<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Student Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td><em>Diversity of microbiome affects nutrient cycling in Caribbean sponges</em></td>
<td>Hunt Jones, Marine Biology (Master's Student)</td>
</tr>
<tr>
<td>10:40 AM</td>
<td><em>Elucidating the role of activity-regulated cytoskeleton-associated protein and sex hormone estradiol in anxiety-like behavior and other behavioral abnormalities</em></td>
<td>Kirsten Snyder, Biology</td>
</tr>
<tr>
<td>11:00 AM</td>
<td><em>Women’s Health &amp; Cross-Generational Communication in the Rural Southeast</em></td>
<td>Courtney Smith, Communications and Political Science</td>
</tr>
<tr>
<td>11:10 AM</td>
<td><em>Increasing Vaccine Confidence in Religious Communities: The Intersection of Faith &amp; Health</em></td>
<td>Regan Gregory, Public Health</td>
</tr>
<tr>
<td>11:20 AM</td>
<td><em>Sino-American Tensions</em></td>
<td>Edmund Philipson, Political Science</td>
</tr>
<tr>
<td>11:30 AM</td>
<td><em>Design, Assembly, and Lab Testing of a Novel, Miniaturized, 3D Imaging Scope for Medical Applications</em></td>
<td>Brianna Joyner, Physics BS</td>
</tr>
<tr>
<td>11:40 AM</td>
<td><em>Black Speculative Fiction Through a Young Adult &amp; Millennial Lens</em></td>
<td>Jay Scott, Middle Grades Education</td>
</tr>
<tr>
<td>11:50 AM</td>
<td><em>The Mind of the Accuser: Nighttime Hallucinations in Early Modern English Witchcraft</em></td>
<td>Francesca Gibson, History and Psychology</td>
</tr>
<tr>
<td>12:00 PM</td>
<td><em>An Evaluation of the Uniform Partition of Heirs’ Property Act</em></td>
<td>Andrea Kimpson, Economics and International Studies</td>
</tr>
<tr>
<td>12:10 PM</td>
<td><em>Laypeople’s Sensitivity to Suggestive Influences in parent-child Conversations about Childhood Sexual Abuse</em></td>
<td>Alexandra Marsden, Psychology</td>
</tr>
<tr>
<td>12:20 PM</td>
<td><em>Health Information Seeking Among African American Adults in the Tri-County Area</em></td>
<td>Lisa Gawes, Public Health</td>
</tr>
</tbody>
</table>
1. 10:30 AM

*Diversity of microbiome affects nutrient cycling in Caribbean sponges*

Student Presenter: Hunt Jones, Marine Biology (Master's Student)

Faculty Mentor(s): Dr. Christopher Freeman, Marine Biology

Additional Author(s): Dr. Cole Easson (Middle Tennessee State University), Dr. Cara Fiore (Appalachian State University), Dr. Robert Thacker (Stony Brook University)

Marine sponges comprise the oldest animal phylum and are dominant on Caribbean coral reefs. Their success is shaped by efficient filter feeding and associations with microbial symbionts that expand host metabolism by allowing for the assimilation of dissolved organic matter (DOM), fixation of C and N, and recycling of host wastes products, such as ammonium. Previous work suggests that microbial abundance is the primary determinant of which resource sponges derive nutrients from. However, there is also substantial variation in the diversity and community composition of microbiomes across sponge species. Thus, we hypothesize that nutrient assimilation and recycling is highly variable among sponges with divergent microbiomes, even those hosting similar microbial abundance. To assess this, we conducted three pulse/chase experiments, using four sponge species (Aplysina cauliformis, Iotrochota birotulata, Niphates digitalis, and Xestospongia muta) with divergent microbiomes. We pulsed them using resources (DOM, particulate organic matter (POM), and inorganic compounds) enriched with 13C and 15N. Stable isotope analysis shows a significant difference among species in the efficiency of assimilation and recycling of C and N from different resources. Additionally, scanning electron microscopy and nanoscale secondary ion mass spectrometry allow visualization at the cellular level of uptake and recycling of C and N, providing key insights into the differing metabolic roles of the hosts and their microbiome in the symbioses of four dominant Caribbean sponges.

2. 10:40 AM

*Elucidating the role of activity-regulated cytoskeleton-associated protein and sex hormone estradiol in anxiety-like behavior and other behavioral abnormalities*

Student Presenter: Kirsten Snyder, Biology

Faculty Mentor(s): Dr. Rachel Penrod, MUSC Department of Neuroscience

Additional Author(s): Dr. Renaud Geslain, Biology

Sex differences have been observed in a number of psychiatric conditions, including anxiety disorders, addiction liability, and panic disorders, yet the synaptic plasticity underlying these differences remains widely unknown. Glutamatergic synapses are thought to play a role in these behaviors, and the immediate early gene and synaptic regulator, activity-regulated cytoskeleton-associated protein (Arc), has been implicated in this process. The nucleus accumbens is widely believed to play a role in mood...
and anxiety disorders and is involved in motivated behavior and responses to anxiety and fear, making it the ideal brain region to study these factors. Using shRNA, in vivo protein expression related to behavior and sex was studied, identifying sex-dependent behavioral changes in Arc knockdown mice. Arc knockdown in female mice resulted in escalation of sucrose seeking and addiction behaviors. In vitro stimulation studies with estradiol will demonstrate the role of circulating sex hormones on ARC expression. Quantification of changes in Arc expression in response to fear conditioning is also necessary to substantiate our understanding of sex-based involvement of Arc in ALB. These studies will elucidate the role of Arc symptoms of psychiatric disorders.

3. 10:50 AM

Overlooked Assets: Cultural Resource Management Plans in University Settings
Student Presenter: Jacob Mossbrook, Historic Preservation and Community Planning, Studio Art
Faculty Mentor (s): Dr. R. Grant Gilmore, Department of Art and Architectural History

Many universities in the United States and abroad maintain a wealth of historic and cultural resources that reflect university history as well as that of the surrounding community. In particular, the College of Charleston maintains over one hundred historic structures, sixty of which date to the Antebellum period, making it one of the richest historic landscapes in the country. In addition to the educational and aesthetic appeal embodied in old structures, these buildings present opportunities to university leadership as avenues for improving economic performance and viability while simultaneously investing in local social and community landscapes. However, most older universities in the United States do not have plans for the organized and effective maintenance and exploitation of these structures. As a result, many universities are actively losing their historic landscapes as the pressures of competitive development drive demolition and new construction. By analyzing the historic preservation activities of forty American universities established before 1801 through data collection surveys and independent research, it is clear that universities with robust and relevant cultural resource management plans (CRMPs) more effectively preserve their historic assets and utilize them in ways that enrich campus learning and involve members of the campus community in their execution. Furthermore, this paper argues that universities, and especially the College of Charleston, should make concerted efforts in establishing cultural resource management plans that catalogue, organize, and describe historic assets alongside clear guidelines that will inform how university facilities should maintain, adapt, and reuse historic structures to best suit the needs of the university, its stakeholders, its faculty, and its students. Through these efforts, universities can foster a more vibrant, diverse, sustainable, and successful campus environment that serves its community and encourages stability and longevity.

4. 11:00 AM

Women’s Health & Cross-Generational Communication in the Rural Southeast
Student Presenter: Courtney Smith, Communications and Political Science
Faculty Mentor (s): Dr. Cara Delay, History

Communication styles for men and women, as many scholars have written, can be fundamentally different. But even within groups of women, communication can be fraught; discussions of health in particular can be uncomfortable for some. Women family members often struggle to communicate effectively about their health, even with the other women and girls in their families. Even today, the
taboo nature of some health topics, including menstruation, sex, and birth control, leaves women under-informed about their bodies and healthcare. This study aims to deepen the understanding of women’s health-related intergenerational communication in rural communities in Appalachia and the Southeast. Through analyzing a series of interviews with women who are between 39-60, I connect women’s healthcare access and knowledge, hesitant communication about bodies and health within childhood homes, and cultural pressure towards shame and silence. In doing this, I aim to fill a knowledge gap about women who were raised between the height of the 2nd and 3rd wave feminist movements in the rural United States. This study also asserts that exploring rural women’s health is imperative to developing a comprehensive understanding of women’s experiences in America since most existing studies focus on urban contexts.

5. 11:10 AM

*Increasing Vaccine Confidence in Religious Communities: The Intersection of Faith and Health*

Student Presenter: Regan Gregory, Public Health
Faculty Mentor(s): Dr. Beth Sundstrom, Communication
Co-author(s): Dr. Elijah Siegler, Religious Studies

The COVID-19 pandemic has presented researchers with a unique opportunity to study vaccination habits. Vaccine hesitancy was identified by the World Health Organization as one of the top ten threats to global health in 2019. It is believed that vaccine hesitancy and resistance have roots in misinformation or a general misunderstanding of vaccination sciences. Vaccine literacy can dispel these myths and misconceptions, and this study exists to explore how academic-community partnerships can improve vaccine confidence in religiously diverse communities. Students from 7 campuses across the Carolinas have interviewed faith leaders, congregation members, student ambassadors, and campus leaders in a one-on-one, confidential, virtual format. We aim to understand how members of these communities remove barriers to COVID-19 vaccination specifically, as well as how these communities perceive the benefits and barriers to vaccination. We have 29 in-depth, qualitative interviews completed by student ambassadors. Data analysis with NVivo 1.7 software reveals emerging themes and patterns from interviews, using codes based on research objectives and existing literature. With a diverse sample of interview participants, the most prevalent themes have been related to defining faith and health, community engagement, centering community and personal hopes and dreams, and a unique, “listening first” approach to academic-community partnerships. Additionally, vaccine literacy is a central component of this project in that participants are citing a variety of interpersonal and intrapersonal barriers to literacy. We aim to build on previous vaccine hesitancy literature to make suggestions for future health promotion initiatives in faith-based organizations.

6. 11:20 AM

*Sino-American Tensions*

Student Presenter: Edmund Philipson, Political Science
Faculty Mentor(s): Dr. Guoli Liu, Political Science

Semiconductors are the new oil. They have become critical pieces of technology that have transformed the way the world communicates, innovates, and protects sovereign territory. You can find these pieces
of technology in your phone, computer, car, and even your refrigerator. Semiconductors are critical to national security because of the government’s reliance on them for military systems such as communication, missiles, and fighter jets. It is safe to say that semiconductors have enabled a technological revolution. In 2021, the United States dominated the global market share with 46% of the industry. Many of the world’s leading chip design companies can be found in the United States. These companies then outsource manufacturing to foundries such as the Taiwan Semiconductor Manufacturing Company or TSMC. TSMC fabricates the most advanced chips in the world for major entities like Apple and the US Government. China is rapidly trying to gain market share and catch up in the semiconductor industry. They are the largest consumer of semiconductors and a major buyer of American chips. The Chinese are determined to create more autonomy from the American chip industry. Furthermore, President Xi Jinping is determined to reunite Taiwan with mainland China and complete Mao Zedong’s dream of reunification. Xi’s plan has been thwarted by America’s reliance on Taiwan for advanced chips. America’s reliance on Taiwan and Xi’s dream of reunifying it with China is slowly escalating tensions between these two superpowers. This paper will analyze the buildup of tensions that could drag these two nations into war over the next few years.

7.  11:30 AM

*Design, Assembly, and Lab Testing of a Novel, Miniaturized, 3D Imaging Scope for Medical Applications*

Student Presenter: Brianna Joyner, Physics

Faculty Mentor(s): Dr. Joe Carson, Physics & Astronomy

Co-Author(s): Jenna Snead (Physics & Astronomy), Stanley McAfee (Pensievision), Bailey Williamson (Pensievision), Kevin Gainey (Pensievision)

Women around the globe, especially those residing in underserved communities with minimal healthcare access, continue to suffer from fatal cervical cancer. To mitigate the harm from this terrible disease, Dr. Carson’s research group invented the CervImage device, to enable an affordable, simple-to-use method to screen for cervical pre-cancers with 3D imaging. While patient testing this past year has shown that CervImage successfully allows for minimally invasive screening, there is a need to further miniaturize the device, to access currently inaccessible anatomical regions where cancers reside, like within the cervix entrance, uterus, and other areas. CervImage’s current hardware limitation is its front-mounted liquid lens, which cannot be made any smaller. However, Dr. Carson’s research group recently created a modified design to effectively achieve such miniaturization through the use of a 2.7mm diameter sheathless scope with the liquid lens mounted on the back end. The goal of my project was to conduct in-lab testing of such a prototype to determine if it is suitable for 3D medical imaging. I have been doing so by measuring the angular field-of-view and spatial resolution, and by evaluating if depth information can be measured by varying the liquid lens focus, as CervImage does to achieve its 3D images. If successful, this experiment would represent the smallest-diameter medical scope ever shown to be capable of 3D optical imaging.
Throughout literary history, the world of speculative fiction can sometimes remove or dehumanize the Black experience, leading authors to reassess and contextualize history through the genre of Afrofuturism. I am writing short speculative fiction to continue this exploration of the language arts via religion, racial injustice, and the supernatural.

“Brown,” depicts Terence, a parapsychology professor, as the victim of police brutality and Leon, his fraternity brother, as his avenger and a champion of Karma herself. Terence works at Avery University, a fictional historically Black university based on the real Avery Normal Institute. The Avery Normal Institute was the first accredited secondary school for African Americans in Charleston, SC.

“Through God’s Grace” is a Biblically-inspired story introducing the Rapture through Amechi, a preacher’s daughter. This city was chosen as the central location for the Second Coming because Charleston was previously known as "the Jerusalem of American slavery, its capital, and center of faith." The premise follows the story of Revelation 12, where an unknown woman faces the Devil and is protected by God, stirring the question, “What if God had a daughter?”

“The Kemetic King” explores the spread of Christianity from the perspective of Tatenen, the primordial creation deity in some tales of Egyptian mythology.

“Civil Fire” follows FBI Agent Ebony Charville as the Ku Klux Klan takes over the fictional town of Edensboro, VA, in search of the mystic Sherman’s Flame.

In an attempt to rationalize the witch-hunts, the public and historians alike have adopted anachronistic approaches, suggesting that the accusers were simply driven by misogyny, ignorance, and even hallucinogenic mold. Current historiography acknowledges the idea that witchcraft could have real-world implications, but there has been minimal research into the role of psychological processes in the experience of bewitchment. Despite a growing body of scholarship on the reality of witchcraft and the prevalence of nocturnal incidents mentioned in primary sources, the role of nocturnal hallucinations (hypnagogia) in the witch-hunts has received little attention. So, to understand the implications of hypnagogia in witchcraft accusations, this research was conducted through an in-depth analysis of historical primary sources as well as secondary historical and psychological literature. Focusing on England from 1563-1640, this research advocates for interdisciplinary approaches to history, arguing that hypnagogia played an instrumental role in fueling the witch-hunts, exacerbating fears of bewitchment, and corroborating witchcraft beliefs. Significantly, these findings encourage interdisciplinarity and grant new insight into witchcraft persecutions.
10. 12:00 PM

An Evaluation of the Uniform Partition of Heirs’ Property Act
Student Presenter: Andrea Kimpson, Economics and International Studies
Faculty Mentor (s): Dr. Peter Calcagno, Economics

Legal and illegal forms of discrimination contribute to long-standing wealth disparities for African Americans. One contributor to this disparity can be found in land loss due to the partition sale of heir’s property, property passed to family members by inheritance without a will or estate planning strategy. A lack of clear legal title leaves heirs vulnerable to partition sales where land is divided and split, often without full consent from all heirs. The Uniform Partition of Heirs’ Property Act (UPHPA) emerged in 2010 to address this issue by giving legal protection to individual heirs’ property owners during a sale. The UPHPA provides structure for the independent fair market value appraisal of property and creates opportunities for heirs’ to contest the appraisal and sale. This paper aims to evaluate the efficacy of the UPHPA in increasing wealth for African Americans in the south and posits that it was successful. A difference-in-difference framework will be used to compare the changes in wealth over time for African Americans in states that enacted the law using data from the Decennial Census, the American Community Survey and the House Price Index from the Federal Housing Finance Agency. States will be grouped into cohorts by year of enactment with a pre-treatment period beginning in 2000 and a post-intervention period ending in 2020. From this analysis, it will be possible to draw conclusions about the effects of formalizing property ownership among marginalized groups using lenses of equity, accuracy, and efficiency.

11. 12:10 PM

Laypeople’s Sensitivity to Suggestive Influences in parent-child Conversations about Childhood Sexual Abuse
Student Presenter: Alexandra Marsden, Psychology
Faculty Mentor (s): Dr. Gabrielle Principe, Psychology

In cases of child sexual abuse or molestation, there is typically no witness or collaborating evidence (Otgaar et al., 2017), physical or medical evidence is extremely uncommon, and prosecution often relies solely on a child’s testimony (Cross & Whitcomb, 2017; Principe & London, 2022). In most cases, suspicion of child sexual abuse arises during interactions with a non-offending parent (Malloy et al., 2013). However, when parents have preconceived suspicions or misinformation of an event their child experienced, they are more likely to converse with their child in a highly structured and controlled approach. Parents may unintentionally shape conversations through how they question their child to elicit reports that align with their assumptions and beliefs, which is known to result in memory errors (Principe et al., 2017). This poses the concern that well-intending parents may influence a child’s report, not recognizing the impact their questioning style has on eliciting disclosures from their children. In this study, adults read transcripts of parent-child conversations where child sexual abuse is disclosed to determine if laypeople can recognize what biased or suggestive parental questioning looks like and to what extent they are aware questioning can influence children’s reports. Analyses examine laypeople’s
beliefs about children’s disclosure and parental questioning. We discuss the implication for future legal cases involving young children.

12. 12:20 PM

*Health Information Seeking Among African American Adults in the Tri-County Area*

Student Presenter: Lisa Gawes, Public Health
Faculty Mentor(s): Dr. Sarah Maness, Health and Human Performance

To this day the United States still faces major problems such as structural racism that reinforces discriminatory beliefs and values, leading to health disparities in the distribution of resources in healthcare. Racial and ethnic minorities are most at risk of inequity in seeking health information and receiving adequate health treatment. Specifically, African Americans are not as likely to be insured, and often struggle to get health care. This leads to limited options and a lack of proper health care. Furthermore, African Americans often live in areas that contain underfunded school systems which leads to higher dropout rates which perpetuates a poorer understanding of health literacy. This study used a health and financial literacy approach to qualitatively determine how African American Adults in the Tri-County Area find out about health information, how they decide the information is true and how to pay for this healthcare (n=20). This examination gives an in-depth analysis of the health disparities and inequity when it comes to health information seeking and sheds some light on how to address this disparity and invest in an overall improvement in the health care network for African American adults in the Tri-County area, South Carolina.

13. 12:30 PM

*Tri-County Community Health Needs Assessment: Identifying Key Health Concerns in the Lowcountry*

Student Presenter: Jessica Plair, Public Health
Co-Author(s): Renee Linyard-Gary
Faculty Mentor(s): Dr. Morgan Hughey, Public Health

A Community Health Needs Assessment (CHNA) is essential for prioritizing health issues within a community and guiding action steps. Roper St. Francis Healthcare established the Tri-County CHNA in 2013, including Berkeley, Charleston, and Dorchester counties. This CHNA aims to identify the most urgent health needs of the community in 2022 to inform the community action plans. Methods: Through partnerships, key informants and focus group participants were recruited. Key informant interviews and focus groups were conducted using an organized interview guide. All interviews were recorded and then transcribed verbatim by student research assistants. Then, all transcripts were reviewed closely by listening to and reading the transcriptions of interviews. A summary page was provided for each interview, summarizing the key informants’ basic background, challenges, future, and methods for increasing knowledge. Recurring themes were identified for more in-depth analysis, and representative quotes of these themes were extracted to highlight key topics. Results: Key informant interviews (n=10) and focus groups (n=5) pointed out that access to health care, behavioral health, clinical preventive services, maternal, infant, child care, and obesity were the top health priorities. These topics cited economic burdens, transportation challenges, and a need for more comprehensive resources for each key issue. Conclusions: Access to health care must be addressed to tackle community needs.
cited expanding Medicaid to help overcome this challenge. Healthy Tri-County may use the qualitative data collected and evaluated to provide insight into the community's needs and methods to improve the community's health in the future.

14. 12:40 PM

Making Sense of Primordial Alphabet Soup

Student Presenter: Brison Shira, Biochemistry and Classics
Faculty Mentor(s): Dr. Jay Forsythe, Chemistry and Biochemistry

Scientists surmise that before life emerged, a mixture of chemicals existed (e.g., amino acids, AAs) and evolved into biological molecules (e.g., protein). This mixture of chemicals is often called “primordial soup.” The primordial soup likely contained hundreds, if not thousands, of AAs, but biological proteins only use a selected alphabet of 20. The way protein evolved from inanimate letters to “words”—that is, its structure(s) and biological function(s)—remains unclear to this day. Scientists researching chemical evolution make model primordial soups in which AAs link together, forming protein-like polymers called peptides. To determine the order of AAs in a peptide (a.k.a., to read the word), researchers often use a technique called tandem mass spectrometry (MS/MS). Our goal is to develop fluency in reading peptides that contain not only the 20 biological AAs but also other AAs or similar molecules. Although these letters are no longer used in the biological alphabet, they were likely important to evolution. Here, peptides with various letters in the alphabet were made and analyzed by MS/MS. MS/MS data was interpreted using computational chemistry. We have determined that how peptide chains orient themselves during MS/MS analysis affects how they are read. Our work should enable researchers interested in the origins of life to read not only modern peptides but also those generated from primordial “alphabet soup.”
ARTISTIC PRESENTATIONS
Cougars Den – off the mezzanine

10:30  
*Bach Violin Partita in B minor*, Beryl Ayiku

10:45  
*Hemlock*, Queen Hamilton

11:00  
Misha Pekar

11:15  
Clara Camacho

11:30  
*Juntos*, Alejandra Casco

11:45  
*Kundiman: The Musical and Socio-Cultural Development of Filipino Art Song*, Meleana Cabales

12:00  
*Hayden Cello Duo (2 movements)*, Zach Butler, Allyson Dorsey

12:15  
*Bolcom, The Garden of Eden (I and II)*, Reed Kurtz

12:30  
*Hayden String Quartet Op 1 No1 (2 movements)*, Bailey Kassem-Tittle, Tyree McDowell, David Robinson, Isaac Hill

12:45  
*Kundiman: The Musical and Socio-Cultural Development of Filipino Art Song*, Meleana Cabales

15. 10:45 AM  
*Hemlock*

Student Presenter: Queen Hamilton, Music

Faculty Mentor (s): Dr. Yiorgos Vassilandonakis, Music

I would like to present a composition I wrote entitled Hemlock. It is a string trio that is roughly 3min in length. The music is meant to depict a walk in the forest that presents both the danger and beauty of the landscape. The listener is meant to feel as if they were there themselves and struggle with the situation placed before them. Is it Hemlock or Queen Anne's Lace?

16. 11:30 AM  
*Juntos*

Student Presenter: Alejandra Casco, Dance

Faculty Mentor (s): Kristin Alexander, Dance

This semester I have choreographed a latin-jazz piece that represents the beautiful Latino/a culture through dance. The intent behind this piece is to create a story about people coming together in life to truly begin living for the first time, and realizing that no one is going through this journey alone. We are

*Sustainability-themed project*
all going through it together, so we should make the most of it. The latin culture heavily revolves around the idea of community, and I think that's what we need more of. Not only at this school or in this city, but in society as a whole. My cast will be performing the piece.

17. 11:45 AM and 12:45 PM
*Kundiman: The Musical and Socio-Cultural Development of Filipino Art Song*
Student Presenter: Meleana Cabales, Music
Faculty Mentor (s): Dr. Michael O’Brien, Music

This ethnomusicological research project was centered around the Filipino kundiman, love songs with nationalist sentiments hidden within longing lyrics and melodies. This genre emerged as a folk tradition during the period of Spanish colonialism, but developed into a formal art song in the 20th century. This can be attributed to the influence of American musical education on two hallmark Filipino composers: Nicanor Abelardo and Francisco Santiago. Formal conservatory training, exposure to high quality performances, and study opportunities in Europe and the United States refined their compositional skills. The evolution of kundiman into a national art song helped distinguish Filipino identity after centuries of forced assimilation and cultural cross-fertilization. Depending on the amount of time allotted, I will perform one song (approx. 3-4 minutes) and give a brief oral presentation (approx. 5 minutes) on its translation and context within the greater kundiman history.

**POSTER ABSTRACTS**

**School of Languages, Cultures and World Affairs**

**DEPARTMENT OF CLASSICS**

18. *Unapologetic Apathy: Three Cheers for Tyranny*
Student Presenter: Grace Shaffer
Faculty Mentor (s): Dr. Jennifer Gerrish

In an age of increasing disinformation, it is imperative to critically engage with the histories that have been passed down to us. The historian Tacitus (56-120 CE) provides us with our primary source for the reign of emperor Nero (54-68 CE). Long praised for its supposed impartiality, Tacitus’ Annals has been held up as one of the major precursors to ‘scientific’ historiography. Upon closer examination, however, this text is not as objective as it might initially appear. Tacitus is not entirely altruistic in his composition; he hopes to explain the origins of the degeneracy that seemed to be plaguing Imperial Rome. He expresses his disapproval through depictions of forced suicide of the elite, inner-circle courtiers. Tacitus finds solace in positive examples of Romans who stage their deaths as scenes of resistance against a corrupt regime—highlighting these glimmers of virtus (virtue) and libertas (liberty) amidst Nero’s depravity. Simultaneously, the historian disparages those who praised Nero in death or tried to step out of their designated societal roles. The historian’s editorialization heightens both the corruption of the emperor and the heroism of those who opposed him. As a consequence, Tacitus’ representations of...
death directly contradict his claim that he is removed from passions that might sway his account towards praise or hatred.

19. Regional Land Use Patterns in the Northeastern Peloponnese: Developing a Cross-Comparative Framework
Student Presenter: Matthew Titzler
Faculty Mentor (s): Dr. James Newhard
Additional Authors: Haley Bryan, Kelsey Campbell, Emma Jansen

One of the main reasons for conducting regional survey is to understand long-term land use and social change. Synthesizing these data contributes to broader, interregional constructs for understanding human social development. Recent work has furthered the discussion by combining multiple survey datasets into large, singular interregional entities for analysis. Despite its promise, the work is complicated by the various methods used to collect data within each region. By assessing individual survey data via standardized metrics related to continuity and change, separate regional patterns can be developed. These patterns can then be combined, serving as data useful for developing broader interregional models that illustrate general trends, tempered by regional variation, which then become useful for framing questions related to long-term human histories. This study serves as a test case. Four surveys in the northeastern Peloponnese were reviewed in terms of survey methodology and data collection and reporting. Data on land use history was compiled and measured against established metrics that assess continuity, change, and social resiliency. When combined, these individualized assessments provided a comparable dataset that allowed for the development of specific regional histories and broader interregional modeling of human landscape use over time.

DEPARTMENT OF FRENCH, FRANCOPHONE, AND ITALIAN STUDIES

20. Gender and Genre: The Characterization of Genders across Film Genres, Tradition vs. Fluidity
Student Presenter: Emily Dombrowski
Faculty Mentor (s): Dr. Robert Sapp

From its publication in 1975, Laura Mulvey’s concept of the male gaze has defined a traditional approach to film studies, however, contemporary films demonstrate a more complex portrait of gender, the individual expression of identity unlinked from sex. This study suggests that film genres use this conception of gender to inform and characterize the style of film. This project analyzes four films, Portrait d’une jeune fille en feu (a period piece), Elle (a thriller), OSS 117: Caire, Nid d’espions (a comedy), and Titane (a horror film), to compare the role of gender with Mulvey’s characterization of the male gaze and scopophilia. The comedy and the thriller genres rely on the traditional gender expressions that Mulvey critiques for the understanding of humor and a sense of fear, but the period piece and horror film emphasize the fluidity of gender to communicate the complexity situations in the films. In the same way that film genres compartmentalize styles of films, traditional gender roles limit individual expression. Certain film genres continue to rely on traditional expressions of gender, while others branch out and include more realistic portraits of gender to underline the complexity of our world.
21. Animal Communication in Linguistics? What animals can teach us about language evolution
Student Presenter: Regan Honeycutt
Faculty Mentor(s): Dr. Ezequiel Durand-Lopez

Communication is prevalent in animal behavior across taxa. Despite communication originating from biological factors, humans were once thought to have unique language characteristics not found in other species (e.g., recursion) (Hockett, 1958). While other animals share similar neurological structures responsible for language processing to those of humans, they have not developed the same complexity. Importantly, there is little research on the conditions that permitted the development of language characteristics such as recursion, which is the embedding of smaller items in larger ones of the same kind (Goldin-Meadow, 1982). This study aims to understand this characteristic’s development by comparing three groups: humans, songbirds, and marmosets. These animals are social and regularly communicate with conspecifics. Humans and songbirds, however, have similar sections of the brain that allow communication processing. Crucially, the latter two also share linguistic recursion. Comparing these groups can show the necessity of both sociality and neural development for human language development. Our qualitative analysis suggests that homologous areas of the brain shared between songbirds (e.g., hyperstriatum ventrale, pars caudalis and caudomedial nidopallium) and humans (e.g., Broca’s and Wernicke’s areas) are associated with increased language complexity, including recursion. Recursion occurs in human language as embedded subunits like morphemes or words in longer words or phrases granted they follow a grammatical structure. In songbirds, recursion also appears as embedded subunits (subsongs) within a longer, structured song. We defend the idea that recursion must be neurologically permitted and is only biologically relevant in the context of social behavior.

22. The Mutual Intelligibility of Tzotzil and Tzeltal
Student Presenter: Kevin Riley
Faculty Mentor(s): Dr. Ricard Viñas-de-Puig

Throughout the world, there is prejudice against indigenous peoples which has led to assimilation into the majority culture. The social pressure for assimilation has caused the loss of traditional practices, culture, language, etc. In Chiapas, Mexico, indigenous peoples of Mayan descent have been fighting for rights and representation from the Mexican government to protect their culture and land. The Sna Jtz’ibajom Special Project is currently working to increase literacy of Mayan cultures and traditional practices along with fluency of the two most widely spoken Mayan languages, Tzotil and Tzeltal, which are found in the highlands of Chiapas. They are currently experiencing displacement, which is the loss of a language due to disuse. By studying these two languages in conjunction, we can further the current knowledge of the linguistic diversity in Mexico. These languages are from the same language family and are found geographically close to one another, and yet they are formally recognized as independent languages. Because of this, Tzotzil and Tzeltal share many linguistic characteristics. These languages originated in Chiapas, Mexico but frequently interact in the United States due to immigration. The commonalities between the groups create a sense of community that connects the languages. By linguistically comparing them, we can better understand how speakers of these languages in immigration settings are able to communicate and how diverse Mexican indigenous languages truly are.
With this study we hope to analyze the mutually intelligibility of Tzotzil and Tzeltal and bring awareness to the importance of indigenous cultures and languages.

DEPARTMENT OF INTERNATIONAL STUDIES

23. Actions of Women’s Civil Society Organizations in Response to the Bosnian War
   Student Presenter: Margaret Bruce
   Faculty Mentor (s): Dr. Max Kovalov

This project focuses on transitional justice efforts pursued by women’s civil society organizations in the aftermath of the Bosnian War. Following the conflict, there was a demand to address the numerous war crimes perpetrated by Serbian forces against Bosnian civilians. In addition to genocide and forced relocation, gender-based violence was a key feature of the conflict. Traditional transitional justice methods, such as the International Criminal Tribunal for the Former Yugoslavia (ICTY), attempted to provide relief for victims. Many Bosnian women felt that the courts were limited in their impact and failed to appropriately address gender-based violence. In response, numerous women’s civil society organizations were created after the war to demand justice. I examine the work of 13 women’s civil society organizations in Bosnia that advocate for transitional justice, women’s rights, and protection against violence. I use the original data on specific projects pursued by these organizations, such as street actions, legal action, educational campaigns, and victim support activities. I analyze the impact of each of these projects on the women they are intended to serve. I hope to understand how women’s civil society organizations affect their communities and advocate for justice in the aftermath of conflicts.

PROGRAM IN JEWISH STUDIES

24. Medical Caregivers as Perpetrators of the Holocaust
   Student Presenter: Brynn Korin
   Faculty Mentor (s): Dr. Chad Gibbs

The job of medical personnel is to help and to heal patients. Yet in the Holocaust, physicians and their assistants took part in the mass murder of millions of people along with countless inhumane experiments. Over the course of two semesters, I have conducted research that seeks to understand how those sworn by the Hippocratic Oath to “first, do no harm” became important foot soldiers in the assault on lives deemed unworthy of life by Nazi ideologues. How could one go into a profession with the intention to care and cure people, yet end up being responsible for the murder and suffering of so many? Through this research I have read sources on the Nazi German T4/euthanasia program, Operation Reinhard, Nazi medical perpetrators, and medical experiments in depth. Through these studies I have collected data that has helped me identify some of the social and psychological factors that led Nazi medical perpetrators of the Holocaust to commit such atrocious crimes. Gaining a deeper understanding of how and why medical personnel participated in these actions helps explain the progress ideologies behind the Holocaust. Additionally, this research provides insight into the central immorality of Nazi bioethics. Studying the twisted bioethical immorality of Nazi physicians and other hospital staff provides not only a due historical recognition of what their patients and victims endured, it can also act as a guide for the conduct of doctors today and in the future.

Sustainability-themed project
25. Do Political Outsiders Actually "Drain the Swamp"?
Student Presenter: Will Cason
Faculty Mentor (s): Dr. Beatriz Maldonado

There are increasingly more outsiders entering the political sphere promising to ‘drain the swamp’, reduce corruption, upend elite-controlled institutions, etc., often—though not always—on populist platforms. Names like Donald Trump, Volodymyr Zelensky, Evo Morales, Alexander Lukashenko, and Hugo Chávez ring bells not just within the realm of political science and public economics, but also in everyday discussion. There is good reason to examine how these politicians, with few years of experience and from outside the political machine, change institutions in their wake. This project investigates the question of the political and economic impact of outsider administrations at a broader, cross-regional level. This will be done by tracking whether the presence of an outsider politician in the executive branch changes measures of corruption (from the International Country Risk Guide), government size (government spending as a percentage of GDP from the World Bank), and income inequality (Gini coefficients from the Standardized World Income Inequality Database). By comparing these metrics in years where outsiders were in power and the years where they were not, this study will test whether outsider politicians deliver on their promises.

Student Presenter: Emily Cook
Faculty Mentor (s): Dr. Calvin Blackwell

We surveyed 545 U.S. adults about their feelings of F.O.M.O (fear of missing out), mindfulness habits, social media usage, loss aversion, and discount rate. We find that individuals who have higher levels of social media usage are significantly more likely to report higher levels of F.O.M.O, as measured by the Fear of Missing Out Scale (Przybylski et al., 2013). Those with higher levels of F.O.M.O also indicate different relationships with loss aversion and discount rate than those with lower levels of F.O.M.O. Primarily, higher levels of F.O.M.O led to lower levels of loss aversion and less present bias than hypothesized. These lower levels of loss aversion and lack of present bias were significantly different than the levels seen in individuals with lower levels of F.O.M.O. The relationship between F.O.M.O and mindfulness was as expected: higher levels of mindfulness, measured by the Five Facet Mindfulness Questionnaire, led to lower reported F.O.M.O levels. This suggests that currently utilized F.O.M.O marketing tools may not be producing the anticipated and desired results from consumers.
In 2019, Greece welcomed 34 million foreign tourists, reaching a record high for this international destination. By the end of 2020, this number fell to 7 million, as the covid-19 pandemic emerged. Today, however, travelers are eager to explore in a post-covid context—in 2021, the quantity of international tourist arrivals rose again to 15 million. Iceland—another destination known for its natural wonders—saw a 44% increase in international tourist arrivals between 2020 and 2021. While tourists have already begun flocking once again to destinations abroad—for a multitude of purposes from business to pleasure to adventure—tourism service providers in both nations have struggled to regain stability. The combination of a rapid renewal of international tourist arrivals, combined with the instability of post-covid economic infrastructures, has left visitors, tourism providers, and a wealth of other international actors wondering ‘when enough is enough.’ There is therefore an urgent need for observational study of over-tourism contributing to economic growth or decline in a post-covid context through case studies of international destinations. In my research, I will study the now popular issue of over-tourism in Iceland and Greece through a series of twenty interviews with major tourism actors and industry experts (with ten interviews dedicated to each location). Ultimately, I hope to determine where and if over-tourism has become a concern at these destinations following a global pandemic. And with what is learned, I will make recommendations or suggestions for the destinations’ futures.

28. The Economic Attractiveness of the Cooper River Bridge Run

Student Presenter: Macy Axton
Faculty Mentor (s): Dr. Stephen Litvin

This research takes a look at the expenditure patterns and tourist behaviors of road-race tourists to Charleston, South Carolina during the city’s annual Cooper River Bridge Run, which last year attracted more than 45,000 participants. This research involved the economic impact of the Low-country region of South Carolina, specifically on the city of Charleston and the town of Mt. Pleasant. In my research, we focused on topics such as tourism displacement, mega-event, and micro-event patterns, and how they affect the surrounding cities. I concentrated my data collection on tourists visiting due to the Bridge Run, on April 1st, 2022, the day of the run I handed out surveys to runners who had completed the run which included questions about their spending habits, demographics, and how they plan to spend their time in Charleston. I then analyzed the data collected on SPSS. The findings suggest that runners/walkers are less than ideal tourists for the community. My research concludes with suggestions to tourism officials that this event is not likely to draw the most economically attractive tourists for Charleston business in April but if officials reconsider changing the race to a more profitable season by applying my reasoning, they can certainly make a positive contribution.
29. How Social Media Marketing Affects Visual Arts Institutions
Student Presenter: Madeline Usdan
Faculty Mentor (s): Dr. Stephen Litvin

As the world has transitioned into the digital age, social media marketing has become vital to the success of businesses. This bachelor’s essay project will delve into the visual arts sectors’ usage of social media. I will collect qualitative data by interviewing twenty local arts marketing professionals from different galleries in the Charleston metropolitan area. The questions will center on their use of Instagram, TikTok, and Facebook to attract tourists outside of the local Charleston community. My next step for this project will be to analyze the social media presence of twenty different galleries from tourist destinations in the southeast such as Savannah, Hilton Head, Charlotte, Myrtle Beach, and New Orleans. I will analyze their social media usage by looking at their number of likes and content posted on each platform and compare it with the qualitative data received from art marketers in Charleston. By comparing and contrasting the data from these sample populations of art galleries I will hope to identify the most effective social media strategies to reach the largest tourist audience. The conclusions drawn from this research will prove beneficial to participants as they can adjust their own marketing efforts to increase foot traffic at their location and gain a higher revenue for their workers and artists with these positive marketing changes.

DEPARTMENT OF MANAGEMENT AND MARKETING

30. Employee Readiness for Leadership Development: A Lifespan Approach
Student Presenter: Brea Fields
Faculty Mentor (s): Dr. Ivana Milosevic

Leadership development continues to be an essential yet increasingly complex process in contemporary institutions due to the ever-increasing external pressures for change and the need for leaders to navigate them. A growing concern within the leadership development field is the process of acquisition of leadership skills, particularly the ability to accurately assess the employee's readiness to acquire necessary skills through development programs. Although few studies pointed to the importance of early dynamic experiences, the antecedents of individuals' readiness to develop as leaders remain black-boxed. To better understand how early experiences may influence employee readiness for leadership development programs, I will conduct an extensive literature review of leadership development literature and borrow insights from the attachment theory and experiential learning theory to build a theoretical model explicating the antecedents and conditions of employee leadership readiness – readiness to acquire leadership skills. Preliminary analysis suggests that employees whose early dynamic experiences resulted in a secure attachment style will have the ego resources and self-regulatory capabilities necessary for developing leadership skills. However, the analysis also pointed to the importance of the continuous and intentional processing of experiences through which individuals build new cognitive models as an important intervening variable, increasing employee readiness for leadership skill development. These preliminary insights contribute to the leadership development theory and practice by identifying individual-level antecedents to employee readiness for leadership development and how organizations may increase employee readiness through carefully designed opportunities to acquire leadership experiences and reflect on them early in their career path.
31. How Nudge Marketing Can Combat Alcohol-Induced Industries in Downtown Charleston
Student Presenter: Charlotte Fitzsimmons
Faculty Mentor (s): Dr. Esta Shah

Weekend nights in Downtown Charleston are prone to higher rates of alcohol consumption which, in some cases, lead to increased alcohol-induced injuries. The city of Charleston has the highest percentage of reported binge drinking (30%) out of all counties in South Carolina (County Health Rankings & Roadmaps) and South Carolina has been ranked the third most dangerous state for pedestrians from 2016 through 2020 (National Complete Streets Coalition). Given the high pedestrian traffic in Charleston due to both the downtown location of the College of Charleston campus and the high rate of tourism, there is a need for action to improve pedestrian safety. This proposal integrates research from nudge theory, social conformity, drug science, and neuroscience to inexpensively and effectively combat alcohol-induced injuries in Downtown Charleston. We propose the integration of a nudge campaign which uses reflective lights and color-coded walkways to promote safe pedestrian habits as well as improve driver awareness. Alcohol has a strong correlation with slowed cognitive processes and can lead to a multitude of risky behaviors such as discoordination, depressed nerve functioning, snap judgements, and injury. Nudge marketing is a relatively inexpensive, yet effective social change tactic that could be implemented by the city to lessen auto-pedestrian accidents by leveraging snap judgments to make safer responses and decisions.

