a Prosthetic and Orthotic Clinical Setting***
Poster #6 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Ansley Coyle
Graduate Student(s): Allison Roach and Zach Contois
Research Mentor(s): Michael Hales and John Johnson

*Motion analysis systems were first created in the 80s and have made tremendous technological advancements. The use of these systems in medicine is increasing and becoming more accessible and easily utilized. These systems utilize high speed motion cameras to capture specific movements, angles, and data for medical analysis. New software continues to be developed such as OpenCap to allow motion capture to be used more efficiently and practically in clinical settings. The objective of the study determined the validity of the new technology (OpenCap) to a high-quality motion analysis system. In order to compare the systems, three squats were performed in a sequence and captured by cameras on Vicon and three IPads on OpenCap. OpenCap could potentially be used for quick and reliable testing in clinical settings and research facilities if proven reliable rather than the standard use of Vicon processing.*

***Acute Effects of a Brisk Walk on Muscle Function and Balance in Females***
Poster #5 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Graduate Student(s): Melanie Antonio, Breanna McDonald, Micah Poisal, William Reed, and Lacey Harper
Research Mentor(s): Garrett Hester

*Research examining fatigue typically employs exercise that is strenuous or specific to an isolated joint. Muscle function and balance responses to activity resembling acts of daily living represent a more prevalent issue for non-exercising individuals. Rate of torque development (RTD), how quickly muscle force is generated, is more sensitive than peak torque (maximal strength) to fatigue, so modest fatigue from a brisk walk might cause meaningful decrements. PURPOSE: The purpose*

*of our ongoing study is to identify differences in muscle function and dynamic balance between young and middle-aged females. Here, we report on preliminary findings with no age-related comparisons. Thirteen untrained females (28.7±15.1 yrs) completed a testing visit 3-7 days after a familiarization visit. Subjects performed balance and muscle function testing before and up to 10.5 min following a 6-min walking task. Instructions for the 6-min walk were to "cover as much distance as possible". The Biodex Balance system captured overall postural instability and an index in the sagittal and frontal plane. Muscle function testing consisted of rapid maximal voluntary isometric contractions of the plantar flexors. Peak torque, and RTD at early (0-50 ms) and late (0-200 ms) time intervals were recorded from the torque-time curve. One-way ANOVAs with Bonferroni corrected post hoc comparisons were used to assess changes across time. Overall postural instability increased 2 min after the 6-min walking task indicating poorer balance. PT and RTD remained unchanged after the walking task ($p > 0.05$), though some large effect sizes were notable for the latter. Our findings indicate that balance was negatively affected after a 6-min brisk walking in young females. We expect middle-aged females to demonstrate greater fatigability than young females, thus increased fall risk. We plan to incorporate age-related comparisons in our future analysis to test this hypothesis.*

***Acute Effect of a Multi-Ingredient Pre-Workout Supplementation on Power Expression Through a High-Intensity Functional Training Workout***

Poster #6 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Britton Rellinger, Colton Sheetz & James Henley
Graduate Student(s): Christopher Staples, Jacob Fanno, & Ashley Hines
Research Mentor(s): Gerald Mangine & Jacob Grazer

*A common high-intensity functional training (HIFT) workout structure is to have trainees complete the same circuit of exercises for 'as many repetitions as possible' (AMRAP) within a given duration. Performance is dependent on sustaining the necessary power to complete each movement at a pace that also minimizes breaks due to fatigue. This ability is known to improve with training and HIFT experience. However, several individual nutritional ingredients are known to impact energy availability and/or assist with fatigue management, and these may collectively be found in a variety of pre-workout formulations. Thus, supplementing with a pre-workout formulation may provide a greater benefit to AMRAP performance than training and experience alone, but no study has investigated the acute effects of such formulations in experienced HIFT trainees. PURPOSE: To examine the acute effects of a pre-workout supplement on power expression and HIFT workout performance. METHODS: Men (n=7: 28.8 ± 7.2 years, 172.9 ± 9.2 cm, 83.2 ± 17.0 kg) with HIFT experience (≥2 years) volunteered for this cross-over design, placebo-controlled study. Participants completed four consecutive weekly experimental visits at approximately the same time and day in randomized order. Upon arrival, they consumed*

*either a pre-workout supplement (S, Shifted® Maximum Pre-workout Formula) containing ingredients known to improve energy availability and manage fatigue, or a placebo (P) of similar caloric content, and then rested 40 minutes before completing either a 5- or 15-minute AMRAP of 9-calorie rowing, six barbell thrusters (43.1 kg), and three 0.61m box jumps. Performance was quantified on the rower (strokes completed and power [PRow]) via ergometer microcomputer, thruster barbell velocity (VTHR) and power (PTHR) via 3D motion tracking system, and box jump peak force (FBJ) and rate of force development by in-ground force plates on each repetition. Subsequently, their average, standard deviation (SD), and slope was calculated across each round completed. RESULTS: Separate repeated measures analysis of variance with Greenhouse Geiser adjustments revealed significant differences ($p < 0.05$) existed across trials for repetitions completed, total rowing strokes, average PROW, PTHR slope, and FBJ slope. Bonferonni post-hoc analysis revealed expected differences between workout durations for repetitions completed (15-min = 182 - 186 repetitions; 5-min = 78 - 81 repetitions, $p < 0.001$), total rowing strokes (15-min = 142 - 162 strokes; 5-min = 58 - 59 strokes, $p < 0.001$), and average PRow (15-min = 184 - 214 W; 5-min = 308 - 323 W, $p < 0.05$). Interestingly, average rowing strokes were significantly different and more variable between 15-min P and 5-min P ($p < 0.001$) but not between S-trials, though FBJ slope was steeper during 5-min with S(slope = -83 ± 39 N/round) compared to both 15-minute workouts (slope = -13 to +6 N/round). No other significant differences were observed. CONCLUSION: Aside from more consistent rowing, the multi-ingredient pre-workout supplement did not affect AMRAP performance, regardless of duration. PRACTICAL APPLICATIONS: The data does not support consuming this multi-ingredient pre-workout supplement to better maintain power throughout a 5-minute or 15-minute HIFT AMRAP in experienced men.*

***Acute Effect of a Pre-Workout Supplement on Energy Expenditure During CrossFit® Workouts***

Poster #7 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Colton Sheetz & Britton Rellinger
Graduate Student(s): Jacob Fanno & Christopher Staples
Research Mentor(s): Gerland Mangine

*CrossFit® (CF) training involves high-intensity efforts that typically utilize carbohydrates for energy, which is not ideal if fat loss is a goal. Pre-workout supplements typically contain several ingredients known to alter blood flow and substrate utilization, but no study has investigated the acute effect of such formulations on CF performance. PURPOSE: To compare the acute effects of a pre-workout supplement on energy expenditure during CF workouts. METHODS: Men (n=7: 29±7 years, 173±9 cm, 83±17 kg) with CF experience (≥2 years) volunteered for this cross-over design, placebo-controlled study. Across four, weekly experimental visits in randomized order,*