32. Redefining Beauty: A Critical Analysis into TikTok’s #BodyPositive Atmosphere
Student Presenter: Ryann Tracy
Faculty Mentor (s): Dr. Kelley Cours Anderson

Consumers and marketers are redefining cultural expectations for what is socially acceptable as “beautiful.” This growing phenomenon is expanding throughout the technological world, emphasizing the idea of #BodyPositivity. Social media influencers advocate followers to accept their bodies unconditionally. However, it is unclear whether this is a reality or another deceiving portrayal from across a screen. Consumer movement, coupled with practitioner reactions, drives a need to expand our understanding of this discourse. Specifically, we have little clarity on the environments that make up and impact this digital culture. As such, this study investigates what messages are conveyed by influencers and emotionally embodied by viewers about #BodyPositivity on TikTok. We analyze numerous video content curated by #BodyPositive influencers whose following fantasize this lifestyle and confidence. Following netnographic observation, we selected 50 posts using hashtags categorized under #BodyPositivity, #BodyPositive, #BodyAcceptance, and #BodyImage led us to a source of representative content that pertains to our study. The method follows recommended approaches to curate a collection similar to what would be visible to everyday consumers. We leverage the lens of an affective atmosphere as well as the critical visual analysis approach to investigate the phenomenon. The affective atmosphere is textured, providing a space for consumers to cocreate #BodyPositivity, redefining beauty through humor, angst, communal insecurity, and praise. Content creators intentionally craft these artifacts, and thus, influence the meaning of beauty delivered through this body positive atmosphere. Theoretical and managerial implications are provided.
33. The Information Source Terrain: Mapping Relevancy in Supply Chain Media
Student Presenter: Sebastiano Ronchi
Faculty Mentor (s): Dr. Rafael Teixeira

Today’s news landscape relies on Internet capabilities to provide instantaneous news and information to professionals and businesses alike. Within the area of supply chain, a whole category of publications exists dedicated to reporting on current supply chain issues on a local and global scale. This subset of digital news is responsible for producing hundreds of articles entering cyberspace every day, sourced from accredited and informal sources alike. While the abundance of digitalized news provides the opportunity for supply chain professionals to access a wide variety of authors and articles like never before, it subsequently creates a dilemma of choice, where the validity of the content presented to readers is left to the judgment of the reader’s impressions of the source rather than its true credibility. With publications not producing equal levels of quality among their content, this research attempts to quantitatively measure biases and quality among 41 supply chain publications actively reporting on the Internet, of which 18 sources the authors believe provide quality, current news. By analyzing the contents of 500 articles sourced from the 18 publications against nine recurring themes, results show varied levels of bias towards topics among widely read publications.

34. Communication Technology in the Food Supply Chain
Student Presenter: Rex Bingham
Faculty Mentor (s): Dr. Rafael Teixeira

This paper analyzes the communication technologies that are used between the tiers of different industries’ food supply chains. These technologies are often used for communication between companies, information-sharing, visibility into the supply chain levels, accountability, and safety for the consumers. The different food supply chains that are analyzed in this paper are general meat, beef, pork, fish, dairy, grain, and vegetable. This paper will outline some of the technology that is currently being used in each of these supply chains, in addition to technologies that will likely be used in the near future. Some of the most prevalent technologies that will be discussed in this paper, which are therefore present in the aforementioned supply chains, are blockchain, IoT devices, cell phone/mobile devices, equations and math modeling, industry 4.0 technology, RFID, smart packaging technology, cloud-based technology, electronic traceability systems (ET), artificial intelligence, and big data. The method of research for this paper up to the current time has been a literature review of the topic, and this preliminary research suggests that the objective of this paper is to synthesize and reveal new connections between the tiers of the food supply chain and technology used amidst them. Further research in coming months will utilize interviews of supply chain professionals.
MASTER’S IN BUSINESS ADMINISTRATION

35. Re-Thinking Engagement Data with Good Analytics: A Case Study from Colonial Life
Student Presenter: Madison Williams
Faculty Mentor (s): Dr. Iris Junglas

This research project aimed to test the effectiveness of utilizing Low Code/No Code business intelligence software in addressing data reporting needs within a corporate environment. As a scholar intern pursuing an MBA with an emphasis in Business Analytics, I conducted an experiment to improve data reporting at Colonial Life. The experiment was designed to address the issue of not being able to see a side-by-side overview of how different accounts' digital communication products were performing comparatively. We started with Microsoft’s PowerBI but found limitations in terms of functionality and the ability to distribute it. We then pivoted to Google Analytics and Looker Studio, which provided real-time data and customizable dashboards that allowed our team to make more informed decisions and work more efficiently. The results of the project showed that the Low Code/No Code software approach, specifically Google Analytics and Looker Studio, effectively addressed the team's reporting needs and led to greater insights into account performance. The ease of use and customizable dashboards make it an ideal tool for teams looking to gain insights into their data quickly and efficiently. This project serves as an example for other researchers and businesses looking to implement low-code/no-code solutions for their data reporting needs. It shows that these tools can be effective and valuable in driving business decisions and improving outcomes.

School of Humanities and Social Sciences

DEPARTMENT OF COMMUNICATION

36. Historical Challenges of Abortion Providers in the American South
Student Presenter: Bailey Brewer
Faculty Mentor (s): Dr. Beth Sundstrom and Dr. Cara Delay (History)

In America, abortion access has been an ongoing debate for the past century because of adverse political opinions, social climate differences, as well as contrasting cultural perceptions of abortion ethicality. Opinions and perceptions often play into government regulation of reproductive rights altogether, which makes it increasingly difficult for individuals seeking an abortion to obtain access conveniently. Government restrictions on abortion access and reproductive rights effects not only individuals seeking an abortion but also the medical providers trained to perform these procedures. Therefore, this research chapter examines the role that medical abortion providers play in abortion accessibility. This chapter statistically analyzes and investigates the question of medical professionals’ participation and willingness to provide abortions regarding various social, religious, and political barriers. Furthermore, the literature expands on current statistical evidence of state-imposed abortion restrictions and their effect on abortion rates in the United States in comparison to other developed nations, across the states, and particularly in the American South. Disparities in health access occur across the globe and embed themselves in rural communities within nations. This chapter focuses on the American South and the importance of promoting sufficient informational and educational resources to strengthen public knowledge and understanding so that underserved community members
can intellectually challenge government policies and plans to advocate for universal sexual and reproductive healthcare as well as access to abortion.

37. Sustainable Fashion Communication in the Ready-to-Wear Market: An Analysis
Student Presenter: Tyler McCormack
Faculty Mentor(s): Dr. Feifei Chen

The fashion industry is notorious for a large carbon footprint and utilizing a plethora of non-renewable resources. In recent years, brands have adapted to include more sustainable practices in their production processes. My project examines ready-to-wear brands’ sustainability communication content and effectiveness on social media. Past research has primarily examined this topic in luxury and mass-market segments (of the fashion industry), leaving the ready-to-wear brands’ socially mediated communication largely unexplored. While ready-to-wear brands are less likely than luxury or mass-market brands to communicate about their sustainability, research has shown that they are increasingly practicing sustainability. To gain insight into their sustainability communication, I am conducting a content analysis of four ready-to-wear brands’ Instagram communication over the time span of one year. All four brands have at least 200,000 Instagram followers, established sustainability practices, and qualified as “ready-to-wear” based on their price point and presence in stores like Neiman Marcus, Net-A-Porter, and Moda Operandi. The findings will address the research gap in the fashion industry’s sustainability communication literature and offer practical guidance to ready-to-wear fashion brands seeking to increase social media user engagement with their sustainable content.

38. The Influence of Non-verbal Communication of Physical Spaces on Discriminatory Behaviors
Student Presenter: Hayle Turner
Faculty Mentor(s): Dr. Brook Irving

Between 1997 and 2014, the United States Treasury paid 15.2 million USD across 235 Capitol Hill sexual harassment settlement cases. Sexual harassment on Capitol Hill is a nuanced issue because not only does this space serve as a workplace, but it also serves as the environment in which legislation about sexual harassment is debated and passed.

Using concepts such as non-verbal communication and sexual geography, this project examines how the built environment of the U.S. Capitol can influence discriminatory behavior against women, specifically sexual harassment. Existing literature in communication has analyzed the influence of the built environment on human behavior on restricting and enabling certain actions. In political and legal scholarship, research has explored the sexual harassment of women, including examining the rationale of why they face harassment. Through analysis of the physical environment of the U.S. Capitol and personal accounts of the individuals that work there, this project argues that the built environment of the U.S. Capitol can facilitate and encourage the harassment of the women that work there.

39. Slavery & The Holocaust: How Rhetoric is Used to Create Public Memory on Social Media
Student Presenter: Jack Bartlett
Faculty Mentor(s): Dr. Kelly Jakes

The following study will analyze the creation of public memory online through the use of the rhetoric of social media. Specifically, this study will compare the Instagram accounts of both the Monticello
Plantation and the Auschwitz-Birkenau concentration camp to highlight the difference in rhetoric contributing to the way slavery in the United States and the Holocaust are perceived by online audiences. By drawing this comparison, I will ask the following research questions: How do site managers present Monticello and Auschwitz-Birkenau on social media? Which memories of antebellum America and the Holocaust do their posts emphasize and which ones do they obscure or elide? How do the representations of these sites invite particular responses, especially ownership of personal responsibility, from mass audiences?

Preliminary analysis of each site’s Instagram account reveals that the Monticello account serves as a site of nostalgia for ‘simpler times,’ whereas the Auschwitz account operates as a site of a memorial for the individuals who lost their lives in the Holocaust. Understanding these rhetorical patterns not only helps us to understand the differences in the ways each atrocity is remembered, but also brings together rhetorical studies and social media studies, two cornerstones of communication that have yet to be intertwined by the scholarly communication community. The results of this study will begin the conversation about how rhetoric and public memory are shaped by social media.

DEPARTMENT OF ENGLISH

40. Pale Beauty: The Privilege of White Deception in Vanity Fair
Student Presenter: Peyton Baxley
Faculty Mentor (s): Dr. Timothy Carens

The femme fatale, the infamous beautiful woman who seduces men to gain power over them, relies upon an “unmarked” racial identity. Put simply, one who is “marked” deviates from the majority group—white Victorians—and thus face the “consequence of the application by others of rules and sanction” (Becker 9). The femme fatale is related to age-old mythological creatures, marked by otherness, who allure and destroy: vampires, sirens, mermaids, nymphs, sphinxes, etc. Unlike these supernatural creatures, the white femme fatale is a “regular” woman whose appearance functions to obscure her ambitions. Her pale beauty wins the trust of men, distracting them from her plots to use them as instruments of power. Racial otherness works in reverse as a visual alarm, similar to the unnatural physical characteristics of vampires and mermaids. In the nineteenth century, dark skin forfeits the privilege of deception. The white femme fatale is able to exploit men because she meets the standard of “normal” beauty. She thus has the opportunity to impose her power through a carefully contrived performance. The racialized woman, alternatively, disturbs “identity, system, [and] order” with her existence alone (Kristeva 4). The racialized woman cannot use the manipulative performance of gender as a means to an end; her ability to manipulate the patriarchy successfully is damned by her “shadiness.”

Using William Makepeace Thackeray’s Vanity Fair, I will explore how the femme fatale relies on her “whiteness” to successfully enact an artificial theatrical role, acting as the paragon of feminine obedience and propriety in the sanctuary of her racial identity.
41. *Teaching Queer Southern Literature*

Student Presenter: Catherine Quarles
Faculty Mentor (s): Dr. Julia Eichelberger

I am a Southern Studies minor and for my Capstone, I have begun to revise my analysis of Queer Southern Literature, a project I began in my Independent Study, Queer Southern Lit, by creating a syllabus for a class on Queer Southern Literature. In this proposed course concept, I will synthesize what I have learned about Southern Culture from multiple Southern Studies classes in order to contextualize the history and culture of the South for students. While my previous work focused entirely on queer analysis of different works of Southern literature, I intend to include in this syllabus the context for the rigid gender hierarchies of the South, as well as the religious, racial, and class ideologies which characterize the region. My proposed concept includes sources from other Southern Studies classes that I have taken, populating an Oaks course with a syllabus, reading material, discussion questions, and assignments. The course will be designed to help students become comfortable participating in class discussions, engage with academic research, and develop a greater sense of belonging in the South. The intended audience for this work is a college class at the intro level. The goal of this project is to engage with students unfamiliar with Southern culture, literature, and queer theory, and to promote insight into queer Southern literature as a reflection of the diverse and complex history of the region.

42. *Distance, Desire, and Damnation: The Epistolarity of Bob Dylan and Ovid*

Student Presenter: Brandon Eichelberg
Faculty Mentor (s): Dr. Scott Peeples

The connection between the epistolary properties of Bob Dylan’s songs to such properties in Ovid’s exilic poetry stresses the prevalence of the epistolary genre. Throughout my essay, I explore what it means for a work to be considered an epistle, and moreover, why generic properties of the epistle, such as the relationship between distance and emotion, vitalize the works of both Dylan and Ovid. Previous research on the genre that I reference includes Janet Altman’s Epistolarity: Approaches to the Form and Linda Kauffman’s Discourses of Desire: Gender, Genre, and Epistolary Fictions. Furthermore, I draw from some sources which explore classical epistolarity and others that explore Dylan’s classical influence. My research differs from previous scholarship because I focus on how epistolary fictions express themselves through poetry and song and, furthermore, how Dylan’s use of the genre relates to that of Ovid. By examining many of Dylan’s songs, such as “Girl from the North Country” and “I Want You,” alongside selections of Ovid’s poetry from his Heroïdes and Tristia, I establish epistolary connections between the two poets. Through this research, I claim that spatial, temporal, and emotional distance, along with the emotional turmoil of desire and hatred, maintain the ambiguous generic aspects of the epistolary genre. Such results, as expressed through the works of Dylan and Ovid, exemplify how the epistolary genre provides a unique perspective into the human condition through its emphasis upon separation-based emotion.
HISTORIC PRESERVATION AND COMMUNITY PLANNING

43. Analysis of Colonoware Ceramics Recovered in Charleston County, SC
Student Presenter: Caleb Kelly
Faculty Mentor (s): Dr. Grant Gilmore

This study interprets recently excavated low fired earthenware ceramic artifacts associated with the development and colonization of the Charleston area. Colonoware is a ceramic produced locally by enslaved Africans, African Americans, and Native Americans during the colonial period. Recent excavations conducted at two sites by CofC students and faculty uncovered a variety of ceramics identified as colonoware. The 63 ½ Coming St. project, located behind Rivers Green on the CofC campus, identified an antebellum kitchen before the construction of a solar pavilion. Likewise, The Long Point Schoolhouse project in Mt. Pleasant, SC produced various historic and prehistoric ceramics during a pre-development survey. These two sites represent disparate periods of regional development. As these sites are not contemporary, this allows a unique diachronic interpretation. Utilizing comparative analysis and type classification, this research contextualizes these artifacts within the broader scope of the social and economic systems which developed in pre-20th Century Charleston. These systems were instrumental to Charleston’s success and have created lasting consequences which are visible, and very much so felt, to this day. This research offers a perspective on such issues and an opportunity to understand their foundations.

DEPARTMENT OF HISTORY

44. Abortion Storytelling and Courtroom Narratives in Ireland, 1900-1950
Student Presenter: Anna Walter
Faculty Mentor (s): Dr. Cara Delay

Storytelling as a form of activism was essential to the Campaign to Repeal the anti-abortion Eighth Amendment of the Constitution of Ireland, which succeeded in 2018 after decades of abortion controversies and debates. A great deal of recent scholarship on abortion in Ireland has focused on the importance of storytelling during the Repeal movement as a means to convince undecided voters that abortion should be legalized and, moreover, considered a form of essential healthcare. However, little has been written about the role of storytelling in abortion history for earlier periods. My research argues that women used abortion storytelling similarly in early-to mid-twentieth century Ireland during criminal trials for their abortions. It will demonstrate that while women who appeared in court for criminal abortions from 1900-1950 were not advocating for the legalization of abortion, they used stories of their embodied experiences with abortion to convince juries that their procedures were done out of absolute medical or social necessity—women on trial for abortion often stressed their belief that continuing their pregnancy would result in severe physical harm or that the societal judgment for continuing their pregnancy would have been debilitating. As a result, juries often proved sympathetic to abortion-seeking women and reluctant to convict accused abortionists.
DEPARTMENT OF PHILOSOPHY

45. Sea Level Rise, Nature-Based Solutions and the Charleston Perimeter Wall
Student Presenter: Katherine Highfill
Faculty Mentor (s): Dr. Ewan Kingston

The US Army Corps of Engineers (USACE) is in the planning process of designing a “perimeter wall” intended to protect the City of Charleston from storm surges, largely funded by the US federal government. Local stakeholder groups have been engaged in this process as it unfolds. The proposed wall has had a mixed reception and such groups have raised several concerns with the project. We focus on two: first, the relative lack of “nature-based solutions” in the proposed wall, and second, the projections of sea-level rise. The first refers to the alleged lack of natural features such as artificial islands, living breakwaters and the like in the proposed measures, and the second refers to debate around whether USACE is appropriately accounting for climate-induced sea-level rise. Through document analysis and in-depth interviews with experts, we present the complexity of the debate about both these issues in the context of the Charleston perimeter wall.

DEPARTMENT OF POLITICAL SCIENCE

46. Denaturalization in Modern Liberal Societies as a Form of Exile
Student Presenter: Claire Turner
Faculty Mentor (s): Dr. Briana McGinnis

This work argues that denaturalization is a form of exile in modern liberal societies. John Stuart Mill, Isaiah Berlin, and John Locke define a liberal government as one that does not unjustly restrict a person's liberties, so long as they do not harm others in the community. Following World War II, mass denaturalizations decreased in the U.S. until the 1997 "Citizens USA" campaign. Since then, denaturalization has happened under claims of due process and "unofficial denaturalization." Naturalized citizens in the U.S. voluntarily consent to enter the social contract yet are treated as second-class citizens.

This work identifies exile as a punishment that inflicts a form of civic death. Erasure of a person's citizenship through denaturalization effectively kills their legal person in the eyes of the government and removes them from the political community. Citizenship means more than legal membership; it is a relationship built over time that creates expectations, obligations, and affective connections. This work first examines United States v. Jean-Baptiste (2005) and the 2013 Yemeni-American passport revocations, demonstrating the capricious and unaccountable process by which the U.S. government sometimes strips people of their citizenship. It proceeds to argue that naturalized citizens ought to be viewed as more connected to their citizenship than natural-born citizens due to their active and voluntary engagement with the requirements laid out in the Immigration and Nationality Act of 1952. Ultimately, I conclude that denaturalization is an illiberal form of contemporary exile, an illegitimate circumvention of commitments, and an invisible and unaccountable system U.S. authorities implement to tacitly redefine the "legitimate American citizen."
47. **South Carolina’s Geriatric Oligarchy Sweeps Frat Boy Joe in Gubernatorial Race**  
*Student Presenter: Julia Hughes*  
*Faculty Mentor(s): Dr. Gibbs Knotts*

The 2022 South Carolina’s governor’s race was a fun one to watch despite almost everyone in the state already foreseeing the outcome. With abortion and inflation fresh on Carolinians minds, this midterm election was considered high stakes and one to keep an eye on. This race was also entertaining due to the 35-year age gap between candidates which became very apparent in their differing campaign strategies. According to the Post and Courier, the Republican incumbent McMaster swept this election with “twice the support that voters gave him four years ago.” With the incumbency advantage and the historical pattern advantage where the president’s party loses seats in the midterm election, McMaster won the governor’s race. This paper will look at county level data, and specifically how variables like the percent black population in the county, the percent of people who voted for Trump in 2016, the percent of people with their bachelor’s degree, and the median household income are correlated with McMaster’s success in that county.

48. **Millennials and Baby Boomers in Politics**  
*Student Presenter: Marenna Mitchell*  
*Faculty Mentor(s): Dr. Gibbs Knotts*

The political state of South Carolina does not tend to sway very often- Republicans dominate most elections. However, this did not stop people from believing that Democratic nominee Joe Cunningham would win the 2022 Governor’s race. To understand this important contest, I examined multiple factors using both qualitative and quantitative methods. I profiled the candidates themselves and compared their campaign strategies. I also examined county-level data from the U.S. Census and the S.C. Election Commission to determine what sort of factors best explained the 2022 election. My dependent variable was percent for Henry McMaster in 2022 and my primary independent variables were region, percent black, and election result results from the 2018 Governor’s race and the 2020 presidential contest. I found that past elections and demographics affected the outcome of this election greatly. More specifically, counties that supported Donald Trump were far more likely to support Henry McMaster in 2022. South Carolina’s election results are yet another example of how the fundamentals of American politics determine who is successful when running for any seat.

49. **The SC 2022 Governor’s Race & It’s Political Implications for 2024**  
*Student Presenter: Elizabeth Kreutner-Eady*  
*Faculty Mentor (s): Dr. Gibbs Knotts*

My project analyzes the results of 2022 Governor’s race in South Carolina using a mix of qualitative and quantitative methods. First, I compared the two candidates’ backgrounds, campaign budgets, TV ads, and overall messaging. I also discuss the national and statewide political environment for each of their parties and how this context shaped electoral outcomes. Using county level data from the U.S. Census and State Election Commission, I evaluated the types of counties most likely to support the Republican candidate. I examined several key independent variables including percent black, percent for McMaster in 2018, and region of the state. My overall findings showed a lower level of voter participation in majority-Black counties in 2022 in comparison to 2018, how Cunningham underperformed in his home region of the Lowcountry, and how McMaster flipped multiple counties and improved upon his margins.
across the state. In addition to explaining the 2022 Governor’s race in South Carolina, this study has implications for national politics as well. South Carolina continues to be the first southern presidential primary for Republicans and recently became the first in the nation presidential primary for Democrats. Therefore, understanding the politics of the Palmetto State is more important than ever.

50. Frat Boy Joe vs Foghorn Leghorn
Student Presenter: Bailey Ford
Faculty Mentor (s): Dr. Gibbs Knotts

In this study, I examined the results of the 2022 South Carolina gubernatorial election in South Carolina. I compared the different messages of the two candidates and the way they ran their campaigns. In the end, Joe Cunningham’s campaign failed, with McMaster beating him by over 17 points, for a variety of reason. Cunningham was not a strategic politician, and he ran for governor in a historically Republican state in the middle of the term of an unpopular Democratic president. Cunningham also failed to come up with clear messaging in his campaign and supported a lot of ideas too radical for South Carolina’s more moderate Democratic voters. He also made the mistake of alienating powerful Democrats like Jim Clyburn. Cunningham failed to secure the votes of groups and regions of the state that normally vote for Democratic candidates. For the second part of my study, I analyzed county-level data from the U.S Census Bureau and the State Election Commission to better understand the results of this important contest. For this portion of my study, the dependent variable was county-level percent for McMaster, and I examined a range of independent variables including region, income, education, health insurance rates, and Covid vaccination rates. In the Lowcountry, Cunningham’s home region and a region that is normally kinder to Democrats, McMaster won 7 of 12 counties. Moreover, my results indicate that counties with higher percentages of bachelor’s degrees were more likely to vote McMaster, a group normally taken by Democrats. A similar trend could be seen in counties with lower numbers of citizens with health insurance.

51. The Common Law Approach to Conflict Related Sexual Violence in a Global Context
Student Presenter: Cameron Wilson
Faculty Mentor (s): Dr. Hollis France

The establishment of sexual and gender based violence into the Statute of the International Criminal Court was a unique process that largely occurred in the last three decades. Breakthroughs were made during the International Criminal Tribunals of Rwanda and the Former Yugoslavia which led to the codification of sexual violence into the Rome Statute through an especially unique process as humanitarian and nonprofit organizations played a major role in prosecuting this form of violence. Despite this important step of codifying sexual violence into humanitarian law, there have been many criticisms regarding the efficacy of addressing sexual violence through a common law approach. This project explores this criticism by investigating the relationship between prevalence of conflict related sexual violence and ratification of the Rome Statute in two case studies. The first case study is an example where the prevalence of sexual violence increased after ratifying the Rome Statute, and the second is an instance where it decreased after ratifying. This investigation uses a mixed method approach to evaluate if and how the Rome Statute impacted the prevalence of conflict related sexual violence and which types of actors it had the greatest effect on.
Individuals who experience traumatic events are at heightened risk for developing adverse mental health outcomes, specifically post-traumatic stress and depressive symptoms. Symptoms of depression and post-traumatic stress are common following a traumatic burn injury; however, little is known about the impact of burn-related intensive care unit (ICU) admission on future risk of developing post-traumatic stress disorder (PTSD) and depression. Thus, the current study examined the associations between burn injury acuity (defined by admission to ICU vs. non-ICU) and risk for developing mental health problems (i.e., depression and PTSD) among burn center patients assessed within the initial 30 days following their injury. Participants included 286 patients admitted to the burn center at a southeastern academic medical center (M age = 46.79, SD = 17.47; 25% admitted to ICU). Risk of PTSD and depression was assessed by the hospital’s burn behavioral health program via the Injured Trauma Survivor Screen (ITSS), a validated measure used to determine risk of PTSD and depression following injury. Independent samples t-tests revealed that ICU admission was associated with an increased risk for developing post-traumatic stress (p = .022) and depressive symptoms (p = .016) compared to non-ICU admitted patients when assessed within the initial 30 days following a burn injury. Though preliminary, results highlight the importance of considering burn acuity when evaluating the risk of developing psychopathology following a burn injury. Given these results, it is important to prioritize psychological recovery following a potentially traumatic burn injury in those admitted to ICU through early screening and intervention.

For the last 10 years the usage of cannabidiol (CBD) in the United States has dramatically increased. According to Moltke and Hindocha (2021), “the top 4 reasons for using CBD were self-perceived anxiety (42.6%), sleep problems (42.5%), stress (37%), and general health and wellbeing (37%).” However, there is not much known about the effects of CBD on neurological responses and why this supposed reduction in stress occurs. The purpose of this study was to examine if CBD alters the locomotor response in planaria in response to a stressor. It was hypothesized that CBD would have an effect on locomotor activity in response to exposure to predator stressor, shrimp extract. Planaria were placed individually into petri dishes with graphing paper underneath, and allowed to acclimate. Following acclimation, the number of line crosses were recorded over a two minute period, as a measure of locomotor behavior. The data collected supports the hypothesis that CBD had an effect on locomotion of planaria in response to a stressor. This data helps us to better understand the psychoactive effects of CBD.
Peripheral nerve injury impacts hundreds of thousands of people each year. This type of injury can produce many debilitating physical effects such as muscle weakness or loss of sensation that require long-term rehabilitation. These deficits are caused at least in part by reorganization and loss of connections within the spinal cord. Previous research has shown that treatment with estrogen or with exercise in the form of treadmill training can reduce this reorganization and loss. Our current study proposes to examine whether estrogen signaling may be employed during treadmill exercise to mitigate the synaptic changes that occur after injury to the axons of motor neurons. Using a mouse model of sciatic nerve injury, we will examine whether pharmacologically blocking estrogen signaling during exercise will change the ability of exercise to prevent the synaptic loss seen in untreated animals. We will also reassess whether exercise alone in animals will mitigate the loss of synaptic contacts necessary for repair. If we discover that estrogen signaling is involved in the process by which exercise exerts its effects, then we may be able to begin to translate our findings into new pharmacological treatments for patients suffering from peripheral nerve injury during periods when they are unable to engage in exercise.

The use of Cannabidiol (CBD) and alcohol has become popular. The effects of CBD on the nervous system are unknown. We aimed to explore the effects of CBD and alcohol on the nervous system quantified by changes in locomotor behavior. Using planaria, we compared the changes in locomotor activity, defined as the number of lines crossed on grid paper, after exposure to alcohol, CBD, or spring water. We found a decrease in the number of lines crossed when exposed to alcohol and an increase when exposed to CBD. Based on these results, after exposure to CBD has psychoactive effects on the nervous system that differs from alcohol.

A substantial body of work demonstrates that parent-guided reminiscing plays an essential role in the development of children’s autobiographical remembering skills. Through these dialogues, children learn how to search their memory for the details of past experiences and relay these recollections in a narrative form to others (Nelson & Fivush, 2020). Little is known, however, about the role of such exchanges in shaping how children come to interpret and remember specific personal experiences.

In an initial examination of these issues, Principe and colleagues (2019) asked mothers and their children to reminisce about shared events that evoked positive or negative emotions. Then, children independently experienced a scripted event that included a series of ambiguous social interactions.
Results indicated that children of mothers who made more mentions of negative emotion when reminiscing were especially likely to interpret the ambiguous aspects of the scripted event in a negative manner as the event was ongoing. When later asked to recall the event, these children were prone to produce distortions in memory that incorporated their previous negative interpretations.

This pattern suggests that mothers who focus on the negative when talking about past events may put their children at risk for developing negative interpretation and memory biases. This is an important finding for discussions of depression because such biases are not merely associated with depression but also drive the onset and maintenance of the disorder (Dalgleish & Werner-Seidler, 2014). As such, it is important to explore what sorts of early experiences might contribute to their development.

In the current study, we aimed to replicate and extend Principe and colleagues (2019) findings in a sample of mothers with a history of depression to determine if mothers who have a tendency towards depression might frame conversations about the past with more negative attributions, causes, and resolutions than non-depressed mothers. If so, mothers with depression may put their children at risk for learning negative memory biases in the context of memory sharing interactions.

57. The Perceptions Laypeople Have Regarding Conversations Between A Mother And Child Where The Child Discloses Abuse
Student Presenter: Samantha Tracey
Faculty Mentor(s): Dr. Gabrielle Principe
Additional Authors: Lizzie Petagna, Aaliyah Pickens, Haley Schonberg

Children’s testimonies often serve as the sole piece of evidence in child sexual abuse cases. This is because there are often no other corroborating witnesses or evidence. Since these accusations often develop from a conversation between a child and a non-offending parent, it is worth considering how said parent can influence the child’s report and the case as a whole. Typically when a parent questions a child regarding abuse, they unintentionally use highly suggestive questions because this is how they typically interact with their children. However, these leading questions are avoided by trained investigators due to the risk of eliciting a false confession. This study aims to investigate how laypeople (i.e. adults) perceive conversations where a child reveals maltreatment. We will conduct a survey where we assess how much adults accurately recall a conversation where a child reveals maltreatment to their mother. Participants will be assigned either a conversation with leading questions or non-leading questions. We will also manipulate the level of belief that the mother has about her child’s abuse, and assess the subject’s beliefs about the contents of the conversations, as well as their beliefs about children’s memories and sexual abuse. Finally, we will collect standard demographic information. This research will provide important insight into how laypeople understand conversations between a parent and child where maltreatment is disclosed. This will allow for better evaluation of the validity of children’s sexual abuse testimonies, as well as provide insight into how to handle parental influence on those testimonies.
58. Laypeople’s Perceptions of Child Abuse Disclosures to Parents
Student Presenter: Catherine Hopkins
Faculty Mentor (s): Dr. Gabrielle Principe
Additional Authors: Alex Marsden, Dr. Kamala London (University of Toledo, Psychology)

In child sexual abuse cases, a child’s testimony is typically the only form of evidence that is used in court. These testimonies are often heard by the parent first, who then repeats the statements to police and other officials. However, there are many body’s of work that demonstrate how parents can be suggestive and leading when talking to their child. Since a child's memory is heavily susceptible to influence, they tend to believe misinformation as events they have actually experienced and are unable to recognize their parents as a source of memory errors. This creates potential danger of a child making a false report based on their parents own suspicion. Although this is well known within the field of forensic psychology, it is relatively new information for the general public.

For this study, we present participants with parent-child conversations where a disclosure of sexual abuse was made. In half of the conversation, the mother was suggestive towards the child and motivated the child to respond with what they themselves believed occurred. In the other half, the claims of abuse were spontaneous and required little prompting from parents. After reading the conversations, participants are questioned on their beliefs towards the parent’s questioning style. In our analysis, we focused on the participant's ability to recognize suggestive verse non suggestive questioning.

59. Improving Memory for People with Down syndrome: A New Experimental Paradigm
Student Presenter: Catarina Casey
Faculty Mentor (s): Dr. Cynthia May
Additional Authors: Rachel Kaup

The ability to retrieve memories from our past directly influences how we interact with the world and therefore is a vital skill for every day functioning. This study focuses on ways to boost memory for people with intellectual disabilities (ID) who may be less successful in implementing intentional memory strategies. Here, we explore the possibility that emotion may improve memory for people with Down syndrome. Data show that neurotypical individuals remember emotional content and events better than neutral content and events. This emotional enhancement effect appears to be automatic and non-strategic, making it an ideal mechanism for enhancing memory in people with ID. We have developed a novel paradigm that evaluates whether the emotional enhancement effect is robust for individuals with Down syndrome. The paradigm includes a task in which participants view emotional (e.g., child crying) and neutral (e.g. office desk) scenes, with target items embedded in each. To assess the emotional enhancement effect, at test we examine whether memory is better for the emotional relative to neutral scenes. To explore whether the benefits of emotional processing extend to other material, we compare memory for items within each type of scene. We also included a novel autobiographical memory test to understand what people with Down syndrome spontaneously recall about recent events in their daily lives. Finally, we assessed each participant with an intensive neuropsychological battery from the NIH toolbox. We will detail this novel paradigm and present preliminary findings from our work.
60. Salivary cortisol immunoassay efficacy and relatability in response to emotionally salient images
Student Presenter: Caitlin Cody
Faculty Mentor(s): Dr. Michael Ruscio and Dr. John Widholm
Additional Authors: Verina Salib

This study aims to detect changes in salivary cortisol in response to a memory recall task involving emotionally salient images. Emotion plays a well-established, but nuanced role in memory recall. Subjects in two groups were presented with a series of 25 word-image pairs. One group of word-image pairs were intended to evoke a positive emotional valence. A second group of word-image pairs (same words, different images) were intended to evoke a negative emotional valence. Following the presentations, subjects were asked to recall as many of the 25 words as possible. Subjects provided a saliva sample before and after viewing the word-image pairs to determine changes caused by either set of images. The changes in concentration of cortisol were determined using an immunoassay kit (Salimetrics #5004400). Cortisol is a hormone generally associated with a stress response but can also be elevated when attention increases. Preliminary data demonstrates an increase in recall in the subjects viewing the images with positive social valence. Preliminary data from the cortisol assay demonstrates that samples fall within the typical distribution range and can generate a valid standard curve. Additionally, cortisol is elevated (but not significantly) in the subjects who viewed images with negative emotional valence. These preliminary data help to establish the efficacy of our immunoassay for cortisol. Based upon these pilot data, future investigation will aim to formalize our protocol and add additional subjects.

61. Time of Day as a Contextual Cue for Operant Renewal in Rats
Student Presenter: Alex Katsikaris
Faculty Mentor(s): Dr. John Widholm
Additional Authors: Annebeth Heller, Megha Patel, Charlotte Uhlmann

Behavioral renewal refers to the recovery of a previously extinguished behavior due to changes in context. While ABA renewal has been demonstrated using physical and enteroceptive (i.e., drug) contexts, the current experiment was performed to examine whether time of day could serve as an abstract contextual cue for operant renewal. Sixteen rats (8 male, 8 female) were trained to lever press for a food reinforcer under a VI30” schedule of reinforcement for 10 consecutive sessions in morning (0900) or afternoon (1700) testing sessions (context time A) followed by five consecutive sessions of extinction at the alternate testing time (i.e. 0900 acquisition group underwent extinction at 1700 and vice versa; context time B). Following extinction, all rats were then tested for their tendency to lever press at both testing times (0900 or 1700). It was hypothesized that time of day would serve as a temporal context, resulting in an increased tendency to respond during the time of day associated with reinforcement (context A). Despite observing a slight elevation in response rates during context time A for both males and females, the differences in response rates were not large enough to reach significance. The current data do not support the hypothesis that time of day can serve as an effective contextual cue for operant ABA renewal in rats.
62. The Effects of Savoring and Nostalgia on Romantic Relationships
Student Presenter: Julia DeMiro
Faculty Mentor (s): Dr. Chelsea Reid

Nostalgia is a sentimental longing for one’s past. Savoring is when one attempts to intensify positive feelings by bringing to mind an emotionally relevant event. Since nostalgic memories and the moments that people savor cause them to feel positively, we looked at the role that nostalgia plays in romantic relationships including the relationship between relationship savoring and various other relationship outcomes.

The goal of this study was to determine if nostalgia plays a role in positive relationship outcomes in college students. Participants were assigned to fill out one of two writing prompts that asked them to bring to mind either an ordinary event or a nostalgic event. They were then asked to fill out multiple scales in order to measure savoring, gratitude, couple satisfaction, affective attraction, relationship flourishing, and relationship quality.

Because the population consisted mostly of freshman college students, we saw many ceiling effects due to participants reporting at the upper end of the relationship outcome scales provided. We determined that this is likely because many events, whether nostalgic or ordinary, are exciting to this age group because a lot of the time it is the first time they are experiencing certain events while in a relationship.

Although we did not see significant results with the nostalgia manipulation, we did find significant positive correlations between savoring and many of the relationship outcomes. Savoring in a relationship capitalizes on the positive moments experienced together, which is likely why participants who reported higher levels of savoring also experienced higher levels of satisfaction, flourishing, and quality.

63. Addressing the restorative role of relationship nostalgia in a community sample
Student Presenter: Rachel Kaup
Faculty Mentor (s): Dr. Chelsea Reid

Although in the past nostalgia was believed to be a negative recollection of memories from the past, new research has demonstrated otherwise. The literature has shown that nostalgia has restorative effects, such as increasing positive coping behaviors following bereavement (Reid et al., 2021). Nostalgia can also increase lonely individuals’ meaning in life and can counteract loneliness by increasing perceived social support (Abeyta & Juhl, 2022; Zhou et al., 2008). Nostalgia’s ability to bolster the well-being of individuals has led researchers to wonder whether nostalgia may also increase the well-being of interpersonal relationships.

In our current study, we wanted to assess this topic. We looked at how nostalgia within a relationship can affect overall relationship satisfaction. After assessing this amongst undergraduate students, we decided to test a community sample. We surveyed community members and asked them to either recall a meaningful memory in their relationship (nostalgia condition) or to recall an ordinary event in their relationship (control condition). We then had couples fill out several questionnaires, assessing their relationship satisfaction, gratitude, commitment, etc. We hypothesized that individuals in the nostalgic condition would report greater relationship satisfaction, higher levels of commitment and love for their partner, and greater feelings of closeness.

Sustainability-themed project
64. Event-Based Benefits of Relationship Nostalgia: The Implications of Passionate and Companionate Love

Student Presenter: Francesca Gibson
Faculty Mentor(s): Dr. Chelsea Reid
Additional Authors: Alex Marsden

Nostalgia is a positive reflection on past experiences with sentimental value that may induce a sense of longing. Nostalgia can alleviate distress already present in a person’s life, yet little research has focused on nostalgia’s benefits in romantic relationships.

Passionate love involves “physiological processes, pleasure, pain, and relationship initiation,” whereas companionate love entails mutual understanding, intimacy, and security (Karandashev & Clapp, 2016, p. 56). The study used the Relationship Nostalgia Scale (RNS) and created subscales based on passionate and companionate love scales. These scales were then used to evaluate the relationship between different subsets of relationship nostalgia and relationship satisfaction as well as relationship quality.

We then ran multiple Pearson correlations to analyze the relationship between nostalgia for different types of love and benefits.

This study found a positive relationship between greater relationship nostalgia and both relationship satisfaction and quality. Furthermore, the content of the experiences being reflected upon mattered. There was a positive association between relationship nostalgia for companionate love and both relationship satisfaction and quality, but this association was not present regarding passionate love.

65. Place Attachment as a Buffer for Political Conservatism and Climate Disengagement

Student Presenter: Francesca Gibson
Faculty Mentor(s): Dr. Stephen Short

The study examined the interaction between place attachment, conservatism, and local versus regional message framing in regard to climate change disengagement. Participants completed scales related to place attachment to Charleston, SC. After, they were randomly assigned to watch a video on climate change in Savannah, GA or Charleston, SC. The footage did not differ apart from the names of the cities. Participants then completed five questions concerning the video before answering attitude questions, including questions on climate change disengagement.

A multiple regression model with place attachment, conservatism, and the experimental condition revealed a significant three-way interaction (b = 0.28, p < .05). For the Savannah video group, when participants were low in place attachment to Charleston, conservatism was a significant positive predictor of disengagement (b = 0.84, p < .001), and this positive slope effect continued, albeit a bit weaker, for mean place attachment (b = 0.59, p < .01). However, participants high in place attachment to Charleston showed no significant effect of conservatism on their climate change disengagement (b = 0.34, p = .06).

When climate change is framed regionally (Savannah), if a participant is low in place attachment to Charleston, as they report being more conservative, they disengage further from climate change. However, if a participant is high in place attachment to Charleston, conservatism is not a predictor for disengagement. Interestingly, place attachment does not buffer conservatism for those receiving the locally framed message, which is possibly because they are less disengaged from climate change.
66. Investigating our response to discomfort
Student Presenter: Shira Finke
Faculty Mentor(s): Dr. Adam Doughty

Maladaptive decision-making is a prominent area of study in behavioral psychology. Discounting is a form of maladaptive decision making where individuals decrease the present value of something (e.g., a sum of money, a painful experience) in relation to what happens in the future. Acceptance Commitment Therapy (ACT) interventions have proven highly effective at lessening the effects of discounting. Thus, the purpose of the present research is to examine whether a values exercise, rooted in ACT, will improve discounting in a task involving short-term costs (engaging in a temporarily painful experience) and long-term benefits (charitable donations to valued charities). Specifically, we will measure, before and after an exercise shown to increase one’s values, the degree to which participants accept longer periods of temporary pain (short-term costs) as a function of the size of the delayed benefits (i.e., money amounts) and how well those benefits match one’s values (e.g., if the money is donated to one’s highest-valued activity). The temporary pain will be induced by having participants undergo a Cold Pressor Task which involves submerging one’s hand in cold water. It is predicted that participants will accept longer periods of hand submersion following the values-based exercise only when doing so leads to greater benefits for charities associated with their heightened values. The results will be discussed in the context of improving ACT-based treatment strategies.