*participants completed pre-exercise assessments of heart rate (HR), quadriceps cross-sectional area (CSA), blood lactate, oxygen uptake (VO2), and respiratory exchange ratio (RER) before consuming the pre-workout supplement (S) or non-caloric placebo (P). They rested 40 minutes and then completed as many repetitions as possible within a 5- or 15-minute circuit of 9-calorie rowing, six barbell thrusters (43.1 kg), and three 0.6-m box jumps. All pre-exercise measures are repeated immediately post-exercise. RESULTS: Repeated measures analysis of variance revealed a trial x time interaction (p2, and CSA. Compared to pre-exercise values, post-exercise elevations (p2 (+2.92 L/min) and quadriceps CSA (+0.88-3.68 cm2). CONCLUSION: A higher RER during the 5-minute trials indicates a greater carbohydrates utilization, but neither this or any other parameter were affected by the supplement. Aside from demonstrating greater carbohydrate utilization during shorter CF-style workouts, these data do not support the use of this supplement for altering substrate utilization for this workout at either duration.*

***Agreeability of ActiGraph and activPal 4™ Measures of Vigorous Activity***
Poster #12 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Hannah Sandstrom, Alyssa Thomas, and Sophia Ramirez
Graduate Student(s): Barry Francis, Sthefany Diaz Orduz, and Bre Mcdonald
Research Mentor(s): Katherine H. Ingram and Janeen Amason

*Introduction: Wearable technologies are consistently used in research to track physical activity and study how it can improve overall health. ActiGraph and activPal are research-grade accelerometers that track activity levels of all intensities in humans. ActivPal has recently improved its technology to measure vigorous activity more accurately to be consistent with the gold standard Actigraph measures. The purpose of this study is to test the agreeability between the vigorous activity measures of the ActiGraph and activPal 4™ devices. Methods: Regular exercisers are being recruited from the KSU Department of Exercise Science and Sports Management to participate. They are fitted with one activPal 4™ on the thigh which will be compared with two ActiGraphs: one worn on the waist and the other worn on the right wrist for three days. Participants record their exercise sessions in an activity diary. Rate of perceived exertion (RPE) and heart rate are also recorded to determine exercise intensity. Exercise is considered vigorous if RPE is 5 or more and if the heart rate is 76% of age-predicted heart rate max or higher. Statistics will include paired t-tests to determine the differences between the means, correlations to determine strength of agreement, and Bland Altman plots for inter-device agreement. Results: Data collection is currently underway, and findings will be presented at the KSU Symposium for Student Scholars. Conclusions: This study will determine the level of agreeability between the ActiGraph and activPal 4™ measures during vigorous activity. It will provide information about whether ActivPal 4 is acceptable to use for measuring vigorous activity in humans.*

***Does a Brisk Six-Minute Walk Cause Upper Body Fatigue in Females?***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023
12:40pm – 12:55pm
Undergraduate Student(s): Kaden Buford and Esther Steingold
Graduate Student(s): Lacey Harper, Melanie Antonio, William Reed, Valentina Taddia, Micah Poisal, and Breanna McDonald
Research Mentor(s): Garrett Hester

*Non-local performance fatigue (NLPF) can be described as performance decrements occurring for a muscle group that was not directly involved in the fatiguing activity that preceded. Most studies on NLPF involve strenuous exercise of an isolated joint in trained populations, however, little evidence exists on NLPF derived from activities mimicking acts of daily living. Determining whether NLPF exists following brisk walking is worthwhile, and rate of force development (RFD), the rate at which muscle force is produced, may possess increased susceptibility compared to maximal strength. The purpose of our ongoing study is to determine the responses, if any, for maximal strength and RFD of the upper body after brisk walking in young and middle-aged females. Here we report on preliminary findings with no age-related comparisons. Subjects completed handgrip testing before and 3, 7, and 11 minutes after a 6-min brisk walking task. The instructions for the walking task were to "cover as much distance as possible". Subjects were instructed to squeeze the handgrip dynamometer as "hard and fast as possible". PT, and peak, early (0-50 ms), and late (0-200 ms) RTD were calculated from the torque-time curve. Friedman's test and relative changes were computed to examine responses across time. RESULTS: RFD 0-200 was decreased at 3 min post ($p = 0.004$), whereas all other measures remained unchanged across time. Late RFD was reduced 3 minutes post, but maximal strength was not, suggesting late RFD may be more sensitive to NLPF than maximal strength. However, it is unclear why only late RFD was reduced. Additional research is needed to characterize the physiological changes which might explain these changes.*

***Evaluating Low Student Attendance at KSU Sporting Events***
Poster #14 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Ethan Key
Research Mentor(s): Kyu-soo Chung and Joshua Pitts

*Kennesaw State University has seen some low and inconsistent numbers among student attendance at sporting events. Event attendance can strong impact the growth of college programs and their reputations. In order to find a fix to this issue I researched how students perceive different*

*things about KSU and how these tendencies can effect event attendance. I was able to collect this information through a survey of 58 KSU Sport management students. The results to this research show that a students' perception of their education is related to their evaluation of athletics and event attendance. This leads us to believe that in order to increase event attendance we have to also increase how students feel about the school as a whole. Administrators at KSU will be able to use these findings to try to solve these problems and improve the academic and athletic experience for students.*

***Exercise Science and Sport Management: Air Quality and Soccer Players' Well-Being Near MARTA Stations***
Poster #15 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Lily Conroy
Research Mentor(s): Kyu-Soo Chung

*Air pollution is a massive problem that the world is facing. Different areas will vary in air quality based on the season, amount of freeways, and the amount of public transportation. Purpose: To determine the air quality at multiple sites and observe what factors would contribute to the results. Methods: Take an air quality detector to numerous different locations that have other infrastructures and write down any object, building, or transportation in the area. Procedure: We will go and record the air quality at Soccer in the Streets' venue. We will go every weekend till the conclusion of the project. Walk around and write down anything that might affect the air quality. Also, record the air quality at each site with the results and the time and place next to it. The collected data will be analyzed and the descriptive statistics will be shown. Results: Air quality at sites such as Marta and near big interstates like 75 and 285 are higher than those in the suburban areas. This is because most public and private transportation vehicles use gas which over time creates more and more air pollution. Also in springtime, there is a large amount of pollen that can affect the air quality. Areas near extensive forests have worse air pollution because of the large amounts of pollen in the air. Conclusion: Big cities and places near large popular highways create the most air pollution. This is because very few people use electric cars as well as very few public transport options.*

***A Research on the Criteria for Dividing Regular Fans and Die-hard Fans of Professional Sports***
Poster #13 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Chaeeun Kwon
Research Mentor(s): Kyu-soo Chung