67. The Validity of Temporal-Based Scoring for the COWAT
Student Presenter: Leah Lancellotta
Faculty Mentor(s): Dr. Thomas Ross

The Controlled Oral Word Association Test (COWAT; Benton et al., 1994) is a measure of verbal fluency requiring participants to generate words beginning with a certain letter during an imposed time constraint. The number of words produced across three, 60 second trials is sensitive to cognitive impairment following neurologic disorders (Lezak et al., 2012). Other scoring indices were developed to better assess the cognitive abilities underlying effective performance. Raboutet et al. (2010) proposed temporal-based scoring to distinguish between automatic processes during the first epoch (0-30s) and controlled processes (i.e., executive functions) that are required to a greater extent during the second epoch (31-60s). The present study will investigate the construct validity of Raboutet et al.’s (2010) scoring method by examining the patterns of correlations observed between temporal-based COWAT indices and measures of other relevant constructs (e.g., executive functioning to explore convergent validity and general intelligence to explore divergent validity). Participants include approximately 60 healthy undergraduates with no history of neurologic trauma or disorder who completed the COWAT and several other measures. Several hypotheses reflecting the assumptions of Raboutet et al.’s (2010) scoring procedure will be examined. For example, scores generated from the second epoch (31-60s) should correlate more closely with measures of executive function (e.g., Wisconsin Card Sorting Test performance) than scores generated from performance during the first epoch. The present study will contribute significantly to psychometric findings on temporal-based scores for the COWAT which, at present, are limited to a small number of studies.
68. Our Emotions in Writing
Student Presenter: Jessica Andrews
Faculty Mentor (s): Dr. Sarah Robertson

Our lives have changed significantly since COVID-19 was introduced in early 2020, and this change has impacted our mental health. Many people have reported noticeably higher levels of anxiety and depression since the beginning of the pandemic. The situation has gotten so bad that some call it a "global mental health crisis" (Kellend, 2020). Expressive writing is an intervention associated with improved mental health outcomes in college students. We aim to help improve our understanding of the relationships between word utilization in expressive writing and mental health symptoms.

College students (N = 166) were randomly assigned to either complete expressive writing, benefit-focused writing, or neutral writing for 3 consecutive days. Depression and anxiety were measured on each day of writing and also at a one-month follow-up visit. Participants completed the Beck Anxiety Inventory and the Beck Depression Inventory. The Linguistic Inquiry Word Count (LIWC) was utilized to quantify the percentage of anger words in their writing.

At the one-month follow-up visit, anger words were significantly correlated with depression (r =.29, p =.001) and anxiety (r =.25, p =.001).

So what does this mean? Based on the evidence provided above, we have discovered a significant association between the expression of anger in writing and high scores on the anxiety and depression inventories. Correlation does not necessarily indicate cause, though. Additional investigation is required to determine whether there is a causal connection between these two variables.

69. The Effects of COVID-Focused Writing Interventions and Initial Symptom Severity on Anxiety
Student Presenter: Elana White
Faculty Mentor (s): Dr. Sarah Robertson

Research has demonstrated that COVID-19 has been associated with increases in anxiety and depression in college students. The current study focuses on how three writing interventions [benefit-focused (BF), expressive writing (EW), and fact-based (FB)] and initial symptom severity of depression and anxiety, could affect the change scores in anxiety from the initial time of measurement to the 1 month follow up. Participants were randomly assigned to one of the three writing conditions. The BF group wrote about personal benefits associated with COVID-19. The EW group wrote about their thoughts/feelings about COVID-19. The FB group wrote an emotionless passage about an object. A median split was conducted to separate participants into high and low groups of depression and anxiety scores. Four groups (low depression/low anxiety, low depression/high anxiety, high depression/low anxiety, high depression/high anxiety) were created. The primary outcome measure was the change in anxiety over the course of the one-month follow-up period. A two-way between-groups analysis of variance was conducted to explore the impact of writing intervention and symptom severity on anxiety change scores. The interaction between writing intervention and symptom severity was significant, F(6, 142) = 2.60, p < .05. Post-hoc analyses indicated that symptom severity significantly impacted anxiety change scores in the EW and FB writing groups, while symptom severity did not impact anxiety change scores in the BF writing group. The current study exhibited that symptom change can be affected by both initial symptom severity and type of writing intervention. Clinical and research implications are discussed.
70. Excessive Food Delivery Application Usage is Associated with Symptoms of Food Addiction
Student Presenter: Olivia Dixon
Faculty Mentor(s): Dr. Chad Galuska and Sarah Robertson

Since COVID-19, there has been a rapid rise in the use of food delivery (FD) applications, particularly among college students. These services primarily provide fast and genetically modified foods that can lead to poor physical and mental health outcomes. This study sought to investigate what psychological factors put undergraduate students at risk of excessively using FD applications by surveying 84 introductory psychology students. By evaluating participants’ impulsivity, stress, food expectancy, food addiction, and disordered eating levels, the current study found an association between food addiction and food delivery application usage. In addition, financial stress, academic stress, marijuana expectancy, alcohol expectancy, and impulsivity were also found to influence the patterns of FD users. These results indicate potentially problematic mental and physical health outcomes for at-risk populations that excessively use food delivery applications.

71. Meta-analysis of the association between gratitude and loneliness
Student Presenter: Calvin Widholm
Faculty Mentor(s): Dr. James Hittner

A random-effects meta-analysis was performed to examine the association between gratitude and loneliness. Analysis of 28 studies revealed a moderate sized effect (mean Fisher’s z transformed correlation, $z_{r} = -0.411$, 95% confidence interval [CI] = -0.478, -0.345; mean back-transformed correlation, $r = -0.389$, 95% CI = -0.445, -0.332). In addition, results of a p-curve analysis indicated that 96% of the statistically significant (i.e., < 0.05) p-values were less than 0.02. Random-effects homogeneity testing was significant, suggesting the presence of effect size heterogeneity. Despite such heterogeneity, the limits of the 95% prediction interval for the mean back-transformed $r$ ranged from -0.628 to -0.085, indicating that if a new study was conducted, it would yield (with 95% certainty) a negative correlation between gratitude and loneliness. Finally, statistical tests (e.g., Egger’s regression test) and a funnel plot indicated a lack of publication bias, meaning that our results are not influenced by unpublished studies on this topic. In summary, these meta-analytic results indicate a moderate sized inverse association between gratitude and loneliness, and additional analyses indicate that potential moderators (e.g., sample size, publication year, country where study was conducted) did not significantly influence this association.

72. What do undergraduates with high childhood adversity want from campus sexual health services?
Student Presenter: Shannon Woods
Faculty Mentor(s): Dr. Grace Hubel

Risky sexual behavior and sexually transmitted infections are major health concerns on college campuses. Some college students have been exposed to stressors that increase the likelihood of these concerns, including adverse childhood experiences (ACEs). ACEs are early life events such as child abuse or having a parent who is incarcerated. Research links ACEs to maladaptive coping strategies, impulsive behavior, and substance use, which can negatively impact sexual health. Our study tests messages about sexual healthcare to determine which are most appealing to college students exposed to ACEs. The study uses an anonymous survey of ACEs and regulatory focus among CofC students. Regulatory focus is defined as the type of goals that individuals are likely to pursue, tending to fall into either promotion or

Sustainability-themed project
Sustainability-themed project

Prevention focus is on gains or successes, such as quality of life. Prevention focus is on avoidance of losses or failures, such as morbidity associated with a health risk behavior. We will present analyses of the relationships between ACEs, regulatory focus, and participant’s rating of the persuasiveness of messages that describe sexual healthcare. These messages vary in terms of message frame (i.e., using language consistent with either promotion or prevention regulatory focus), type of service delivery (i.e., tele-health or in person), and whether the service addresses partner relations. The presentation will include messages our data suggest are likely to be most persuasive for students exposed to ACEs. Implications for the broader issue of sexual health disparities among individuals exposed to ACEs will be included.

73. Compassion and Mental Illness
Student Presenter: Melanie Snider
Faculty Mentor(s): Dr. Lisa Thomson Ross

College students tend to have poor mental health: more than 60% of students met the criteria for at least one mental health problem in the 2020-2021 school year (Lipson et al., 2022). Many factors affect one’s mental health, including family dynamics such as growing up with a mentally ill loved one. Might this experience promote greater compassion for others, and might this affect one’s mental health? Thus far, researchers have focused mostly on self-compassion, noting that it is related to one’s well-being. We explored how having a mentally ill family member affects distress and compassion levels. In this study, college students (N = 240) answered survey questions assessing their compassion for others, self-compassion, family mental health history, current mental health, and family of origin experience. Students with more distress reported less self-compassion and more compassion toward humanity and toward people with mental illnesses. To test possible moderation, we ran correlations separately for students with and without a mentally ill loved one. Distress correlated with compassion toward humanity and toward mentally ill strangers among students who grew up with a mentally ill loved one, but not among those without this childhood experience. It appears growing up with a mentally ill family member moderates some relationships between compassion and distress. Witnessing these struggles amongst loved ones apparently makes people more vulnerable to the negative effects being compassionate can have on their psychological functioning. Future studies should investigate whether boosting self-compassion can mitigate the negative influence compassion toward others has on one’s distress.

74. Parental Drinking: Does Self-Compassion Mitigate Depression?
Student Presenter: Courtney McClure
Faculty Mentor(s): Dr. Lisa Thomson Ross

In a U.S. sample of college students 39.1% reported feeling depressed (American College Health Association, 2017). In some samples, self-compassion is associated with less depression in college students (Raes, 2011). Self-compassion appears to be a moderator of some risk factors for depression among college students, such as family chaos (Hood et al., 2020) and homesickness (Terry et al., 2013). One risk factor of depression is parental alcoholism (Anda et al., 2002). Therefore, we investigated whether self-compassion moderates the relationship between parental problem drinking and depression. Participants were college students (N=182) who completed online questionnaires including demographic questions, 2 questions pertaining to the probability of parental problem drinking.
drinking/substance misuse, depression symptoms (Radloff, 1977), and a brief Self-Compassion Scale (Raes et al., 2011). The Institutional Review Board approved this study. Depression correlated with higher parental substance use scores ($r = .253, n = 167, p < .01$) and with lower self-compassion ($r = -.614, n = 159, p < .01$). We trichotomized the parental substance misuse scores into leveled groups. In group 1 (no misuse), the correlation between self-compassion and depression was $r = -.578, n = 105, p < .01$. The correlation for group 3 (scoring 3 or higher on the 6-point variable) was $r = -.695, n = 23, p < .01$. These two correlations were not significantly different, though it appears low self-compassion is even more problematic among college students whose parents had a substance use problem. Implications for counseling college students and boosting their self-compassion are discussed.

75. Mental Health and Interpersonal Relationships in Emerging Adulthood: The Contributions of Parent Child Relationships and Perceived Mattering
Student Presenter: Olivia Panasko
Faculty Mentor (s): Dr. Amy Kolak

Emerging adulthood is a period within the lifespan that is characterized by changes/challenges that can influence mental health and interpersonal connections. In attempts to uncover the roots of emerging adulthood outcomes, this study examines the intersection between parent-child relationships and perceived mattering within young adults. Parent attachment is defined by the perceived security or insecurity the child feels toward their parents or caregivers while growing up, parental authority represents the style of parenting among the parent-child relationship. Research shows that parental attachment and parental authority impact child outcomes into emerging adulthood (Nada Raja et al., 1992; Steinberg, 2001; Patock-Peckham & Morgan-Lopez, 2006; Steinberg 2001). Mattering represents the perceived level of significance and value someone experiences among others, including their parents (Flett, 2021). The construct of mattering, which includes anti-mattering, mattering to others, and general mattering, has also been found to influence emerging adulthood outcomes (Vélez et al., 2020). Both parent-child relationship and mattering constructs aid in influencing emerging adulthood outcomes separately, but this study attempts to close the gap in the literature by simultaneously examining the contribution of both. The sample, which was recruited at a southeastern college, consists of 295 individuals with a mean age of 18.73. The sample is over 80% female identifying and over 80% white. The participants completed a Qualtrics survey. Using correlation and regression analyses, the connection between perceived mattering and anti-mattering levels and parent-child relationships and their associations with emerging adulthood outcomes will be elucidated.

M.S. CHILD LIFE

76. Child Life Program Development Within the International Pediatric Setting
Student Presenter; Mackenzie Wade
Faculty Mentor (s): Dr. Susan Simonian
Additional Authors: Taylor Donzelli, Delaney Carlisle, Olivia Hison, Georgia Massey

Child life practice within the multidisciplinary pediatric medical setting requires not only education/skills related to child development, pediatric medical stress, coping, play, and family systems but also the ability to build quick and effective rapport with diverse populations receiving care. Rapport building involves both verbal and non-verbal skills. This can be difficult when interacting with diverse
populations, many of whom are non-English speaking. Child life specialists seek to improve rapport building and meaningful, ethical relationships through a framework of cultural humility. This framework recognizes the intersectionality of individuals and fosters active engagement in an ongoing process of self-reflection. Through the process of developing normative and therapeutic child life play interventions with non-English speaking children and families in Italy, child life graduate students are challenged to reflect on their own individual histories, gender, ethnicity, assumptions, and western culture values, beliefs, and biases. The process of designing interventions that are non-culture and western value-bound and introducing and facilitating these interventions with children who do not speak English is an invaluable learning and training tool which prepares child life graduate students to adapt their intervention approaches and achieve improved outcomes with the diverse populations they serve. Learning to build rapport and develop and facilitate child life interventions through a hands-on immersive training model allows for important, durable knowledge and experience in pediatric psychosocial care that incorporates key values of cultural humility.

DEPARTMENT OF RELIGIOUS STUDIES

77. Street Corner Cathedral: Politics, Performance, and Preaching in the Public Square
Student Presenter: Allen Duggar
Faculty Mentor (s): Dr. Lenny Lowe

Street preaching in the Evangelical tradition challenges the basic assumptions of a liberal democratic society. Drawing on models of Hebrew prophets, New Testament evangelists, and Protestant exhorters, contemporary street preachers intentionally subvert secular ideology by forcing religion into the public sphere. In their contradiction of prevailing societal norms that religion is a private matter, street preachers position themselves in opposition to civic authority, traditional church institutions, and the very public to which they minister. The setting is important because the street is a place of potential. Interactions there can remain unmediated by institutions in a way that pulpit preaching never can. As a result, street preaching can be considered a different genre of public preaching than that which takes place on Sunday within the bounds of normative Christian ritual. I trace the origins of the creative tension with power which still propels the field preaching movement. The prototypical street preachers of the 18th and 19th centuries reveal the ways in which practitioners have innovated and cultivated their unique social position in American life. Following scholars Stephen Blythe and Kyle Byron, I apply performance studies to the practice of open-air preaching. I then also apply an urbanist lens to this practice to examine the complex rhythms of city life and their effects on the form and content of street preaching. I conclude by examining contemporary field preaching by reviewing instructional literature produced for street preachers and by interviewing two active public ministers.
M.S. ENVIRONMENTAL AND SUSTAINABILITY STUDIES/PUBLIC ADMINISTRATION

78. A Program Evaluation of the Edible Garden Series: A program to mitigate food apartheid locations in Charleston, South Carolina

Student Presenter: Alexandra Petruch
Faculty Mentor(s): Dr. Kendra Stewart
Additional Authors: Dr. Morgan Hughey, Lucy Davis, Christopher Burtt

Food apartheid areas are prominent in the United States, where many individuals face discrimination with little to no access to proper food. This paper outlines the pressing issue of food insecurity due to individuals living in food apartheid areas in Charleston County, South Carolina. The Edible Garden Series, a program hosted by Clemson Extension focusing on empowering and providing educational resources on food systems and agriculture to the low-income community in the Lowcountry, is a potential resource to mitigate this issue. An impact assessment of the Edible Garden is proposed to assess the effectiveness in which this program is engaging with the target audience, increasing community resilience and agricultural understanding, and allowing participants to continue to engage and share knowledge with other members of the community.

79. Mapping Connections: Using Participatory GIS as a Decolonial Tool to Visualize Indigenous Ecological Knowledge in South Carolina Landscapes

Student Presenter: Katherine “Kit” B. Kelly
Faculty Mentor(s): Dr. Brennan Keegan

Traditionally, landscape management practices have centered on western perceptions of landscapes and their importance, such as recreation and economic values. The perceived western values of landscapes influence the policies and expectations of how landscapes are managed, understood, and available for people to interact with. Western Science Knowledge (WSK) practices often focus on the perceived pristineness of landscapes, along with the hold that the economic value of a place has over the cultural and community importance of a landscape. Alternatively, Indigenous Ecological Knowledge (IEK) is a dynamic knowledge system that focuses on relationships and connections to the environment and the cultural and historical significance of place and space. Relationships with a landscape can vary by individual and community and can influence a community’s cultural knowledge and understanding of a landscape. Incorporating IEK knowledge into participatory Geographic Information Systems/Science (GIS) practices for landscape management could increase protections for landscapes outside of those landscapes’ recreation and economic value. GIS could be used to visualize cultural and ecological connections to landscapes that focus on IEK, influencing how people understand and connect to landscapes. IEK holders can utilize GIS and GIS researchers as mechanisms of decolonization by holding agency over the narratives of their representation in mapping applications. Methods of decolonial-GIS can be community-focused and provide methods of claiming a connection to landscapes, even when communities are physically separated from their land(s).
**DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY**

80. *Exposure to Diversity and Its Influence on Mental Health Outcomes*

Student Presenter: William Roebuck  
Faculty Mentor(s): Dr. Tracy Burkett

This research explores the influence of exposure to diversity on mental health and well-being. Using the lens of Gordon Allport’s contact hypothesis—that the more frequently people are in contact with individuals of different races or ethnic backgrounds, the less likely they are to act prejudicially toward dissimilar others. Drawing on Allport’s theory, I hypothesize that exposure to diversity has the capacity to improve mental health outcomes. I analyze survey data collected on college students during the 2022-2023 academic year and test if frequent contact with people of dissimilar backgrounds influences measures of mental health and well-being. Measures of diversity include self-reported composition of friendship networks at the start of their college career and at least one more point afterwards depending on class standing. These measures are paired with self-reported measures of mental health at the same points in time. The results of this research have implications for campus-wide initiatives surrounding inclusion, belonging, and retention.

**School of the Arts**

**DEPARTMENT OF THEATER AND DANCE**

81. *Physical vs Digital Model Making*

Student Presenter: Ethan Robey  
Faculty Mentor(s): Janine McCabe

Over the summer I set out to find the best solution to model making. I wanted to compare the two types of models, physical and digital, to find the most cost efficient, eco friendly and fastest way of making a model. To put these two methods to the test, I created one physical model based on the scenic design from “Lizzie” and I created multiple digital models, each using a different 3D softwares. I used Sketchup for “Lizzie” and “Much Ado About Nothing” and I used Blender for “Frankenstein”. This was my first attempt at digital model making so I wanted to give myself more projects to get familiar with the software.

I tracked the amount of time it took me on each model and I also tracked the amount of material and cost each took me. For the physical model it took me a total of 9 hours to fully build it, and cost me $30 for all the materials. For the first digital model, “Lizzie”, it took me a total of 7 hours to create and had to pay for a subscription to Sketchup, which is $300 for a whole year. For my second model, “Much Ado About Nothing”, using Sketchup it took me 4 hours to make using the same subscription. My last digital model, “Frankenstein”, took me a total of 12 hours using Blender, which is a free software. But Blender needs a powerful enough computer, so I used my own personal NZXT PC.
82. **Developing the Costume Design Process: A Christmas Carol**  
Student Presenter: Molly Rumph  
Faculty Mentor(s): Janine McCabe

“Developing the Costume Design Process” was a SURF grant project that allowed for an intensive look and practice in the day-to-day work and research involved for a Costume Designer on theatrical productions. Using the creation of original designs for Charleston Stage’s *A Christmas Carol* as the framework, this project facilitated a deep understanding of the processes of theatrical design and provided exposure to a professional theatre setting with high production value.

The project required in-depth analysis of the script and characters, extensive period research, communication, and problem-solving techniques in a collaborative atmosphere while interacting with all members of the production’s creative team at Charleston Stage. Furthermore, a significant portion of the project involved the creation of over 25 hand-painted costume renderings to guide the costume shop in the creation of the garments. While the faculty mentor Janine McCabe served as the lead designer on the productions, the student, Molly Rumph, collaborated in all stages of the design processes and execution of the designs.

At the culmination of the project, the student and mentor created a full design package for Charleston Stage and aided in the creation of the costumes for the production, which ran from November 30th through December 21st, 2022. This presentation captures the full design process, creation, and execution of the production.

83. **Constructing the Professional Theatrical Scene**  
Student Presenter: Bristol Barnes  
Faculty Mentor(s): Jonathan Wentz

Academic theatre allows students to learn about scenic design in an environment that encourages questions, discoveries, and exploration. However, a university environment is much different than a professional theatre company. Because of this, there can be a large learning curve upon entering the workforce after graduation. In order to avoid this, working on professional shows as an assistant to a designer was a choice the student made to improve their skills. Working as an Assistant Scenic Designer to their mentor during Summer 2022 for two shows, *Much Ado About Nothing* with the Shakespeare Theatre of New Jersey and *Lizzie* with Actors Express, allowed for the student to experience the entire creative process of design from the first steps of reading the script to the final set being built on both an established, classical work and a contemporary new musical. While serving as an assistant to their mentor, they were able to observe and try their own hand at the individual parts of the process. Developed skills include image research, model building, sketching, rendering, use of digital technologies, presentation within design meetings, and collaboration with other designers. The student also received firsthand experience of tech week for one of the shows in Atlanta, Georgia with the professional theatre company.

At the conclusion of this project, the student was able to experience a complete scenic design process, develop their skills as a designer, add these productions to their designer portfolio, and make connections with professionals in the professional theatrical world.
The nature of the theatrical lighting design artform is collaborative and requires immersion in realized production work that cannot fully be achieved solely in a classroom setting. Thus, it is imperative that the student begins to transfer the learning from their coursework to experiences in the professional world to begin to obtain this immersion.

“Shedding Light on Multiculturalist Theatre” allowed for extensive practice in the daily work and research that professional lighting designers do as a part of a creative team on a theatrical production. The creation of an original design for Fefu and Her Friends, a play by Maria Irene Fornés, served as the framework for the student to gain an understanding of the processes of other theatrical design professionals and expose the student to multicultural theatre while working with BIPOC creatives.

The project required: In-depth analysis of the script and detailed cultural research, drafting a fully realized lighting package that riggers and electricians implemented in the venue, collaborative production and design meetings with a team of renowned multi-international creatives, and—most importantly—the final actualization process of the lighting design in Iowa City, Iowa.

At the conclusion of this project, the student has experienced complete immersion in the lighting design process, interaction with many theatre professionals, developed skills as a lighting design artist, and has high quality professional work at a regional theatre added to their portfolio.

School of Education

SPECIAL EDUCATION

85. Graduate Level Special Education Teacher Recruitment Through a School-University Partnership
Student Presenter: Hannah Woods
Faculty Mentor (s): Dr. Adam Jordan

Recruiting special education teacher candidates to teacher preparation programs and to special education classrooms continues to be a national struggle (National Center for Education Statistics, 2022; United States Department of Education, 2021). While a number of solutions to this decades-long problem have been explored, we offer the analysis of a school-university partnership designed to target active, certificate-holding general education teachers for inclusion in a special education certificate program. The program of focus is designed to prepare general educators for certification eligibility and practice as highly qualified special education teachers intent upon remaining in their current P-12 districts. The value of having general education teachers and special education teachers engage in co-professional development, particularly focused on co-teaching, has a history of successful collaboration (Miller & Oh, 2013). It is plausible, then, to recognize the value of preparing successful general educators to transition to the special educator role (Fee et al., 2012). An outline of a cohort-designed special education graduate certificate program is described. Results are reported based on data obtained from completer surveys, qualitative interviews, and Praxis examination scores. Suggestions for
ways in which human resource professionals can help foster school-university partnerships are provided.

86. Culturally Relevant Pedagogy: A Framework for Teaching
Student Presenter: Audra Mitchell
Faculty Mentor (s): Dr. Carlos Lavin

The purpose of this research project was to investigate the perception of pre-service teachers on the use of Culturally Relevant Pedagogy (CRP) as a teaching framework using reflective journals. The students began responding to prompts in this journal at the start of the semester and responded to a total of seven prompts during the semester. Using qualitative research methods, we coded the journals into thematic networks. Findings show a general consensus of the importance of using CRP as a teaching framework. Additionally, findings demonstrated an eagerness from the participants to learn more about CRP and ways to implement it in their classrooms. Further students participating in this study identified ways in which their personal biases influenced their perception of others and by the end of the reflective process the majority of participants changed their point of view to a more inclusive stance. Finally, we present evidence relating to how most of these students realized the importance of learning about and displaying different races and cultures year round and not just at specific times throughout the year. Limitations and next steps are also discussed.

TEACHER EDUCATION

87. In/Accessibility Throughout The College of Charleston
Student Presenter: Sarah Khantzian
Faculty Mentor (s): Dr. Carlos Lavin
Additional Authors: Alex Grillo, Lexie Bolton, Grace Winiarski, Graeme Taylor

This project describes a semester-long investigation into the accessibility of College of Charleston buildings. Within our EDFS 401 class, Neurodiversity: Introduction to Exceptional Children in Youth, each student focused on a spot on campus that was not accessible, conducted research on the issue, and found a solution in order to improve our campus and create a more inclusive atmosphere. Students in this course identified resources that can be used to facilitate the process of fixing each issue along with the estimated cost of the materials and labor that would be required to carry out with each project. We focus on certain entrances to buildings that lack accessible wheelchair access, crosswalks that are not accessible to individuals with visual impairments, and fire evacuation signs throughout buildings that do not contain braille instructions. Our collected research shows that the majority of our proposed projects can be completed at a low cost and under a short period of time. Although our proposed projects can be completed at a fast rate and at a low cost, the lack of awareness of these issues has caused a setback in the process of putting our plans into action.

88. Experiential Learning with a Lasting Impact
Student Presenter: Penelope Fleckman
Faculty Mentor (s): Dr. Susan Flynn
Additional Authors: Maya Gamble, Elise DeBernardo, Jay Scott, Belle Rizzi

First Year Experiences at the College of Charleston can have a lasting impact on college freshmen. Participation in the experiential learning of the FitCatZ aquatic and motor therapy program (FYE Special
Sustainability-themed project

O.P.S. class), impacts the career paths of many CofC students. The goal of this project is to showcase the FitCatZ program as an educational community service opportunity for College of Charleston students. Rationale: To share the importance of community service as a lifetime pursuit to improve oneself and give back to others.

Methods: Presenters will volunteer as Group Leaders assisting with program management, safety and supporting the freshmen providing therapy for the children.

Outcomes:
To widen the reach of the FitCatZ program in the community as well as the CofC student body to increase volunteer involvement.
To create effective social media strategies to enhance the online presence, leveraging the power of social media to improve marketing and website design.
Solicit community support though local grant proposals.
The project will highlight the programs impact to:
enrich the functional development of children within the Neurodiverse community.
broaden the knowledge of college students interested in both typical and atypical growth and development of children.
provide experience for volunteers interested in working in careers such as therapy, special education, and the medical fields.

Through commitment from the College of Charleston and community support, and intervention through this EXPO project, the FitCatZ program has the potential to expand services for the Tri-County community and CofC student body.

M.Ed. OF TEACHING, LEARNING AND ADVOCACY

89. ELA Curriculum Audit and Professional Development Proposal
Student Presenter: Rosemarie Porter
Faculty Mentor (s): Dr. Kevin Eakes

All too often in education, new curriculum is introduced and immediate implementation is expected, yet insufficient training and support is provided to teachers expected to do the work. I chose to conduct a curriculum audit of an English Language Arts (ELA) curriculum for my graduate course in Curriculum Foundations, Principles, Issues, and Applications (MTLA 668). As an instructional coach, I found that I was in a unique position to improve the way my school implemented this curriculum. While preparing the audit, I found that a key component limiting the success of the high quality curriculum was the minimal professional development in place for teachers. I prepared, as a final presentation, a proposal for funding a 5-6 day summer professional development program in order to better prepare teachers for this curriculum implementation. This summer program would allow for a professional development focused on 2 days of unpacking the basic curriculum structure for new teachers, 2 days for returning teachers and new teachers to unpack the first two modules of study and plan for differentiation, with
the final day set aside for organizing materials, creating anchor charts, and teacher exemplars of performance tasks. As a result of this proposal, my school’s administration has approved the need and purposefulness of this work. My school’s staff will be participating in this additional professional learning during the 2023 summer break with funding for teacher stipends paid for by my school administration.

90. The Redefinition of Nutrition Education
Student Presenter: Ashleigh Werth
Faculty Mentor (s): Dr. Kevin Eakes

While South Carolina is not the highest-ranking state in regards to childhood obesity and malnutrition rates, the issue still remains a significant problem that needs addressing. So much of that stems from children from low socioeconomic status lacking proper education on how to live a healthy lifestyle, as well as little access to healthy resources. With more information, students can be encouraged to prioritize a nutritious and active lifestyle. So many health classes, diet plans presented by doctors and schools, and efforts to prevent obesity are solely weight-focused, which tend to cause the development of eating disorders in students, and only amplify the issues that these programs were initially attempting to end. There is also a lack of an understanding of how specific foods affect each individual, resulting in intolerances, disabilities, and allergies going untreated, impacting the way students learn and grow both cognitively and physically. The South Carolina nutrition curriculum needs to be refined to focus on informing children how to develop healthy relationships with food and their bodies, without encouraging disordered eating and exercising habits. I aim to work hand-in-hand with nutrition specialists, psychologists, and educators to create a structured curriculum outline that focuses on health data collected by the CDC, integrating specific nutrition information throughout pre-existing state education standards.

91. How Could We Have Retained Our Teachers?
Student Presenter: Kathleen Rexroad
Faculty Mentor (s): Dr. Will McCorkle

The purpose of this study is to determine why new teachers are leaving the teaching profession within the first five years of teaching and to determine if the school, school district or state could have offered or changed that would have encouraged the educator to rethink the decision to leave. Participants will be asked to complete a short 23-question survey using Qualtrics to help ensure anonymity. I will be using mostly multiple-choice answer questions with a few short answer questions to allow participants the opportunity to share their ideas. Qualitative and quantitative data will both be collected. The participants will be elementary school teachers who have recently left. The group will consist of teachers who have decided based on professional frustrations to change careers. Teachers who have left for personal reasons, medical reasons or “I just won the lottery” reasons will not be included.

Participants will be from varied races, ages, and socio-economic backgrounds and will be recruited from various Facebook groups. There are several Facebook groups teachers rely on for support, suggestions, or political advice on national or local issues. Posting on those types of various groups will help to broaden the spectrum of participants. There is also the possibility that the survey could be reposted or shared with other individuals or groups which would also help increase the chances of receiving answers coming from teachers outside of the Charleston, SC area. Suggestions from various former teachers can be presented to school boards around the area to help stop the flow of teachers leaving the profession.
The ubiquity of plastic has created a colossal environmental pollution problem. Of the roughly 5.25 trillion plastic particles in our oceans, over 90% are micropastics, or particles less than 5mm in diameter. Micropastics have been discovered in a wide variety of lower-trophic marine fauna, and there is building evidence to suggest that micropastics may be transferred to apex predators and humans through consumption of contaminated fish. Previous studies have shown that micropastics can have a variety of negative effects on humans such as gastrointestinal inflammation, metabolic changes, and oxidative stress. To better understand the potential for trophic transfer, 31 fish, representing four distinct species, were collected from Sarasota Bay in September 2022. Whole filets and gastrointestinal tracts were collected from each individual fish for microplastic screening. Specifically, tissues will be digested using 10% KOH and filtered using glass fiber filters. Plastic will be confirmed with a hot needle test and fourier-transform infrared spectroscopy (FTIR). Controlling for species and sample weight, particle concentrations and physical characteristics (i.e., color, shape, surface texture, polymer) will be compared between tissue types (filet vs metabolic or gans) to evaluate the potential of contaminated fish as an additional source of microplastic exposure for seafood consumers. Findings from this study will improve our understanding of the connections between seafood contamination and risk of exposure to marine microplastic, assist with efforts to monitor seafood safety, and inform intervention and risk communication needs regarding seafood safety.

Phthalates are endocrine disrupting chemicals commonly found in plastics and personal care products. Due to their widespread use and propensity to leach from the products to which they are added, species in nearly all environments are susceptible to phthalate exposure. Previous studies have demonstrated phthalate exposure in a variety of marine mammals, including the common bottlenose dolphin (Tursiops truncatus); however, exposure routes in marine environments are not well established. To better understand the risk of phthalate exposure from contaminated fish, 31 fish across four species were...
collected from Sarasota Bay in September 2022. Whole filets and metabolic tissues (i.e. gills, liver, kidney, gall bladder) were collected from each fish for phthalate metabolite screening. Specifically, phthalate metabolites will be isolated with solid phase extraction and quantified via high-performance liquid chromatography with tandem mass spectrometry. Geometric means will be used to summarize exposure when metabolite concentrations are above the limit of detection (LOD). If >20% of concentrations are below the LOD, means and standard deviations will be calculated using censoring methods such as Regression on Order Statistics (ROS) or Kaplan Meier methods. Controlling for species and sample weight, metabolite concentrations will be compared between tissue types (filet vs. metabolic organs) using appropriate statistical tests that account for non-detect data (e.g., Peto-Peto, Mann-Whitney, Kruskal-Wallis). Findings from this research will clarify if contaminated fish could be an additional source of human exposure to xenobiotics and help to inform risk communication needs for coastal communities.

94. Prevalence and associations of food insecurity on a college campus with a student-run food pantry
Student Presenter: Lilliana Taylor
Faculty Mentor (s): Dr. Kathleen Trejo Tello

Background: Recently, food insecurity has been recognized as a significant public health issue on US college campuses. To address this, universities have begun creating resources such as food pantries; however, the degree to which these resources are addressing food insecurity remains unknown.

Purpose: The purpose of this study was to assess the prevalence and determinants of food insecurity among college students on a public campus where food resources have been created.

Methods: Students at a Southeastern public university with an existing student-run food pantry were invited via email to participate in an anonymous electronic Student Health Survey (SHS) in Spring 2022. Food security was assessed using the USDA Food Security Short Form Survey included in the SHS. Affirmative responses across the items were summed and total scores were used to classify food security status as high, low, or very low.

Results: A total of 1,025 students responded to the USDA items, predominantly female (80.1%, n=822), white non-Hispanic (79.3%, n=813). More than half of students, 53.9% (n= 553) experienced food insecurity in the last year, of which 27.7% of students (n=284) reported very low food security. Additional demographic associations with food security status are currently being analyzed.

Discussion: In spite of the existence of resources on campus, more than half of students experienced food insecurity. More information is needed on how to make these resources acceptable, accessible and known across campus in order to function as viable solutions to the food security problem.

95. Feasibility and fatigue measures in blood flow restricted arm curl exercise
Student Presenter: Korey Little
Faculty Mentor (s): Dr. John Sieverdes and Dr. Wesley Dudgeon

PURPOSE: The purpose of this study was to 1) investigate the feasibility of blood flow restriction (BFR) during various arm curl protocols and 2) assess muscular fatigue. METHODS: Five resistance-trained men (mean age = 21.0 [SD1.9] year) completed pre-post arm curl isokinetic testing (i.e., Biodex) over four conditions (i.e., all 30% occlusion; 30-second rest periods; conditions [A: (standard) 30% 1RM, reps 3
RESULTS: Participants were able to complete 91% of condition A’s repetitions (range: 65-75), 41% of B (range: 23-38), 99% of C (range: 38-39), and 68% of D (Range: 31-39). Condition A had notably higher time under tension (TUT) (mean 191 sec; p = .035) and TUT x load = 7388.11 sec*kg (p = .001) compared to condition C (TUT = 109 sec, TUT * load = 1994.9 sec*kg. Findings showed a non-statistically significant reduction in max isokinetic torque in condition A (-3.9 [SD 8.62]) but not in the other conditions. Highest to lowest mean EMG resulted in similar peak amplitudes (B: 146.2%, D: 124.4%, C: 109.5%, A: 103.7%), and load by time (B: 922.8%, A: 859.9%, D: 794.1%, C: 768.4%). CONCLUSION: Higher %1RM and slower repetition speed notably reduced the number of repetitions and TUT though produced the highest EMG amplitude and EMG load by time compared to standard protocols implying that higher TUT may contribute most to muscular fatigue.

96. The Relationship Between Workload and Injury in Men’s Soccer Athletes
Student Presenter: Grace Powell
Faculty Mentor(s): Dr. Kate Pfile

External workload is measurable physical exertion, like total distance performed in a practice session. Workload can be analyzed in acute and chronic phases. The acute to chronic workload ratio (ACWR) represents fatigue over overall fitness. Rapid increases in workload within a short period of time have been shown to increase injury risk in youth and professional soccer athletes and non-soccer collegiate athletes. Workload and injury risk research is limited for collegiate men’s soccer athletes despite having an above average injury rate compared to other collegiate sports. A team of 24 male collegiate soccer athletes wore GPS tracking devices for all practices and games during a 12-week competitive season. Their ACWRs were calculated for five variables (total distance, sprint distance, power plays, player load, work ratio) through a rolling average and an exponentially weighted means average based on previously established methods. Previous research established target ranges for ACWR ratios and their associated injury risks: (low: <0.8, sweet spot: 0.8-1.3, overreaching: 1.3-1.5, high: >1.5). Injury reports were collected for each week. The athletic trainer provided weekly injury reports, individuals were defined as injured, and Mann-Whitney U tests compared ACWR variables between injured and uninjured athletes each week. No significant differences in workload variables existed between injured and uninjured participants. The participants’ training resulted in “sweet spot” ACWR ratios for weeks 5-12 of the season, potentially minimizing injury risk. A conservative injury definition may have limited the number of total injuries (12) included in the analysis.

97. Lack of drinking fountains on a university campus: an audit
Student Presenter: Olivia Yalden
Faculty Mentor(s): Dr. J.D. Adams
Additional Authors: Darcy Everett, Jennifer Mills

Background: Access points to public drinking fountains are a community health issue. On a university campus, densely populated areas lack convenient access to drinking fountains. The purpose of this study was to quantify public drinking fountains on a university campus.

Methods: Data were obtained from the Facilities Management division of university in South Carolina, such as classroom sizes, library population, residence hall bed availability, and access points to on-campus drinking fountains.
Results: Data are reported by ratios of water fountains compared to the available population in the building. Major academic buildings (i.e., business, science, mathematics) possessed ratios ranging from 1/122 to 1/270. Residence halls possessed ratios ranging from 1/47 to 1/627 with several residence halls lacking water fountains overall.

Conclusions: In this preliminary audit, the investigators found a lack of drinking fountains, given the current campus population. Further input is needed regarding building codes and other recommendations to increase access to drinking water on campus.

98. *Nicotine dependence and vaping cessation among college students.*
Student Presenter: Winnie NI
Faculty Mentor (s): Dr. Christy Kollath-Cattano

This study aims to qualitatively explore college students’ perceptions of and motivations for e-cigarette use, knowledge about e-cigarette harms and dependence, quit intentions and attempts, and desire for vaping cessation services. E-cigarette use among youth/young adults has been increasing consistently since e-cigarettes arrived on the market. Many studies examining intersections of e-cigarette use and cessation among college students have focused on use of e-cigarettes to quit smoking traditional cigarettes, and not on subsequent cessation of e-cigarettes. More recent studies have assessed vaping cessation intentions and behaviors among young adults/college students and found that many have tried to quit vaping, yet research has not explored the cessation methods used or students’ interest in on-campus vaping cessation services. Furthermore, qualitative studies on college student tobacco use, including traditional cigarettes, are sparse in general. This will be the first study of which we are aware to qualitatively assess college student e-cigarette use and cessation.

Methods: In-depth qualitative interviews with current student e-cigarette (i.e. past 30 days) users are in progress (n=10-15). The interviews are conducted in-person or over ZOOM and will cover reasons for initiation and current use of e-cigarettes, perceptions of e-cigarette harm, and e-cigarette quit behaviors and techniques. Participants are also asked about recommendations for campus-based smoking/vaping cessation services. Interviews are being recorded, transcribed verbatim, and analyzed using content analysis with deductive and inductive approaches to coding. Findings from this study will be provided to the institution and potentially used to inform future vaping cessation initiatives on campus.

99. *College Overdose Encounters: A Study Addressing the Aftermath and the Long Lasting Perceived impacts*
Student Presenter: Samuel Swartz
Faculty Mentor (s): Dr. Christy Kollath-Cattano and Dr, Sarah Hatteberg
Additional Authors: Riley Sisung, Samantha Petillo (Research Project Coordinator at University of South Carolina)

Background: The purpose of this study is to identify potential educational and supportive resources that might be helpful to college students who have encountered overdose.

Methods: In-depth interviews were conducted during summer-fall 2022 with twenty-four current/former college students who had encountered at least one form of substance use overdose,
including alcohol, (their own, a witnessed overdose, or the overdose of a family member or friend). Interviews were transcribed verbatim, and transcripts are being coded inductively.