*This research aims to identify the factors that reflect the degree of fans' contribution to professional sports clubs. To achieve this goal, the researcher establishes a universal standard for dividing fans into two groups: regular fans and die-hard fans. A total of 144 fans who support more than one specific professional sport club completed a survey. Responses were categorized into two groups based on whether the respondents identified themselves as regular fans or die-hard fans. Among the criteria selected by the respondents, four numerical criteria were identified. A final standard was determined by focusing on the most significant difference between the answers of die-hard fans and those of regular fans. Die-hard fans met all four criteria, including having one or more uniform or cheering tool, watching more than 70% of games per season, spending more than $100 per season on club-related activities, and watching more than 10% of games at the stadium per season. Based on these findings, clubs can classify their fans into regular fans and die-hard fans and then develop different marketing strategies for each group. This market segmentation will increase the competitiveness of the club by providing value that meets the two groups of fans subdivided according to specific criteria. Furthermore, fans can demonstrate their loyalty and contribution to the team by belonging to a specific fan group established by specific standards or by meeting the criteria to be part of another fan group. This research provides valuable insights for professional sports clubs seeking to understand and leverage the contributions of their fans to support their team.*

***Toward a Quantitative Understanding of Infant Crawling Development***
Poster #17 (Convocation Center)
Thursday April 20, 2023
2:00pm – 2:45pm
Undergraduate Student(s): Isabel Linares, Jeremy Hamson, and Maneet Bains
Research Mentor(s): Mark Geil

*93% of children use crawling before they begin walking, and studies have shown that this activity can reveal details about an infant's development and possible health issues, especially neuromotor conditions. However, very little normative data is available to help us comprehend typical or atypical development. This study aims to obtain quantitative data to understand crawling development. This includes analyzing the effects of an infant's age, weight, and length on crawling patterns and how those patterns develop. To collect data from the infants, the Zeno pressure transducer mat (ProtoKinetics, Havertown, PA), measuring 4.9m (16') x 1.6m (2'), was used. The software used to collect the data from the mats was called PKMAS4. This mat and software were originally designed for quadruped animal-based research. However, it was used in this case to observe infant crawling using 4 limbs, which allows for the software to still work. Upon parental consent, infants were placed on the mat and encouraged to crawl, thus allowing the procedure to be non-invasive for the infants. The program allowed footfalls to be viewed and labeled. Using data from the footfalls, the variables evaluated were cadence, crawling speed, limb support percentage,*

*anterior-posterior pressure ratio, and bilateral pressure ratio. Throughout the study, 75 typically developing (TD) infants will be observed every 2 weeks from when they start crawling to when they begin walking. 15 infants with limb loss (LL) will be observed once, at any point when they're crawling. The trial provided a longitudinal analysis of the TD infants crawling development. Age and crawling rate are significantly connected (r=0.81, p=0.00013), as is cadence (r=0.71, p=0.0021). The only measure that showed a statistically significant difference between the developmental status groups was the IPR A-P group (t=2.31, p=0.03).*

## Health Promotion and Physical Education

***Awareness and Utilization of Food Resources in KSU Students***
Poster #1 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Jenna Doran
Research Mentor(s): Afekwo Mary Ukuku

*College students experience food insecurity at a higher rate than the general U.S. population. Food insecurity can be linked to negative physical, mental, and academic well-being within U.S. college students. While both community and government food resources are often accessible for college students, what percentage of food insecure students at Kennesaw State University (KSU) actually utilize these food resources has not been explored. This study aims to explore the relationship between food resource awareness and food resource utilization among undergraduate students at Kennesaw State University.*
*Data is expected to be collected from undergraduate students at KSU. Participants will take a survey via Qualtrics evaluating their food security level, awareness of the KSU food pantry and SNAP, utilization of the KSU food pantry and SNAP, and potential barriers they face in accessing these food resources. Demographic variables such as gender, age, race/ethnicity, grade classification, and place of living will also be collected. Data will then be cleaned, sorted, and coded through use of SPSS software. Expected results are that students who are unaware of food resources available to them will be less likely to utilize those food resources. This study aims to work on showcasing the need to increase awareness of food resources available to food insecure college students through targeted marketing and education.*

***Bioethics and African American Men: Lessons Learned***
Poster #6 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Maygui Jean

Research Mentor(s): Evelina Sterling & Tyler Collette

*Despite much research in chronic disease self-management, significant gaps in knowledge still exist, especially regarding vulnerable and underserved populations. More specifically, low-income African American men are disproportionately affected by chronic conditions, especially coping with multiple morbidities. Low-income African American men also experience additional burdens to health related to cultural beliefs and practices about health, knowledge and perceptions regarding chronic conditions, and lack of support systems, creating even greater health inequalities. Moreover, the problems of systemic racism in predominately African American communities are complex, multifactorial, and historically rooted. While these problems are deeply morally troubling, bioethicists have not contributed substantially to addressing them. This study investigates how bioethicists can offer meaningful contributions to the public discourse, research, teaching, training, and policy development in response to the alarming and persistent patterns of racism and implicit biases within the healthcare system. We worked with Wellstar Health System (the largest healthcare system in the state of Georgia) to further assess the experiences of African American men and the hospital medical ethicists. Qualitative data were collected to describe these experiences and provide further insight to include in behavior change interventions, aimed to improving self-efficacy, patient activation, and patient/provider communication. Lessons learned were utilized to develop recommendations for Wellstar's medical ethics team about how bioethicists can offer meaningful contributions to further respond to the alarming patterns of racism and implicit bias through their work with patients.*

***Comparing the Self-Efficacy of Weight Management in Young Adults***
Poster #7 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Tamara Sutherland
Research Mentor(s): Afekwo Mary Ukuku

*The obesity epidemic in the United States continues to grow as research progresses to understand more behind this issue. As monitoring one's health continues to progress from a clinical setting to a "self-monitoring" method with the use of technology such as cell phones, it comes to question how confident individuals feel about controlling their own weight. Previous studies have explored connections between technology and weight, but focus more on the effectiveness of the platform being used rather than the certainty of the individuals to understand how the effectiveness impacts them. The purpose of this study is to explore the relation between the use of health/fitness mobile applications and the self-efficacy in weight management for young adults aged 18-24. Young adults attending Kennesaw State University will take a survey via Qualtrics evaluating their control of their weight management. Weight management will be evaluated by using 6 items from the subscale WMA (weight management actions) from the P-Weight to assess current weight*

*status. The use of health apps will be measured using items from a survey based on the UTAUT2 (second version of the Unified Theory of Acceptance and Use of Technology model) to confirm the use of health apps. Barriers will be evaluated by using a 5 item pros and cons scale to measure perceived barriers to maintaining ideal weight statuses. Demographic variables such as age, gender, access, BMI, and awareness of wellness were also collected. SPSS will be used to analyse the collected data. Expected results include that those that actively use health and fitness apps will have a higher level of self-efficacy of their weight compared to those that do not regardless of weight (BMI) status. This study aims to improve the understanding of the current weight status of young adults and the perceived effectiveness of e-health platforms.*

***Crime in Los Angeles***
Poster #14 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Cierra Hughley
Research Mentor(s): Kevin Gittner