Results: Preliminary findings indicate that respondents generally believed that overdose is a concern amongst college students, and many expressed a desire for more overdose-related educational and supportive resources. For example, several respondents suggested that peer support groups might be a helpful support resource for students who have encountered overdose. In terms of overdose response, many respondents reported that fear of getting in trouble likely influences whether students seek help for overdose situations. When asked about the university’s Medical Amnesty policy, many respondents indicated they were either unaware of the policy or they were unfamiliar with policy details.

Conclusion: It is of utmost importance that colleges understand college students’ experience with overdose to improve understanding of overdose risk and to better support students who have encountered overdose. Developing programming that raises awareness of overdose, provides education on universities’ Medical Amnesty policies, and creates support resources tailored to students’ experiences and needs may help to reduce overdose and its impacts within college communities.

100. Utilizing remotely sensed solar irradiance as a proxy indicator of vitamin D status: Association with COVID-19 mortality
Student Presenter: Samantha Andritsch
Faculty Mentor(s): Dr. Brian Bossak

The environment and how humans interact with it have a direct relationship with the emergence and spread of zoonotic pathogens like COVID-19. Existing literature suggests that air pollution and other climatic factors such as temperature and humidity have exacerbated COVID-19 mortality, leading to a disproportionate burden of disease across geographical space. However, very few studies have analyzed the relationship between COVID-19 mortality and solar irradiance, a proxy for vitamin D exposure. In this study, we analyzed the association between COVID-19 mortality and vitamin D status, calculated from dietary metrics and naturally derived vitamin D from solar irradiation. No existing studies, to our knowledge, have considered dietary intake of vitamin D in conjunction with solar irradiation measures. Utilizing NASA satellite data, we were able to estimate the annual average solar irradiation for a select set of coastal and inland countries. The dietary metrics data were derived from the Food and Agriculture Organization of the United Nations database, and the COVID-19 data was collected from the Johns Hopkins COVID-19 Dashboard. We conducted a multiple regression analysis to examine the solar irradiance data and per capita nutritional intake of fish across a latitudinal matrix. We found an association between exposure to these variables and COVID-19 outcomes based on coastal locations with extensive seafood exposure versus inland locations with inland fish dominance. Future studies could examine peak solar irradiance and speciation of fish consumption to expand this study further.

101. Addictive drug use causes primary antipsychotic failure through downregulation of the dopamine transporter
Student Presenter: Ariana Angelis
Faculty Mentor(s): Dr. Morgan Hughey and Anna Kruyer (MUSC)

The biology of primary antipsychotic failure is unclear and problematic. Primary antipsychotic failure is the loss of efficacy of antipsychotic drugs (APDs) in the first episode of psychosis. Antipsychotic failure
occurs in up to 25% of patients with first episode psychosis, and is correlated with disease severity and poor long-term prognosis (Tiihonen 2018, Schennach 2012, Agid 2011). The mechanisms underlying primary antipsychotic failure are not clearly understood. We tested antipsychotic efficacy in two rodent models of psychosis, locomotor in response to systemic ketamine or tail pinch, to investigate APD efficacy. We found that in untreated animals, delivery of the antipsychotic haloperidol reduced locomotion in both models. Instead, animals that had prior experience of cocaine use were more likely to exhibit primary antipsychotic failure, measured as reduced ability of haloperidol to blunt ketamine- or tail pinch-induced locomotor responses. Since the literature demonstrates that addictive use leads to downregulation of both glutamate (GLT-1) and dopamine transporters (DAT) in the brain, we tested whether GLT-1 or DAT knockdown in the ventral striatum were responsible for primary antipsychotic failure in cocaine-trained animals. Our preliminary data show that either DAT or GLT-1 knockdown in the nucleus accumbens core (NAcore) may be sufficient to produce primary antipsychotic failure compared to control animals. These results suggest a relationship between addictive drug use in early life and primary failure of APDs. A potential strategy to prevent primary failure is to increase expression of neurotransmitter transporters and limit exposure to addictive substances in individuals with a family history of psychotic disorders.

102. **E-bike Promotion of Physical Inactivity Reduction in Charleston, SC: Assessing the Physical Activity Outcomes an Electric Bike Share Program**

Student Presenter: Dara Fuller
Faculty Mentor (s): Dr. Morgan Hughey
Additional Authors: Gabby Stubbs and Lancie Affonso

Intro: Physical activity is one of the most significant preventative and corrective health behaviors. 24% of Charleston, SC adults report physical inactivity outside of the workplace (County Health Rankings, 2022). Opportunities for physical activity have expanded for Charleston locals and tourists due to the growth of newly introduced bike share programs. This study aims to compare regular versus e-bike usage and physical activity outcomes. Methods: Data from two Charleston bike share companies was analyzed. One data set reported regular bike trip data (July- November of 2019 and 2021), while the other reported e-bike trip data. Comparative metrics between e-bikes and regular bikes were calculated based on speed to establish metrics of metabolic output (MET)—standardized scores of metabolic equivalents that reflect energy expenditure capacity. Due to gaps in existing research comparing regular bikes to e-bikes, our methods are constrained, and we can only provide estimated comparative measures. Outcomes: E-bike share data is currently being analyzed, and results comparing trip characteristics and physical activity between regular and e-bike data will be presented at the 2023 CofC EXPO. The total number of regular bike trips is 34,344 with an average distance of 2.36 miles, an average speed of 5.9 mph, and an average of 154.9 MET minutes. Implications: Newly introduced bike share.

103. **Measuring physical activity and play behavior among youth in Charleston, SC**

Student Presenter: Maria Zweig
Faculty Mentor (s): Dr. Morgan Hughey
Additional Authors: Allison Carter, Dr. Aaron Hipp (North Carolina State University)

As childhood obesity is currently an epidemic in the United States, it is pertinent to examine how children utilize public playspaces. By studying factors such as how play areas are utilized, which structures attract children the most, and potential cultural differences in playground use, we may better understand the factors that contribute to obesity and develop strategies to promote healthy habits.
understand how to more effectively design, program, and manage these spaces to maximize physical benefits and enjoyment of activity among children. In partnership with the Word Playground Research Institute, this study aims to characterize play episodes among children in Charleston, SC. Using Global Positioning Systems (GPS) and accelerometers (i.e., devices that capture physical activity information), data will be collected regarding the intensity and duration of physical activity and play among children in three playgrounds in Charleston, South Carolina. Additional validation will be conducted using the examination of either child-worn or environment-based video cameras to define play episodes and correlate findings to data collected by the GPS and accelerometers. We intend to recruit at least 50 youth, ages 5-10 years old to wear the accelerometer, GPS, and video recording devices for a minimum of 15 minutes at each location. This multicomponent data collection will allow the research team to analyze levels and duration of activity on different types of play equipment. The results will be forthcoming as the project progresses. This approach could provide valuable information for practitioners by identifying natural play patterns, characterizing playspace and amenity use, and correlating play episodes with specific structures, natural elements, social aspects, and layouts of play spaces.

104. Urban Park Quality in Lisbon, Portugal
Student Presenter: Allison Carter
Faculty Mentor (s): Dr. Morgan Hughey
Additional Authors: Stephen Astor, NyEmma Drakes, Elizabeth Finkelstein, Annebeth Heller, Abigail Hutchison, Christa Joby, Clare Kimiecik, Megha Patel

Introduction: Lisbon, Portugal is known for its Public Green Spaces (PGS) and won the European Green Capital Award in 2020 due to its distinguished environmental record. PGS, which are defined as parks, urban forests, nature reserves, and trails, are important in promoting physical and mental health.

Methods: In this project, a group of Honors College students audited a total of 47 PGS with the use of the Quality of Public Open Space Tool (P.O.S.T.) which was composed of 49 items to survey public green spaces. After surveying the PGS, the results were combined into a collective database for analysis.

Results: Of the PGS audited in Lisbon, Portugal, data showed that the overall environmental quality, the safety, and the access to activities in the parks was very high. All parks had trees present within the grounds, 78% of the parks had walking/biking trails, and over 95% had lighting features located in the parks. Data results show that there are roughly 2.1 activity areas per park. The majority of the PGS were for active-informal use or active-formal use. Almost 50% of the parks offered playground areas featuring a variety of different playground equipment. Over 82% of the PGS offer public transportation within a block. Conclusions: The P.O.S.T. allowed our group to gather a multitude of information about PGS in Lisbon. By collecting results from the audits of activity areas, playgrounds, and amenities, we can determine which factors encourage park usage and which do not.

105. The Association Between Attention-Deficit/Hyperactivity Disorder (ADHD) and Nicotine Use Impact of COVID
Student Presenter: Chandler Dent
Faculty Mentor (s): Dr. Morgan Hughey and Dr. Rejoyce Green (MUSC)

The COVID-19 pandemic resulted in limited social interaction and heightened emotional distress. Adolescents reported heightened levels of anxiety, stress, boredom, and depression, all of which are risk factors for substance use. Youth with a neurodevelopmental disorder, such as Attention-Deficit /
Hyperactivity Disorder, may have experienced greater difficulty engaging in behavioral self-modulation and impulse control during this time. The aim of the present study was to conduct a narrative review of the association between ADHD and substance use among youth, with an emphasis on nicotine use, and examine how the COVID-19 pandemic may have altered on-going impairments and early substance use. As adolescents with ADHD are more likely to engage in risk taking behaviors, they are also more likely to initiate smoking at younger ages and more rapidly engage in regular smoking (Rhodes et al., 2016). Previous studies have shown compared to peers without ADHD, adolescents with ADHD exhibited greater inattentive and hyperactive / impulsive behaviors during the pandemic (Breaux et al., 2021; Davoody et al., 2022). As individuals with ADHD are at an increased risk of smoking, they may also experience greater morbidity and mortality due to smoking-related health consequences in comparison to non-smokers. The effects of the COVID-19 pandemic on ADHD symptomatology among adolescents may exacerbate the risks of engaging in early smoking behavior.

106. Park Access Policy Scan: Assessing the State of the Field in the U.S.
Student Presenter: Maya Pai
Faculty Mentor(s): Dr. Morgan Hughey
Additional Authors: Emma Langan, Heather Zeidler, Lesley Leake, Cody Mclellan, Dr. Kendra Stewart

Introduction: According to the Trust for Public Land (TPL), 1 in 3 Americans do not have access to a park or greenspace within a 10 minute walk. Among those most affected are minority and low income communities that are disproportionately unable to access parks, which can be essential to the promotion of health. As a result, the TPL established the 10-Minute Walk Program to address these inequities by changing city policies. However, the field lacks wide scale information about current park equity policy initiatives and strategies being employed across the nation. Objectives: To a) develop a tool for auditing city park policy documents and b) use this tool to conduct a document review of park policies, resulting in a comprehensive understanding of the “state of the field” of park access policies. Methods: The sample includes 25 cities of varying population sizes and demographic characteristics, representing each region of the United States. The document review tool provides a framework for compiling information about key categories of interest, including community engagement, funding, and park-to-resident connectivity. Results: Data collection and analysis is still ongoing, and part of the results will be available for the CofC EXPO. This will include a summary of the percentages of cities that have policies associated with expanding park access. Conclusions: The conclusions made from the data will be utilized to provide a thorough analysis and compilation of park access policies and initiatives so the 10-Minute Walk Program and city governments can more effectively examine and initiate policy change.

107. Journey Mapping A Cancer Patient’s Care Experience
Student Presenter: Jillian Gray
Faculty Mentor(s): Dr. Paul Gangarosa

In 2020, cancer was the second leading cause of death in the United States, killing 602,350 people. Despite revolutionary innovations in medicine and substantial advancements in medical care, hundreds of thousands of patients die each year. Numerous health barriers exist in patient care and treatment methods in the treatment of cancer that lead to poor patient outcomes, long-term disability, and in some cases, death. An in-depth analysis of head and neck cancer patient outcomes and participation in a trial at the Medical University of South Carolina (MUSC) was performed to identify key health barriers in head and neck cancer patients’ experiences. The researcher performed a journey map of head and neck

Sustainability-themed project
cancer patients’ experience utilizing the up-and-coming Public Health approach. Journey mapping is a visual process that goes through a person’s experience in the completion of a specific task or event; the research focuses on identifying key health barriers and implementing solutions in a cancer patient’s experience through radiation and chemotherapy treatments. Through journey-mapping a patient’s care experience during chemotherapy and radiation treatments, key health barriers were determined. Researchers found the following factors leading to long-term disability and adverse health effects: overall lack of consideration by health care providers towards the quality of life throughout treatment, and harsh radiation use. The researcher determined several solutions which could lead to better patient outcomes and quality of experience through chemotherapy and radiation treatments; these include testing albumin levels prior to treatment, implementation of a modified ‘geriatric assessment’, and counseling throughout treatment.

108. Contraceptive Knowledge among College Women
Student Presenter: Lauren Kendall Graham
Faculty Mentor (s): Dr. Sarah Maness
Additional Authors: Dr. Beth Sundstrom

Background: Women ages 18-24 have the highest unintended pregnancy rate compared to all other age groups. Reproductive outcomes in the U.S. vary geographically, and the existing literature indicates a need to examine contraception knowledge in the Southeast. South Carolina is particularly concerning, as 71.3% of women ages 18-24 are at risk of unintended pregnancy. Specifically, college students have insufficient knowledge regarding contraception and female anatomy.

Objectives: The purpose of this study was to explore contraceptive knowledge among college women in the Southeast. This research provides insight into contraceptive practices within an understudied population. This study sheds light on the gaps in contraception knowledge found in college women and can be used to improve educational interventions on college campuses.

Methods: Participants of college-age women between the ages of 18-25 were recruited to complete an in-depth qualitative interview over Zoom. The interview evaluated levels of contraceptive knowledge. We examined levels of knowledge by asking participants to list the contraceptive methods they were aware of, followed by probes that further assessed their understanding of and familiarity with different forms of contraception.

Results: Participant demographics (n=44) indicated a mean age of 20.23, 95.5% identified as women, and 4.5% identified as non-binary. Initial themes emerging from the data suggest that while most participants were familiar with IUDs, there is a negative climate surrounding use uptake.

Conclusion: Results from this study will inform future contraceptive education campaigns for college women that will fill current gaps in the existing literature on contraceptive knowledge among this population.
School of Sciences, Mathematics and Engineering

DEPARTMENT OF BIOLOGY

109. Effects of the Eastern Mud Snail (Ilyanassa obsoleta) on Benthic Bacteria Communities
Student Presenter: Timara Vereen
Faculty Mentor (s): Dr. Craig Plante
Additional Authors: Kristina Hill-Spanik, Josiah Waters

Bacteria play important roles in the function of mudflat ecosystems, supporting primary production and organic matter recycling back into the food web. Both abiotic and biological factors influence bacterial community structure. One possible biological factor is the highly abundant, deposit-feeding mud snail, Ilyanassa obsoleta. Earlier lab experiments examining mud snail gut microbiota found that communities were dominated by Mycoplasma. Our objective was to determine if bacterial changes due to snail grazing impact natural mudflat sediments. In 2021, a mudflat near Grice Cove, Charleston, SC was surveyed. A 60-meter transect was divided into 10 blocks with one experimental unit each of three treatments: snail exclusion, snail inclusion (181 m²), and ambient snail abundance (no-cage control). Cylindrical wire-mesh cages were constructed for snail inclusion and exclusion. At t=0 and t=14 days, surficial sediment was randomly sampled within each treatment using syringe corers for subsequent DNA metabarcoding. There was no significant difference in bacterial richness over time (p>0.05) or any significant difference among treatments at T14 (p>0.05). For the snail inclusion treatment, Shannon diversity decreased through time (p=0.032), and community structure also changed over 14 days (p=0.004), with no changes through time in the exclusion or ambient treatments. Mycoplasma was detected but in <1% relative abundance, thus indicating that the mud snail gut microbiota has minimal impact on the composition of the mudflat sediments. Their contribution is likely swamped by bacterial competition, with recolonization occurring rapidly as nutrient regeneration continues within this ecosystem.

110. Phenotypic Variation in Nutrient Manipulated A. thaliana
Student Presenter: Emma Beck
Faculty Mentor (s): Dr. Matthew Rutter
Additional Authors: Kyanna Gonzalez, Nathan Rumph

Being a model organism, Arabidopsis thaliana, otherwise known as the Thale Cress, is studied by ecologists to better understand many other plants in our ecosystems. To determine the growth effects of nutrient treated as well as environmentally different organisms, two populations were compared by students at the College of Charleston. Utilizing software programs and data collection sheets, students measured different variables of growth for a variety of treated organisms. This paper reflects the studies of students Emma Beck, Nathan Rumph and Kyanna Gonzalez. The collected data resulted in conflicting conclusions. Some statistical tests that represented growth did not have significant enough evidence to support a difference in populations while other tests did indicate there was a difference. These results present an inconclusive result, and require further tests or a larger sample size.
111. Does inoculation with endophytic fungus influence plant phenotypes? A genotype by environment analysis
Student Presenter: Caitlin Watts
Faculty Mentor (s): Dr. Courtney Murren and Dr. Matthew Rutter
Additional Authors: April Bisner, Juan Barcenas

Organisms underground can act as symbionts with plant roots, contributing essential resources for the host and in return providing nutrients, water, and protection. One beneficial fungal belowground relationship is that of endophytic fungi and plants. Piriformospora indica is a root endophytic fungus that is a facultative plant symbiont. From our ongoing quantitative review of the literature, we have found that P. indica interactions with plants increase performance, nutrient uptake, resistance to disease, and minimizes effects of abiotic stress. Experimentally, P. indica can be independently grown on artificial media. Our project goal is to determine scalable inoculation methods that will allow us to evaluate the mutualistic relationship between P. indica and A. thaliana and test the genotypic, phenotypic and environmental contributors to their relationship. We have conducted experimental trials of root immersion in mycelium solution, soil inoculation with mycelium, soil inoculation with spore suspension, on different potting media, and plants and fungi grown together on agar plates. Our initial results indicate that rosette diameter is largest on average in the soil inoculation plants, and we are able to detect differences among genotypes in performance. We ultimately seek to characterize the mutualistic relationship across many abiotic conditions, particularly those associated with climate change, to determine if P. indica could be a viable large-scale agricultural solution for the success of many plant genotypes within species in constantly changing environments.

112. The Effects of Various Cryoprotectant Mixtures on Cell Viability and Recovery
Student Presenter: Celia Campbell
Faculty Mentor (s): Dr. Ana Zimmerman
Additional Authors: Kelvin Brockbank - Tissue Testing Technologies

Cryopreservation is the use of extremely low temperatures to preserve cell and tissue function and structure for use in biomedical research and human transplantation. Rapid freezing is often lethal to cells due to ice crystal formation. However, increased viability can be achieved by adding cryoprotectants that change the solute balance in order to combat ice formation. The project presented here describes our testing of a variety of different cryoprotectants on human cells utilized in biomedical research. A Sodium Salicylate solution (Unisol) was enhanced with membrane stabilizers, apoptosis inhibitors, protein oxidation inhibitors, and antioxidants that optimized growth in microvascular endothelial cells, cardiac muscle cells, and skeletal muscle cells. Cells were plated and grown for 24 hours prior to treatment with cryoprotectants. Cells with varied cryoprotectant mixtures were held at very cold temperatures for a period of 22 hours. After the 22-hour period, cells were incubated for four hours after being washed in phosphate buffered saline to remove the cryoprotectants. Cell recovery rate and viability were discerned every 24 hours for three days using fluorescence and a stain called Alamar Blue. Cell viability varied both by cell type and specific cryoprotectants, with mixtures that included apoptosis inhibitors and antioxidants exhibiting the highest cell viability. Based on the data collected, current cryoprotective agents can still be improved, which will hopefully fortify cells and tissues subjected to cryopreservation and help advance human transplantation practices.
**113. THC/CBD vapor self-administration impairs spatial memory in an age- and sex-specific manner**
Student Presenter: Caitlyn Costa
Faculty Mentor(s): Dr. Carmela M. Reichel (MUSC)
Additional Authors: Jordan S. Carter (MUSC), Samuel K. Wood (MUSC)

Recent changes in cannabis policies have led to substantial increases in cannabis use, especially among vulnerable populations, including adolescents, women, and older adults. Despite growth in recreational use, the neurological effects of cannabis across sex and age are not fully characterized. While males are more likely to develop cannabis use disorder (CUD), women transition from casual use to CUD more rapidly and have greater rates of comorbid anxiety/mood disorders. Age may also play a role in the effects of cannabis, as older subjects may have cognitive enhancing effects while younger subjects experience detrimental effects. The objective of this pilot was to investigate sex and age differences in spatial memory following Δ⁹-tetrahydrocannabinol (THC)/cannabidiol (CBD) vapor self-administration. Adolescent and aged male and female rats self-administered THC/CBD vapor for 20 days. After 14 days of abstinence, their spatial memory was tested using the spatial location recognition memory task, which is dependent on the hippocampus. We hypothesized that females would take more THC/CBD than males and that prior THC/CBD exposure would impair spatial memory in adolescents only, regardless of sex. We found that females self-administered more THC/CBD than males in both age groups. Interestingly, THC/CBD induced a spatial memory deficit in adolescent males; a deficit that may correlate with THC/CBD intake. Conversely, THC/CBD impaired spatial memory in aged females. These age- and sex-specific findings on the impacts of THC/CBD on spatial memory require further exploration. We are particularly interested in exploring the role of estrogen and its protective effects on spatial memory in females.

**114. Characterization of complement peptide-mediated killing of Candida species**
Student Presenter: Logan DiBenedetto
Faculty Mentor(s): Dr. Caroline Westwater, MUSC

In the Oral Health Sciences lab at MUSC this semester, Dr. Westwater and I have investigated the fungus Candida, specifically its most virulent species, Candida auris. The Candida species represent an invasive fungal disease that has recently been regarded as a critical/high priority group in the first ever fungal priority pathogen list published by the World Health Organization (WHO). Throughout this research project, quantification techniques such as hemocytometry, PCR, and killing assays have been implemented to determine the interaction of Candida with MAC and the complement cascade at a molecular level. The end goal of this research will be to confirm the direct neutralization of candida species through the complement system and determine what causes this interaction at a molecular level in order to find a solution to this critical priority fungus.

**115. Using Hemolymph Chemistry to Assess Aging in Atlantic Horseshoe Crabs, Limulus polyphemus**
Student Presenter: Emily Dombrowski
Faculty Mentor(s): Dr. Jody Beers
Additional Authors: Daniel Sasson, Department of Natural Resources

Atlantic horseshoe crabs (HSC), *Limulus polyphemus*, are collected along the eastern Atlantic Coasts in the USA for commercial harvest of their hemolymph, the circulatory fluid analogous to blood in vertebrates. HSC hemolymph is a vital component for testing vaccines and injectables in the biomedical
industry: it is made up of granule-containing amebocyte cells that lyse in the presence of endotoxins, and is refined into a lysate (Limulus Amebocyte Lysate; LAL) that is used to test for bacterial presence. Nearly 700,000 horseshoe crabs were collected in 2020 by the biomedical industry for blood extraction. Studies have estimated mortality rates ranging from 4-30% following the release of bled HSCs back into the ocean. Variation in mortality rates may be in part due to age-related differences in HSC physiology or stress responses post bleeding. This project aims to understand how age relates to hemolymph physiology in HSCs using several hemolymph biochemical analyses. HSCs were collected on James Island, South Carolina, binned into young, middle, and old age categories based on carapace color and degradation, and underwent hemolymph extraction. Hemolymph lactate, glucose, total protein, and phenol oxidase levels were quantified and compared among HSC age groups to assess differences in blood parameters. Results are being analyzed for correlations with age. These data provide insight into age-related HSC health and stress levels, which may aid in developing biomedical practices that minimize post release mortality.

116. An Oligonucleotide Microarray platform to study tRNA Expression in Normal Mouse Tissues
Student Presenter: Ansley Elkins
Faculty Mentor(s): Dr. Renaud Geslain

Transfer RNAs (tRNAs) are ubiquitous, short non-coding RNAs essential for the translation of genetic information into proteins. tRNAs are so deeply involved in maintaining basic cellular functions that their expression is often assumed to be homogenous in multicellular organisms. However, recent studies have challenged this assumption suggesting that some cell types modulate the expression of tRNA subsets to optimize the expression of their proteins. This project will expand upon these discoveries by establishing that, in a mouse model, some, if not all, tissues display unique patterns of tRNA expression. I have successfully isolated workable amounts of tRNAs from 13 Mus musculus tissues. I have also designed, implemented, and optimized a microarray platform comprising 56 DNA probes (all 70-mers) complementary to the tRNA species encoded by the mouse genome. To determine the optimal hybridization conditions for this prototypic platform, I used mouse tRNAs that I purified from NMuMG. This mammary epithelial cell line offers a scalable supply of tRNAs identical (in sequence at least) to our limiting tissular tRNAs. In the upcoming months, tRNA samples will be radioactively labeled and hybridized onto arrays. Using the tRNA profiles generated from this project, I aim to examine whether the synthesis of tissue-specific proteins in mammals corresponds to the expression of tissue-specific tRNA.

117. By the skin of their teeth: morphology and replacement of Squalus suckleyi denticles
Student Presenter: Melanie Fischer
Faculty Mentor(s): Dr. Gareth J. Fraser (University of Florida, Friday Harbor Labs)
Additional Authors: Karly E. Cohen (University of Florida, Friday Harbor Labs)

All sharks are covered in denticles; ectodermally derived tooth-like structures that are highly variable in shape and size due to function and hydrodynamic responsibility. Denticles develop similarly to teeth however, it is not clear if like teeth denticles ever replace and if they do, what mechanisms are responsible for renewal. In oral teeth, replacement is controlled by the dental lamina – tissue located in the jaws that secretes the necessary genes for building and maintaining teeth. Using micro-CT scanning, electron microscopy, and histology we investigate the morphology and replacement of denticles in the Pacific spiny dogfish, Squalus suckleyi. We initially hypothesized that denticles would replace differently.
than oral teeth due to the lack of dental lamina and that replacement is instead driven by damage. Instead, we found denticles replacing across the body of the shark and replacement was not inherently due to damage or loss. Replacement denticles were superficial to the dermal region of the skin and not associated with any identifiable dental lamina-like structure. Denticles typically emerge first as two dorsolateral rows in eggcase developing sharks, however in S. suckleyi, a viviparous shark, we saw no apparent dorsolateral row. This could indicate a difference between internal, uterine and external, eggcase developing sharks. This study shows denticle replacement differs from oral teeth replacement and that the emergence pattern is not a shared characteristic amongst all sharks.

118. Sterile hypersaline environment simulation: aerial dispersal of halophiles between geographically isolated regions
Student Presenter: Heather Ghent
Faculty Mentor (s): Dr. Moshe Rhodes

The mechanisms for microbial dispersal have been extensively studied; however, it is unclear how these mechanisms apply to extremophiles, or microbes that require highly specialized conditions. Halophiles—extremophiles requiring high salt concentrations—are of particular interest since, unlike other extremophiles, they potentially lyse when outside of their optimal environment. A possible dispersal mechanism is aerial vectors, such as migratory birds, since they have been found to contain halophiles in salt crystals located in their feathers and nostril glands. Wind carrying salt crystals is also a possible dispersal mechanism. Previous studies have reported on the genetic makeup of naturally occurring hypersaline environments (e.g., the Dead Sea), solar salterns, and microbial mats transplanted into laboratory conditions. Prior to the present study, no samples have been sequenced or cultured from a hypersaline environment that was initially sterile. The current study simulated a sterile hypersaline environment in an outdoor sterile pool in order to observe which genera and species grew and were prevalent over a six-month period. Samples from the pool will be compared with samples taken from the Great Salt Lake, a naturally occurring hypersaline environment, in order to determine if the Great Salt Lake can serve as a potential reservoir for long distance dispersal. The results of this study will allow us to confirm that halophiles can be dispersed via aerial mechanisms between geographically isolated areas.

119. Effect of elevated salinity on predator-prey interactions of amphibian tadpoles and dragonfly Nymphs
Student Presenter: Amanda Montgomery
Faculty Mentor (s): Dr. Allison Welch

Increased salinity in freshwater habitats is a major ecological concern. Habitat salinization can cause behavioral changes, reduced growth, and even death in various freshwater organisms. However less is known about the impact of elevated salinity on interspecies interactions. Effects of freshwater salinization on ecological interactions are important to understand, as they have the potential to alter community structure and ecosystem function. Elevated salinity has been shown to negatively impact tadpoles from various amphibian species, which play important roles in freshwater ecosystems as herbivores and as prey. We investigated the effects of elevated salinity on predator-prey interactions involving amphibian tadpoles and dragonfly nymphs, a known predator of tadpoles. Salinity tolerance trials with nymphs of the odonate Erythemis simplicicollis indicated greater tolerance to salinity than has been documented for tadpoles of most amphibian species, including green treefrogs (Hyla cinerea).

Sustainability-themed project
In predation trials, Erythemis simplicicollis nymphs were allowed to prey on green treefrog tadpoles after both species had been exposed to moderate salinity for several days, and predation rates were compared with freshwater controls in which neither species had been exposed to elevated salinity. These findings suggest that tadpoles are less tolerant to elevated salinity than their odonate predators, and may therefore be more vulnerable to predation in elevated salinity conditions, which could impact amphibian populations and their ecological roles.

120. Complicating choice-tests: Oviposition site salinity and mate choice in squirrel treefrogs (Hylasquirella)
Student Presenter: Regan Honeycutt
Faculty Mentor (s): Dr. Allison Welch

Anthropogenic change challenges organisms with novel conditions in which existing traits may prove maladaptive. Although evolution optimizes fitness, competing demands in rapidly changing environments can undermine previously adaptive behaviors. Simple choice-tests typically used to assess behavioral preferences only include one factor and ignore how environmental conditions and competing choices impact organismal decisions. For many animals, two co-occurring factors are important determinants of offspring success: mate choice and oviposition site choice. Freshwater salinization is a current threat to many freshwater systems globally and can impact the habitats in which various amphibians breed and develop. We characterized the mating calls of male squirrel treefrogs (Hyla squirella) from a local population and investigated how reproductive female squirrel treefrogs responded to variation in oviposition site salinity and in male advertisement call frequency. Phonotaxis tests were conducted in which reproductive female frogs were presented with two speakers, each broadcasting a synthesized frog call and each associated with a pool of water. Females were presented with various combinations of salinity and call frequency in order to test whether mate choice would be altered by variation in oviposition site quality. Female frogs showed low responsiveness, particularly in trials with water pools. This indicates that more research is necessary to more accurately assess how oviposition site salinity impacts squirrel treefrog mate choice; however, to determine this, competing demands and environmental conditions must be included successfully in laboratory choice-tests.

121. The Contributions of Neuronal Nitric Oxide Synthase (nNOS) to Cued-Cocaine Seeking
Student Presenter: Jacob Lavine
Faculty Mentor (s): Dr. Michael Scofield (MUSC)
Additional Authors: Adam Denton (MUSC)

To date, cocaine abuse poses a major health concern that has consumed the lives of millions of people for thousands of years. Interneurons in the nucleus accumbens (NAc) that release neuronal nitric oxide synthase (nNOS) have been identified to play a crucial role in cued-cocaine seeking. This study aims to understand the neurological pathways involving these nitrergic interneurons during cocaine conditioned place preference (CPP) and self-administration (SA). Our studies employ viral design in the NAc followed by immunohistochemistry analysis of the transgenic mice and rats post-mortem. In the first experiment, it was shown that the loss of mGluR5 receptors in the NAc suppress cocaine seeking in mice. In the second experiment, it was shown that the loss of nNOS in the NAc inhibit cocaine seeking after SA and extinction in rats. Control trials administering saline instead of cocaine verified these findings. Confocal microscopy techniques and Imaris software were used to analyze dendritic spine head diameter (dH) and density of the interneurons. It was found that there was a notable increase in dendritic spine head
diameter, and in the second study the results varied depending on the strain of rat. D2 female rats had increased dH but decreased density, while D1 female rats had increased dH and increased density compared to the controls. Males were found to have the greatest increase in density. These results support that nNOS is central to cued-cocaine seeking, but do not conclusively identify the underlying mechanisms for this behavioral phenomena with respect to biological sex.

122. Identification of Nuclear Localization Signals in Transcription Factors of the Developing Sea Urchin
Student Presenter: Adaora Okeke
Faculty Mentor (s): Dr. Christine Byrum

As development proceeds, embryonic cells become more specialized to perform precise tasks. How are these cell fates determined? The major purpose of this project is to better understand potential roles of importins in cell fate decisions through their interactions with transcription factors. The availability of specific importins at particular developmental stages affects regulation of transcription factor nuclear import. Using transcription factor sequences, we are identifying nuclear localization signals (NLSs) and hope to form hypotheses about how importins influence cell fate decisions in development of the sea urchin Strongylocentrotus purpuratus. Previous research suggests that the presence or absence of a specific importin can affect the availability of transcription factors needed for cell fate specification and differentiation. Though this has occasionally been addressed in previous studies, much remains to be learned. Using Eric Davidson’s Endomesoderm and Ectoderm Gene Regulatory Networks, we have identified transcription factors critical for early development of the sea urchin and these sequences have been retrieved from the GenBank Protein Database or from Echinobase. Utilizing specialized sequencing programs such as NLS Mapper and ELM, we will identify the NLSs of each transcription factor and will evaluate these to determine whether subsets of the transcription factors utilize similar signals and therefore may be transported by the same importin. Through this research, we hope to gain additional insights into the development of Strongylocentrotus purpuratus and the importance of nuclear localization of transcription factors in cell fate decisions.

123. Expanding Freshwater Sponge Surveys in South Carolina
Student Presenter: Josephine Shostak
Faculty Mentor (s): Dr. Christopher Freeman

Sponges are critical filter feeders found in many freshwater environments, but, to our knowledge, no studies have assessed their distribution and diversity in South Carolina. In the last two years, we have visited over 50 locations in South Carolina including rivers and lakes from Charleston to the North Carolina and Georgia borders. Sponges were found on diverse hard substrates at 30 of these sites with up to three species at a single site. To identify sponges, sponge tissue was digested in bleach, and spicules were identified using a compound microscope and a dichotomous key. We have also used molecular techniques including 28S barcoding to help with identifications. To date, we have found at least 12 different species and, of these, we estimate that approximately five are new records for South Carolina and two may be new species. This work sheds light on an understudied group and expands our understanding of the biodiversity in freshwater systems of South Carolina and the Southeastern United States.
124. Marine Sponge Diversity in Hong Kong
Student Presenter: Darby Parham
Faculty Mentor (s): Dr. Christopher Freeman

Sponges are ecologically important members of marine communities around the globe, but there is a lack of research on this group in many regions of the world, including a large gap in the South China Sea and, in particular, around Hong Kong. By using a combination of molecular barcoding and taxonomy, I am identifying 31 marine sponge samples that were collected during an initial survey of sponge biodiversity around the islands of Hong Kong in 2013. To date, I have identified at least 15 unique taxa based on spicules and skeletal sections, and more species are likely to be identified following results from molecular barcoding. These results suggest the presence of high biodiversity even on coral reefs in close proximity to a metropolis of over 7 million people. Having a baseline inventory of the sponge biodiversity in the region will allow future surveys to reveal shifts in species richness that are being driven by climate change and human activities.

125. An exploratory analysis of Osprey mortality and migration.
Student Presenter: Emmi Triplett
Faculty Mentor (s): Dr. Bill Roumillat

Osprey (Pandion haliaetus) are considered essential bioindicators of ecosystem health due to their high-trophic level, diet of fish, and vulnerability to environmental contaminants. Therefore, it is important to monitor and assess osprey populations in order to understand if population trends are due to changes in mortality, production, or a combination of the two. The U.S. Geological Survey (USGS) Bird Banding Laboratory (BBL) database holds electronic records of banding operations and encounters in North America from 1960-2022. Using this data set, an exploratory analysis of osprey mortality will be performed using R software for statistical programing. By providing a deeper understanding of mortality patterns, future conservation efforts and wildlife management strategies will be assessed to ensure the long term survival of osprey populations. Ultimately, the findings of this study contribute to the preservation of both wildlife and human communities that rely on healthy ecosystems.

126. Review of Fish Assemblages in Deep Sea Habitats off the coast of the Carolinas and Georgia Using ROV Technology.
Student Presenter: Alexander Weidlich
Faculty Mentor (s): Dr. Antony Harold

Observation of fish species at great depths has been difficult for some time. Their inaccessibility has made it nearly impossible to survey them and their habitats. However, recent advancements in Remotely Operated Vehicles (ROVs) have made this task much simpler, and at less cost to the fishes and their habitats. With the high demand for marine resources, the ever-looming climate crisis, and other harmful anthropogenic activities, utilizing this technology is of utmost importance to protect and further understand the creatures that dwell in the oceans’ depths. Though this technology is not without its weaknesses, which will also be discussed, this poster will mainly focus on 20 deep sea dives performed by NOAA that were thoroughly reviewed for fish assemblies the ROV encountered off the coasts of North Carolina, South Carolina, and Georgia. These dives varied from depths of 400m to over 3000m and includes a variety of different habitats on and off the continental slope in order to more accurately identify areas in need of conservation and to observe a multitude of different populations of fishes,
particularly those considered economically and ecologically important. The fishes were identified to the lowest taxonomical level possible, and over the course of 180+ hours of dive footage, 47 unique genera were observed, with the majority of the diversity being found inshore on the continental shelf at depths of 500-1000m. The data gathered will hopefully provide information that can guide future ROV dives as well as insight into future marine conservation efforts.

127. *Hormonal Response of Elasmobranchs to Temperature Stress*
Student Presenter: Jake Kuenzli
Faculty Mentor (s): Dr. Jody Beers

As ocean temperatures increase, marine life will experience a wide array of physiological changes. Atlantic stingrays (*Hypanus sabinus*) are species whose physiology could be affected by these changes in temperature, including effects on their reproductive biology (e.g. gestation period and time of breeding). Past studies have been done on hormone concentrations of testosterone and estradiol in some marine species but not only is this data outdated from over 30 years ago, it does not include a clear linkage between temperature and reproductive capacity. To determine this, I investigated the sex hormone levels of *H. sabinus*, as well as smooth butterfly rays (*Gymnura micrura*) to elucidate how temperature affects the reproductive capacity of this estuarine species. Rays were collected in the field using seine nets on the shores of Charleston Harbor. Blood samples were taken for examination of hormone concentrations and other metabolic parameters (e.g. lactate and glucose). A small subset of *H. sabina* were brought back to the lab and lab acclimated to 16C, 21C, and 26C to represent the range of what the animals experience naturally. Again, blood hormone concentrations were measured to assess the effects of temperature. Results are still currently being developed, but will provide significant evidence for how the rise in temperature, which is associated with global climate change, could negatively affect the reproductive health of coastal elasmobranchs.

128. *Physiological Response to Temperature Stress of the Atlantic Stingray*
Student Presenter: Rylie Talmadge
Faculty Mentor (s): Dr. Jody Beers

There are a variety of factors that can alter a fish’s behavior, including both biotic and abiotic considerations. The Atlantic stingray, *Dasyatis sabina*, inhabits estuaries and shallow waters along the Atlantic coast and is notably influenced by changing environmental factors. Of particular interest, this elasmobranch has an observed broad tolerance range for temperature and other physiological stressors. Their temperature tolerance can operate at high and low ranges, though not much is known about their physiological response when acclimating to such ranges. Thus, our study seeks to understand the effect of temperature on the physiology of Atlantic stingrays through a combination of respirometry, blood, and tissue-level biochemistry. We plan to observe stingrays in both in-situ and laboratory acclimated environments. To assess the physiological tolerance of the various temperatures, we will perform respirometry experiments and carry out tissue level analyses via blood biochemistry and protein expression. Our primary objective is to correlate the metabolic rates of stingrays with varying extreme temperatures. Secondly, we aim to learn more about the underlying physiological mechanisms that may support organismal tolerance to a wide temperature range. Finally, we intend to view such results through an integrative lens by applying our knowledge of the physiological response to the species’ temperature resiliency and future conservation efforts. Ultimately, this research will help us learn more

*Sustainability-themed project*
about the effects of abiotic factors on the potential health and fitness of an important ecological fisheries species and further elucidate adaptations of coastal elasmobranchs to environmental change.

129. C5a going undetected when introduced to PBS during the process of promoting advanced wound healing
Student Presenter: Avery Lynn
Faculty Mentor (s): Dr. Dr. Michael Yost (MUSC)
Additional Authors: Maryann Jarnagin; Mara Richard (MUSC); Kim Sutton (MUSC); Guangmao Cheng (MUSC)

The development and application of treatments that are centered on repairing wounded tissue and organs from stress or injury through bioengineered grafts encompass regenerative medicine. The survival of these grafts is hindered by rejection. This experiment aims to understand the innate immune system and why bioengineered Scaffold-free Prevascular Endothelial-fibroblast Constructs (SPECs) fail to survive past three days post-implantation. By understanding these topics, we can promote faster and better wound healing while preventing graft rejection. We hypothesized that SPECs will release C5a and be detected in higher concentrations in SPECs treated with PBS, phosphate-buffered saline, and those treated with growth media. Analysis of total protein concentration showed that there was no significant difference between the amount of protein present in the SPECs treated with PBS or growth media. It also proved that the complement factors were not being released significantly from the SPECs. It can be concluded from this data that the complement factors present that are responsible for graft rejection are mostly on the host side. Analysis of tissue cultures from mouse surgeries confirmed this theory showing that the complement factor was present mostly in the cultures where a SPEC was implanted rather than the healthy mouse tissue itself. We conclude that while complement factors are seen in the SPECs and are subsequently found in graft tissues, the majority of graft rejection and prevention of wound healing is due to the host's innate immune system.

130. Assessing the impact of Release Over 20”
Student Presenter: Mallory Rosenfeld
Faculty Mentor (s): Dr. Gorka Sancho

Large fishes are an integral part of healthy fish populations and important to ensure sustainable fisheries. Largest females have the highest fecundity and play an essential role in overall egg production, because the number of eggs they produce and possibly selected genetic traits. Release Over 20” is a non-profit organization that promotes coastal anglers to release fish that are larger than 20 inches, independently of what the local fishery legal release limits are, in an attempt to preserve healthy fish stocks. In this study I estimated the effectiveness of releasing these large fishes. The Marine Recreational Information Program (MRIP) dataset provided catch and length data from 1981-2021 for recreationally caught fishes in North Carolina, South Carolina, Georgia, East Florida, West Florida, Alabama, Mississippi, and Louisiana. Using this dataset, I estimated the potential impact of releasing Southern Flounder (Paralichthys lethostigma), Spotted Seatrout (Cynoscion nebulosus), and Sheepshead (Archosargus probatocephalus) over 20 inches of length. These data will provide concrete evidence as to whether release of fishes over 20 inches has significant impacts on the populations of these three recreationally important species.

Sustainability-themed project
131. Reef-Top Feature Volumetric Analysis in the Mesophotic Zone of the Northern Gulf of Mexico
Student Presenter: Eryn Faggart
Faculty Mentor(s): Dr. Gorka Sancho and Dr. Scott Harris (Department of Geology and Environmental Geosciences)

Coral reef morphology varies throughout the mesophotic zone of the Gulf of Mexico, exemplified by the diversity of geological origin, including paleo-shorelines, erosional remnants (reef top ridges), salt domes, and drowned landforms that have become reefs formed during low stand sea levels in the late Quaternary Period. The purpose of this project is to report on the geologic features for several positive bathymetric features characterized as reef tops between 65 - 85 m water depths at the head of DeSoto Canyon south of Mobile, Alabama. The information gained from this analysis will aid in artificial reef designs for the Gulf of Mexico restoration following the Deepwater Horizon Oil Spill of 2010. In May and June of 2022, multibeam bathymetric and backscatter data were collected aboard the NOAA ship Ferdinand R. Hassler. Measurements related to area, relief, volume, and geologic origin were documented for select high relief (reef top) features in the mesophotic zone of the Gulf of Mexico. Standard operating procedures (SOPs) have been developed for ArcGIS Pro to characterize measurements related to slope, concavity, rugosity and other morphometrics. Visualizations and characterization of the seafloor features were made with QPS Fledermaus and ArcGIS Pro. Overall, we identify areas where constructive and destructive processes have produced varied landform features on the seafloor that host a diversity of habitats and organisms. Metrics quantifying the morphology of such landforms in this study are necessary to accurately reproduce coral reef ecosystems and produce scaled models necessary for restoration of these coral reef habitats.

132. Functional imaging of brainstem sensory nuclei following spinal cord injury
Student Presenter: Madeline Keller
Faculty Mentor(s): Dr. Takashi Sato (MUSC)

Sensory information from the periphery nerve is conveyed to the brainstem before transmitted to the thalamus and to the cerebral cortex. While the brainstem sensory nucleus plays a critical node in the sensory pathway, the functional organization within the nucleus has never been studied. Here we report precise functional map in the brainstem sensory nucleus of the mice. We express GcaMP7s using AAV-PHPeB, and developed a novel approach to visualize the functional properties of brainstem sensory nuclei using in vivo two-photon calcium imaging. The neurons responding to the forepaws and hindpaws were spatially segregated and there was no overlap. The functional map was stable following spinal cord injury that induce plastic changes in the cortex. Based on its stability, we propose that the sensory brainstem will be an ideal site for brain machine interface that will assist people who lost sensations due to spinal cord/peripheral injuries.

133. Optogenetic priming of motor circuits facilitates functional recovery following stroke
Student Presenter: Ashley Matunis
Faculty Mentor(s): Dr. Takashi Sato (MUSC)
Additional Authors: Kenta Abe (MUSC), Emma Stacy, Takahide Itokazu (Osaka University), Tatsuo K. Sato (Japan Science and Technology PRESTO)

Functional recovery following stroke determines patients’ long-term quality of life. This recovery is thought to be mediated by plastic reorganization of the remaining intact cortical sites, but the
underlying circuitry mechanisms remain unclear. In this study, we discovered that functional recovery is mediated by a newly identified group of neurons in the hemisphere opposite to the site affected by the stroke (contralesional) - the neurons exhibit motor-related activity during recovered movements of the body affected by the stroke. To accomplish this, mice were trained to reach a water droplet with their right forepaws under a head-fixed configuration, and then a photothrombotic stroke was induced in their left frontal cortex. Longitudinal in vivo two-photon calcium imaging of the contralesional motor cortex before and during stroke recovery identified a substantial number of neurons that increased activity during the recovered movements compared to the original movements. The necessity of these neurons was demonstrated using optogenetic suppression. We further examined whether the new functions of the contralesional hemisphere could be primed before the stroke. Optogenetic suppression of the left motor cortex during the reaching task was applied, similar to previous work. This demonstrated that the mice that underwent the optogenetic priming recovered faster and to a higher degree than the control mice. From these experiments, it was concluded that functional recovery is mediated by neural circuit changes in the contralesional hemisphere, which can be primed by optogenetic training.

134. Intranasal Administration of BDNF Improves Cognitive Recovery and Promote Synaptic and Dendritic growth in a Neonatal Mouse Model of Hypoxic Ischemia
Student Presenter: Madelynne Saddow
Faculty Mentor (s): Dr. Serena-Kaye Sims
Additional Authors: Catrina Robinson (MUSC)

Neonatal stroke, or hypoxic ischemic encephalopathy (HIE) results in lifelong neurological disabilities. Neonatal stroke care is limited to supportive care, such as hypothermia. Administration of brain derived neurotrophic factor (BDNF) reduces cell death and infarct volume in preclinical stroke model in rats. Delivery of BDNF through the nasal cavity is attractive in that it is non-invasive and bypasses the blood brain barrier with minimal side effects. Our overall hypothesis was that intranasal BDNF would improve recovery following neonatal stroke in a neonatal postnatal day (PND) 7 hypoxic mouse model. For our model of neonatal stroke, a ligation of the right carotid artery was induced which is followed by a 45-minute exposure to an 8% oxygen/ 92% nitrogen and were then subjected to a 2 hour hypothermia. Intranasal BDNF was administered with a pipette at the same time each day for 7 days into each nasal cavity. We evaluated cognitive recovery with the novel object recognition (NOR) at PND 28 and 42 and performed western analysis to analyze neuro-markers such as synaptophysin and microtubule associated protein -2 (MAP2). The objective of these study was to evaluate the therapeutic potential of BDNF in neonatal stroke recovery. Our results suggest that intranasal delivery of BDNF compared to saline in HIE animals are predictive of better improvements at day 28 and 42 on cognitive assessments. Our results also demonstrate HIE animals with BDNF treatment have higher levels of synaptophysin and MAP2 which suggests greater neuroplasticity after injury due to treatment.
135. The Role of the Perirhinal Cortex to Nucleus Accumbens Neural Circuit on Novelty Recognition in Methamphetamine Self-Administered Rats
Student Presenter: Dylan Freels
Faculty Mentor (s): Dr. Carmela Reichel (MUSC)

The Perirhinal Cortex (Prh) to Nucleus Accumbens (NAc) neural circuit is hypothesized to be a critical component in cognitive deficits caused by long-term methamphetamine (meth) use and in relapse. The potential for relapse was tested using a novel cue procedure in which a novel lever competes with a meth-associated lever to drive behavior. To investigate the behavioral significance of the Prh-NAc pathway, the circuit was isolated and manipulated with a dual virus strategy in both Long-Access (LgA) and Short-Access (ShA) meth self-administering (SA) rats. Inactivation of the circuit in ShA animals resulted in increased responding on the meth-associated lever relative to the novel lever, whereas vehicle resulted in similar responding on both levers. Activation of the circuit in LgA animals was unexpectedly without effect. These results suggest that inhibition of the Prh-NAc circuit in the ShA procedure is sufficient to shift behavior away from novel stimuli, however activation of the pathway in the LgA “addicted” phenotype is not sufficient to shift behavior.

136. Investigating The Downstream Targets of The Hedgehog Pathway in Cancer Associated Fibroblasts
Student Presenter: Alexandra Adams
Faculty Mentor (s): Dr. Lu Han (MUSC)
Additional Authors: Alexandra Adams (MUSC), Tom Walter (MUSC), Michael Ostrowski (MUSC)

Pancreatic ductal adenocarcinoma (PDAC) is the third leading cause of cancer related deaths in the US, with a 10% five year survival rate. PDAC is characterized by desmoplasia, an abundance of cancer associated fibroblasts (CAFs), which modulate disease progression and therapeutic responses. The Hedgehog pathway, where a paracrine signal secreted by tumor cells is received by CAFs, is highly upregulated in PDAC compared to the normal pancreas. The Hedgehog pathway plays critical but complex roles regulating PDAC formation, and the precise targets of this pathway in CAFs are still not fully determined. Previous studies show that CAFs originate from the splanchnic mesenchyme during fetal development. Intriguingly, the Hedgehog pathway is also active in the splanchnic mesenchyme, with Foxf1 and Gata6 being two important targets there. Therefore, we hypothesize that Foxf1 and Gata6 are also downstream targets of the Hedgehog pathway in adult pancreatic fibroblasts. To test this, we examined the expression of Foxf1 and Gata6 in tissue resident fibroblasts (TRFs) derived from normal adult pancreata and in CAFs derived from tumor-bearing pancreata. Preliminary data shows an upregulation of Foxf1 while Gata6 was downregulated in CAFs compared to TRFs. Furthermore, Foxf1 expression in TRFs increased upon treatment of Hedgehog agonist PMA while Gata6 in CAFs decreased with PMA treatment. This suggested Foxf1 as a positive target and Gata6 as a negative target of the Hedgehog pathway in adult pancreatic fibroblasts. This provides further insight into the complexity of the Hedgehog pathway, which could be leveraged to design therapeutics targeting the Hedgehog pathway in PDAC patients.
Pancreatic cancer is a lethal disease that holds one of the lowest five-year survival rates for patients after initial diagnosis. Cancer associated fibroblasts (CAFs) are one of the major cellular components in the pancreatic tumor microenvironment. CAFs play many important roles impacting pancreatic tumor progression. However, defining these roles of CAFs is still unclear, which therefore makes distinctive CAF subtypes poorly understood. To better understand different CAF subtypes, we aim to test the hypothesis that two transcription factors, Foxf1 and Gata6, are expressed in distinct CAF subtypes with differential locations relative to tumor cells. Foxf1 and Gata6 are downstream targets of the Hedgehog (HH) pathway during fetal development. This pathway holds communication lines between tumor cells and CAFs. However, CAF targets within the HH pathway are not defined. A genetically engineered mouse model (referred to as KPF) was used in this study. These mice develop spontaneous pancreatic cancer, recapitulating the pathophysiology of human pancreatic cancer patients. To determine the expression pattern of Foxf1 and Gata6, immunostaining was performed in KPF pancreatic tumor tissues. The percentage and location of Foxf1 or Gata6 positive CAFs relative to tumor cells were quantified. Results showed Foxf1 and Gata6 were expressed in a small proportion of CAFs, with a largely non-overlapping pattern. Additionally, quantification showed a longer distance between Foxf1+ CAFs and the nearest tumor cells compared to the distance between Gata6+ CAFs and the nearest tumor cells. This preliminary data suggests Foxf1 and Gata6 are expressed in different CAF subtypes and are localized in separate regions within the tumor microenvironment. Further research is directed towards better understanding the regulation and significance of these CAF subtypes during pancreatic tumorigenesis.

The greater Charleston area is prone to frequent flooding. When these events occur, the overflow from stormwater ponds and surface runoff enters the rivers and ends up in the Charleston Harbor, potentially increasing the nutrient (i.e. nitrate and phosphate) input into the estuary. Elevated nutrient concentrations may alleviate the pressure of nutrient limitation on certain phytoplankton taxa, resulting in a shift in the phytoplankton community composition. The Charleston Harbor estuary is currently dominated by diatoms, so a change in the community towards smaller picoplankton and/or cyanobacteria could impact carbon cycling, overall water quality, human health, and the local seafood industry. To investigate the nutrient status of the Charleston Harbor, water samples were collected from two different locations. One location was upstream in the Ashley River, an urban setting, and the other location was near the mouth of the Stono River which represents a more pristine natural environment. Nitrogen (nitrate + ammonium) and phosphate additions were made in an attempt to alleviate potential nutrient limitation and to alter the N:P ratio. Samples were collected to monitor changes in total phytoplankton biomass and in community composition and to quantify nutrient depletion over the course of the experiment. The goal of this project is to provide the student with the opportunity to become proficient in a variety of laboratory methods, while investigating the impact of
nutrient conditions on the Charleston Harbor phytoplankton community. Common lab techniques like biomass measurements and nutrient analysis will prepare the student for post-graduate laboratory or research employment.

139. **C3a Is Not Released by Bioengineered Grafts Prior to Surgical Implantation in Mouse Models**

Student Presenter: Maryann Jarnagin  
Faculty Mentor(s): Dr. Michael Yost (MUSC)  
Additional Authors: Avery Lynn (CofC), Mara Richard PhD (MUSC), Kim Sutton (MUSC), Guangmao Cheng (MUSC)

Regenerative medicine aims to enhance the repair response of dysfunctional or injured tissue. Scaffold-free pre-vascularized endothelial-fibroblast constructs (SPECs), made from human cells, implanted in mouse models have been shown to establish a vascular network to support cell and tissue growth in damaged skeletal muscle. Here, we use SPECs made from mouse cell lines to decrease the chances of xenograft rejection; however, after implantation the SPECs do not survive past three days. Complement proteins, such as C3a and C5a, have been shown to be produced by endothelial cells and the release of these proteins prior to implantation could activate the host's innate immune response, impacting graft survival. The aim of this study was to determine if SPECs are releasing complement factors, specifically C3a, induced by stress resulting from a standard surgical hold in phosphate buffered saline (PBS) prior to implantation. SPECs (n=16) were divided into a control group held in normal mouse growth media and a treatment group held in PBS for thirty minutes. We hypothesized that C3a will be released by the SPECs and detected at higher concentrations in those held in PBS compared to those held in growth media. Analysis of protein concentrations showed that C3a is present in but not released by the SPECs and there was no statistical significance between the control and treatment groups. Furthermore, C3a was detected in post-implantation tissue samples from mice, indicating that SPEC rejection is not a result of pre-implantation procedures and is most likely due to the host's innate immune response.

140. **Characterization of Macroalgal Foraging Sites in South Carolina**

Student Presenter: Claire White  
Faculty Mentor(s): Dr. Heather Spalding

Macroalgae are commonly consumed in other areas of the world, and are a potential resource for local harvesting and the aquaculture industry in South Carolina. However, knowledge of edible macroalgal species diversity, abundance, and distribution is limited in this region. This project aims to characterize seasonal trends in macroalgal diversity, abundance, and water quality to provide a baseline for potential macroalgal foraging sites and promote subsequent consumption. Macroalgal abundance was quantified every meter along a 10 m transect using the DACOR method at 12 sites during the fall and spring months. Water temperature, salinity, dissolved oxygen concentration and pH were recorded to characterize water quality conditions. Species identifications were verified using herbarium specimens and microscopic examination. The spring had a higher abundance and diversity of macroalgae, with hard substrates such as docks and jetties hosting a higher diversity than estuarine environments. However, soft sediment environments hosted the highest abundance of edible Gracilaria spp. and Ulva spp. Future experimentation could potentially involve using this data set to survey the areas of higher abundance, collect specimens that have potential to be eaten and conduct nutritional analysis for comparison across species present at that site. Subsequent data can also be utilized to track the presence of species, as the climate continues to change, and how this affects the status of both native and invasive species.

*Sustainability-themed project*
141. Analysis of Microbiomes of Hawaiian Macroalgae
Student Presenter: Kyle Macalincag
Faculty Mentor (s): Dr. Heather Fullerton
Additional Authors: Dr. Heather Spalding

The ocean houses diverse and unique ecosystems which can vary by depth and distance from land. In many of these habitats, macroalgae are primary producers, habitat formers and indicator organisms for overall ecosystem health. All organisms form close relationships with bacteria and archaea and this microbiome can be indicators for host health. The Manawai atoll (formerly Pearl and Hermes) which is located in the Northwestern Hawaiian Islands is minimally influenced by anthropogenic factors. Because of this, Manawai Atoll is an ideal habitat for studies on macroalgae and their associated microbes. There are three phyla of macroalgae, Chlorophyta, Rhodophyta and Ochrophyta and representative species from each phylum were collected in 2021 for microbiome analysis. A previous study with limited collections of the invasive-like alga, Chondria tumulosa, noted it had a distinct microbiome as compared to other Rhodophyta in the same location. This study seeks to expand the comparative microbiome analysis between C. tumulosa and native macroalgae at Manawai Atoll. Therefore, results will provide understanding of microbial-macroalgal interactions and how such relationships influence the microbial communities of each associated macroalga.

142. Comparative Analysis of Hydrothermal Vent Microbial Symbionts and Nascent Microbial Mats
Student Presenter: Akshay Patwardhan
Faculty Mentor (s): Dr. Heather Fullerton

Microbes are globally dispersed and can form relationships with various animals and plants. One biome of interest are hydrothermal vents which host endemic species of invertebrates. These deep-sea invertebrates form symbiotic associations with chemosynthetic microbes for their nutrition and growth in this extreme environment. Previous analysis of these symbionts from the East Pacific Rise hydrothermal vent has shown a relatively simple community within the invertebrates with little specificity, as compared to related coastal invertebrates. While this study is useful in differentiating between microbe and invertebrate symbioses between different regions of the ocean, this study did not examine the microbial communities at hydrothermal vents that are not associated with animals. To address this knowledge gap, we used microbial growth chambers to collect nascent microbial communities from the East Pacific Rise. These nascent communities will be compared to previously published microbial communities of hydrothermal vent invertebrates to assess any similarities and differences. This information will be useful in determining overall bacterial diversity and biogeography of the studied regions of the EPR. Furthermore, this will allow us to examine factors related to microbial growth and diversity, and give a better foundation to study areas of the EPR that have not been examined in detail.

143. Conspicuous coliforms: Antibiotic resistant bacteria in two of Charleston’s most popular recreational Waterways
Student Presenter: Brooke Emery
Faculty Mentor (s): Dr. Heather Fullerton and Brian Bossak (Health and Human Performance)

Shem Creek and Wappoo Creek are two waterways in Charleston, South Carolina that are highly utilized for recreational activities such as kayaking, boating, and fishing. In a prior pilot study, Shem Creek was

Sustainability-themed project
Sustainability-themed project found to have increased concentrations of antibiotic-resistant coliforms following a rainfall event. Coliforms are capable of living in the mammalian gut and can cause a variety of illnesses that threaten community health. In this follow-up study, Wappoo Creek was included as an additional sampling site with Shem Creek serving as a control site. Samples were collected for enumeration of total coliforms and ampicillin-resistant coliforms. Coliforms found to be resistant to ampicillin were then tested against six additional antibiotics to determine if they were multi-antibiotic resistant bacteria (MRBs). Forty MRBs were identified in this study. They belong to a variety of species including: Citrobacter, Escherichia, Pseudomonas, Shigella, Serratia, and Klebsiella. The concentration of antibiotic-resistant bacteria (ARBs) in sampled waterways increases following rainfall events that increase surface water runoff from surrounding sources such as hospitals, urban built environment, livestock farms, and combined runoff-sewer overflow systems. Continuous monitoring and health promotion efforts are essential to lessening or mitigating against the public health impacts of ARBs in recreationally used waterways in Charleston, South Carolina.

144. Microplastics Act as a Vehicle for Ingestion of Adsorbed Toxins by Aquatic Organisms

Student Presenter: Layne Leggett
Faculty Mentor(s): Dr. Robert Podolsky

Microplastics are small particles of variable polymer composition that result from manufacturing or breakdown of larger plastics. As they accumulate in the environment, the consumption of microplastics has become of increasing concern because of their potential to leach endogenous toxins and interfere with normal feeding. One unexplored concern is that they might also act as a vehicle to increase the ingestion of environmental contaminants that adsorb to their surface. Because aquatic organisms are regularly exposed to both microplastics and contaminants, it is essential to understand how they impact organisms independently and synergistically. We tested the hypothesis that microplastics can exacerbate the negative effects of environmental toxins using sea urchin larvae, which consume algal cells in a similar size range. We exposed larvae to 5 treatments: polyethylene microbeads at low concentration, dissolved phthalates (a demonstrated toxin), beads and phthalates introduced separately, beads incubated in phthalates before introduction, and a seawater control. In the first trial beads alone had little effect on larval growth, whereas beads in the presence of phthalates reduced growth and increased arm asymmetry significantly more than phthalates alone. The second trial produced similar patterns but without statistically significant interactions between beads and phthalates. Our results suggest that microplastics can have an underappreciated indirect negative impact on organisms even when at low concentrations that have little direct effect.

M.S. MARINE BIOLOGY

145. Characterizing Invertebrate Communities Associated with the Cryptogenic Alga Chondria tumulosa in the Papahānaumokuākea Marine National Monument, Hawai‘i

Student Presenter: Ray Radick
Faculty Mentor(s): Dr. Heather Spalding
Additional Authors: Dr. Robert Podolsky and Kristina Hill-Spanik

Coral reef habitat availability and structural complexity are factors that influence community composition. Habitat alteration can change the abundance and diversity of the flora and fauna of coral reefs, especially in relatively undisturbed ecosystems such as the Papahānaumokuākea Marine National Monument.
Sustainability-themed project

Monument (PMNM) in the Hawaiian Archipelago. The cryptogenic red alga Chondria tumulosa was discovered in the PMNM at Manawai (Pearl and Hermes Atoll) in 2016 and at Kuaihelani (Midway Atoll) in 2021. This alga forms dense mats up to ~20 cm in height that overgrow native corals and algae. C. tumulosa has the potential for rapid spread, thus altering the benthic habitat available for invertebrate macrofauna. The goals of this study are to characterize and compare invertebrate abundance and diversity in C. tumulosa mats between two atolls and in native macroalgal (Microdictyon setchellianum) beds. C. tumulosa samples (n=624) were collected at Manawai from five sites in August 2019 and eight sites in July 2021. Additional samples of C. tumulosa (n=275) and M. setchellianum (n=100) were collected from eight sites at Kuaihelani in July 2022. Invertebrates from each sample will be sorted to the lowest identifiable taxon, and DNA barcoding will be used to identify representative specimens. Community composition will be compared across variables such as depth, time, and percent algal cover. This study will be the first to compare invertebrate communities in native and invasive-like algae in the PMNM and establish a baseline to better understand how the continued spread of this habitat-altering alga will further influence invertebrate community structure.

146. Ecophysiological Adoptions of Abundant Mesophotic Macroalgae in the Main Hawaiian Islands: Shedding light on Macroalgal Photosynthesis
Student Presenter: Ian Rolfe
Faculty Mentor (s): Dr. Heather Spalding

The intensity and quality of light changes exponentially with increasing depth, thus driving adaptations in photosynthetic organisms. Mesophotic coral ecosystems are characterized by low light levels from 30-150+ m depths, and have a high abundance of macroalgae and corals in the Hawaiian Archipelago. The classic theory of chromatic adaptation predicts that brown algal species are better adapted to lower depth ranges than green algal species depending on coastal water type. To test the variance in ecophysiologial characteristics between fleshy Chlorophyta and Ochrophyta at mesophotic depths, 112 samples of abundant macroalgae were collected from O‘ahu and Maui from 2004 to 2011 from 51 to 125 m depths. Each sample was dark-adapted and analyzed for photosynthetic yield, relative maximum electron transport rate (rETRmax), photosynthetic efficiency (eff), and saturation irradiance (E»k) using pulse amplitude-modulated (PAM) fluorometry. With increasing depth, the photosynthetic yield, electron transport rate, and saturation irradiance were found to be genus, or family, specific. There were no significant relationships between photosynthetic efficiency and increasing depth, suggesting that macroalgae in the mesophotic are adapted to absorb light efficiently regardless of light quantity or quality. When comparing these parameters between phyla, Chlorophyta had a significantly higher photosynthetic yield than Ochrophyta, but was similar in all other photosynthetic measurements, suggesting these algal groups are using physiological adaptations contrary to chromatic adaptation. Future pigment concentration analyses and comparisons to shallow water macroalgal samples and neighboring mesophotic coral species will provide insight into the unique physiology of mesophotic macroalgae and the factors driving the persistence of these species in low light conditions. Similarly, evaluating the competitive interactions of corals and macroalgae under decreasing light conditions may be useful in future climate change scenarios of decreasing water clarity and algal phase shifts.
147. Ecophysiological approach to assessing Symbiodinium in mesophotic octocorals Swiftia exserta and Muricea pendula to support laboratory-based propagation
Student Presenter: Kassidy Lange
Faculty Mentor(s): Dr. Peter Etnoyer (NOAA)

The endosymbiosis between Symbiodinium and shallow water octocorals has been a driving factor in their ecological success. However, many mesophotic octocorals are described as azooxanthellate due to the low irradiance in this deep-water environment. Two octocoral species, Swiftia exserta and Muricea pendula, were collected between 57 and 68 m depths from the Northeastern Gulf of Mexico (GoMx) in 2022 using an ROV and maintained alive in aquaria. These were examined for the presence of Symbiodinium using pulse amplitude modulated fluorometry, histology, and chlorophyll autofluorescence. Additionally, in situ measures of irradiance, temperature, and nutrient availability on the mesophotic reefs were made to 150 m using a CTD rosette. S. exserta had low total quantum yield values (0.28 +/- 0.03). Both histological analyses and chlorophyll autofluorescence revealed scattered Symbiodinium structures within the tissues. M. pendula had inconsistent or zero total quantum yield values and no identifiable structures. The 1% light level in the region varied from 47 to 57 m depths and the temperature at the reefs varied seasonally from 18°C to 28°C. Nitrogen (NO3) and phosphorus (PO4) were measured at twelve reefs and found to be 0.32 +/- 0.09 mg/L and 0.24 +/- 0.10 mg/L respectively. To summarize this ecophysiological study, Symbiodinium was found in S. exserta but not in M. pendula, and the environmental conditions in the GoMx could support the photosynthetic Symbiodinium found in S. exserta. The information provides useful context for octocoral husbandry including potential adjustments to lighting and feeding. Future research on lipid analysis, stable isotopes, and molecular typing may be useful to understand the role of mesophotic Symbiodinium in autotrophic versus heterotrophic energy acquisition.

148. Validation of Species Distribution Models in the Mesophotic Zone of the Pinnacles Trend, Northeastern Gulf of Mexico
Student Presenter: Morgan Will
Faculty Mentor(s): Dr. Peter Etnoyer

The Pinnacles Trend region is a 120 km extent of mesophotic (50-100 m) habitat, located off the Mississippi and Alabama coasts in the northeastern Gulf of Mexico. This area is of particular interest due to its proximity to the Deepwater Horizon oil spill (oil slick covered area for 2-5 weeks in 2011). To assist restoration efforts, this study aims to locate aggregations of three species of octocorals (S. exserta, M. pendula, T. nivea) and two species of black corals (A. atlantica, and A. furcata) throughout the Pinnacles Trend region through validation of spatial models. Models from three sources were analyzed: a biotope identification model (enhanced topographic position index; Nash & Randall, 2014), presence-only habitat suitability models (Silva & MacDonald, 2017), and presence-absence occurrence models (Goyert et al, 2021). An independent set of biological data was collected using a remotely operated vehicle (ROV) in summer 2022, gathering visual information on coral abundance and area swept to yield density values from 12 sites across Pinnacles Trend. The overall performance of all three model types was low, with minimal correlation between observed and predicted coral occurrences. The biotope identification model had the highest performance of the three model types, identifying 466 reef-top features of varying size and relief throughout Pinnacles Trend, of which few have been surveyed. All reef-tops surveyed had corals present, but the coral species and abundance was unpredictable. Significant correlations were found between density of species and size of reef-tops. Based on these findings, when
attempting to identify new aggregations of corals for sampling, more focus should be placed on learning the basic geology of areas and developing associated biotope identification models, as opposed to large-scale regional habitat suitability models with coarse environmental variables that yield no increase in performance.

149. Distribution and Characterization of Microplastics in Sediments and Commercial Shrimp Species in South Carolina Estuaries
Student Presenter: Annabelle Tierney
Faculty Mentor (s): Dr. Andrew Tweel

Estuaries are highly productive and biologically diverse ecosystems that serve as a key habitat to a variety of marine organisms. Continued urbanization and population growth along the South Carolina (SC) coast has led to influxes of microplastics (MPs) into estuaries and associated marine sediments, potentially impacting sediment, and trophic processes. Commercially and culturally important white shrimp (Penaeus setiferus, Linnaeus 1767) and brown shrimp (Penaeus aztecus, Ives 1891) may be especially vulnerable to MPs in estuarine sediment due to their benthic foraging strategy. This raises questions regarding the consumption of shrimp and the potential for MP ingestion by humans. The objective of this study is to determine the abundance, distribution, and types of MPs in sediments, and white and brown shrimp in SC estuaries. Furthermore, I will evaluate the potential for microplastic ingestion by humans via shrimp consumption. I hypothesize that MPs will be present in sediment and shrimp samples, and that these MPs will be the greatest in areas of finer sediments and high urbanization. The increase of impervious cover with urbanization along the SC coast has caused increased MP pollution in estuaries, where dense MPs can sink and settle into sediment. Sediment samples were collected in SC estuaries in 2019-2022, and shrimp samples were collected in 2022. The abundance and types of MPs present in the sediment and shrimp are being analyzed via microplastic extraction techniques, tissue digestions, microscopy, and spectrometry. Preliminary data indicates that 100% of benthic sediment samples analyzed so far contain microplastics. It is expected that a variety of MPs will be found within the sediment samples and that shrimp will also contain MPs but at more variable levels. This study is significant as it is the first report addressing broad scale distribution of microplastics in sediments coast-wide and MP presence in commercially important shrimp species in SC. This will provide critical baseline data regarding microplastic levels in estuaries and shrimp, and the potential ingestion of microplastics by humans via shrimp consumption.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

150. Small Peptide Models of Hydrophobic Collapse
Student Presenter: Lane Kenan
Faculty Mentor (s): Dr. Michael Giuliano

Human galanin is a 30 amino acid neuropeptide with potential medical use as an anticonvulsant agent. Previous studies in our group have found consistent clustering of hydrophobic residues on 5 backbone models of this peptide. There are various models of protein folding that venture to explain these clusters. The energy landscape theory claims there are many folding sequences leading to the lowest energy protein conformation, while the defined pathway model argues there is only one sequence of folding steps. The model we focus on in this lab is a lattice model which uses hydrophobic collapse to reach the lowest energy conformation. No current structure prediction method or theory beyond a simple lattice appears to describe this type of “irregular secondary structure” well. Using 2D Nuclear
Magnetic Resonance (NMR) Spectroscopy, we study and compare the properties of small, modified peptides expected to form irregular secondary structures via a hydrophobic collapse model, and evaluate our results in light of contemporary protein folding theories and structure prediction models.

151. A Comprehensive Profile of Bilayer-Opioid Interactions
Student Presenter: Hailey Ninness
Faculty Mentor (s): Dr. Michael Giuliano

The purpose of this research project is to profile the general affinity of opioid peptides for cell membranes. This study makes use of synthetic peptide samples in the presence of phospholipid bicelles, which are soluble and mimic the lipid bilayer found on cell surfaces. The aim is to extend this work to representatives of the ligands of all three known opioid receptor classes: μ, δ, and κ. Opioid peptides (met-enkephalin, leu-enkephalin, message sequence, adrenorphin, α-neoendorphin) were prepared and analyzed using solid and solution phase peptide synthesis, reverse-phase high performance liquid chromatography (HPLC) purification, and mass spectrometry. Analysis of peptide solution behavior and structure was carried out with a wide variety of Nuclear Magnetic Resonance (NMR) experiments, including two-dimensional diffusion-oriented NMR spectroscopy (DOSY-NMR). The data has shown that the peptides in their aqueous state diffuse faster than in the presence of bicelles, but slower than various small molecule control samples. Lipid association appears to be a general feature of opioid peptides, which is significant since these peptides bind membrane-bound receptors, where they carry out a variety of crucial biological functions including pain sensation and mood regulation. We are currently validating data which suggest that the ability of an opioid peptide to associate with membranes is also correlated to its specific receptor subtype. The structures of the opioids in their preferred environments - lipids or solution - are therefore likely tied to these important processes.

152. The Direct Measurement of Properties of Cell Membrane Mimics
Student Presenter: Gabby Molloseau
Faculty Mentor (s): Dr. Michael Giuliano and Marcello Forconi

The environments of cell surfaces are notoriously complex and play a large role in intercellular communication and other biological processes. The interaction between water molecules embedded in the cell’s membrane and other molecules is what creates such a convoluted environment, that has yet to be researched fully. It is believed that the surface of the cell near the membrane will reflect similar properties to organic solvents, since most of the nearby water is bound up by the membrane itself. Previous work in the lab has allowed us to synthesize small organic reporter molecules that is now be used to embed into mimics of the membrane of a cell. Atoms in the reporter molecule give unique spectroscopic signals. Atoms in the reporter molecule give unique spectroscopic signals, due to their sensitivity to the solvent surrounding the cell’s surface. By embedding into lipid membrane mimics, these signals allow for a better understanding of the properties of the environment of the cell’s membrane. Understanding the intricate nature of cell surfaces will allow for a better understanding of cell signaling and communication, the binding of medicines to cellular targets and how it affects their designed purpose, and how structure and function of biomolecules are related to their environment. The aim of this study is to apply these newly synthesized probe molecules to various lipid assemblies to
obtain direct spectroscopic measurement of the solvent environment at the surface of several different mimics of the cell membrane.

153. *Kemp Elimination in Acetonitrile/Water Mixtures*
Student Presenter: Jackson Savage
Faculty Mentor(s): Dr. Marcello Forconi

The base-catalyzed ring opening of benzisoxazoles, also called Kemp elimination, has been extensively studied as a model reaction for proton transfer from activated aromatic systems. It is well-established that aprotic solvents significantly increase the rate constant for the Kemp elimination. For example, we recently found that dimethylsulfoxide (DMSO) accelerates the Kemp elimination of various benzisoxazoles by about 10 orders of magnitude relative to water. Intriguingly, we found an inverse linear correlation between the logarithm of the second-order rate constant for the reaction and the molar fraction of water present in the water/DMSO mixed solvent. It is known from the literature that acetonitrile (AcCN) also accelerated the Kemp elimination by 5-7 orders of magnitude, relative to water. However, no studies in AcCN/water mixtures had been done before. We found that the second order rate constant for the Kemp elimination also shows an inverse log-linearly dependence with respect to the molar fraction of water in AcCN/water mixtures. We are now extending our analysis to different bases (acetate, hydroxide) and substrates (such as the less reactive benzoisothiazoles).

154. *The Base-Catalyzed and Alternative Pathways of the Kemp Elimination Reaction Including the Redox Catalysis by Water-Soluble Porphyrins*
Student Presenter: Emma Van Horne
Faculty Mentor(s): Dr. Marcello Forconi

The Kemp elimination is as a model reaction for proton transfer and has been used as a benchmark for the computational design of enzymes. It is widely accepted that this reaction is base-catalyzed; however, recent experimental results involving the catalysis of this reaction by three heme proteins (cytochrome c, myoglobin, and hemoglobin) and water-soluble porphyrins, indicate a possible redox pathway. In comparison to the base-catalyzed pathway where the proton is simply abstracted, the proposed redox pathway for heme proteins involves an internal rotation of the substrate and internal proton transfer that results in the product formation. Water-soluble porphyrins also show catalytic properties for the Kemp elimination; however, the proposed redox mechanism for this reaction involves an external proton transfer with the solvent, as opposed to the internal rotation and internal proton transfer. Results of the pH-rate profile of both the water-soluble iron and copper porphyrins indicate that proton transfer is likely the rate-limiting step; however, an inflection in the profile suggests an alternative rate-limiting step as the pH increases. The degradation of multiple porphyrins was analyzed, which indicated there is a degradation in the iron porphyrins due to the presence of ascorbate as the reducing agent. We also studied the effect of reducing agents on the reaction. Further research will be done to further explore the catalytic properties of water-soluble porphyrins in the Kemp Elimination.
155. Kemp Elimination of Benzoisothiazoles
Student Presenter: Hannah Todd
Faculty Mentor(s): Dr. Marcello Forconi

The Kemp elimination is a well-studied reaction that involves base-catalyzed proton abstraction from the C3 of benzisoxazoles with concurrent ring opening due to the cleavage of the labile O-N bond. The reaction is concerted, with no intermediate detected, and greatly accelerated by polar, aprotic solvents and by the presence of electron-withdrawing groups on the benzisoxazole ring. Benzoisothiazoles are more resistant to the Kemp elimination, but their reactivity has not been studied in detail. We found that benzoisothiazoles also undergo Kemp elimination when hydroxide is added as the base, and that reactions are greatly accelerated by dimethylsulfoxide (DMSO), a polar and aprotic solvent, relative to water. Extrapolations suggest the reaction of benzoisothiazoles in water is at least seven orders of magnitude slower than the corresponding reaction of benzisoxazoles. Further research is being planned to study the mechanism of the reaction through NMR experiments, along with reaction studies of the reaction in DMSO using different bases.

156. Mitochondrial CYP2E1 and the ketogenic diet
Student Presenter: Abigail Ryan
Faculty Mentor(s): Dr. Jessica Hartman (MUSC)
Additional Authors: Fiona Hollis (USC SOM), Joe McQuail (USC SOM)

The ketogenic diet is a high fat, low carbohydrate diet that causes elevated levels of blood ketones due to an uptake in fatty acid metabolism as a response to decreased glucose levels. Under these conditions, the liver produces ketone bodies that are metabolized for energy. Cytochrome P450 2E1 (CYP2E1), an enzyme that is highly expressed in liver endoplasmic reticulum and mitochondria, oxidizes acetone and other endogenous substrates and promotes oxidative stress. In addition to evaluating the effect of a ketogenic diet on mitochondrial function, this study measures CYP2E1 levels in the livers of rats fed a ketogenic diet and the effect of CYP2E1 expression in HepG2 cells on the lethality of ketogenic media. Liver mitochondria and microsome samples were analyzed in absorbance assays to determine reaction rates for complexes I-IV of the electron transport chain. Western blot analyses were performed to quantify concentrations of CYP2E1, cytochrome c oxidase, and endoplasmic reticulum membrane oxidoreductase. A modified HepG2 cell line was cultured in low glucose media spiked with ketone bodies to determine the effect of localized CYP2E1 expression on cellular survival. In the activity assays, a ketogenic diet caused a decrease in complex IV activity in young male and female rats but not old rats. No significant differences were observed between keto and control groups in complexes I-III. Data collection and analysis is in progress for the western blot analysis and cell culture experiments. The results of this study will contribute to the understanding of the keto diet’s effects on cellular function and age and sex differentiated responses to the keto diet.

157. PTEN/STAT3 pathway in cancer-associated fibroblasts in Pancreatic Cancer
Student Presenter: Ashlyn Ivey
Faculty Mentor(s): Dr. Michael Ostrowski (MUSC) and Dr. Samaneh Saberikashani (MUSC)

Pancreatic cancer has the seventh highest mortality rate compared to all cancer forms (Sung, 2021), with only 10% of patients surviving after the five-year mark (Gorchs, 2022). Pancreatic cancer is often characterized by dense stroma surrounding the cancer cells. Phosphatase and tensin on chromosome 10
(PTEN) is a tumor suppressor gene that is an essential regulator of transcription in stromal fibroblasts. Disruption of PTEN has profound effects on cancer progression and development. Mutations that cause a loss of PTEN are often associated with more aggressive cancers and are usually found in solid tumors such as breast and prostate cancer.

Conversely, STAT3 signaling in pancreatic cancer-associated fibroblasts provides an immunosuppressive and fibrotic stroma in pancreatic cancer. In addition, an increase in STAT3 phosphorylation when PTEN is depleted from cells shows that PTEN may be a negative regulator of STAT3 activation (Lefler, 2022). Our study hypothesizes that there is an interaction between PTEN and STAT3 in cancer-associated fibroblasts and that they contribute to an immunosuppressive tumor microenvironment in pancreatic ductal carcinoma. In this study, we will use a Duolink® Proximity Ligation Assay (PLA) to determine whether there is an interaction between PTEN and STAT3 proteins within CAF cells. We will confirm this interaction by transfecting COS-7 cells with tagged PTEN and STAT3 plasmids to measure their interaction through co-immunoprecipitation.

158. Synthesis of P(CL-co-TOSUO) Polymers Using Sn Catalysts
Student Presenter: Katelyn Jackson
Faculty Mentor (s): Dr. Brooke Van Horn
Additional Authors: Addie Barnes and Nick Orlando

The preventative approach of engineering antimicrobial materials as opposed to the reactive method of killing microorganisms after they have infiltrated a surface, could prove revolutionary to the field of medicine. Over the course of the academic year, I am looking to build on previous research in our lab synthesizing TOSUO PCL copolymer, a potentially antimicrobial biodegradable agent, with various ratios of solvents, catalysts, and reactants. My objective is to study the chemical characteristics of the copolymer, which will provide a foundation for its incorporation into larger compounds and eventually pharmosudomedical materials. Because the rate of hydrolytic degradation is largely dependent on the accessibility of the polymer backbone to water, I aim to further characterize the polymer using DSC (differential scanning calorimetry) and MALDI (matrix assisted laser desorption/ionization). These tests will allow our team to first assess the structure of the polymer in greater depth and then connect its structure to a degradation pattern, which can be used to predict later hydrolytic behavior within antimicrobial materials.