*This study will examine crimes committed in the city of Los Angeles dating back to the year of 2020. The reported data was pulled from the open data of Los Angeles Police Department. The purpose of this study is to show if gender is related to the three primary crimes: property crimes, violent crimes, or other crimes. Doing so will show which crimes were committed by each gender. Even though this study is on gender and crimes committed; it was a hard decision because there were many variables to choose from. However, exploring the relationship between crime and gender was more compelling and interesting considering the gender comparisons and differences in today's society. The primary research question for this study, "Is gender related to the type of crime committed by criminal offenders in Los Angeles?" It is hypothesized that males will have more violent crimes than females while females will have more property crimes than males. Univariate pie charts and descriptive summaries for the crimes committed and the victim's sex will be generated to show how many crimes were committed. It will also ensure that crime categories are recoded into three different categories: property crimes, violent crimes, and other crimes correctly. Then, repeat the same thing for the victim's sex variable and split them into three different categories such as male, female, or missing as it was not listed in the codebook. The plan is to crossover the gender variable with the crimes committed variable to see how the results will turn out. The results of this study could be used by public health professionals to explore crime and create strategies to address them. There are a total of 514,108 males and females leaving 139,482 missing values. In addition, there are a total of 653,590 crimes that were committed.*

***Early Stage or Curable Cancer Diagnoses in Minorities: A Journey of Survivors***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023

11:40am – 11:55am
Undergraduate Student(s): Naya Phillips
Graduate Student(s): Lora Asberry
Research Mentor(s): Evelina Sterling and Troy Mutchler

*Patients diagnosed with early-staged or curable cancer experience physical, as well as, mental challenges associated with disease progression and treatment. Previous studies have demonstrated that minorities and underrepresented communities do not receive the same level of care in comparison to their non-minority counterparts. The objectives include: determining whether medical disparities vary between minorities and non-minorities who have early-stage or curable cancer, analyzing the effects of cancer diagnoses in minorities compared to non-minorities, assessing different perspectives in minority male vs. female participants, and demonstrating whether there is a communication barrier between patients and medical professionals, regarding the health and knowledge of their diagnosis. Participants will discuss the unique experiences of being diagnosed with early-stage or curable cancers by race/ethnicity, gender, age, and diagnosis.*

***The Effect of COVID-19 on African American Men***
Poster #9 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Kirsten Davis
Research Mentor(s): Evelina Sterling and Tyler Collette

*Recent research has shown that confirmed COVID-19 cases and deaths are disproportionately higher in communities with large African American populations. The direct and downstream effects of COVID-19 have reduced life expectancies for African American men by upwards of three years in 2020 alone. Inequities are further magnified given the known risk factors for COVID-19 complications such as hypertension, diabetes, obesity, and higher prevalence of cardiovascular disease among African American men. Many factors have further exacerbated COVID-19-related disparities such as mistrust in medical systems., lack of health insurance, and more. Applied researchers have developed methods for addressing these issues using a self-management approach. However, previous work has suggested that traditional self-management programs produce as pronounced positive effects for African American men than in other groups. The major goal of culturally competent self-management programs is to provide healthcare workers such as nurses, social workers, and public health professionals with an adaptable program that will give those in need tools designed to improve their day-to-day lives. Moreover, the interruption of the COVID-19 pandemic forced a new vital question: Is a COVID-19, or viral hygiene, specific module necessary for any future self-management program? The purpose of the current project was to evaluate the COVID-19-related knowledge, attitudes, and behaviors of African American men with chronic conditions. In particular, the current project seeks to answer the following question;*

*is a viral hygiene specific module necessary for a culturally competent self-management program? African American men who self-reported at least one chronic disease responded to guided interview questions regarding their knowledge, attitude, and behaviors related to COVID-19 along with self-reported health and quality of life. Thematic analysis was used to identify themes that are linked to the data with an inductive, essentialist, approach.*

***The Effects of Physical Activity, Motivation, and Feeling Connected to Campus on Nontraditional and Veteran Students' Academic Performance***
Poster #4 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Phillip Beeslaar
Research Mentor(s): Afekwo Mary Ukuku

*The concept of academic performance in college is usually measured by GPA with no regard to the reasons that are behind how a student performs. Nontraditional and veteran college students have even less research done on them with larger possible reasons for a lower academic performance. The objective of this study is to examine the relationship between physical activity, motivation, and how connected a student feels to campus on their academic performance in nontraditional and veteran students. The study will be using an online survey for data collection. The distribution of the survey will be in person on the Kennesaw State Universities' main campus and Marietta campus. It will also be handed out to other participants through people who have already taken part in the survey and agree to hand it out. The survey will consist of a maximum of forty questions ranging from physical activity levels, intrinsic and extrinsic motivations, how connected the students feel to campus, and questions evaluation their academic performance without asking about any grades. As of now there are no results as IRB review is still needed. The study could provide useful information to Kennesaw State University about how their nontraditional and veteran students are doing academically and the different things that may be impacting their performance. It can also help to show the students what may be helping them achieve greatness or how to begin to become more successful in their studies.*

***Employee Attrition: Analyzing Factors Influencing Job Satisfaction of IBM Data Scientists***
Poster #14 (Convocation Center)
Thursday April 20, 2023
4:00pm – 4:45pm
Undergraduate Student(s): Graham Nash
Research Mentor(s): Kevin Gittner

*Employee attrition is a relevant issue that every business employer must consider when gauging the effectiveness of their employees. Whether or not an employee chooses to leave their job can come from a multitude of factors. As a result, employers need to develop methods in which they can measure attrition by calculating the several qualities of their employees. Factors like their age, years with the company, which department they work in, their level of education, their job role, and even their marital status are all considered by employers to assist in predicting employee attrition. This project will be analyzing a dataset generated by IBM data scientists exploring employee attrition within their company, assessing variables like overall job satisfaction, performance rating, education, monthly income, travel distance from home to work, and work-life balance. The research question for this project is whether there is a significant relationship between the two primary variables of interest: job satisfaction and performance rating. Job satisfaction will be the independent variable and performance rating the dependent variable. The relevant hypothesis for this project is that there is a positive relationship, meaning that an increase in an employee's performance rating directly leads to an increase in job satisfaction. This project will utilize four supplementary variables to reinforce the results of this study. The data was collected from Kaggle, a well-renowned data collection and machine learning website, with no missing variables and few errors with variable categorization. This project will also conduct an exploratory analysis by assessing the descriptive statistics for each of the variables, interpreting the graphs for each variable, and discovering potential correlations between the variables. After that, a discussion of the results of the analysis will determine whether the initial research question was answered or if there is no relationship between the variables of interest.*

***GA Department of Public Health: FY 2023 Adolescent Health and Youth Development Strategic Evaluation Plan***

Poster #7 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Graduate Student(s): Shaina Bester
Research Mentor(s): Evelina Sterling

*Teenage pregnancy and sexually transmitted infections (STIs) continue to be public health issues in the United States of America. In Georgia, birth rates by teenage females declined by 66% between years 1991 and 2015 (GA-DPH, 2022). However, there were 9,661 teen births in 2014 of which 73% occurred among older teens (15-19 years). Unintended pregnancies continue to be a concern with an estimated $918 million spent in 2010 for unplanned pregnancies (GA-DPH, 2022). Offering risk reduction strategies through evidence-based curricula and programs has been found to empower youth with the skills and knowledge they need to decline risk behaviors or practice safe sexual behaviors (Gavin et al., 2010). For this reason, the Georgia Department of Public Health (GA-DPH) focuses on creating supportive networks to assist youth in developing healthy lifestyles. To understand the prevalence of this public health issue and effectiveness of*

*programs implemented, GA-DPH is partnered with Kennesaw State University to collect data via state-wide surveys and execute a strategic evaluation plan informed by data analysis. Evaluation methodologies include conducting pre and post surveys with follow-up. Summarized results from the Fiscal Year 2022 reporting period surveying a total of 1,977 youth were as follows: (1) 56% reported an increase in knowledge regarding STD and pregnancy prevention; (2) 41% gained knowledge of healthy behaviors in relationships; (3) 89% reported increased knowledge and awareness of topics covered at events, such as, effects of drugs and alcohol on the body, teen pregnancy, STD/STI prevention, maintaining personal hygiene during puberty, bullying prevention strategies, and avoiding dating violence. In conclusion, these encouraging results have prompted the statewide strategic evaluation team to revamp and expand its survey questionnaires, provide pre and post surveys in other languages to reach youth from diverse cultures, and improve on data analysis techniques for fiscal year 2023.*

***Good News or Bad News?: Being Diagnosed with Early Stage or Curable Cancer***
Poster #8 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Naya Phillips
Graduate Student(s): Lora Asberry
Research Mentor(s): Evelina Sterling and Tyler Collette

*Technological advancements aimed at improving screening and early detection has led to a greater number of people diagnosed with early stage and curable cancers with excellent survival rates and less harsh treatment requirements. However, when people hear the word cancer, most assume the worst case scenario—that they have a disease that will kill them. Similarly, many physicians agree with this perspective and act or advise their patients, accordingly, compounding fear and distress. Although it can be lethal, cancer actually encompasses a wide range of diagnoses, from diseases that are aggressive and with high mortality to indolent lesions with extremely low potential for growth or metastasis. Cancer diagnoses exist on a spectrum, yet little information exists about the lived experiences of those diagnosed at the early stage and curable end of the cancer spectrum. This begs the question: how do people with early-stage cancers make sense of their experiences? To reduce the overall burden of cancer and meet the psychosocial needs of a broader range of individuals, it is necessary to critically assess the typical one-size-fits-all approach to cancer and the broad-based use of the term cancer that has traditionally been the norm. This study aims to investigate the experiences of those who have been diagnosed with early stage or curable cancers. We conducted interviews with 30 adults who had been diagnosed with a wide range of early stage and curable cancers who did not fit the "typical" cancer narrative. After analysis using a modified grounded theory approach, we identified several key themes, including defining cancer, receiving the diagnosis, and expectations for the future, As cancer diagnostics and treatments advance, and*

*diagnosis takes place earlier, there will be greater need to understand the experiences of people living with early stage or curable cancer.*

***How Levels of Resilience Inform Help-Seeking Behaviors in Firefighters***
Poster #2 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Michael Paul
Research Mentor(s): Afekwo Mary Ukuku

*This study looks into the mental health of firefighters to determine if a connection exists between how the level of emotional and mental resiliency informs the completion of help-seeking behaviors. This is significant as mental resiliency plays a key role in how firefighters perceive stressful situations and whether or not they perform help-seeking behaviors. As these individuals work in high-risk occupations, it is important to understand if those with higher levels of resilience do not feel the need to perform help-seeking behaviors as they feel they can support themselves. Issues that prevent the completion of help-seeking behaviors can lead to poor coping methods and the development of trauma-related mental disorders. Surveys will be given to currently employed firefighters in Cobb County, Georgia. Convenience and snowball sampling will be utilized to recruit survey participants and SPSS Statistics software will be used to examine and interpret the data. Data has not been collected yet but will be by the time the Symposium takes place. The impact of this study will be the gathering of useful knowledge to determine if those with high levels of resilience do not feel the need to perform help-seeking behaviors to better determine the overall utilization of these behaviors.*

***The Impact of the COVID-19 Pandemic on Maternal Health Outcomes***
Poster #5 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Jaiden Outten
Research Mentor(s): Afekwo Mary Ukuku

*The COVID-19 Pandemic has disrupted access to maternal health services. Lockdowns, fear of contracting the disease, and limited access to healthcare services may have affected the overall well-being of expectant mothers and their newborns. Studies from previous infectious disease outbreaks have shown that adverse maternal outcomes have increased. Research is needed to determine the indirect impact the pandemic had on various areas of maternal health. The purpose of this study is to conduct a systematic literature review to understand the impact of COVID-19 on maternal health. A systematic review was conducted using Google Scholar, PubMed, EBSCO, and MEDLINE databases to obtain relevant sources for this project. The sources included peer-*

*reviewed journals and other scientific articles. The main findings of each article were extracted. The key search terms for this study included, "impact of COVID-19 pandemic on maternal outcomes", "prevalence of adverse maternal outcomes", "postpartum depression" and "postpartum complications." Several themes were identified from the selected articles including postpartum depression, reduced access to healthcare services, maternal stress, and health complications. A total of 18 articles were included in this review. Postpartum Depression was discussed in 38.9% of the selected articles followed by adverse maternal outcomes (33%). The findings of this research will be used in projects to identify evidence-based strategies on how to increase well-being within maternal health. This study will improve understanding of how the pandemic may have exacerbated adverse maternal health outcomes and provide areas that practitioners and future researchers can focus on optimizing health outcomes. Key Terms: adverse maternal outcomes, anxiety, depression, postpartum depression.*

***The Impacts of Distance Learning due to the Pandemic on the Mental and Physical Health in Burmese American Parents of students enrolled in k-12***

Poster #6 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Ngun M. Tial
Graduate Student(s): Shaina Bester
Research Mentor(s): Afekwo Mary Ukuku

*According to the US census, there are approximately 20-millions of Asian Americans in the US residing in the United States, yet they are still very underrepresented in the research. Burmese American are one of the largest refugee populations in the United States since them beginning to resettle since 2008 due to the political and religious persecution happening in Myanmar. Despite them being one of the largest refugees in the country, there is a significant lack of research on this population. Many Burmese Americans are unaware and often neglect mental health wellbeing as it is being often stigmatized in the culture. This study aims to contribute to the literature on Burmese Americans and addressing the population gap through mix method research. This study will be utilizing the existing quantitative surveys but translating them in Burmese language and the Chin dialect, to ensure that the survey is accessible to the Burmese American community. Through convenience and snowball samplings, data will be collected from the Burmese American parents of students. The study emphasizes the need of studying the Burmese Americans population as they are growing in number. The expected findings of this study will provide evidence on the impact of COVID-19 pandemic on the physical and mental health of Burmese American parents of students, which will also contribute to the understanding of mental health awareness among this population.*