159. Uniquely Microstructured Copolymers of epsilon-Caprolactone and TOSUO Monomer via Organic Catalysis
Student Presenter: Addie Barnes
Faculty Mentor (s): Dr. Brooke Van Horn

Polymer microstructure significantly influences material properties such as crystallinity and the rates and modes of hydrolytic degradation. Each of these characteristics are key for materials with biomedical applications. In my undergraduate research at the College of Charleston, I have employed organic catalysis over traditional metal-mediated ring opening polymerization (ROP) strategies for the preparation of novel biodegradable polyester copolymers of ε-caprolactone (CL) and 1,4,8-trioxaspiro[4.6]-9-undecanone (TOSUO). TOSUO’s inclusion in the polymer chains allows for future derivatization of the polymers with biomedically-relevant ligands, such as X-ray imaging agents. Preliminary syntheses indicate a difference in the rate of incorporation of TOSUO compared to CL when...
prepared with the organic catalyst 1,5,7-triazabicyclo[4.4.0]dec-5-ene (TBD). Gradient copolymer products are observed when compared to the rates of incorporation observed for the Sn (II) (2-ethylhexanoate)-mediated polymerizations. This presentation will showcase my nuclear magnetic resonance (NMR) spectroscopy evidence of both crude aliquots of kinetic/set-time polymerizations and precipitated/isolated products, as well as thermal characterization data from differential scanning calorimetry (DSC).

160. Synthesis and Degradation Studies of PCI Polymers
Student Presenter: Nicholas Orlando
Faculty Mentor (s): Dr. Brooke Van Horn
Additional Authors: Jennie Jackson, Addie Barnes

Polycaprolactone (PCI) is a material that is biocompatible, biodegradable, malleable, has a low melting point and is copolymerizable for potential functional group addition. This makes it an ideal polymer for medical materials. These include short-term degradable sutures, which is a key niche that current medical polymers (such as Monocryl) have difficulty filling. However, before more work can be done in manufacturing polymers of this type their resilience must be examined, which was measured via both synthesis of different lengths of PCI monomer via use of a traditional tin catalyst, as well as environmental simulation studies on the breakdown of PCI over time in a variety of conditions.

These synthesized monomers were analyzed with the use of thermal imaging techniques like Differential Scanning Calorimetry (DSC) to gain data on bulk properties of polymer. This was paired with techniques like Matrix Assisted Laser Desorption/Ionization to confirm properties such as end group composition, along with verification of successful polymerization and properties through NMR. Further realistic environmental conditions for monitoring of their hydrolytic breakdown over time for these different lengths of monomer in the environment (as the product is intended to be reasonably biodegradable) was performed in both acidic and basic conditions with presence of natural products such as humic acid that appear in varied breakdown scenarios over a large swathe of possible decomposition scenarios. These decomposition products were similarly analyzed via MALDI for changes in composition and DSC for bulk changes over time.

161. Synthesis and Conformational Analysis of a Silicon-substituted Three-membered Ring
Student Presenter: Abanob Hanna
Faculty Mentor (s): Dr. Gamil Guirgis

The microwave spectrum (6500-18 500 MHz) of cyclopropyl, c-C4H8SiHF has been recorded and 87 transitions for the 28Si, 29Si, 30Si, and 13C isotopomers chloromethyldifluorosilane have been assigned for a single trans conformer. IR spectra (3050-350 cm-1) of the gas and solid and Raman spectrum (3100-40 cm-1) of the liquid have also been assigned from the predicted value using ab initio calculations. The vibrational data indicate the presence of two conformers as trans and gauche conformers.
162. Characterization of Model Primordial Peptides with Noncanonical Amino Acid Residues
Student Presenter: Alexis Torrence
Faculty Mentor(s): Dr. Jay Forsythe

Depsipeptides are copolymers of amino acids (AAs) and hydroxy acids (HAs) and may have been precursors to polypeptides on primordial Earth. Unlike traditional peptides, depsipeptides form easily in simple chemical reactions which likely occurred in the primordial soup. The goal of this study was to investigate depsipeptide incorporation of the AA valine and its nonproteinogenic isomers isovaline and norvaline. It is generally thought that all were all available in primordial environments, yet only valine is genetically encoded. Why did biology select valine over its other isomers? In order to begin investigating this question, we compared the incorporation of valine to its nonprotein isomers using mass spectrometry (MS) and Fourier transform infrared (FTIR) spectroscopy. Initial comparisons suggest similar levels of incorporation between valine and norvaline, with lower incorporation of isovaline. It is possible this is due to increased steric hindrance of isovaline at the alpha-carbon, which could reduce its reactivity. Isovaline has received interest in astrochemistry and origins of life research due to instances of slight enantiomeric excess of its L-isomer in meteorites. Our findings suggest that if isovaline had been involved in enantiomeric enrichment at some stage of chemical evolution, perhaps it was as a free AA and not when incorporated into polymer.

163. The Therapeutic Applications of Flavonoid Compounds
Student Presenter: Nicholas Baker
Faculty Mentor(s): Dr. Sandra Craig Dr. Renaud Geslain
Additional Authors: Dr. Renaud Geslain

Though treatment has come a long way over the last half-century, the current therapeutic model for cancer is expensive and involves a host of toxic medications that often lead to severe complications. There is a great need for novel cancer therapies that reduce costs, limit side effects, and act to prevent cancer before it develops. There is a growing body of research that indicates a group of naturally occurring compounds called flavonoids exhibit significant anti-inflammatory, antioxidant, anti-bacterial, and anti-carcinogenic properties. Flavonoids are naturally abundant in fruits, vegetables, grains, wine, and tea. The flavonoid diosmetin has shown promise in halting tumor progression in preliminary studies. Our investigation seeks to build upon the current therapeutic potential of diosmetin as an anticancer agent by (a) synthesizing structurally similar derivatives; and (b) implementing these novel compounds into a biological system and observing changes in therapeutic efficacy. Each derivative will be introduced, with increasing dosages, into various cancer cell lines and changes in cell viability will be monitored with a representative assay. Furthermore, our set of novel drug candidates contain slight modifications to the molecular structure of our lead compound, diosmetin, that current research indicates may increase potency as it relates to halting tumor progression. By determining the viability of flavonoid-derived cancer therapies and gathering crucial data that relates molecular structure to biological activity, this study will provide invaluable insight into novel cancer therapies – and, to that end, meaningfully contribute to our understanding of a disease that has plagued mankind for millennia.
164. Ab Initio Calculations of 2-amino-1-trifluoromethylethanol
Student Presenter: Kaili Yap
Faculty Mentor (s): Dr. Kristin Krantzman
Additional Authors: Dr. Richard Lavrich

A joint computational and high-resolution spectroscopic study has been undertaken to examine the role that inductive effects have on intramolecular hydrogen bond strength in linear amino alcohols. The amino alcohols under investigation are 2-aminoethanol (2AE) and 2-aminotrifluoromethylethanol (2ATFME). The presence of an electron withdrawing group, CF3, in 2ATFME adjacent to the hydrogen donating alcohol group results in an increase in its acidity relative to 2AE. As a result, it is hypothesized that a stronger OH····N intramolecular hydrogen bond will be found in 2ATFME relative to 2AE. Several geometric parameters can be used to characterize the strength of an intramolecular bond. Stronger hydrogen bonds are associated with increased bond distance, decreased intramolecular hydrogen bond distance, a preference for a more linear angle, and a torsional angle approaching planarity. Experimental moments of inertia obtained from Fourier-transform microwave spectroscopy of the heavy atom isotopologues of both 2AE and 2ATFME have been used to determine highly precise conformational structures. The resulting structural parameters discussed above, along with those obtained from high level quantum calculations performed at the MP2/6-311G++(d,p) level were used to infer the relative strengths of the intramolecular hydrogen bond found in 2AE and 2ATFME.

165. Ultra-Sensitive Nitric Oxide Assays using Inducible Nitric Oxide Synthase
Student Presenter: Liam Radeke
Faculty Mentor (s): Dr. Amy Rogers

Tetrahydrobiopterin (BH4) is an essential cofactor in the in vivo synthesis of nitric oxide (NO) by nitric oxide synthase (NOS). NO serves as a neurotransmitter and a vasodilator when produced by constitutive forms of NOS and acts as a cytotoxic agent when NOS synthesis is induced. NOS converts L-arginine to L-citrulline and NO in two steps forming the substrate intermediate N-hydroxy-L-arginine (NOHA). Both steps in catalysis require BH4. Overproduction of NO has been a culprit in many diseases making BH4 a target for therapeutic interventions. Our lab investigates BH4 analogs for efficacy or inhibitory effects of the pterin in NOS using an ultra-sensitive colorimetric NO assay. Preliminary results indicate positions three and four on the pterin play a key role in the competency of the pterin cofactor.

166. The Role of CYP2E1 in High-Fat Induced Fatty Liver Disease
Student Presenter: Zaria Killingsworth
Faculty Mentor (s): Dr. Jessica Hartman (MUSC)

Non-alcoholic fatty liver disease (NAFLD) involves accumulation of an excessive amount of fat within the liver. It is a progressive spectrum ranging from simple steatosis to non-alcoholic steatohepatitis (NASH), fibrosis, and cirrhosis. NAFLD is the most common liver disease in the global population, affecting over 25% of US adults. CYP2E1 is a highly regulated mammalian cytochrome P450 enzyme that metabolizes xenobiotics and endogenous free fatty acids. CYP2E1 levels are elevated in human liver NASH biopsies in comparison to normal livers. Furthermore, inhibition of CYP2E1 exhibited an advantageous effect on NAFLD in mice, reducing insulin resistance and increasing glucose tolerance, both primary factors in NAFLD development. The aim of this study is to determine how CYP2E1 expression and subcellular targeting affects the cytotoxic activity and accumulation of lipid droplets in HepG2 hepatic cell lines.

Sustainability-themed project
under a high fatty acid load. Exogenous palmitate, oleate, and physiologically relevant mixtures were added to HepG2 cell lines transduced to express CYP2E1 in the ER, mitochondria, or both. Cells were treated with FFAs for 24 hours or 5 days, following which we measured cell death, lipid droplet accumulation, and expression of genes related to lipid handling. We found that CYP2E1 subcellular localization dramatically alters the cellular response to these FFAs. For palmitate, ER-localized CYP2E1 caused the most dramatic cell death, while MT-localized CYP2E1 prevented lipid accumulation. By contrast, for oleic acid, ER-localized CYP2E1 promoted lipid accumulation. Together, these findings and ongoing studies suggest a vital mechanistic role for CYP2E1 in NAFLD liver pathogenesis.

167. Effect of Complexation on Heavy Metal Removal from Water by Magnetic Nanoparticles
Student Presenter: Casey O’Brien
Faculty Mentor (s): Dr. Katherine Mullaugh
Additional Authors: Jeff T. Luecken, Griffin M. Balkey

The quality of water resources is threatened due to rapid industrialization, water-intensive agricultural practices, and climate-related changes to precipitation patterns. The problem is most pronounced in low-resource areas so new water treatment methods that can be economically implemented are needed. Removal of chemical contaminants through adsorption to the surface of magnetic nanoparticles (NPs) is one plausible strategy that could be used to remove various pollutants from water. Citrate-coated magnetite (Fe3O4) particles were prepared by oxidizing iron (II) in basic conditions with heat in the presence of citrate, which acts as a capping agent, resulting in NPs <100nm in diameter. Our studies show the model heavy metals zinc, cadmium, and lead can be readily removed from pristine solutions, but more studies are needed to understand how differences in water matrices can influence the overall removal efficiency. Of particular interest is the complexation of metals by ligands, which may interfere with the adsorption of metal cations onto NP surfaces. Adsorption experiments were performed with heavy metals with various concentrations of ligands (ethylenediamine, citrate, NTA, EDTA). Chemical equilibrium modeling software was used to predict complexation over the range of ligand concentrations used in our experiments. When metal cations were strongly complexed, adsorption efficiency decreased, highlighting how NPs of this type will need to have their surface chemistry modified to overcome the problem of metal complexation, especially in organic-rich waters.

168. Structural and functional characterization of EToV endoribonuclease nsp12
Student Presenter: Jaci Fleming
Faculty Mentor (s): Dr. Meredith N. Frazier
Additional Authors: Patrick E. O’Reilly

Toroviruses (ToV) are enveloped single stranded RNA viruses in the Nidovirales order, which also includes coronaviruses. Toroviruses cause disease in animal industries worldwide that lead to economic losses; additionally, there have been cases of toroviruses causing mild disease in humans. Many non-structural proteins (nsps) involved in replication and transcription are conserved across nidoviruses; therefore, understanding the structure and function of these proteins across nidoviruses will help identify possible therapeutic targets and inform rational drug design. One viral protein of interest is an endoribonuclease (NendoU), which regulates viral RNA to evade host immune systems. Using a literature search and bioinformatic tools, we annotated the equine torovirus (EToV) genome to identify the viral protease cleavage sites that produce the mature nsps. We aim to use previously established protocols to express EToV NendoU in E. coli, purify it, and perform RNA cleavage assays and structural
studies. Our bioinformatics analysis enabled us to identify the boundaries of the EToV NendoU protein and design constructs for protein expression and purification. This research will provide insight into the evolution of nidoviral endoribonucleases through comparing EToV NendoU activity and structure to NendoU proteins in MERS, SARS, and SARS-2 coronaviruses.

169. Molecular Basis of Ryanodine Receptor Ion Channel Inhibition by Ca2+ and Mg2+
Student Presenter: MacKenzie Kral
Faculty Mentor (s): Dr. Naohiro Yamaguchi (MUSC)
Additional Authors: Millar Elferdink, Jordan S. Carter (MUSC)

Transient increase in cytosolic Ca2+ is an essential step for muscle contraction. During action potentials, the ryanodine receptor (RyR) ion channel releases Ca2+ from the sarcoplasmic reticulum. Dysfunctional RyRs are associated with muscular diseases, and >400 mutations in RYR genes were reported in human patients with cardiac/skeletal myopathies. Thus, a better understanding of the regulatory mechanisms of RyR leads to drug discoveries and preventative care for muscular diseases. RyRs are activated by ~1 µM cytosolic Ca2+ and inhibited by >100 µM Ca2+ suggesting positive/negative feedback regulations. Our earlier studies found that two RyR domains–EF hand and S2-S3–are involved in Ca2+ inhibition, and these domains likely interact through hydrogen bonds. The EF hand is a potential Ca2+ binding site, but is distal from the ion-conducting pore; thus, we hypothesized that interactions between EF and S2-S3 domains transmit the Ca2+-inhibitory signal to the pore site. We introduced point mutations on the hydrogen-bond amino acids, expressed recombinant mutant RyRs in HEK293 cells, and observed how mutations affect Ca2+ inhibition using the [3H]ryanodine binding method. Mutations on hydrogen-bond amino acid, K4101, of skeletal RyR1 isoform effectively reduced Ca2+/Mg2+-dependent inhibition of RyR1. Likewise, skeletal myopathy-associated G4733E-RyR1 mutation, located on the domain interface between EF and S2-S3, greatly reduced Ca2+/Mg2+ inhibitions. However, corresponding cardiomyopathy-linked G4663S mutation in cardiac RyR2 isoform does not greatly alter Ca2+ inhibition. Structural comparisons of two RyR isoforms suggested that Ca2+-inhibition and mutational effects depend on the distance between the EF and S2-S3 domains.

DEPARTMENT OF COMPUTER SCIENCE

170. Courting Contraceptives
Student Presenter: Jo Jackley
Faculty Mentor (s): Dr. Sarah Schoemann
Additional Authors: Barbara Condron, Maddie Reed, and Henry Smith

Due to the need for more and more diverse forms of reproductive health care education, our team worked in collaboration with faculty from the College of Charleston’s Women’s Health Research Team to create an educational game discussing contraceptive technology for college aged people who menstruate. In addition to educating a diverse audience on a much needed topic the game also specifically highlights the users choice of whether or not they choose to menstruate by highlighting hormonal contraceptive options that prevent bleeding. Using a light hearted tone by parodying dating shows like The Bachelor, the game engages players in an entertaining educational experience to empower them with a deeper knowledge of reproductive healthcare options.
171. Piddle: An Open Source Tool for Peer Instruction in Computer Science Courses
Student Presenter: Edin Aleckovic
Faculty Mentor(s): Dr. Ellie Lovellette

Peer Instruction is an existing pedagogy which encourages student learning through preparation of the course prior to the class meeting time. This preparation comes in the form of pre-class reading, note-taking and whatever else the instructor might assign. When in class, students are then gauged on their knowledge through ConcepTests, small quizzes which allow the teacher to see what material is understood, and which material is not. What is currently nonexistent in Computer Science is an open-source method to administer these ConcepTests, with an attached database of free computer science questions for instructors to choose from. This is where our research steps in. Throughout this year, we have been focused on creating an open-source, cross-platform application that can be used by teachers and students to administer and take ConcepTests for Peer Instruction. To do this, we have been working with Google’s open source UI development kit titled Flutter. This has given us the opportunity to create what is currently missing in the field of Computer Science. Our application, named Piddle, is cross platform, meaning that it works on every single device from iOS to web browsers. Included in the application, is the ability for teachers to create and administer ConcepTests to students, who can participate as a guest or create their own account. The application then processes and returns important data to the teacher such as the amount of correct answers, time required by each student to complete the question, and many more features that aid in the use of Peer Instruction in CS.

172. Compliance System of Software Licenses
Student Presenter: Booke Duvall
Faculty Mentor(s): Dr. Kris Ghosh
Additional Authors: Catherine Perry, Chris Poole, Hunter Monaghan

Compliance System of Software Licenses (CSSL Version 1.0)

Software developers are not trained in legal matters. The software developed and its license often have conflicts with existing software licenses. In this work, a tool is constructed that will aid the software developers to identify the conflicts between the software license. The tool is a web application to compare software licenses using natural language processing concepts such as term frequency-inverse document frequency (TF-IDF), cosine similarity, and named-entity recognition. The users of the application will upload a software license and have it compared against a corpus of common software licenses. The application will be able to detect similarities between the uploaded software license, and the entire corpus and display the software licenses that are the most similar, as well as being able to detect where the software licenses differ. With the information provided by our web application, we aim to help Computer Scientists choose a software license that suits their project the best, or find a new software license if they have issues with two or more dependencies in their project having licenses that conflict with each other. The compliance tool will eventually be available as an open source for the software community.
173. Formal Analysis of Data Dependent Models in Phylogeny
Student Presenter: Caroline Goodman
Faculty Mentor (s): Dr. Kris Ghosh

Analyzing the complex evolution of organisms within an environment is vital to reaching a greater understanding of the world around us. This study focuses on these evolutionary relationships between varying species, individuals, and genes. Trees visualize gene sequences as they transform through generations. In this work, a formalism is created involving the construction of these phylogenetic trees under imprecision of data. Imprecise data is addressed through the implementation of stochastics. Continuous-time Markov chains (CTMC) model these phylogenetic analyses. Establishing queries and specifying properties represented by temporal logic helps to evaluate the computational feasibility of the formalism created. PRISM model checking software assesses the property specifications. Ultimately, researchers are able are able to validate models of phylogenetic systems against particular properties specified under temporal logic.

174. Graph Models and Algorithms in Identification of Duplicate Bug Reports
Student Presenter: Christy Shoener
Faculty Mentor (s): Dr. Kris Ghosh

Bug reports are important documentation that allow quality testers and users to report issues with software to developers. For applications with many users, it is likely that multiple reports will be submitted for the same bug. Companies then must identify these duplicate reports or risk assigning the same bug to multiple developers, wasting time and money. This research outlines an unsupervised learning method for identifying duplicate reports using minimum spanning tree and community detection algorithms. An edge-labeled graph is constructed where the nodes represent bug reports and the edge labels are Jaccard or cosine similarity values between bug reports. The minimum spanning tree is computed on the edge-labeled graph as well as a computation retaining only edges that are above the mean edge weight. Community detection algorithms are implemented on the edge-labeled graphs. The results are analyzed to examine the impact that number of edges had on the detection of duplicate reports and therefore, evaluate the performance of the method in identifying the duplicate bug reports.

175. Ethics Aware Artificial Intelligence Software
Student Presenter: Channing Smith
Faculty Mentor (s): Dr. Kris Ghosh

As technology continues to grow in our society, more and more artificial intelligence systems are making decisions than ever before. It is crucial that we look at the impact such systems have on our daily lives and examine whether the decisions made are ethical. Software must be developed to respect our morality and make decisions without bias and discrimination. Without having ethics integrated in the software decision making process, there poses a risk of unethical principles imbedded in systems that we interact with every day. Ensuring that software is developed with ethical principles in mind would protect all parties involved – including the user, the developer, and the organization. We create a formalism that models ethical dilemmas. The actions made by the software are represented in the form of logic formula and posed as a query in the model representing the actions of the software. We evaluate the computational feasibility of our formalism.
176. Temporal Network Approaches for Analysis of Trends in Software Vulnerabilities
Student Presenter: Hailey Sparks
Faculty Mentor(s): Dr. Kris Ghosh

The deluge of attacks on IT infrastructure have necessitated the understanding of cybersecurity vulnerabilities for mitigation. A two step novel model is developed to harness time-stamped data to analyze the vulnerability trends. In the first step of the model, a text network is created from the vulnerability reports of each month in a year. Next, a temporal network is constructed from the text networks. Temporal network theoretic properties are evaluated on the model to understand the vulnerability trends and the evolution of relationships amongst the vulnerabilities. The analysis leverages on the community detection algorithms on text networks. Experimental results from vulnerability reports spanning from 1999-2021 are presented. The analysis of each vulnerability group is precisely evaluated and studied based on the growth or shrinkage of its size across the temporal network. Correlations of vulnerabilities with advances in software are also evaluated.

177. REU: Robust Deep-learning-based Side-Channel Attacks
Student Presenter: Channing Smith
Faculty Mentor(s): Dr. Boyang Wang
Additional Authors: Joel Ward (Cedarville University), Chenggang Wang (University of Cincinnati)

An REU is a highly competitive research experience for undergraduate students – and in this case, it was funded by the Department of Defense and National Science Foundation. Students work on a project for 10 weeks and engage in presentations and research talks. From participating in this REU, I learned that machine learning and deep learning play an important role when it comes to side-channel attacks. Although many studies have been able to achieve a high accuracy during same-device scenarios, they are not robust – meaning sometimes they fail to recover keys even with their high accuracy rate. Throughout this summer REU at the University of Cincinnati, I helped leverage a new method called TripletPower to promote the robustness of machine-learning based profiling side-channel attacks in the cross-device scenario. We collected multiple datasets (masked and unmasked) from XMEGA and STM32F3 microcontrollers in order to see if the method was able to recover keys correctly after training and testing. We also studied the effects of instruction rewriting on the model.

178. Arduino Wireless Weather Station
Student Presenter: Sydney Pearson
Faculty Mentor(s): Dr. Kebin Xu
Additional Authors: Sophia Browne, Emily Alfortish

We will create a Wireless Weather station that can be accessed from anywhere with the use of WiFi. Data from the weather station can be used to create an alerting system for students on College of Charleston’s campus. Materials include Arduino DHT11 Temperature and Humidity Sensor, LCD 1602 Module, and connection to WiFi. The Wireless Weather Station will be able to measure rain, barometric pressure, and UV Index. A basic circuit and C programming will be utilized to reach the end result. A possible application of this project could be sending the measurements directly to the local weather center for real-time reporting and updates. Charleston has some of the most diverse weather patterns in the country due to its coastal location and subtropical climate. Implementing these wireless weather stations throughout College of Charleston’s campus will keep students prepared for the weather at all

Sustainability-themed project
times. By implementing an alert system based on the measured conditions, students will stay informed on the current and future forecast.

179. Charleston Under the Microscope: Incorporating Thermal Drones to Enhance Satellite Based Urban Heatmaps
Student Presenter: Bryan Rickens
Faculty Mentor(s): Dr. Navid Hashemi

As remote-sensing becomes more actively utilized in the environmental sciences, our research continues the efforts to use civilian UAVs and drones for land surface temperature (LST) analysis. Given the increased spatial resolution that this technology provides as compared to standard satellite measurements, we sought to further study the urban heat island (UHI) effect -- specifically when it comes to heterogeneous and dynamic landscapes such as the Charleston peninsula. Furthermore, we sought to develop a method to enhance the spatial resolution of publicly available LST temperature data (such as those measured from the Landsat satellites) by building a machine learning model utilizing remote-sensed data from drones. While we found a high correlation and an accurate degree of prediction for areas of open water and vegetation, our model struggled when it came to areas containing highly impervious surfaces. We believe, however, that these findings only further illustrate the discrepancy between high and medium spatial resolutions, and demonstrate how urban environments specifically are prone to inaccurate LST measurements and are uniquely in need of an industry pursuit of higher spatial resolution for the environmental sciences.

M.S. DATA SCIENCE AND ANALYTICS

180. Enhancing Security with AI-Powered Weapon Detection
Student Presenter: Will Myrick
Faculty Mentor(s): Dr. Navid Hashemi

Weapon detection is a crucial task for ensuring public safety and preventing violent crimes. With the increase in mass crimes in the last decade, detection of weapons is more important than ever before. Artificial intelligence models known as Convolutional Neural Networks (CNNs) have proven to be effective in detecting weapons in images and videos. The ability of CNNs to learn hierarchical representations of objects and their features makes them well suited for this task. This project aims to detect weapons from static images using a CNN. The data to be used is from the Andalusian Research Institute in Data Science and Computational Intelligence. Combining the handgun and knife datasets results in 19,300 images. 200 of these contain handguns or people handling handguns, 635 contain knives or people handling knives, and the rest contain neither, many with people handling ordinary objects such as pens, wallets, or phones. This data will be cleaned, preprocessed, and a portion of it will be fed to a CNN in order to train the model. Then a portion of the data not seen by the CNN will be used to test how well the model determines whether an image contains a weapon. The model will be evaluated based on how well it deciphers between images containing weapons and images not containing weapons in the unseen dataset.
181. Downtown Charleston Flooding Occurrences Effect on Neighborhood Housing Values
Student Presenter: Giselle Schreiber
Faculty Mentor (s): Dr. Navid Hashemi

Flooding is a significant issue in coastal cities and can cause considerable damage to infrastructure, homes, and businesses. In addition, flooding can also have a notable impact on local property values, as homes located in flood-prone areas are often perceived as being less desirable. This research project aims to utilize machine learning techniques to predict the likelihood of flooding in downtown Charleston, SC, and its potential correlation with home values in the area. We aim to test the hypothesis that homes in the most flood-prone streets will have lower values than those of their counterparts in less flood-prone streets.

The project will analyze GIS data from Charleston City's Open Data initiative, including rainfall amounts, tidal measurements, and historical flood records, to train machine learning models. The models will use these data inputs to make predictions about future flood events in downtown Charleston and their potential correlation with changes in local home values. To validate the results obtained, the models will be tested on other similar areas within Charleston County to determine if the same patterns can be found in other regions facing flood risks. This will enable us to assess the validity of the findings and the applicability of the models to other coastal cities.

Insights gained from this project can inform policy and decision-making to help improve the resilience and stability of communities facing similar challenges. By leveraging machine learning and GIS data, it can greatly improve the safety, resilience, and economic stability of communities in Charleston and beyond.

182. The Perfect Partnership: The Synergistic Benefits of Large Language Models and Computational Knowledge Engines
Student Presenter: Cayden Dunn
Faculty Mentor (s): Dr. Navid Hashemi

This project aims to combine the conversational capabilities of large language models such as GPT-3 with other computational knowledge engines like Wolfram Alpha. Using the LangChain library as a bridge to allow these models to interact, the goal is to create an application that can not only understand and respond to natural language input, but also perform advanced mathematical calculations and provide accurate solutions. This is something that neither system can do in isolation but together can hopefully tackle seamlessly. To measure the success of the proposed application, Bayesian inference will be used to evaluate its performance against the baseline performance of individual language models and knowledge engines. The success of the tool will be quantified by measuring its ability to accurately solve a variety of mathematical problems and respond appropriately to natural language inputs. To evaluate the performance of the proposed tool, a diverse set of mathematical problems and natural language inputs will be used as test data. The mathematical problems will range from basic arithmetic operations to more complex algebraic equations and calculus problems. The use of such diverse data sources is expected to provide a comprehensive evaluation of the tool’s capabilities, including its ability to generalize to new inputs and to handle multiple problem types and domains. The final project will be hosted on a Hugging Face Spaces, making it easy for developers and researchers to
access and utilize this technology. The project will focus on the implementation of this technology and the broader potential implications of removing powerful models from isolation and synergizing.

183. Leveraging Machine Learning to Identify Risk Factors for Veteran Suicide
Student Presenter: Cayden Dunn
Faculty Mentor: Dr. Navid Hashemi

Veteran suicide is a significant public health issue in the United States, with an average of 17.2 veteran suicides per day in 2019. The U.S. Department of Veterans Affairs lacks an effective outreach program to distressed veterans, resulting in an estimated 10.4 of these daily veteran suicides among those with no VHA encounter in 2018 or 2019. In this project, we use machine learning techniques to identify veterans who may be at risk of committing suicide in the future. Our model analyzes sets of data regarding criminal arrest records, medical records pertaining to suicides, and demographic data to identify patterns of behavior that are predictive of suicide risk. We focus on CDC's 5 main categories of suicide indicators: financial hardship/issues, substance abuse, relationship issues, lack of connectedness (loneliness), and legal problems. Our primary objective is to establish a model that can show a "more than random" pattern of correlation between these behavior factors and suicide, which can ultimately help the VA establish a queue to determine an order of outreach for the Veterans most in need. This first version of the model uses a performance window of January 2019 to March 2020. Future models may be able to predict not only suicide but also the manner of death in a suicide.

184. Etching Out Happiness in the United States: Measuring Your Serotonin Based on Where You Live
Student Presenter: Lydia Ahrens
Faculty Mentor (s): Dr. Navid Hashemi

Can your happiness be dictated by your geographic location? What are the factors in our environment that define us, make us happy, or detract from the positive feelings that keep us from despair? These two questions posed seem a bit dramatic, but happiness can be calculated – chemically, but also by our own testament.

Many of us are familiar with the World Happiness Report, a study that went through many countries and asked individuals how happy they were and probed for the details of their life. Beyond that, there are other accounts, within the U.S.A, of which states have happier people and which, do not. These studies focus on a variety of individualizing factors that define these states.

This project will be using data from the above reports, US census data, and similar datasets to train a machine to answer the happiness question, specifically looking at the U.S. states, with the hope to further focus on a city-level. The aim will be to utilize this vast array of happiness reports, consolidate our data into clusters, and from there approach a decision algorithmically on who is happy and why.

By answering this question, we should be able to provide an answer to the details of why a person would or would not feel happy. This gives us values we should push forward to within our personal means, as well as any means beyond ourselves, such as political actions or figures that can help implement ‘feelings of happiness’ on a mass scale.
**185. Using Machine Learning to Predict Vitals in the Cardiovascular-ICU**
Student Presenter: Sheldon Sutton  
Faculty Mentor(s): Dr. Navid Hashemi

Accurate prediction of patients' vital signs is crucial in the healthcare industry. This project is a joint effort with MUSC using a sparse multivariable time-series dataset collected from the MUSC CV-ICU to predict patients' vital signs 24 hours in the future. The dataset spans from 4 years ago to present day with new entries being added daily.

We approach the problem using time-series forecasting with past observations of patients' vital signs. Feature engineering techniques are used to handle sparse data. Statistical models such as ARIMA, as well as deep learning models like LSTMs are used for prediction. The performance of these models will be compared to determine the best solution.

The results of this effort will provide a more accurate and reliable prediction of patients' vital signs, ultimately leading to better care and treatment. Additionally, we should be able to compare the impact of financial approaches to the quality of patients’ vital signs.

This machine learning project provides a novel approach to predicting patients' vital signs in the next 24 hours using financial approaches at MUSC. By combining feature engineering, statistical models, and deep learning models, we aim to provide a comprehensive solution to this problem. The results will be valuable to the healthcare industry and can be used to improve patient care and treatment.

**186. Unlocking the Secrets of Heart Transplant Success with Machine Learning**
Student Presenter: Trevor Leach  
Faculty Mentor(s): Dr. Navid Hashemi and Roshan Mathi, MUSC Surgical Innovation Center

Machine learning (ML) models have been increasingly applied in healthcare to help predict medical outcomes, including the success of heart transplantation. The United Network for Organ Sharing (UNOS) provides a CSV dataset of over 40,000 heart transplantations in the United States, which can be used to develop ML models for predicting transplant failure. The goal of the model developed in this project is to identify patients at risk of heart transplant failure before 90 days or before 365 days post-transplant, to allow for earlier intervention and improved outcomes. This project makes use of Python’s Scikit Learn, Pandas, and PyTorch libraries to build a binary classification model to predict whether a patient's transplant will fail. Algorithms, such as decision trees and support vector machines, are used to train the model to predict the outcome given features such as demographic information, medical history, and pre-transplant test results. The model’s performance in predicting heart transplant failure is evaluated using metrics such as accuracy, precision, recall, and F1-score. The final model is expected to predict transplant failure, while minimizing false positive and false negative results and performs well on new data. The use of UNOS transplant data and ML models has the potential to greatly improve the outcomes of heart transplantation. By identifying patients at risk of transplant failure, healthcare providers can intervene earlier and provide necessary care to prevent failure. This can lead to better patient outcomes, improved use of resources, and a higher success rate for heart transplantation.
187. Geomorphology of Puerto Rico’s Southern Continental Margin
Student Presenter: Anna Dagostino
Faculty Mentor(s): Dr. Leslie Sautter

Originating as a volcanic island, Puerto Rico is composed of submarine geological features as a result of convergence of the North American and Caribbean Plates. Features such as shallow submarine canyons indicate the presence of turbidity currents, which are often caused by earthquakes or slope failure and change the morphology of the seafloor. Sediment separates from substrate and travels downslope, eroding the seafloor to create submarine canyons, and deposits sediments, creating terraces on the lower slope. Knowledge of plate boundaries, areas of earthquake activity, and turbidity currents show importance in predicting geohazards, and affected coastlines and marine habitats. NOAA ship Okeanos Explorer multibeam sonar data collected in 2018 and 2022 were used to identify geological features and study deep sea marine habitats where geological features demonstrated past turbidity currents from earthquakes that shaped submarine canyons and gently sloping continental margins with dispersed terraces.

188. Analysis of Pacific Seamounts of the Coast of British Columbia
Student Presenter: Griffin Miles
Faculty Mentor(s): Dr. Leslie Sautter

The SGaan Kinghlas-Bowie Seamount Chain was surveyed during the Northeast Pacific Seamount Exploration (NA097) aboard the E/V Nautilus. The three seamounts analyzed are found approximately 150 km off the Queen Charlotte Islands and are named Hodgkins, Bowie, and Dellwood. The expedition’s purpose was to collect data on the seamounts’ physical state and to study how processes like weathering and erosion affect them. Multibeam sonar data were used from the cruise to find that the geomorphology of the three seamounts varied dramatically, likely due to the dissimilarity in their depth ranges. Bowie Seamount’s summit is 32 m from the surface and has a flat top from wave and current erosion. Hodgkins and Dellwood Seamounts both lie deeper than 500 m, which means they are safe from intense weathering. Profiles and 3D images were used to calculate seamount flank slopes. Depth, slope and backscatter intensity surfaces were all created and examined to find similar substrate on every seamount. ROVs Hercules and Argon were used during visual surveys along the Dellwood flank. Benthic animals favor dwelling in environments where food is brought up from the ocean floor due to the upwelling of water along the seamount slope. This study examines the geomorphology and seafloor character of three seamounts.

189. Comparison of Seabed Features within the Azores and Nearby Mid-Atlantic Ridge
Student Presenter: Kate Leturgez
Faculty Mentor(s): Dr. Leslie Sautter

NOAA Ocean Exploration and partners conducted high-resolution bathymetric and ground-truth video surveys on the Azores Plateau and Mid-Atlantic Ridge; located south of the plateau, from July 22- August 18, 2022 (EX2206). This expedition was conducted to collect critical baseline information on these unexplored deep-water areas and to improve knowledge on potential geological and biological seafloor habitats. In this study, the geomorphology of three locations within the plateau and Mid-Atlantic Ridge
was analyzed and compared using bathymetry, slope, and backscatter intensity surfaces. Geomorphologic features found include a steeply sloped escarpment at the Plateau Escarpment site that exhibits numerous terraces with exposed scarps, formed from seismic tectonic activity and seafloor spreading associated with the Azores rift. At North Ridge and Kai Ridge Sites, axial valleys with significantly different geomorphology were present. The features seen at each ridge are due to diverging convection currents at the Terceira Rift spreading center. Kai Ridge, located just west of the plateau, lies at shallower depths than other ridge segments and has a prominent valley at its ridge axis with an intermediate spreading rate, whilst North Ridge lies at greater depths, with a prominent valley ridge at its axis and a relatively fast spreading rate. Depth profiles were made across the ridge axis sites, and comparison slope and backscatter intensity values along the profiles showed no correlation. Due to the lack of any extensive prior research, data, and sample material from the seafloor of the Azores’ geographic area, interpretation regarding the regional impact of plate tectonics is somewhat limited.

190. A Nodosaurid Skeleton From The Glenrock Exposure With Novel Armor Morphology And Evidence Of Tyrannosaurus Feeding
Student Presenter: Juliet Riddle
Faculty Mentor (s): Dr. Scott Persons

GPM-0018 is an associated ankylosaur skeleton excavated from the Glenrock Exposure of the Lance Formation (Upper Maastrichtian), WY. The specimen consists of over 250 osteoderms and one right ischium. Based on the morphology of the osteoderms, which are generally symmetrical and have slightly concave bases, and the ischium, which is strongly curved, GPM-0018 is identified as a nodosaurid (most probably Denversaurus). The recovered osteoderms range in morphology from small elliptical nodules to larger keeled components of the cervical half-rings. Many of the medium-sized osteoderms are hexagonal in dorsal/ventral view. That these hexagonal osteoderms articulated together in a mosaic fashion is affirmed by multiple fused sections, where the hexagonal osteoderms had grown together. The largest of these fused mosaic sections is over 230 mm long and is similar in general form to a portion of a pelvic shield, as is known in ankylosaurs like Gastonia and Polacanthus, but lacks keels, rosettes, or other prominent surface features. Both the lateral and medial side of the ischium bear large indentations, some with associated pre-burial surface abrasion. Comparisons with bite marks known from other Late Cretaceous dinosaurs indicate that these punctures were left by the bite of a tyrannosaur. The abundance of these feeding marks on the ischium and the absence of other non-osteoderm bones preserved at the site suggest that the GPM-0018 skeleton was extensively picked over by a Tyrannosaurus and that more desirable elements were consumed or carried away.

191. Geochemical Study of Magma Mixing at Lassen Volcano, CA.
Student Presenter: Raymond DePalma
Faculty Mentor (s): Dr. John Chadwick
Additional Authors: Abby Harper, Bella Fleck, Revs Revels

The Cascade Range is a line of large volcanoes that runs from northern California to southern British Columbia. This volcanism is a result of subduction of Pacific oceanic crust beneath western North America. Lassen Volcano is the southernmost large stratovolcano in the Cascades, and overlaps with an area where the crust is being pulled apart called the Basin and Range. In addition to Lassen volcano, this area also has about 200 small volcanic vents distributed over a wide area. Subduction and Basin and Range extension typically produce chemically and mineralogically distinct lavas. Calc-alkaline lavas are
derived from subduction and tholeiitic lavas are produced by continental extension. Our research in the Lassen area seeks to understand if these two magmas interact and undergo mixing prior to eruption from this volcanic field. Last summer, we collected 20 lava rock samples from various lava flows to test our mixing hypothesis by analyzing their chemistry. We processed the samples using a jaw crusher and agate ball mill and mixed the powders with lithium tetraborate flux to make glass beads for X-ray fluorescence (XRF) and inductively coupled plasma mass spectrometry (ICP-MS) analyses of major and trace elements. We also created petrographic slides to observe the minerals in the lava microscopically. Our geochemical data and data from the literature show strong mixing trends between the calc-alkaline and tholeiite end-member lava types, which is clear evidence that the two have interacted and mixed in the shallow mantle or crust prior to eruption in the Lassen area.

192. The Importance of Ice To South Carolina Coastal Communities: A Guide For Impending Climate Change
Student Presenter: Romberg York
Faculty Mentor (s): Robin Humphreys

This project displays how human induced climate change has triggered cryospheric feedbacks that will have negative impacts on global coastal regions. The cryosphere encompasses all of Earth’s frozen water which includes but is not limited to snow cover, glaciers, sea ice, and permafrost. Research shows anthropogenic increases in global mean temperature have triggered a substantial decay in global ice cover. The loss of ice extent triggers feedback processes that negatively affect regional and global communities. Glaciers have the largest global impact as they house 69% of all freshwater on the planet. Increased freshwater melt from glaciers contributes greatly to sea level rise while additionally altering deep ocean circulation; one of the most critical Earth system processes. Sea ice serves as a climate regulator through albedo feedbacks. With the loss of sea ice comes the loss of albedo reflectivity and increased ocean-atmosphere heat exchange that accelerates global warming. Permafrost melt contributes to Greenhouse Gas emissions thus contributing to global climate feedbacks. Accelerated climate warming, sea level rise, and changes in atmosphere-ocean circulation will negatively impact ecological, social, and economic processes along coastlines. This project is intended to provide basic information on climate and cryosphere change and perspective on the interconnected importance for South Carolina coastal communities.