***Social Media and Self-Perception: A Study on how Social Media Perceptions Affect the Self-Esteem of Black Women Aged 27-47 Living in South Fulton County, Ga***
Poster #3 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Tesia McCullar
Research Mentor(s): Afekwo Mary Ukuku

*This study aimed to obtain body image information from African American (AA) women between the ages of 27 to 47 who live in South Fulton County, Ga, and have graduated from college with an undergraduate degree or higher. The findings from this study will provide valuable information on African American women regarding self-perception, body satisfaction, body dissatisfaction, and self-esteem regarding how social media portrays black women. The assessment used to collect information for this study will be "The Young Women's Experiences with Body Weight and Shape," which Delaney, O'Keefe, and Skeene developed in 1997. The results will be analyzed using the five factors within the assessment tool: weight dissatisfaction, slimness as the quality of life, interpersonal messages regarding slimness, rejecting the value of thinness, and valuing exercise. The expected results from this study are that women who frequently use social media are more likely to have lower self-esteem and prominent body dissatisfaction. Conversely, women who use social media moderately will be less influenced by the images they see, causing them to be less affected by the images posted, which will cause them to have higher self-esteem and a greater chance of having body satisfaction.*

***Study into Postpartum Stress***
Poster #31 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Kaitlyn Coleman
Research Mentor(s): Afekwo Mary Ukuku

*Introduction: Postpartum depression is a major public health issue. Married or partnered women with ongoing low spousal support from partners are more likely to suffer from postpartum depression (Yaksi & Save 2021). Lack of emotional support from a spouse, verbal or physical abuse, and unintended pregnancies may further increase the risk of PPD (Kızılırmak, Calpbinici, Tabakan, & Kartal, 2021). This lack of support from the home adds to the stress and hormonal effects a woman may experience during and after her pregnancy. The purpose of this two-phase study is to identify the impact of stress arousal on postpartum women and to identify areas to explore within postpartum depression and spousal support. The current project will be discussed and the importance of understanding the impact of cognitive load on patients and support*

*partners, how arousal and stress can impact discharge education, and innovate ways to reimage the discharge process. Major themes from the literature review will also be presented.*

***Supply Versus Demand in the Cherokee County Homelessness Needs Assessment***
Poster #20 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Jada Brown, Kennedy Duff, and Jonathan Jones
Research Mentor(s): Matthew Lyons

*Intro: Cherokee County is a growing, rural area in the northern part of Georgia. When we think of areas with homelessness problems, we usually turn towards large metropolitan areas such as Atlanta. But to combat homelessness overall, we need to take a look at rural regions as well. Research Context/background: A needs assessment was conducted in Cherokee County related to homelessness and housing insecurity. Research question/purpose: The purpose of conducting this assessment is determine whether Cherokee County's homelessness resources need upgrading, and to provide recommendations to do so. Method: In order to assess how effective the current homeless service infrastructure is, data were collected via online surveys given to 28 service-side stakeholders in Cherokee County. The participants responded to the question, "How fully is the existing service system able to meet the current level of demand for the following services?" These services included emergency shelter, employment opportunities, the need to send clients to other counties for services, and more.Results/conclusions: With regards to mortgage/rent assistance, twenty-six of providers out of twenty-eight reported that demand greatly exceeded supply. When asked about supportive housing, twenty-five out of twenty-eight participants agreed that the demand was much greater than the supply. The same pattern was observed with regards to supportive housing, mental health resources, utility assistance, and transportation assistance. We can draw the conclusion that the homeless service infrastructure is currently overwhelmed by the level of demand in Cherokee County. To address the needs of the housing insecure and homeless population in the county, additional resources and infrastructure are required.*

***Understanding the Needs of Georgia's Hispanic/Latino Population with Regard to Adolescent Health***
Poster #10 (Convocation Center)
Thursday April 20, 2023
11:00am – 11:45am
Undergraduate Student(s): Aylin Diaz
Research Mentor(s): Evelina W. Sterling

*Georgia's Department of Public Health's Adolescent Health and Youth Development (AHYD) Program is based on the Positive Youth Development Approach as recommended by the Centers*

*for Disease Control and Prevention. This approach engages youth within their communities, schools and organizations, peer groups, and families in a productive and constructive manner. Overall, the AHYD program aims at preventing HIV, STIs, and pregnancy among all youth. In Georgia, the Hispanic/Latino population has grown to over 10% of our total population. However, adolescent health programs within Georgia have not specifically focused on the cultural differences among the large Hispanic/Latino community. This study takes the existing AHYD programs and seeks to investigate how these program resonate with the Hispanic/Latino communities, including variability in countries of origin. First, a thorough literature review was conducted regarding Hispanic/Latino youth, at risk behaviors, and the cultural competency of current programs. More specifically, the AHYD programs were further analyzed for how they address the unique needs of the Hispanic/Latino communities, especially beyond just translations to Spanish. Finally, recommendations were provided in terms of best practices that are needed to be incorporated into the programming as well as any evaluation measures. As the Hispanic/Latino population continues to increase in Georgia, it becomes more evident that improving the health and well-being of Hispanic/Latino children in critical to the state's future. While existing state-funded programs have focused on largely oral health, obesity and nutrition, mental health, unintentional injuries, reproductive and sexual health have been ignored, often due to stigma and cultural expectations. More steps must be taking to ensure their safe passage to adulthood across all areas.*

## Nursing

***Building Capacity through Training for Nursing Curriculum Evolution in Vietnam***
Oral Presentation (ALC 2203)
Tuesday April 18, 2023
12:00pm – 12:15pm
Undergraduate Student(s): Diya Patel
Research Mentor(s): Miranda Hawks

*Nursing education in Vietnam is continually evolving to meet the country's healthcare demands. While curriculum revision is conducted every two years, a recent pilot study revealed the need for a more tailored approach. The purpose of this literature review was to gather and evaluate preliminary data on curriculum revision in Vietnamese nursing education. The findings from this review of the literature will support the development of a prospective grant. If funded, the prospective grant will conduct a large-scale study focused on developing a model of curriculum evolution based on a pilot study with a partner university in Vietnam. To the authors' knowledge, there is no existing model for nursing curriculum revision in Vietnam. Several protocols were followed to ensure a high-quality analysis of curriculum revision in Vietnamese nursing education. Using the Kennesaw State University online library search engine, a comprehensive search was conducted based on peer-reviewed articles on certain keywords, such as nursing*

*"AND" curriculum revision "AND" Vietnam "AND" nursing education. Reviewing the peer-reviewed articles helped identify current trends such as the shortage of nurses and resources in Vietnamese nursing education. The literature review highlighted the need to consider the specific cultural context of manual labor and religious belief in Vietnam. Efforts are currently underway at this nursing school to revise the curriculum in order to better prepare nurses to meet these needs, including addressing the shortage of nurses and resources and considering the cultural context of nursing education. This involves developing a model for curriculum evolution that can address the unique challenges and opportunities identified in the literature review.*

***The Effects of Targeted Discharge Education Provided by Pre-licensure Nursing Students and the Impact of Readmission Rates, and Surgical Site Infections for Selected Post-operative Patients***

Oral Presentation (ALC 2203)
Tuesday April 18, 2023
12:20pm – 12:35pm
Undergraduate Student(s): Zamion Robinson
Research Mentor(s): Toni Johnson

*Background: Surgical site infections account for 20% of hospital acquired infections. Pre-licensure nursing students have an opportunity to reduce readmission rates and surgical site infections through targeted discharge education during their hospital stay. In the review of literature, the teach-back methodology is an effective way to provide appropriate patient education prior to the departure from the hospital. Discharge information along with the use of educational pamphlets and private one on one sessions to instruct caregivers and patients about discharge instructions can be an effective way to educate patients and family members thoroughly. Objective: to evaluate the effects of post discharge education and its impact on surgical site infections, and mediastinitis readmission rates. Methods: comparative study consisting of 50 patients who have undergone coronary surgery and received discharge education using the teach-back methodology. Results: Descriptive statistics will be used to examine the effects of discharge education on the development of mediastinitis between two groups. Conclusion: Examine the effects of timing, reinforcement of discharge education using the teach-back methodology.*

***Effect of Virtual Dementia Tour on Prelicensure Student Nurses' Attitudes Towards Dementia Care: A Quantitative Study Protocol***

Poster #15 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Kevin Alton
Research Mentor(s): Modupe Adewuyi

*With over six million Americans currently living with dementia, it is crucial for prelicensure nursing programs to prepare registered nurses to provide quality care to individuals with dementia and their caregivers. Due to the challenges associated with providing face-to-face clinical experiential learning, particularly during the COVID-19 pandemic, virtual simulation approaches are now being used as alternative or complementary clinical experiential teaching/learning methods. To evaluate the effectiveness of the Virtual Dementia Tour on prelicensure student nurses' attitudes towards dementia care. This study is nested in a larger ongoing multisite, mixed-methods crossover-experimental designed study that investigates the combined effect of an e-learning module with a Virtual Dementia Tour on knowledge and attitudes towards person-centered dementia care in prelicensure nursing education. Quantitative data on attitude will be collected using the dementia care attitudes scale (DCAS) via an anonymous survey. In April 2023, we will extract DCAS data collected from the main dataset and use the IBM SPSS 29 version to analyze it using paired t-tests to determine if there is a statistically significant difference between the pre- and post-scores. Our study findings will be presented at the Fall 2023 KSU Symposium for student scholars, and we plan to submit a manuscript to a peer-reviewed student journal for publication by August 2023. This study's findings could provide potential valuable insights into the impact of the Virtual Dementia Tour on prelicensure nursing students' attitudes towards dementia care. Also, the results of the study could contribute to the current knowledge about the effectiveness of a virtual experiential approach for teaching dementia care.*

***Enhancing Prelicensure Nursing Students' Knowledge of Dementia Care through the Virtual Dementia Tour: A Quantitative Study Protocol***
Poster #16 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Allisa George
Research Mentor(s): Modupe Adewuyi

*Dementia has emerged as an increasing public health concern with over 6 million Americans living with the disorder. As a result, it is essential for pre-licensure nursing programs to equip future registered nurses with the necessary knowledge to provide quality nursing care for individuals living with dementia and care partners. In light of the limitations of traditional face-to-face clinical experiential learning, virtual simulation techniques have emerged as an innovative and novel alternative or supplementary approach for clinical skills learning.*
*To assess the impact of the Virtual Dementia Tour experience on the comprehension of dementia care among pre-licensure student nurses. Our study is part of a large-scale multisite mixed-methods research project that investigates the effect of combining an e-learning module with a Virtual Dementia Tour on pre-licensure nursing students' knowledge and attitude with regards to person-centered dementia care. The quantitative phase uses an anonymous Qualtrics survey,*

*including the dementia knowledge scale (DKAS) , to collect data from recruited participants aged 18 years and older. We will retrieve the data associated with the DKAS from the larger dataset in April 2023. The retrieved data will be analyzed using paired t-test to determine if there is a statistically significant difference between the pre- and post-scores. Our goal is to publish our findings in a peer-reviewed student journal by August 2023 and present them at the KSU Symposiums in fall 2023. Our study's results could provide data on the effectiveness of the dementia tour in enhancing pre-licensure nursing students' comprehension of dementia care. Furthermore, this data could contribute to expanding our understanding of how virtual pedagogical methods can be utilized to improve dementia care knowledge among pre-licensure nursing students.*

***The Influence of Surgical Stress and Inflammatory Biomarkers on the Occurrence of Postoperative Delirium***

Poster #8 (Convocation Center)
Thursday April 20, 2023
3:00pm – 3:45pm
Undergraduate Student(s): Kirsten Davis and Yulisa Flores
Research Mentor(s): Doreen Wagner

*Research focusing on hypothermia has established a relationship between surgical stress and inflammatory biomarkers on delirium incidents in critically ill non-cardiac surgical patients. Unfortunately, postoperative delirium is a common complication after surgery and results in acute brain failure. Though the cause of delirium is still relatively unknown, systemic inflammation with neurological involvement is one of the leading etiologic theories. Another common complication in surgical patients is the occurrence of unplanned hypothermia during non-cardiac surgeries. For our study, we will be looking at two inflammatory biomarkers: C-reactive protein (CRP), and Interleukin 6 (IL-6). CRP is produced in the liver and is an index of overall inflammation in the body and is found elevated in postoperative delirium. IL-6, a pro-inflammatory cytokine, promotes a variety of cell functions that stimulate and enhance inflammation and is also known as a brain-active interleukin. IL-6 is a biomarker identified as a predictor of postoperative delirium when compared to those that do not experience postoperative delirium. Delirium assessments, surgical temperatures, and blood samples will be obtained from at least 100 non-cardiac surgical intensive care patients at a local hospital for the first three postoperative days. Our role in the project is to separate the serum from the blood and perform enzyme-linked immunosorbent assays (ELISAs) for CRP and IL-6. We will be assaying the separated serum to identify the levels of the two previously established inflammatory biomarkers. Through the comparison of inflammatory biomarker levels and surgical temperatures in non-cardiac patients with and without postoperative delirium, we hope to establish the influence of inflammatory stress and unplanned hypothermia on postoperative delirium. It is hoped that the findings from this study will further the understanding of how to assess, treat, and prevent*

*postoperative delirium. Presently, this is a work in progress and our findings will be shared at the symposium.*

***Postpartum Health and Wellbeing***
Poster #8 (Convocation Center)
Thursday April 20, 2023
10:00am – 10:45am
Undergraduate Student(s): Tamara Black
Research Mentor(s): Afekwo Mary Ukuku