193. HPC Cluster Research and Development for SCGIS Laboratory Utilizing Geographic Information Systems to Map Pollutants in Floodwaters of Charleston, SC
Student Presenter: Luke Haenel
Faculty Mentor (s): Dr. Vijay Vulava
Additional Authors: Kevin Wright, Kayla Squiggins

Floodwaters act as a medium between the general populace and aqueous pollutants—trace metals and fecal bacteria—posing a health risk to vulnerable residents. While inorganic pollutants and fecal bacteria are known to be present in Charleston floodwaters, antibiotic-resistant fecal coliform bacteria (ARFC) have not yet been quantified within the confines of the city. Exposure to these bacteria has the risk of causing serious infections and delaying recovery rates long term. With climate change altering the intensity and frequency of these flooding events, the mechanics and health of the waters must be understood. To characterize the nature of floodwaters in the Charleston peninsula, water quality was measured at four select locations. These include sites that are tidally-influenced, stormwater runoff-
influenced, and two influenced by both tides and rainfall. During sample collection, bulk water quality and meteorological data were recorded on-site using Survey123. After returning to the lab, a subset of the samples were analyzed for nutrient ions (NO3- and PO43-) and trace metal concentrations. Others were cultured with either sterilized water, erythromycin, ampicillin, or ciprofloxacin to assess antibiotic resistance of ARFC. Collected data were then analyzed for their spatial relationships using geographic information systems (GIS). Organizing representative sites across Charleston by water input, allows the unknown gaps in location to be interpolated, creating a geospatial profile of the city’s floodwaters. This information is essential when devising action plans for sanitation and can dramatically impact the well-being of the growing Charleston population.

194. Moving from 2D to 3D Mapping: Developing a Method to Create NetCDF Files of Soil Databases
Student Presenter: Connor Cozad
Faculty Mentor (s): Dr. Norman Levine

Soil datasets provide valuable information for many groups, including farmers, engineers, scientists, land managers, and environmental policymakers. These datasets provide information about soil composition, potential uses, and how it might react under various conditions. The U.S. Department of Agriculture (USDA) maintains soil information at multiple scales; SSURGO, STATSGO, and gNATSGO are examples of these soil datasets. These datasets are relational soil databases organized as multiple tables that must be modified before any insights can be gained from them. Using this data requires that the user be well-versed in using a database management system and geographic information system (GIS) software.

In this project, we propose using an implementation of the NetCDF file format for storing gNATSGO data, removing the need to understand database management systems for users to access soil data. NetCDF is a n-dimensional file format. In our implementation, it is being used as a three-dimensional cube where each point has an attribute table of properties. This format makes it easier to navigate the dataset. Modern GIS’s and 3D visualization software have the capability to work with NetCDF files. We demonstrate a workflow using ArcGIS and Python to transform the data from the gNATSGO format into a NetCDF file. We show how working with the resulting NetCDF file is much easier than using the soil databases in both ArcGIS and Python notebooks, making this data more accessible to users. This allows users to create soil maps, and extract insights about soil in an area of interest.

195. Bedrock and fracture patterns control high natural groundwater arsenic concentrations in the piedmont of North Carolina
Student Presenter: Audrey Hayes
Faculty Mentor (s): Dr. Erin Beutel

Naturally occurring arsenic (As) is present above EPA regulation levels in many natural bedrock wells throughout the Piedmont of North and South Carolina. High As levels are particularly concentrated in the Carolina Slate Belt (CSB) also known as the Carolina Terrane. As levels vary widely throughout the CSB with the highest overall levels found in North Carolina along the border with South Carolina.

While numerous studies have looked at overall controls on As levels in bedrock wells, including rock type, location, pH, and local pollutants, these studies have been unable to identify why certain areas of the CSB have higher natural As levels. Two basic components likely control natural As levels in the groundwater; groundwater flow and the concentration of natural As in the bedrock.

Sustainability-themed project
We used ARC-GIS, 10 m DEMs, existing geologic maps, and the NCWELL groundwater database of almost 63,000 wells to establish a strong spatial correlation with high groundwater As levels and bedrock formations. The southern Gold Hill Shear Zone and the southern portion of the meta-mudstone tuff member (Zcm) of the Late Proterozoic El Cid formation clearly have the highest percentage of groundwater As in excess of EPA guidelines compared to the rest of the state. Further, a dramatic change in the fracture pattern from dominantly N-S to NE-SW trending in the southern portion of the ZCM layer could indicate both a tectonic and a groundwater flow mechanism for changing concentrations of As within the meta-mudstone.

196. Cranial material from extinct genus of odontocete uncovered at Chandler Bridge Formation (Charleston, SC)
Student Presenter: Ann-Frances Cowgill
Faculty Mentor (s): Dr. Robert Boessenecker

The Chandler Bridge Formation of the Upper Oligocene has produced a rich assemblage of cetaceans and represents a period of rapid speciation for early Xenorophids, a clade of basal odontocetes that evolved approximately 34-30 MA. Cotylocara macei came from Bed 2 of the formation and supports the hypothesis of echolocation evolving independently multiple times. This is based on postnarial fossa located on the posterior cranial surface, which is theoretically where part of the auditory system would have been. Specimen CCNHM-7456 was retrieved from Bed 3 of the same formation and consists of a partial cranium and atlas. The cranium also displays a postnarial fossa, strongly implicating a derived evolutionary lineage from the older C. macei. The cranium has noticeably different features compared to C. macei that includes two parallel crests formed by the premaxilla, smooth nasals lacking ventral points, an extensive premaxilla, and an oval-shaped postnarial fossa. The incomplete state of the specimen hinders conclusive results, and further research on new specimens within the Cotylocara genus is necessary.

197. A pteranodontid wing from the Pierre Shale with traces of extensive invertebrate scavenging
Student Presenter: Rebecca Starkey
Faculty Mentor (s): Dr. Scott Persons

Specimen GPM 101 is the associated and semi-articulated partial wing of a large pterosaur from an exposure of the Pierre Shale (80.57-78.25 Mya), in east-central Wyoming. All elements of the wing suffer from compaction but are identified as those of a pteranodontid based on the warped deltopectoral crest of the humerus. Most probably, the wing is that of Pteranodon longiceps, although the length of the ulna and of the metacarpal IV relative to that of the humerus slightly exceeds that reported from any previously documented Pteranodon specimen. The total wingspan is estimated roughly at 3.6-3.7 m. The surfaces of all wing elements are littered with circular indentations, ranging from 1.1 to 6.8 mm in diameter. These indentations formed postmortem and appear to be borings left by invertebrate scavengers such as mollusks or gastropods. Evidence of invertebrate borings have not been reported for other fossils from the Pierre Shale, making GPM 101 a unique find.
**198. Mysterious Mercury: Controls on the Distribution of Mercury Concentrations in South Carolina Soils**  
Student Presenter: Skylar Pope  
Faculty Mentor(s): Dr. Theodore Them

Mercury (Hg) is a potent neurotoxin that has the potential to negatively affect most living organisms on the planet. In humans, Hg accumulation can cause a host of health issues including cognitive and neurological disorders, organ failure, and many others. In the state of South Carolina, studies focused on Hg accumulation in aquatic soils, fish, and humans have suggested a large range of Hg concentrations in the environment. Although these data point toward some areas that reach high levels of Hg contamination, there are very few data published from non-aquatic soils. This research will focus on the spatial variability of non-aquatic soil Hg concentrations in South Carolina. In tandem with these newly generated data, maps of the natural Hg distribution, along with interpolations, in South Carolina soils will also be created using a geographic information system. These new spatial data will be compared to Hg concentrations, both empirical and modeled, from aquatic soils, fish, and humans to determine whether the source of Hg to regions that have elevated Hg levels is the environment. These new data can eventually be used to help to mitigate future health ailments that may not yet be recognized.

**DEPARTMENT OF MATHEMATICS**

**199. Localization of Rings and Categories**  
Student Presenter: Terence Carey  
Faculty Mentor(s): Dr. Oleg Smirnov

In algebra, a ring is a collection of elements (e.g. integers or matrices) with some way to add, subtract, and multiply those elements. A preadditive category is essentially a ring where addition, subtraction, and multiplication are only partially defined based on where the 'elements' of the category point to and from. Conversely, a ring can be thought of as a preadditive category with fully defined operations. Generally, one cannot divide by the elements in a ring or a category. The localization of a ring or category is a related object in which it is possible to divide by specific elements. Due to the aforementioned connection between rings and preadditive categories, understanding localization for one aids us in understanding localization of the other and helps us develop a unified method of localization that works for rings and preadditive categories, as well as semigroups and categories.

**200. Deep Learning Models for Wireless Capsule Endoscopy Images**  
Student Presenter: Jane Shelby Porter  
Faculty Mentor(s): Dr. Mukesh Kumar

Wireless capsule endoscope (WCE) has become an irreplaceable tool for diagnostic inspection of the Gastrointestinal (GI) tract. It offers a non-invasive alternative to traditional endoscopes and enables physicians to explore the GI tract with direct visualization, which is otherwise impossible. Accurate recognition of polyps in WCE images is a difficult task due to the complicated characteristics. Therefore, an automatic computer-aided diagnosis system is crucial to assist physicians to analyze and separate polyp images. We aim to develop an automated system for polyp detection in WCE images based on deep learning models which is an improvement to the neural network that contains more computational layers that allow for higher levels of abstraction and prediction in the data. We first present pre-trained multi-layer ResNet and VGG16 models with the help of transfer learning approach for image
classification problems in WCE images. We have shown that transfer learning framework will be beneficial as it saves time of training the CNN models from scratch and can be vital in the field of medicine in the future. Automatic detection of anomalies in WCE images using Deep Learning Models improves the detection accuracy but it requires a huge number of labeled data for model training. But these deep models suffer from explain-ability and fail to include expert knowledge in the model decision-making process. By keeping these aspects in mind, we aim to identify the opportunities for using Semi-Supervised deep learning models over supervised deep learning methods in Wireless Capsule Endoscopy (WCE) anomaly detection and classification.

M.S. MATHEMATICAL SCIENCES

201. Strategies to Help Connect with Students in an Asynchronous Course
Student Presenter: Alex Baham
Faculty Mentor(s): Dr. Kathryn Pedings-Behling and Dr. Amy Langville

Asynchronous courses have become common and with them, a new set of challenges. One such challenge is working directly with students so that they feel a connection with their instructor and feel encouraged that they can succeed. Over the last two semesters in MATH 116, I've worked on finding ways to keep students engaged; including weekly review videos, opportunities for students to get in touch and ask questions, bonus opportunities, shoutouts, and a healthy dose of compassion when it comes to adjusting to the asynchronous format. Calculus requires practice. In a typical ‘in person’ classroom, this would mean whiteboard examples, or separate sections geared towards practicing calculation. In place of this, I’ve set up weekly review videos going through detailed solutions for each homework problem. Students are given an extra credit opportunity to encourage viewing, and keep them optimistic about their grades. They also include weekly shout outs for different students as positive reinforcement for good work. Multiple options for ‘in person’ office hours is crucial since some students learn better when given the chance to talk through their ideas and understanding with an instructor. It’s also important, as a grading assistant, to give students some grace during the adjustment period so that the students have the time to get their bearings in a class format that they may not prefer. This poster will showcase strategies instructors and grading assistants can utilize in their classes, both in person and online, to help them build stronger connections with their students.

202. Calogero Moser Pairs and Exceptional Hermite Polynomials
Student Presenter: Luke Paluso
Faculty Mentor(s): Dr. Alex Kasman

Exceptional Hermite Polynomials (XHPs) are a generalization of the classical Hermite polynomials that are missing a finite number of degrees. For even partitions $\lambda$ of a natural number $N$, we can find a family of Exceptional Hermites. These objects have begun to be studied within the last 15 years. A surprising connection was shown between the KP Hierarchy and Exceptional Hermite Polynomials. In 2020, Kasman and Milson showed that the generating function for the XHPs is a KP wave function in $Gr_0 \subset Gr^{ad}$, connecting XHPs and the KP Hierarchy.

In 1998 George Wilson characterized a certain class of KP wave functions, particularly those in $Gr^{ad}$. The characterization involves a $1-1$ correspondence with all Calogero-Moser(CM) pairs, and KP wave functions in $Gr^{ad}$.
Hence there must be some CM pair associated with the generating function for the XHPs, however it was not clear which pair this should be. We give a pair of matrices $\{X,Z\}$ associated to each partition $\lambda$ and verify the wave function associated to them using Wilson’s formula is the generating function for the corresponding family of XHPs using Linear Algebra and some basic Complex Analysis (computing residues).

We use this connection to find a new formula for the XHPs in terms of our CM pair, $\{X,Z\}$. Next we use similar techniques as mentioned previously (Linear Algebra and Complex Analysis) in order to find an implicit formula for the finitely supported distributions that annihilate the XHPs.

DEPARTMENT OF PHYSICS AND ASTRONOMY

203. Using Liquid Nitrogen Capture Methods to Assess Drop-Size-Distributions Across Multiple Natural Rain Events
Student Presenter: Lili Boss
Faculty Mentor (s): Dr. Michael L. Larsen

The size of a raindrop impacts many of its microphysical properties, such as its shape and terminal fall speed. While there are instruments that are commercially available to measure the sizes and shapes of individual raindrops, they do not have a mechanism for capturing and storing the measured drops for later analysis. While the literature has described a method for individual raindrop capture using liquid nitrogen acquisition, the collection methods were abandoned because they mainly caught raindrops of a larger size (sizes between 1.0mm to 7.0mm in diameter), leading to a misrepresentation of small droplets in the size distribution (sizes between 0.5mm to 1.0mm in diameter). This project utilized a method for raindrop capture using 3D printed PLA plastic filters submerged in a liquid nitrogen-filled dewar to analyze the size distributions of individual raindrops across multiple rainstorms. A method for storage for post-capture analysis was also determined, allowing for the later biogeochemical analysis of the drops.

204. Development of Synthetic Raindrop Production System
Student Presenter: Liam Brunson
Faculty Mentor (s): Dr. Michael L. Larsen
Additional Authors: Lili Boss, Griffin Hall

Precipitation-measuring equipment requires frequent calibration. For some equipment, this is generally done with ball bearings that mimic the sizes and behaviors of raindrops. However, in several cases, these instruments require calibration samples that more closely resemble raindrop-like sizes and fall speeds-- these instruments can be calibrated more reliably using lab-manufactured drops that share the same liquid properties as natural rain. Commercial instruments that can create simulated rain are already available, but most misrepresent a considerable portion of smaller raindrops. This collaborative project was devoted to developing a system of laboratory equipment that generates, captures, and characterizes smaller synthetic raindrops to be used for future testing and calibration. A drop-on-demand system and a high-speed drop photography station were developed to further this study.
205. Searching for Aqueous Alterations on Main-Belt Asteroids  
Student Presenter: Tri Nguyen  
Faculty Mentor (s): Dr. George Chartas  
Additional Authors: Dr. Sarah Sonnett (Planetary Science Institute)

We observed main-belt asteroids to look for absorption bands near 0.7 microns, produced by the presence of surface liquid water at some point in the asteroid’s life. We mostly focused on C-type asteroids which have the highest chance of aqueous alteration but also included a few asteroids of different spectral types that have been less studied. Using the College of Charleston Observatory’s 24-inch telescope, we obtained spectra of several asteroids and normalized them to solar analog spectra in order to identify the absorption band near 0.7 microns. We present the results of our spectral analysis and compare them with previously published results. To increase the signal-to-noise of the spectra collected with the CoC 24-inch telescope, we stacked spectra of the same asteroid together. Additionally, we searched for variability of the reflection spectra with rotational phase.

206. X-ray microlensing the accretion disk of an active supermassive black hole  
Student Presenter: Madeline Davis  
Faculty Mentor (s): Dr. George Chartas

Quasars are thought to be powered by gravitational accretion of gas onto supermassive black holes. As gas accretes onto the black hole it emits intense radiation with wavelengths ranging from radio to X-rays. The X-ray line-emission is emitted from the accretion disk near the event horizon and thus provides a probe for studying the effects of strong gravity and testing general relativity. In order to spatially and spectrally resolve the accretion disk of distant quasars we take advantage of the natural phenomenon called gravitational microlensing, which magnifies portions of the accretion disk. We use the energy shifts of Fe K alpha emission lines produced by the strong gravity near the event horizon to constrain the location of the innermost stable circular orbit and the spin parameter of the supermassive black hole. We also report on the discovery of shifted accretion disk lines of Mg, Si, S, and Ar at lower energies. The lensing and microlensing magnifications make it possible to resolve these lines individually. The known dependence of the relative energies of the reflected lines with the ionization parameter provides a promising diagnostic for determining the ionization parameter of the disk as a function of radius with next generation X-ray telescopes.

207. Molecular Inflows and Outflows of Gravitationally Lensed Quasar HS 0810+2554  
Student Presenter: Eliza Frankel  
Faculty Mentor (s): Dr. George Chartas

We present the Atacama Large Millimeter/submillimeter Array (ALMA) observations on the gravitationally lensed quasar HS 0810+2554, located at a redshift of z = 1.51. We analyzed the data from ALMA observations targeting three carbon monoxide transitions: CO(2→1), CO(3→2), and CO(5→4) using the Common Astronomy Software Applications (CASA) software and Python codes. A number of significant galactic molecular inflows and outflows were found in each transition. In total, 62 significant CO clumps were observed across the three transitions with velocities ranging from -2000 km/s to +3000 km/s. Based on the ALMA observations, the mass, mass outflow rate, radius, significance, and momentum of the outflows and inflows were calculated. Additionally, based on the location of clumps around the quasar, it can be concluded that they are not randomly distributed but rather trace some
underlying structure within the galaxy. By mapping the molecular inflows and outflows of HS 0810+2554 and continuing with this research project, we hope to gain a better understanding of how active galactic nuclei (AGN) outflows influence galaxy evolution and to find a link between large-scale molecular outflows and small-scale relativistic outflows.

208. Multi-Frequency Radiation MHD Simulations of Shakura-Sunyaev Disks
Student Presenter: Christian Kohnle
Faculty Mentor (s): Dr. Chris Fragile

In the realm of general relativistic, radiation magneto-hydrodynamic (GRMHD) black hole simulations, it is conventional to ignore the frequency (or energy) dependence of radiation as a step towards reducing the complexity of the problem. Unfortunately, this results in a loss of valuable information. In this project, we have implemented a method to evolve the radiation in a way that retains at least crude spectral information. Our first goal is to analyze and compare black hole accretion simulations that do and do not include this capability. For the simulations that do include this capability, we can also create spectra and frequency- (or energy-) dependent light curves for comparison with actual observations. Making these connections is important for better understanding the process of black hole accretion. First, though, I show comparisons of the resulting simulation spectra with the standard, multi-temperature-blackbody model for thin accretion disks. While I find a good fit at low energies, there appears to be excess power at higher energies. We are currently investigating the source of this excess high-energy power. In future simulations we plan to test other disk configurations.

209. Ultra-luminous X-ray sources accreting over the Eddington limit, with a tilted accretion source
Student Presenter: Filippo Savoia
Faculty Mentor (s): Dr. Chris Fragile
Additional Authors: Matthew Middleton, University of Southampton

This project will investigate ultra-luminous X-ray sources stars accreting over the Eddington limit, with a tilted accretion source. Accretion is the in-fall of gas onto a star or other gravitating system. Eddington luminosity is the maximum luminosity after which any object in space’s radiation pressure overwhelms gravity, forcing the material outside the object away and impeding accretion.

In Eddington tilted accretion flows we will observe the torque and the Lense-Thirring precession which could explain quasiperiodic oscillations (QPOs) from ULXs (Ultra luminous x-ray sources) and TDEs (Tidal disruption events). Lense–Thirring precession is a relativistic correction to the precession of a gyroscope near a large rotating mass. QPOs are how x-ray light from an astronomical object flicker around certain frequencies.

Because of the spin of the black hole being inclined with respect to the orbit of the companion star, the inner part of the accretion disk is tilted with respect to the rest of the system, a tilted accretion source. An accretion disk is a structure formed by diffuse material in orbital motion around a massive central body.

We will look for evidence of variability of precession. We will also focus on understanding whether the accretion disk and wind precess at the same rate. Winds of compact objects are a flow of particles that move in a spiral around and reach elevated enough speeds ejecting them into the outside space. To
obtain the solutions for our investigation we will run low-resolution practice versions of untilted and tilted simulations covering a range of mass accretion rates.

210. Testing the Functionality of an Variable Focus Camera System for 3D Medical Imaging Applications
Student Presenter: Jenna Snead
Faculty Mentor (s): Dr. Joe Carson
Additional Authors: Bailey Williamson, Stanley McAfee (Pensievision)

While treatable, cervical cancer persists as a deadly disease for lower-income and remote populations in regions such as sub-Saharan Africa. As developed by Dr. Carson's research group, CervImage is a 3D medical imaging device that seeks to disrupt this pattern by combining simple-to-use screening strategies with low-cost technology. The system consists of a handheld, battery powered imaging device controlled by an inexpensive tablet responsible for storing and compiling the image data into a 3D image. One persisting challenge is ensuring that the clinician holds the device at the optimal distance from the cervix. An increase in ease positioning the device would allow for use by a wider skill range of clinicians, and make the entire process more efficient for even the most skilled gynecologists. The development of a camera system that uses quantitative measures to automatically discern ideal proximity to the target has been proposed to alleviate the issue. By comparing numerical measures of sharpness of image datasets to an “eyeball test” of the images themselves, the ability of the computer to direct operation on its own was evaluated. A typical system of this type has a visible light sensor and a lens controlled by a stepper motor to change focal length, all managed by a small board that connects to a Raspberry Pi computer. This study represents an assessment of the field-of-view, depth of focus, and range of focal distances associated with four different, industry standard camera modules and a proof-of-concept of their applicability to the CervImage device.

211. Investigating the Effect of Episodic Stellar Activity on Planetary Evolution
Student Presenter: James Dockery
Faculty Mentor (s): Dr. Joe Carson

Young (<100 Myr) stars are prone to magnetic storms, which can take the forms of flares, prominences, and coronal mass ejections. Stellar storms can degrade the atmospheres of orbiting planets. Atmospheric degradation can transform gaseous planets into terrestrial planets, expose planetary surfaces to high levels of radiation, or render planets unsuitable for surface water. Thus, comprehension of stellar activity is necessary to understand the probability of habitable environments. My investigation used a software package known as CERES (Brahm et. al., 2017, PASP, 129, 4002) to study the spectra of target stars AT Microscopii and AU Microscopii for emission peaks at wavelengths in the Balmer series of hydrogen. To evaluate such emission, Gaussian curves were fitted to the spectra using Python's NumPy package. The spectroscopic data I used was collected by collaborators using the One Meter Telescope at La Silla Observatory over several months. By tracking the emission features, I observed that AT Microscopii and AU Microscopii have strong emission near the H-alpha. I also found that AU Microscopii simultaneously has strong absorption at H-alpha. Such features persisted over multiple observations.
212. Projected Rotational Velocities for O-Type Stars from HST/COS High-Resolution Spectra
Student Presenter: Colin Kane
Faculty Mentor(s): Dr. Laura Penny

Projected rotational velocity (Vsini) is directly correlated with the width of the cross-correlation peaks of a star's spectra. In this project, the calibration between Vsini and cross-correlation function (CCF) width that was created to approximate the projected rotational velocity of different targets will be improved upon by adding more stars. We used observations of stars in the Small and Large Magellanic Clouds (SMC LMC) taken by the Ultraviolet Legacy Library of Young Stars as Essential Standards (ULYSSES) project, specifically those taken using the Cosmic Origins Spectrograph (COS) on the Hubble Space Telescope (HST). The targets were O and B type systems with known Vsini values. Their spectra will be cross correlated with the TLUSTY synthetic spectra and the widths of the CCFs were measured. These widths were added to the plot of the known rotational velocities and a more accurate calibration curve will be fitted to allow the rotational velocities of other stars to be found from their widths.

213. Projected Rotational Velocities for O-Type Stars From HST/STIS High-Resolution Spectra
Student Presenter: Rhian Purves
Faculty Mentor(s): Dr. Laura Penny

The projected rotational velocity (Vsini) of a star describes its rotation, where V is the equatorial rotational velocity and i is the inclination, measured from the axis of rotation of the star to the viewer. It is an important observable which can provide astronomers with insight into the angular momentum evolution and mass loss of a star (Penny & Gies 2009). There is a correlation between the Vsini of a star and the width of the peak in its cross-correlation function. This project would use observations of stars in the Small and Large Magellanic Clouds (SMC & LMC) taken by the Ultraviolet Legacy Library of Young Stars as Essential Standards (ULYSSES) project, specifically those taken using the Space Telescope Imaging Spectrograph (STIS) on the Hubble Space Telescope (HST), with the purpose of generating a calibration function to allow for the Vsini of other OB type stars to be determined.

214. Determining the Ratio of Variable Stars for the Pleiades
Student Presenter: Seth Zoppelt
Faculty Mentor(s): Dr. Ashley Pagnotta

This project focused on light curves of stars in the Pleiades to determine how many stars are periodic as a ratio of periodic stars to total stars in the cluster. Using K2 data and Lightkurve, individual light curves and their respective Lomb-Scargle periodograms, periods, maximum powers, and frequencies were found for 826 stars within the Pleiades. The following constraints were used to determine if the star is periodic or not: \( P_{\text{max}} < 6000 \) ppm and \( 0.2 \text{ days} < P < 0.3 \text{ days} \), where \( P_{\text{max}} \) is the maximum power produced in the periodogram and \( P \) is the period in days. The maximum power was chosen based on the powers of other periodograms, where 6000 ppm was a threshold where the light curve and periodogram did not exhibit much periodicity. The \( P \) constraint was chosen because of Kepler telescope's thruster re-firing every six hours, thus creating alias periods of about 0.25 days. From these constraints, 715 stars were determined to be periodic out of the 826 star sample, producing a ratio \( R=0.866 \).

* Sustainability-themed project *
215. Investigation and Analysis of Novae Using Kepler K2 Mission Data
Student Presenter: Cameron Fish
Faculty Mentor (s): Dr. Ashley Pagnotta

In Astronomy, novae are one of the most prominent and well-documented celestial phenomena that can be regularly observed; as such, they are a valuable resource when it comes to understanding the greater reaches of space. Novae are also one of the most likely possible end stages for stars in our universe. Because of this, knowing more about their individual properties and overall population can help us better understand stellar evolution. Our project involves taking a relatively comprehensive list of possible novae in the sky and cross-referencing that list with the Kepler Space Telescope’s K2 observations. Using a combination of different software packages and techniques, we can collect and examine detailed light curves of the novae that were observed during the K2 mission. This will allow us to confirm the nova nature of our targets and analyze their behavior for the duration of the K2 observations. The methods we are developing may also be useful for future students looking to study other variable stars in the Kepler K2 fields.

216. Should We Be More Prepared for Coronal Mass Ejections?
Student Presenter: Lucas Moyon
Faculty Mentor (s): Dr. Ashley Pagnotta

This project’s primary goal is to determine how prepared the U.S. is for a severe coronal mass ejection (CME), which is an outburst of plasma and magnetic material coming from our sun. The Great Quebec Blackout of 1989 and the Carrington Event of 1859 are two instances of societal disruption due to CMEs, but the increased reliance of humanity on technology since those events warrants a close examination of how a CME could affect the U.S. in the 21st century. By exploring both the current CME literature and U.S. government contingency plans for power grids and satellites, we will determine the true nature of the threat of CMEs as well as the appropriate amount of urgency necessary when discussing mitigation measures. Planned outcomes of this research include policy recommendations as well as an increased general awareness of the threat of solar storms.

217. Accurate Depiction of Jupiter as viewed from Europa
Student Presenter: Thomas Guy
Faculty Mentor (s): Dr. Ashley Pagnotta

The objective of this project is to create a scientifically-accurate artistic depiction of the planet Jupiter as viewed by a person standing on its moon Europa. We utilize both scientific and artistic concepts and techniques. A survey of historical astronomical art was used to provide inspiration and conceptualization, and then astrophysical calculations were used to determine what an accurate portrayal should look like. We considered the orbits of Jupiter around the Sun and Europa around Jupiter, the inclination of those orbits as well as the axial tilt of the planet and moon, the atmospheric compositions of both worlds, and the field of vision of the average human, in addition to other factors. The end goal is an acrylic painting that will showcase Jupiter, set amongst the background stars, and will also include some of the icy surface of Europa. This method could be expanded in the future to be applied to other planet-moon combinations, including views from moons with much thicker atmospheres. It could also be used to conceptualize how things might look on planets, moons, and other small bodies (such as comets and asteroids) in solar systems around other stars besides our sun.
Additionally, accurate depictions of heavenly bodies could be incorporated into mass media such as television, films, and video games.

218. Ultra-luminous X-ray sources accreting over the Eddington limit, with a tilted accretion source
Student Presenter: Filippo Savoia
Faculty Mentor (s): Dr. Chris Fragile
Additional Authors: Matthew Middleton (University of Southampton)

This project will investigate ultra-luminous X-ray sources stars accreting over the Eddington limit, with a tilted accretion source. Accretion is the in-fall of gas onto a star or other gravitating system. Eddington luminosity is the maximum luminosity after which any object in space’s radiation pressure overpowers gravity, forcing the material outside the object away and impeding accretion.

In Eddington tilted accretion flows we will observe the torque and the Lense-Thirring precession which could explain quasiperiodic oscillations (QPOs) from ULXs (Ultra luminous x-ray sources) and TDEs (Tidal disruption events). Lense–Thirring precession is a relativistic correction to the precession of a gyroscope near a large rotating mass. QPOs are how x-ray light from an astronomical object flicker around certain frequencies.

Because of the spin of the black hole being inclined with respect to the orbit of the companion star, the inner part of the accretion disk is tilted with respect to the rest of the system, a tilted accretion source. An accretion disk is a structure formed by diffuse material in orbital motion around a massive central body.

We will look for evidence of variability of precession. We will also focus on understanding whether the accretion disk and wind precess at the same rate. Winds of compact objects are a flow of particles that move in a spiral around and reach elevated enough speeds ejecting them into the outside space. To obtain the solutions for our investigation we will run low-resolution practice versions of untilted and tilted simulations covering a range of mass accretion rates.

219. Using SysML to model cloud services for optimizing traffic patterns
Student Presenter: Jeffrey Werth
Faculty Mentor (s): Dr. Funke Oladimeji

Flooding and traffic challenges are a great concern in the Lowcountry area of Charleston, South Carolina, especially downtown, which attracts a lot of tourists due to the rich history of the city. The goal of the research is to examine flooding patterns as well as traffic patterns in the downtown Charleston area to create a model for identifying the optimal travel route. By identifying a strategy for reorganizing the flow of traffic in Charleston we will be able to aid mapping software and physical navigation tools in the downtown area. The current infrastructure used for the physical navigation is a very reactive approach to handling traffic congestion regarding flooding. This usually results in unnecessary and avoidable traffic. With more real-time information from digital tools and infrastructure such as cloud services, this would provide a more proactive approach to rerouting vehicles away from high congestion traffic areas.

The methodology for this project is to use a Model Based Systems Engineering (MBSE) approach that will analyze the system by considering the stakeholders problems and needs, identifying operational scenarios and defining the logical architecture. This will involve utilizing SysML diagram types and using discrete modeling to tackle the operational scenarios. The work on this project will be used in defining
the stakeholder’s need and problem statement, which will help in identifying the requirements critical to the operating scenarios and logical architecture for proposing solutions to traffic congestion in suboptimal weather.

M.S. ENVIRONMENTAL AND SUSTAINABILITY STUDIES

220. Microplastic capture efficiency in particle capture devices installed in separated storm sewers in Mount Pleasant, SC
Student Presenter: Caroline Moore
Faculty Mentor(s): Dr. Barbara Beckingham, Timothy Callahan, John Weinstein (The Citadel)
Additional Authors: Hillary Repik (Operations Officer at the Town of Mount Pleasant)

Microplastics (plastics <5 mm) are an emerging contaminant of concern and stormwater runoff is likely a dominant route of transport to waterways in urban areas. While most separated stormwater systems likely have minimal functional pollutant removal, some storm sewer drains have been installed with manufactured treatment devices (MTDs), advanced catchbasins designed to capture inorganic sediments to aid in pollutant removal. The objective of this study is to characterize microplastic composition and abundance in seven stormwater catchments in Mount Pleasant, SC to evaluate the ability of MTDs to capture microplastics. We collected sediment grab samples on roadways, within MTD chambers, and at their tidal creek outfalls to determine if microplastics accumulate in MTDs sediments. Additionally, I propose to study the microplastic capture efficiency of one MTD by sampling stormwater influent and effluent during rain events. We hypothesize that a fraction of microplastics are captured by these devices and their categorization and abundance will vary within and between sites. This study will provide critical information on one strategy for reducing microplastic pollution.

221. Identification of Ampicillin-Resistant Coliform Bacteria in Urban Floodwater of Peninsular Charleston, SC
Student Presenter: Kayla Squiggins
Faculty Mentor(s): Dr. Vijay Vulava

Flooding is a common occurrence on the Charleston peninsula given its geographic location along the Atlantic coastline and its environmental history of filling marshes for development. Much of this flooding occurs either from rainfall (>2.5 cm/day) and/or high tide (mean lower low water >2 m) flooding related to lower elevations. These floodwaters funnel different pollutants into coastal waters, such as fecal bacteria and metals, which are known to be present in stormwater runoff. However, the prevalence of antibiotic-resistant coliform bacteria (ARC) and trace metals in floodwater is unknown. Floodwater samples were collected from four locations to represent flooding in the urban environment. Of these sites two are influenced by both tides and rainfall, one is purely tidal, and the other is only stormwater runoff. Multiple days were sampled during rainfall and high tides for ARC and metals. ARC samples were processed and applied to Compact Dry EC plates with or without the application of ampicillin. Total coliform abundances including E. coli were obtained, and metal concentrations were analyzed via ICP-MS. These analyses show that floodwater from all sites had ARC present for ampicillin, while metals of concern were found in floodwater, but the concentrations were dependent on the floodwater being dominated by either rainfall, tides, or a mixture of both. Local communities are at risk when exposed to floodwaters because the exposure to ARC can cause untreatable infections in humans. As flooding is

Sustainability-themed project
exacerbated by climate change, more people will be exposed to floodwaters and potential infection from ARC.

**M.S. ENVIRONMENTAL AND SUSTAINABILITY STUDIES/PUBLIC ADMINISTRATION**

222. *Investigating Potential Consequences of Compound Flooding on Ecosystem Value in Coastal Watersheds*

Student Presenter: Hannah Quast
Faculty Mentor(s): Dr. Timothy Callahan
Additional Authors: Chase Austin

Why do natural places matter? Beaches, creeks, and rivers serve people directly but also provide a lot of value for their ecosystems, which are not always apparent in everyday life. For example, tidal creeks and marshes are important coastal ecosystems that provide animal habitat, food, recreation opportunities, and aesthetic value to residents and visitors. Specifically to coastal communities, ecosystem value is largely evaluated based on aquatic ecosystems services, such as commercial fishing or water filtration. Aquatic ecosystem services have historically been resilient to change, but in recent times they have become more vulnerable from increasing anthropogenic factors such as stormwater runoff, sea level rise, and land use change. These factors also contribute to increased compound flooding events, which refers to storm water runoff that meets tidal waters in creeks and the coastline. The impacts of major flood events like this are universally understood for the destruction they cause to life, property, and infrastructure. However, the impact of flooding on aquatic ecosystem services is not fully understood. Increased frequency of compound flooding events can pose a threat to these natural places which provide these services, and in turn affect people as the stewards and co-inhabitants of nature, amplifying the effects of normal flooding events like erosion, landslides, saltwater intrusion, and more. The aim of this research is to investigate how compound flooding events could impact aquatic ecosystem services specific to the coastal watersheds.

**SUSTAINABILITY CLUSTER**

223. *The United Nations Sustainable Development Goals: Connecting Research to Progress for Sustainability*

Presenter: Jen Jones, Center for Sustainable Development

The United Nations Sustainable Development Goals (SDGs) are 17 areas of focus that were adopted by the UN in 2015 to "provide a shared blueprint for peace and prosperity for people and the planet, now and into the future". These goals recognize the interconnectedness of both social and ecological issues and accept that in order to achieve either, we must focus on both. The Center for Sustainable Development (CSD) at the College of Charleston uses the SDGs to help students, faculty, and staff contextualize the work they do within the expansive concept of "sustainability". Often folks have a hard time understanding how they fit into sustainability, especially when their work lives outside of the realm of ecological integrity. The CSD has found that aligning with the SDGs helps to clarify and strengthen these connections and to help our

*Sustainability-themed project*
campus community better understand the role they play in leading us towards a more sustainable future. To highlight this at EXPO, students who self-identified their work as connecting to one or more SDGs will have identifying placards on their poster.

224. Alternative Break to Zakynthos, Greece: An International Perspective to Active Citizenship & Engagement

Student Presenter: Sophie Ecklund
Faculty Mentor(s): Stephanie Visser

The Center for Civic Engagement’s Alternative Break (AB) program empowers CofC students to progress from members of their community to active citizens through social justice-focused education, direct service, and reflection. One of the trips offered is a two week trip to Zakynthos, Greece to volunteer for the nonprofit organization Earth, Sea, & Sky which I took in May of 2022 alongside nine other students. The organization’s mission is to raise awareness about conservation of the endangered Loggerhead sea turtle and to promote sustainable tourism practices on the island. In the Mediterranean sea, 80% of the sea turtle population travels to Zakynthos to lay their eggs yet mass tourism there has degraded beaches and reduced nesting habitat dramatically.

Students helped maintain Earth, Sea & Sky’s Marine Life Center, interacted with and educated tourists on its mission, and collaborated in the production of a video & book about the founder Yannis Vardakastanis and his work. I saw first-hand how tourism has detrimental impacts on native ecosystems and why conservation is critical to improving conditions for endangered species. Zakynthos and Charleston rely on tourism and that it has a negative impact on native habitats. I was able to draw important parallels between the two. Earth, Sea & Sky hopes that witnessing the destruction in Greece can be a tale of warning for other natural habitats that aren’t as far gone. While there is no hope for completely restoring Zakynthos to what it once was, there is still time for Charleston to change before it’s too late.

225. The Center for Sustainable Development Living Lab’s Program: Promoting Student’s Skills Building and Active Citizenship with the Charleston Community

Student Presenter: Sophie Ecklund
Faculty Mentor(s): Dr. Jen Jones

The Center for Sustainable Development’s (CSD) Living Lab’s Program (LLP) was created to highlight opportunities for students to foster deeper connections with the Charleston community, provide much needed services to local nonprofits, and build skills that supplement students’ academic work. In the summer of 2022, interviews with nine community partners were conducted to gain valuable perspective on how to best structure the LLP and maximize the benefit to all involved. That feedback was then used as a baseline to develop the program's framework and curriculum.

Non-profit organizations rely heavily on volunteers to function and since the pandemic many have seen reduced numbers of volunteers and even full-time staff members. Furthermore, collaborating with students is highly valued, yet non-profit staff often lack the time and resources to support student mentorship and skill development that is required for the projects of these organizations. Through the LLP, the College of Charleston will be the link between both parties’ unmet needs.
It seeks to fill these gaps by providing skill development workshops, mentorship, and professional development curriculum within a cohort-style model conducted through the CSD. This foundational knowledge will then be applied through the completion of a project posted by a community partner. An application process facilitated by the LLP will match students' existing and desired skills with community partner needs to complete projects that are specific, have clear deliverables and an end-product within a set timeline. Applications for the LLP will launch in March of 2023 with the first cohort beginning in Fall 2023.

226. Building The Student Sustainability Collaborative, an Intersectional, Student-Forward Solution to Sustainability
Student Presenter: Chase Austin
Faculty Mentor (s): Dr. Jen Jones
Additional Authors: Nicole Killen (Center for Sustainable Development)

Student organizations have undergone extreme changes following the COVID-19 Pandemic, with most organizations currently training new leadership, and many organizations completely disappearing from the College of Charleston campus. Through this chaos, the organizations that have survived have struggled to make effective, lasting change. Student organizations’ ironic lack of organization presented a unique issue for the representation of student voices, and a need for collaborative student self-representation became clear. To fill this niche, we created the Student Sustainability Collaborative (SSC), a diverse and intersectional collaborative of student leaders with a mission to provide consistent, efficient advocacy for holistic sustainability by connecting campus decision-makers and students at the College of Charleston. While still in its earliest stages, the Student Sustainability Collaborative has met monthly since October 2022 and has begun its first project, a survey to identify the student body’s greatest sustainability concerns. This data will be utilized by the SSC to determine its most important first focal points, and to present to campus decision-makers on the importance of sustainability to College of Charleston students. The Student Sustainability Collaborative is actively bringing students together and amplifying their voices, giving power to students to create meaningful change that every community on campus holds a stake in.