*Our project is testing the stress levels of women in postpartum. We developed surveys for women who have recently given birth and then do a two-finger stress test.*

## Public Health Education

***Comparative Analysis between Vaccine Hesitancy and Rural vs Non-Rural Counties in the South-East Region***
Poster #18 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Shelsea Ruiz and Lucy Lansdowne
Research Mentor(s): Kevin Gittner

*Throughout the United States (U.S) there is a variety of people who are hesitant to get the COVID vaccine. Research was collected on April 14,2021 by the Center of Disease Control and Prevention, at a county level for each state. The data depicted this by showing different levels of vaccine hesitancy: "strongly hesitant," "hesitant," and "unsure." Participants could choose between five options: "definitely get a vaccine," "probably get a vaccine," "unsure," "probably not get a vaccine," and "definitely not get a vaccine" . Strongly hesitant included those who only responded they would "definitely not" get the vaccine. We decided with this information to only use the "Strongly hesitant" variable for our data. We used this data to look at the South-east region of the United States, specifically Georgia, Florida, South Carolina, Alabama, and Tennessee. Overall, the purpose of our study is to determine whether there is a difference between vaccine hesitancy and a county being rural vs. non-rural. Using the U.S Department of Agriculture definition of rural, 500 people or less is considered rural per square mile and anything more than 500 people per square mile is considered non-rural. Then we will identify the counties that are rural and the amount of vaccine hesitancy and the non-rural with their vaccine hesitancy. We will be using our data to make statistical graphs to identify the different sizes of rural and non-rural areas. Using this data, we will compare both data of vaccine hesitancy to see if there is a difference between the*

*levels of hesitancy in rural vs. non-rural counties. In conclusion, we expect our data to show that there is a difference in the vaccine hesitancy and of a county being defined as rural or non-rural. This study can help improve our understanding of each county and be able to identify more relationships between health decisions in each county.*

***Unstable Politics, Empty Stomachs: Investigating the Relationship Between Political Instability and Food Insecurity***
Poster #16 (Convocation Center)
Thursday April 20, 2023
1:00pm – 1:45pm
Undergraduate Student(s): Andrew Lewis
Research Mentor(s): Kevin Gittner

*Nowadays, food shortages are becoming more commonplace due to increasing costs and supply chain disruptions caused by the COVID-19 epidemic and other socioeconomic factors. Food security is a crucial public health issue that affects human well-being, health, and development on a global scale. The State of Food Security and Nutrition in the World report from 2021 estimates approximately 2.37 billion people suffered from a lack of food in 2020. In other words, 1 in 3 people could not access enough food (FAO et al., 2021). Food security is not only determined by natural factors but also by social factors such as political stability, governance, and conflict. Furthermore, food insecurity can be a driving force of social unrest, leading to political instability. This mini-project aims to explore the relationships between political instability and food insecurity using a comprehensive dataset from the Food and Agriculture Organization of the United Nations through literature review and secondary data analysis. The study investigates the relationship between food insecurity, measured by the prevalence of food insecurity within each country's population, political instability, measured by an index of political stability or the absence of violence/terrorism, and food imports in total merchandise exports. The results of this study may have significant implications for policymakers and international humanitarian efforts, particularly in developing countries where political instability and food insecurity are significant challenges. Moreover, highlighting the factors contributing to food insecurity allows public health officials to plan better interventions to address this issue. Overall, this mini-project will contribute to a better understanding of the complex relationships between political instability, food insecurity, and international trade in the fight against hunger and malnutrition in a world plagued by violence and corruption.*

## Social Work and Human Services

***Conducting a Program Evaluation for a Community-Engaged Scholar Network***
Poster #11 (Convocation Center)
Thursday April 20, 2023

12:00pm – 12:45pm
Undergraduate Student(s): Valeria Cardenas, Tiffany Cowart, Bailey Cuttle, Hannah Hatcher, Natalie Jimenez, James Karegi, Natalia Lage, Afiya Lestrade, Alexis McCray, Dacey Ngo, and Bensu Tas
Research Mentor(s): Jennifer W. Purcell

*The Engagement Scholarship Consortium is an international association of community-engaged universities. One of its signature programs, the Emerging Engagement Scholars (EES), is aimed at preparing doctoral students and early career faculty for community-engaged scholarship. Since 2007, the EES has accepted a 20-member cohort annually, resulting in a robust national alumni network. Following the disruption caused by the Covid-19 pandemic, the program's leadership sought to undertake a comprehensive program evaluation to learn from alumni if, when, and how EES programming aligned with their needs prior to and throughout the pandemic. Through a community-university partnership, the ESC and students enrolled in the KSU Human Services Program's HS3600: Program Development and Evaluation course, under the supervision of their professor, began the first phase of this evaluative process. Phase 1 required students to examine how the EES leadership can best determine existing program needs as well as opportunities for continuous improvement. HS3600 students were organized into evaluation teams to conduct a threefold inquiry including: (1) a targeted literature review, (2) reviewing existing qualitative and quantitative survey data, and (3) conducting virtual interviews with program stakeholders. This systematic investigation will inform Phase 2 of the study that will take place during the 2023-2024 Academic Year through a continued partnership with community-engaged researchers from KSU, Michigan State University, and the University of Colorado Boulder. A comprehensive program evaluation and implementation plan, inclusive of a program logic model and evaluation matrix, will be completed to inform EESW decision-making and strategic planning, which will be shared at the 2024 ESC Annual Conference. This poster presentation will feature preliminary findings from the evaluation research, including analysis of the strengths, weaknesses, opportunities, and threats to the program identified by EES stakeholders and past participants as well as the initial program logic model and program evaluation matrix informed by the study.*

***Personal Interview with a Person Living in Poverty in Cherokee County***
Oral Presentation (Microsoft Teams Link)
Friday April 21, 2023
3:40pm-3:55pm
Undergraduate Student(s): Kennedy Duff
Research Mentor(s): Matthew Lyons

*Cherokee County, Georgia, has a multitude of issues that affect the quality of life of the people living there, including homelessness. Contributors to homelessness include lack of access to public transportation, expensive housing, underdeveloped infrastructure, and a lack of resources for the*

*low-income population. The lived experiences of homeless individuals are not readily accessible to the general public, and should be amplified. As part of a mixed-methods needs assessment pertaining to homelessness and housing in Cherokee County, an individual experiencing homelessness in Cherokee County was interviewed. The interview covered topics related to the general experience of homelessness, the experience of receiving services in the county, and how services might be improved. The interviewee shared harrowing experiences of homelessness, including sleeping for nights on end in a car, being harassed by shop owners, threatened with legal action by police, and having difficulty meeting her nutritional needs. Since becoming homeless she also developed significant health issues, including obesity, prediabetes, swelling of the feet and legs, anxiety, and depression. Homelessness is a significant issue that negatively impacts those who experience it. Their stories are rarely told in privileged public spaces. Our purpose here was to amplify the voice of a vulnerable individual and shed light on the experience of homelessness.*