227. The Cougar Changemaker Committee: Investing in Sustainability and our Students
Student Presenter: Nathan Thompson
Faculty Mentor (s): Dr. Jen Jones

The Cougar Changemaker Committee is a volunteer group of undergraduate and graduate students from a variety of academic backgrounds that serves as the decision-making body for the Center for Sustainable Development’s small grants program by the same name. Formerly the ECOllective Student Project Committee, it was begun in 2011 to encourage students to develop innovative sustainability ideas and play a role in making change for sustainability on their campus. Funds that support the grants come from the $10/semester Green Fee. The application process has two stages. During the first stage, committee members serve as case managers and aid the applicant in developing a full proposal. During the second stage, full proposals are reviewed by the Cougar Changemaker Committee and scored based on criteria from a pre-determined rubric. The Committee then decides which applications are funded. Projects funded include: the solar pavilion, a machine that dispenses liquid-free and eco-conscious laundry detergent, a mending workshop, and hammocks for students to rest and recharge in.
This program provides valuable, hands-on experience for committee members and applicants alike. Applicants learn about what it takes to bring ideas to fruition through grant writing as well as how to engage stakeholders and develop a budget. Committee members receive training on campus sustainability, learn how purchasing works for the State of South Carolina, and try their hand at mentoring in their role as a case manager. Cougar Changemaker Committee allows students to complement their academic work with experiential learning and build their resume while finishing their degree.

228. Employee Engagement in CSR
Student Presenter: Bailey Roche
Faculty Mentor (s): Dr. Ivana Milosevic

Advancing Corporate Social responsibility (CSR) objectives is difficult, requiring employees to navigate multiple and often conflicting demands. Consequently, why some employees engage in CSR when their role does not mandate such engagement, is of theoretical and empirical interest. The purpose of this study, thus, is to understand antecedents to CSR engagement, specifically how employee moral identity influences the degree to which they engage in CSR. To do so, I conducted a detailed literature search across premier management journals such as the Academy of Management Review, Journal of Management Studies, and Journal of Organizational Behavior. Through this endeavor, I identified 18 articles focused on the nature of CSR and its micro-foundations - the individual actions and interactions underlying CSR. Through the in-depth analysis of the 18 articles and insights from the social cognitive theory, I built a theoretical model explicating the mechanism through which employee moral identity influences employee engagement in CSR. Furthermore, I identified managerial support for CSR as a moderator of the relationship. The theoretical model contributes to the CSR literature by illustrating individual agency in CSR, particularly how employees actualize CSR through their work. This model shifts CSR from obscure to actionable while providing more nuanced insights into how and why managers can support employee CSR engagement.

229. Functionality of the Governance Institutions of the Big Life Crop-Protection Fence in the Amboseli Ecosystem
Student Presenter: Kelsie Seigle
Faculty Mentor (s): Dr. Shishav Parajuli
Additional Authors: Richard Kiaka, School for Field Studies

The Big Life Foundation crop-protection fence was erected in 2016 to prevent human-large herbivore conflicts in the Kimana area of the Amboseli Ecosystem, Kenya. This study analyzes the governance institutions of the crop-protection fence, including fence committees, maintenance responsibilities, and annual monetary contributions from the community. Additionally, community attitudes regarding the effectiveness and sustainability of the crop-protection fence are examined. Data was gathered via 209 household surveys in four villages in the former Kimana group ranch and seven key informant interviews with Big Life employees and fence committee members over the course of nine days. Through qualitative and quantitative analysis, this study found institutional dysfunction rife within the fence governance, evidenced by its failure to meet numerous key governing principles. While the community feels the fence is effective in preventing human-large herbivore conflict, fence committee roles are ambiguous and exclusive, maintenance responsibility is unclear and unenforced, and monetary contributions cannot be sufficiently sanctioned by Big Life. These findings indicate the unsustainability of...
the fence’s current governance structure. Recommendations are provided to Big Life and the community in hopes of enhancing productive enactment of governing institutions to ensure long-term sustainability of the crop-protection fence. These include yearly censuses and more frequent community-wide meetings by Big Life and community accountability in closing gates.

230. The State of the Private Social Services Sector in Charleston, SC: Nonprofit Responsibilities, Needs, Obstacles to Service, and Opportunities for Growth
Student Presenter: Hanna Giblin
Faculty Mentor (s): Dr. George Dickinson

This research aims to explore the gray area that is providing community-level social services across government and private sectors and the issues that may arise from this complex relationship. Federal devolution has resulted in a shift of responsibility to local service organizations to fill in the gaps offering more personalized services to individuals and families in need. The question becomes, how much of this responsibility is on nonprofits to ensure the equitable social wellbeing of a community is maintained? This study uses Charleston, South Carolina and the greater tri-county area as a case study to integrate feedback from nonprofit representatives in assessing efforts in this field. For this descriptive research, both an anonymous online survey, and one-on-one interviews were conducted to get an in-depth insight on both the operations of participating organizations, and their experiences providing social services to the local community. Based on literature studying this complex balance of government and private efforts in combination with support of nonprofit experience guiding the discussion portion, this research can provide a lens by which to promote a more efficient and supportive environment for everyone involved in holistic community development.

231. The Asian longhorned beetle (Anoplophora glabripennis) in South Carolina: eradication methods
Student Presenter: Millar Elferdink
Faculty Mentor (s): Dr. David Coyle (Clemson)
Additional Authors: Meredith Bean, Marina Lupu, Lena Schmitt (Clemson University, Department of Forestry and Environmental Conservation)

The Asian longhorned beetle (ALB) is a federally regulated invasive forest pest that primarily attacks maples (Acer). ALB was discovered in Hollywood, SC in May 2020, representing the southernmost established population in North America. Dendrochronology indicated the infestation in SC likely began around 2013. While eradication of this pest is the goal, ALB’s presence in this novel North American climate and environment raises a number of questions in terms of its biology and ecology. Research in this program has gained insight into ALB population dynamics and phenology, and this information will be used to update prediction models. The most common eradication method is to remove and chip infested host trees; however, due to the swampy nature of Hollywood’s environment, many areas are inaccessible for this type of management. This inaccessibility has led to the development of unique and alternate eradication methods as well as efforts to find native biological control agents. Outreach has been a critical part of the program’s success, and multiple strategies have been employed to reach a wide range of people.

Sustainability-themed project
232. Assessing Nitrogen, Phosphorus, and Carbon Dynamics in a Pond Environment with Experimentation and Modelling

Student Presenter: Claire O’Loughlin
Faculty Mentor(s): Dr. Vijay Vulava

Freshwater ponds feature prominently in the built and natural settings of South Carolina and perform important functions, including nutrient processing (N, P, C), flood control, pollution reduction, and carbon sequestration. These ponds accumulate and process high concentrations of nutrients before discharging them into downstream natural water bodies. However, knowledge of the biogeochemical dynamics of such nutrients is poorly understood. In this study, we focused on delineating specific nutrient dynamic pathways as water travels through a manmade pond and discharges into downstream saltmarsh. The focus of this study is the freshwater pond located at the Stono Preserve, which is in a lowland coastal physiographic setting and serves as an analog for thousands of stormwater ponds common to the region. Groundwater and pond water were sampled and analyzed for nutrient concentrations. On average, we observed higher concentrations of P and N and the similar concentrations of C in the shallow groundwater downgradient from the pond compared with the upgradient of the pond. This may be driven by the release of trapped P in pond sediment and the presence of nitrifying bacteria in the pond. Data were used to create a conceptual and quantitative model to describe the dynamic pathways and concentrations of nutrients in such systems using MATLAB SIMULINK. We expect that these results can be applied to assess ponds across the southeastern US and help better understand the impacts to the surrounding ecosystem.

233. Self-reporting Sustainability Frameworks and Stakeholder Buy-in: A Case Study of AASHE STARS at the College of Charleston

Student Presenter: Oliver Jones
Faculty Mentor(s): Dr. Matthew Nowlin

Higher education institutions not only educate their students, but also influence and define common standards in the broader social sphere, including within the field of sustainability. Sustainability reporting allows higher education institutions to assess and communicate progress towards sustainable development both internally and externally. Stakeholder engagement with sustainability reporting frameworks like the Sustainability Tracking, Assessment & Rating System (STARS) may be a pathway to increasing awareness of sustainability initiatives and programs on campus, engagement with these programs, and perceived importance of sustainability, both personally and to the institution. The presented project evaluates the impact of participation in the self-reporting sustainability framework of STARS on faculty & staff awareness, engagement, and perceived prioritization of sustainability within their home institution of College of Charleston. To complete this assessment, a pre- and post-survey was administered. This survey data was supplemented by content analysis of STARS data collected during 2020 & 2023 and qualitative data obtained from semi-structured in-person meetings.
M.S. ENVIRONMENTAL AND SUSTAINABILITY STUDIES/PUBLIC ADMINISTRATION

234. Engaging Grass-Tops and Grass-Roots Stakeholders to Validate Environmental Justice Indicator: An Evaluation of the Charleston Climate Coalition’s Environmental Justice Profile
Student Presenter: Caitlin Bolger
Faculty Mentor (s): Dr. Jen Wright

Decades of research has documented that historically marginalized communities have been disproportionately burdened by pollution, climate change, and other environmental issues. While national and state-level environmental justice tools exist to quantify environmental justice, these datasets are unable to capture the smaller-scale data to measure environmental justice at the community and even neighborhood level. The Charleston Climate Coalition has created the Environmental Justice Profile, a scientifically-informed tool that communities can use to quantify environmental injustices within their community. This study takes a grass-tops and grass-roots approach to evaluate and validate the Environmental Justice Profile. Findings indicate that with a few edits, the Environmental Justice Profile consists of appropriate indicators of environmental justice and is ready for community use.

235. Nudging Toward Sustainable Waste Practices within Athletic Facilities at the College of Charleston
Student Presenter: Nicole Killen
Faculty Mentor (s): Dr. Calvin Blackwell

Because higher education institutions must feed and house people, operate offices and facilities and maintain grounds, their appetite for goods and materials is huge, and so is their waste output resulting in a serious waste problem for American institutions. A large percentage of this waste output comes from collegiate athletic programs. Behavioral nudges can be a powerful tool for change within collegiate athletics because they hold great promise for collective action by engaging thousands of fans about responsible environmental stewardship. The purpose of this research is to address how different nudges can be used to increase recycling behavior in TD Arena. The EAST Framework will be a guide to determine the best types of nudges to be used within this study. Waste auditing procedures were used to quantify existing waste diversion rates, and changes to those rates following changes in choice architecture within TD Arena at the College of Charleston. Over the course of the 2022-23 men’s basketball season, waste diversion rates improved and significant reductions in the proportion of recyclable materials in the trash were observed when increasing recycling infrastructure in the arena. However, there is no significant difference between the generic signage and the specific signage. This can be a result of the dramatic increase in attendance during the end of the data collection period. This study has tested methods of increasing recycling in a collegiate athletics setting that can also be applied on a wider scale at the College of Charleston and beyond.
236. "I am invisible...people refuse to see me"
Student Presenter: Mahdiyah Elijah-El
Faculty Mentor (s): Dr. Valerie Frazier

Although famed photographers Gordon Parks, Ming Smith, and Joshua Parks drew inspiration from Ralph Ellison’s Invisible Man, all three were tasked with bringing visibility to Black men and underrepresented communities in America. Parks rose to the occasion of the Civil Rights movement, Smith mirrored the poor representation of the 80s and 90s, and Parks demonstrated the importance of marginalized groups, but all three individuals wanted to bring Black men into the spotlight and hopefully better their treatment. In this project, I researched the backgrounds of Gordon Parks, Ming Smith, and Joshua Parks, public historian of Charleston’s International African American Museum, and then analyzed photos taken by them in order to showcase how they shed light on underrepresented groups in Charleston and around the globe. Joshua Parks, (direct descendant of Sol Legare Island, a historic Gullah Geechee sea island community) is the photographer for The Green Book of South Carolina, which, through photographs, brings visibility to the state’s African American history. His photos and documentaries focus on the everyday lives of Black individuals, not just in Charleston, but globally (including Cuba). The invisibility of the Black Man is not limited to America, and the invisibility of minority men is not limited to African American men. Parks extends his lens to both Latino and Black communities, hopping from Mexico to the States to Cuba. As we continue to make everyday changes in how individuals are treated, making strides toward full equity, let us learn that challenges are intersectional and never one dimensional.

237. The importance of Gullah Geechee teachings in Black Owned Businesses in the Charleston peninsula
Student Presenter: Tyler Glymph
Faculty Mentor (s): Dr. Valerie Frazier

Charleston is known as the food capital of the world, and yet not many know Charleston was able to gain this title. It’s no secret that the city of Charleston was built off the hard work of early African Americans, but it doesn’t stop there, the entirety of Charleston food culture has been heavily influenced by the Gullah Geechee culture and many do not know it. I conducted research about just how important Black owned restaurants are to the Charleston peninsula, and how Gullah Geechee culture and teachings wind up in all business & culinary practices. I conducted multiple interviews with local Gullah Geechee chefs as well as food Historians to learn more about this topic.

238. Then And Now African American Studies Experience
Student Presenter: Devin Hammonds
Faculty Mentor (s): Dr. Valerie Frazier

Prior to the year of 1990, African American Studies courses were not offered or made available at the College of Charleston. During my research, to find out about how the African American Studies courses came to be taught at the CoC, I discovered that it took the efforts of Dr. Valerie Frazier, Dennis Muhammad, Dr. Myrtle Glascoe, the director of Avery Research Center at that time, and the Student
Union for Minority Affairs to start a petition that would push for the advocacy for race, equity, and inclusion in the CofC curriculum. In doing so, they hoped to encourage an appreciation of the richness found in African American culture. Once they had garnered enough support through a student petition, which had hundreds of signatures, they would approach Samuel Hines, the Dean of Humanities and Social Sciences at the time, about the need for African American Studies at the College of Charleston. It would be the success of their efforts that would lead to a greater appreciation for African American Studies at the College of Charleston. Their group efforts led to the first African American history class taught by Donald West, and the 1992 hiring of Dr. Bernie Powers, CofC Professor of History emeritus and current Director of the College of Charleston Center for the Study of Slavery in Charleston. And that was the start of our AAST program. Today, we have an AAST major and minor, in large part, because of the efforts of the African American Studies group of the 1990s.

239. Remembering Septima Poinsette Clark
Student Presenter: Aaliya Wiggs
Faculty Mentor (s): Dr. Valerie Frazier

As 1967 Legacy Scholars, we are encouraged to learn more about African American trailblazers who have built the path for equality and opportunity. My study focuses on Septima Poinsette Clark, an African American educator and civil rights activist. Clark was a pioneer for grassroots citizenship education and her role in the Civil Rights Movement was critical for the advancement of African Americans. As a native Charlestonian, her presence is engraved in the city’s history. However, her contributions, suffering, and life story are often overlooked and overshadowed by Charleston’s troubling racial history. In order to truly appreciate Septima Clark, we must appreciate her - a woman, an activist, a wife, a mother, an African American. It is not enough to appreciate what she did for others. Instead, we must recognize who she was as a person. Through extensive research of Septima Clark’s archives at the Avery Research Center and in the Lowcountry Digital Library, I was able to devise a composition that examines the complexity of Septima’s life story, the often-censored authentic history of how she was treated by the city and state, and the struggles she faced in her day-to-day life. Presently, the College of Charleston honors Septima Clark’s life through a renovated auditorium and mural installation in her name in the Thaddeus Street Jr. Education Center. This project stands as a physical representation of the immense progress that has been made in Charleston, as well as a testament to the legacy that Septima Poinsette Clark left behind.

240. Is this Progression or Regression: an examination of our forgotten history and its impact today
Student Presenter: Sam Oliver-Reed
Faculty Mentor (s): Dr. Valerie Frazier

Watching the news, I wonder if we are progressing towards a better world or just regressing? Daily black people face racism as the same conversations about police brutality repeat like a broken record playing America’s greatest hits. The issues of Huey P. Newton and Martin Luther King Jr remain contentious, but they say we have progressed. Racism has become so ingrained in society that we hardly flinch. We see the faces, we hear the names, but do we stop and reflect? Is this a new phenomenon, or is history just repeating itself? Two events nearly a century apart answers the question succinctly.

In the Charleston summer of 1919, Isaiah Doctor, an average black man, was killed by two sailors claiming self-defense. Nearly a hundred years later, Walter Scott would be pulled over by the police and
killed with the officer claiming self-defense. Isaiah Doctor’s life has been forgotten. Gentrification took over his neighborhood. Will Walter Scott be remembered 100 years from now? I went to k-12 in Walter Scott’s neighborhood and watched it slowly change and morph into something almost unrecognizable. Today seems like a progression because the standards of living have improved, and black people are no longer being publicly lynched. But the truth is, racism has not improved; it has simply grown with the rest of society altering itself to fit into an ever-changing world. The sooner we recognize the truths of the world, the sooner we can learn and grow from our past.

241. African American Education in Charleston
Student Presenter: Alyssa Craft
Faculty Mentor (s): Dr. Valerie Frazier

The African American community was not given direct access to education until 1890, almost 30 years after slavery was outlawed. Eventually, black schools were opened and African Americans were given the opportunity to learn. In 1963, almost 80 years later, Millicent Brown was the first African American to walk the halls of an all white public high school in Charleston, South Carolina, Rivers High School. One might think that things started to improve for African American students in Charleston, however as much as it did improve, it also remained the same in some ways. The differences between the treatment of African American students in two schools can be evaluated through the lens of Jasmine Palmer-a sophomore at the College who attended Charleston Charter School- and Millicent Brown, those schools being Charleston Charter School, previously known as Rivers High School, as well as Burke High School.

The American education system still fails to provide equity for the African American community. Yes, African Americans have progressed a significant amount in society, but school systems are one place in society where more progress needs to be made. In 1963, schools began to desegregate, and by 1979 all schools in Charleston, SC were fully integrated. However, today in 2022, public schools on the peninsula and in the entirety of Charleston County are subtly beginning to resegregate. The question remains, what will we do to fix it?

242. Black experience at CofC
Student Presenter: Chandler Harris
Faculty Mentor (s): Dr. Valerie Frazier

1967 is a important year for the College of Charleston, Why? Because this is the year it finally gave up its resistance to desegregation and admitted black students. Within the first year of integration at CofC, the number of black students increased to eight. As most would imagine, the college experience in a newly desegregated institution was vastly different than that of black students today. The topic I intended to investigate was whether, given the changes to the College of Charleston over the years, would black alumni still choose to attend? Would they tell the next generation of black students about CofC? To get the information, I was seeking I went around interviewing past alumni like Otto German, Dennis Muhammad and my cousin who attended. I collected the data of their experiences at the college of Charleston and compared them to one another and asked them whether they would still choose to attend. Out of the three alumni the results where two yes’s and one no. my cousin said yes as well as Otto German, but Dennis Muhammad said no. Dennis Muhammad said that he would rather have attended a HBCU instead of the college of Charleston, he said he would possibly encourage the next generation of black students to attend CofC if the school was more devoted to representing the
population and culture that makes Charleston such a wonderful city. He claims that he hasn’t seen much proof that CofC is dedicated to enhancing the college experience for its black students, thus the answer to the second question is also a “no.” The response given by Dennis Muhammad demonstrates just how different his time at CofC was from Otto German, my cousin, and other black student alumni. It results show just how differently the color of someone’s skin can affect your experiences in life.

243. The Mother Teresa of the Sea Island
Student Presenter: Qynn Woodberry-Gadson
Faculty Mentor(s): Dr. Valerie Frazier

For my project, I have chosen to focus on the extraordinary life of my grandmother, Linda Dingle Gadson. My grandmother is a historic figure who has seen as well as experienced events such as Jim Crow Laws, segregation, and much more. She has experienced so much so I decided to research her life and use a series of first hand interviews with her. My grandmother learned so much during her college years, not realizing she was making history and a legacy for the future generations to come. My grandmother graduated from CofC in 1972, becoming the first African American woman to graduate from this institution. With her working at MUSC during the time of the hospital strike and going to CofC during the first years of desegregation, she became a changemaker and was able to meet people of different ethnicities and gain a global perspective of the world. These lessons then guided her future career, which was becoming the executive director of the non-profit Rural Mission. She was there for 47 years but served as the executive director for 37 years from 1982-2019, helping residents find resources for food and housing. She was named The Mother Theresa of the Sea Islands by a local newspaper and won the Order of the Palmetto in 2010, the highest Civilian honor in the State of South Carolina. I am truly inspired and proud to follow in her footsteps.

HONORS COLLEGE ENTREPRENEURSHIP LIVING LEARNING COMMUNITY

244. Does Sustainability (ESG) Really Matter in the Automotive Global CESIM challenge?
Student Presenter: Kate Schmiege
Faculty Mentor(s): Lancie Affonso

No longer a buzzword, sustainability has become a critical component of today’s business education. Many automotive companies have in the last decade made efforts and commitments to a greater push for sustainability practices within their industry. In 2025 BMW made a large announcement in relation to their ESG goals that they were pushing to have completed by 2025. Are College of Charleston students in international management entering the workforce with the mindset that ESG really matters? Cesim Global Challenge is an educational business game simulation that improves learners’ understanding of the global business operations of an automotive firm in a dynamic, competitive environment. Students need to develop a proper marketing strategy, taking into account their own capabilities and market position, the potential statutory regulations, tariffs, market signals and the strategies of their competitors. While sustainable efforts are discussed- this project will explore the data to see if student groups prioritize ESG and project if they will still remain financially successful if they do.
245. Veteran Affairs vs House Robbers
Student Presenter: Henry Courtney
Faculty Mentor (s): Lancie Affonso
Additional Authors: Brogan Adams, Ryan Leigh, Omani Marshall

This project will examine how the Department of Veterans Affairs had the data of over 26 million individuals breached in 2006. We will explore what security measures were in place at the time in order to understand how it was possible for the data to become vulnerable in the first place. We will discuss measures that the Department of Veterans Affairs has taken over the years in order to prevent data breaches like this one and discuss how they have or have not improved their security. Our goal is to emphasize the importance of encryption and strict security policies when it comes to protecting the data of millions of individuals.

246. How Target Was Targeted
Student Presenter: Luca Barranco
Faculty Mentor (s): Lancie Affonso
Additional Authors: Heidi McKay, Makayla DeMaria, Devin Lamontagne, Ryan Begley

In our project, we will analyze the Target Data Breach, which occurred in 2013. This data was breached through a form of social engineering called phishing. Phishing is the practice of sending an email or message in order to reveal personal information. The cyber attackers posed as Target’s Heating and cooling company (HVAC) through email which allowed them access to Target’s guests’ information. The fake email was the gateway that gave the hackers their access to Target’s VPN. Our team’s poster project will focus on how the hackers used the HVAC company to obtain 85% of Target customers’ private information. A company protocol to prevent a cyber-attack such as this one should include validating email addresses before clicking links. Additionally, other protocols would include securing the companies’ systems to prevent unauthorized access and responding to potential breaches in a timely manner.

247. Racial Equity in the City of Charleston
Student Presenter: David Byrd
Faculty Mentor (s): Lancie Affonso

Racial Inequities are historically linked to the history of Charleston. Charleston was a southern hub of slavery and oppression that trickled and flushed down the timeline to today. Communities like The East Side are one of the last African American and working-class neighborhoods in the city of Charleston. This data visualization project will research and display the historic inequality, creating an inequitable intersection of race and class. As a part of a new City of Charleston open data initiative, my project will explore how we visualize data relating to racial inequities that have been historically active. I will explore data from Urban Displacement, Charleston Neighborhood Change Index, and Social Vulnerability. Our Race Equity and Inclusion (REI) project will also visualize an important narrative that guides you through history, complimenting the data analytics from secondary sources.

As referenced, certain communities, like the East Side, will be displayed and studied. The cultural and demographic composition of the East Side is significant but not dissimilar when compared to other communities in growing metropolitan areas. What is lost is the cultural strength that comes from a **Sustainability-themed project**
tight-knit community of people who have a shared experience. This EXPO will visualize this shared experience.

248. **Sentiment Surrounding ChatGPT**
Student Presenter: Isaiah Kahn
Faculty Mentor (s): Lancie Affonso

ChatGPT is a powerful tool that is changing the way people work. Artificial intelligence is closing in on revolutionizing how most industries operate, and people are reacting differently to this issue. The goal of this project is to quantify sentiment, display opinions and set a foundation for how to approach ChatGPT’s integration into society. Data will be collected using code that searches Twitter for tweets containing the term ChatGPT. Data will be consolidated and organized to allow insights to be made using business intelligence tools. The desired result will accurately map out social-media based sentiment directed towards ChatGPT in a way that clearly explains how people feel about it. Producing the most used words within segmented opinions will add context and help illustrate the “why’s” behind people’s views. We are currently at the beginning of a new technological era, and it is increasingly important to understand and consider emotions and attitudes among the general population.

249. **Understanding the Value of Mentorship Within the Financial Services Industry**
Student Presenter: Jody Bell
Faculty Mentor (s): Lancie Affonso

The financial services industry has always been “traditional” by nature. In the early 2000’s-2010’s the boom of start-up culture spread to nearly every corporate industry; consulting firms brought in ping pong tables, t-shirts replaced suits, and backpacks became the new briefcases. Yet, this didn’t ring true for finance - notably investment banking - which, upon a quick google search of “investment banking culture”, pulls up results such as “boys club”, “frat culture”, and pictures of primarily men in suits. Yet, with the long overdue recognition of disproportionate representation of minorities in corporate America, the financial service industry is realizing that they must truly undergo a cultural change and be innovative to do so. Initial strides to do so started within HR and ensuring female/racial minority representation; yet without a cultural revolution the turnover rates for these traditional underrepresented employees was incredibly high. Now, the financial services industry must confront the fact that ensuring both representation and retention of valuable DEI employees requires a true cultural revolution – and mentorship is the key to establishing just that.

250. **Internship Success: what makes students ideal candidates?**
Student Presenter: Troy Brennan
Faculty Mentor (s): Lancie Affonso

The goal of the project is to look at the traits, skills, and experiences that students develop during their pre-professional career that make them a highly sought after candidate during the job application process. This entails researching what companies look for when they are hiring a student, identifying what university students and faculty deem important when they are pursuing a degree, and discovering outside resources that benefit students the most. Additionally, we will examine what the student does within the organization they are hired at and how success is measured at that level. Building a system for this data to be tracked and monitored per student is a goal that would help each student figure out...
what high-priority skills they are able to use to have better early career success. We hope to share the results with the College of Charleston’s Student Success Center and Career Center to better align our students' experiential learning with what companies are looking for.

251. Is the United States’ MLS (Major League Soccer) a retirement league?
Student Presenter: Jack Hyland
Faculty Mentor (s): Lancie Affonso
Additional Authors: Will Dalton

Many stars have joined an MLS club after playing for top clubs in Europe, emphasizing the thought that the MLS is not a top league in the world due to the age of the foreign stars competing. Even if not already there, the world’s best have expressed a desire to finish their careers in the MLS. The best talent from the United States also seeks playing time abroad, leaving their home league for a more competitive environment.

Using a database on WhoScored.com, which analyzes players’ performances based on over two hundred raw statistics, we aim to find a correlation between age and performance rating on the field. Using this past season’s data, we will record every player’s performance rating per team and will set regulations as to what is considered a valid player. For this experiment, any players under fifteen performances in that season will not be considered due to the lack of playing time and impact on performance rating. We will use a spreadsheet to sort the player data and will use Tableau to visualize our findings. Our aim is to determine if the MLS is a retirement league using player statistics and age.

252. Using ArcGIS StoryMaps for Charleston Flood App
Student Presenter: Julia Kempton
Faculty Mentor (s): Lancie Affonso

The day-to-day lives of citizens in the South Carolina Lowcountry are routinely disrupted by unpredictable tidally induced and rainfall flooding. This poster is part of a South Carolina Sea Grant-funded project that aims to construct a web and mobile application that can be used by citizens of the Lowcountry to track real-time flooding in their area. Over the last couple years, undergraduate researchers on the project made significant contributions to the application by building a data pipeline in Python to retrieve real-time tide data for use in the app, developing a shell and methodology for presenting the tidal inundation data to the public, and creating a robust rainfall runoff model for the region.

As part of an SSM grant, we are exploring how to use a variety of application development tools and the StoryMaps feature of ArcGIS Online to code the applications, work on the user experience, and chronicle the process through which the team created the app. StoryMaps allow users to combine maps with narrative text and multimedia content to form a cohesive story. The researcher aims to develop a StoryMap that documents the app’s development process and tells a compelling story about flooding in Charleston. Together with the maps and analysis tools developed by the rest of the research team, this StoryMap will provide a way for the Charleston region to better understand where, when, and why flooding is occurring. In the future, this StoryMap may also be used for the City of Charleston Open Data Initiative.
253. Zero Day: When Hoarding Secrets Goes Wrong
Student Presenter: Henry Keefer
Faculty Mentor (s): Lancie Affonso
Additional Authors: Luis Aguilar Garcia, Tia Li, Holden Moore,

Zero days are software vulnerabilities unknown to the vendor that, in worst-case scenarios, can be found by hackers, sold on the black market, or potentially collected in secret and turned into exploitative software. EternalBlue was an example of a zero day developed by the National Security Agency (NSA) that used an unknown vulnerability in the Windows OS five years before Microsoft was made aware of the issue. Subsequently, the WannaCry attack in 2017 utilized EternalBlue after it had been leaked from the NSA. In this project, we will construct a general timeline of how a zero day goes from a vulnerability to a full-scale cyberattack, as well as showcase the real-world damages caused by amassing these dangerous secrets rather than reporting them to the vendors for patching through the case study of EternalBlue.

254. Equifax gets Equihacked
Student Presenter: Eric Montiel
Faculty Mentor (s): Lancie Affonso
Additional Authors: Jack Rollins, Luke Noble, West Harrell

In May of 2017, Equifax servers were breached and caused the data of 145 million Americans to be stolen. This was the result of the inexcusable failure of Equifax’s security team to patch a critical vulnerability that was available to them for 3 months. We will discuss how this vulnerability allowed hackers to easily infiltrate and steal information from mid-March to July 29. Equifax’s negligence in vulnerability management when entrusted with citizens’ personal and credit information is a grim reminder to companies and individuals to stay up to date in their security measures. This project intends to further research the ramifications of the attack on Equifax. Not only will we discuss the events that took place at Equifax, we will also note the importance of having an effective response plan and evolving software in the event of an attack.

255. Spear Phishing - Not the Fun Kind
Student Presenter: Jonathan Neideigh
Faculty Mentor (s): Lancie Affonso
Additional Authors: Jeremy Mueller, Brooke Weaver, Clayton Nestor

We seek to research and understand the concept of social engineering while diving further into the capabilities and prevention methods of spear phishing. Social engineering is the use of deception in an effort to manipulate personal information out of someone with the intent of performing fraudulent actions. Spear phishing, a type of social engineering, is a targeted attack on a specific individual or company, in which the goal of the attacker is to obtain confidential information. In September of 2022, Uber was attacked through the use of spear phishing tactics including the manipulation of an employee. The attacker was able to convince the employee to give them sensitive information to gain access to Ubers’ internal systems. Within this analysis, we will explain further, this attack, and analyze how this was executed, while also depicting how spear phishing attacks can be prevented and controlled in the event this happens to you. Understanding spear phishing attacks and prevention methods can help mitigate any vulnerabilities one might have making them a target.
256. *Improving NOAA High Tide Predictions Using Python*  
Student Presenter: Angela Nganga  
Faculty Mentor(s): Lancie Affonso  
Additional Authors: Juliana Martel (South Carolina Governor's School for Science and Mathematics)

Flooding is a common problem for residents in the Lowcountry. The goal of this project is to provide useful tide predictions for the South Carolina Sea Grant Consortium-funded Flood Map Application project. This app, which is currently in preparation, will utilize accurate flood predictions based on high tides developed for the Charleston area. This technology can be used for the entire SC coast, except that the app assumes Charleston as the time reference for all the high tides across SC. Using tide data from the National Oceanic and Atmospheric Administration (NOAA) site and the Hohonu tide monitoring site, an evident time shift was seen across all the tide gauges along the coast. To make tide predictions, regression analysis was performed to determine which factors affect the time shift in the high tides. Using this analysis, a model was made and was very accurate for inland locations. Therefore, this model is limited to locations similar to the ones used for the analysis. In the future, separate models can be made for different zones along the coast to provide accurate predictions.

257. *Combining genetics and data science to predict disease*  
Student Presenter: Aiden Camilleri  
Faculty Mentor(s): Lancie Affonso  
Additional Authors: Bo Dwyer

In the University of South Carolina Big Data Health Science Case Competition, our team was given a dataset of 63,856 gene expressions from 4,000 patients. With this data, our team divided the patients in two groups: one where the patients were affected with an ailment the other where the patients were not. After cleaning the data, initial exploratory data analysis, and pruning the data based on the results, our team used two dimensionality reduction algorithms, principal component analysis and t-stochastic neighbors embedding, to reduce the over 600 dimensions to 2 dimensions. After the dimensionality reduction, the data divided itself into two groups that our team then clustered with K-means clustering, creating one healthy group and another unhealthy group. Then, to find the genes that were most important to the classification, our team fit a random forest classification model to the clustered data and extracted the feature importance. The features with the highest importance correspond to the genes that caused the classification, thus being the most likely causes of the ailment. By cross-checking the most important genes with the gene database, our team predicted a diagnosis by seeing the locations where the genes were most commonly expressed.

258. *Worms in Warfare: How Stuxnet Sabotaged Iran’s Security*  
Student Presenter: Ana Decena  
Faculty Mentor(s): Lancie Affonso  
Additional Authors: Brad Ullrich, James Cox, Jordan Paugh

Cyber warfare is a series of cyber-attacks against a nation-state. These attacks may attempt to steal information, spread propaganda, or sabotage infrastructure. Some of the tools used in the attacks are malware, such as viruses or worms. Computer worms are a type of self-replicating, stand-alone malware. Stuxnet is a computer worm used to sabotage Iran’s nuclear program throughout the late 2000s and early 2010s. Uniquely, it was the first offensive cyber weapon specifically designed to inflict
damage on equipment in the real world. This project demonstrates how the Stuxnet worm operated and infiltrated the system while also examining the ethical aspect of using worms.

259. Leaving the Real World to Enter a Virtual One...
Student Presenter: Grace Strauss
Faculty Mentor (s): Lancie Affonso
Additional Authors: Emma Kate Beard, Margaret Kimery, Julian Feliciano

Technology for the Metaverse has expedited since the beginning of the pandemic due to the need for social interaction in a socially distanced world. The Metaverse is a digital alternative reality, created by Mark Zuckerberg through Meta. The Metaverse is a decentralized database, owned by all the individuals who use the platform, rather than one owner. Due to this decentralized technology, there is no one responsible for its regulation. This is where cyber security breaches reveal themselves. We aim to inform the general public of these cybersecurity threats and why the infancy of the Metaverse is a breeding ground for new thoughts on how we protect our privacy and data. Our particular focus within this project will be on current and hypothetical threats inside the Metaverse and what can be done to stop them.

260. Data Analysis of the Environmental Benefits of E-Bike Shares
Student Presenter: Gabby Stubbs
Faculty Mentor (s): Lancie Affonso

E-Bike shares have introduced a new sustainable form of transportation into the downtown Charleston area. These bikes provide a low emission alternative to driving or taking the bus while also providing a moderate intensity form of exercise. This project seeks to analyze data from the e-bikes to illustrate the environmental benefits of the program for Charleston and the CofC campus. Thus far, data on a past conventional bike share in the area has been obtained and studied. The data was cleaned and analyzed to determine carbon emission output of each trip. This data was then used to simulate the emissions equivalent had these trips been taken by e-bike or car to compare the differences between these methods of transportation. Currently, we are waiting to obtain data from the e-bike company that is currently used in Charleston. We submitted a data proposal that has been accepted, and this information will help us further study the environmental benefits of e-bikes. At the completion of this project, we would like to showcase these benefits using data visualization tools. This can be used to advocate for the use of e-bikes on our campus in the future.

261. Visualizing Charleston: A Deep-Dive into the Charleston Open Dataset
Student Presenter: Jennifer White
Faculty Mentor (s): Lance Affonso

Free access to data is becoming a right and responsibility of governments as we continue through the century. This visualization project will explore the Charleston Open Dataset, the City of Charleston's public platform for exploring and downloading open data, discovering and building apps, and engaging to solve important local issues. Citizen scientists can analyze and combine Open Datasets using maps, as well as develop new web and mobile applications. The website is highly interactive and organized. Using their given titles and divisions, such as storm water, transportation, zoning, and racial equity, I plan on showing the importance of each division and what it makes for Charleston. I want to present research
on how the dataset was founded and show how the city implements such data. I also want to present how they plan on making this data useful to the population of Charleston. The goal of such an endeavor is to begin to solve important local issues. I want to study how this is progressing, and if there are any changes that could be made.

262. The Cyber Attack on GitHub  
Student Presenter: Larissa Joklik  
Faculty Mentor (s): Lancie Affonso

GitHub is a popular website where coders from around the world share and post their code. It can also be utilized as a way for teachers to collect coding work from their students and grade it efficiently. GitHub was a target of a large Distributed Denial of Service (DDoS) attack in February 2018. A DDoS attack is when a targeted server network is overloaded, denying the network services to people trying to use them. During the attack, the bit rate reached 1.3 Terabits while sending data packets at a rate of 126.9 million per second. This is an example of a Memcached DDoS attack. This type of attack is when the attacker executes a large amount of data to the weak point of a server, then creates an imitation of the server of the targeted network. The Memcached server would try to clear the network traffic, however, it ultimately crashed. The attack on GitHub only lasted twenty minutes. This may not seem like a long time; however, this caused a lot of damage to the servers. It took GitHub over a year to repair the damage from the attack. Our project will focus on investigating ways to prevent attacks like this in the future.

263. Guardians of Kim VS Sony Entertainment  
Student Presenter: Luke Burton  
Faculty Mentor (s): Lancie Affonso  
Additional Authors: Dylan Walthall, Josh Griffith, Luke Burton, Patrick Sanders

Sony Pictures Entertainment was hacked in November 2013 by a cybercriminal group called “The Guardians of Peace”, who are believed to be in some way affiliated with the government of North Korea. They began a phishing campaign through emails directed to key members of Sony staff which eventually granted them access to Sony databases. The breach cost Sony 35 million dollars in legal fees and restitution. We will discuss how companies can prevent similar data breaches by increasing awareness about phishing, limiting personnel with access to sensitive information, and compartmentalizing data storage into separate systems.

264. Facebook Immune System  
Student Presenter: Jala Stroud  
Faculty Mentor (s): Lancie Affonso

For our project, we intend to explore Facebook’s very own Intrusion Detection System, entitled Facebook Immune System (FIS). This social networking site that makes it easy to connect to friends and families via posts, photos, etc. has one of the safest cybersecurity systems in the world to help fight cyberattacks. The FIS check every post and actions to detect suspicious links and patterns of weird behaviors, aiming to be one of the safest social media platforms. We would like to go into detail about the three-year process of creating this software, and its advantages and disadvantages.
265. HPC Cluster Research and Development for SCGIS Laboratory
Student Presenter: Blake Mitrick
Faculty Mentor (s): Dr. Norman Levine and Lancie Affonso
Additional Authors: Kyle Barreto

Flooding in Charleston is a major problem and is only increasing in prevalence as the sea level continues to rise. The Santee Cooper GIS (SCGIS) and Remote Sensing Laboratory is currently developing an application that utilizes a computer-based tool that incorporates the National Oceanic & Atmospheric Administration (NOAA) Charleston Harbor tide gauge, both real-time and predictive rainfall data from the NOAA National Weather Service, and rain flow simulations in order to predict flooding across Charleston County. This project seeks to create tools allowing the laboratory to utilize a high-performance computing (HPC) cluster in order to run the highly resource-intensive algorithms needed for the development of the SCGIS flood-predicting application.

266. Business Impacts of Flooding in Charleston, SC  🪖
Student Presenter: Maddie Carrino
Faculty Mentor (s): Lancie Affonso and Dr. Norm Levine
Additional Authors: Callie Wilks

Charleston, SC is prone to flooding due to its topography, tidal cycles, and high precipitation rates. The Army Corps of Engineers aims to mitigate coastal storm surge and flooding risks by building a perimeter storm surge wall around the Charleston peninsula. We aim to investigate the business impacts of flooding in Charleston, utilizing the Army Corps’ proposed surge wall as a potential solution. The impact of this perimeter storm surge wall will be investigated through the lens of need-based entrepreneurship, allowing us to have a better understanding of how entrepreneurial opportunities arise from flooding, as well as how businesses are directly and indirectly impacted by flooding. A holistic understanding of the causes and effects of flooding in Charleston, SC, while utilizing the Army Corps of Engineers study as a reliable solution, will provide Charleston business owners and entrepreneurs with a newfound understanding of the opportunities that lie in the still flood waters. From this project we aim to quantify and explain both the business impacts and entrepreneurial opportunities resulting from flooding in Charleston, SC.

267. Does the study of music improve academic performance? 🎻
Student Presenter: Lily Kirkland
Faculty Mentor (s): Lancie Affonso
Additional Authors: Katie Horton

This project will analyze the correlation between students’ academic performance and whether they play an instrument. Playing an instrument not only demonstrates self-discipline and determination, but many studies have shown that playing an instrument improves physical, mental, and emotional performance. We will be expanding upon the results of a study done in 2019 at the University of British Columbia that found “high schoolers enrolled in at least one musical course score significantly higher than their non-musical peers on English, math, and science exams” (Anderer). This heightened performance was directly correlated with the fact that these students studied music. Peter Gouzouasis, the study’s lead author, explained that “on average, the children who learned to play a musical instrument for many years, and were now playing in high school band and orchestra, were the
equivalent of about one academic year ahead of their peers”. Inspired by this fact, this paper will expand on the positive correlation as the more discipline one has in playing an instrument, the more discipline will carry over to other aspects of their life such as their academic career.