2023 URC Abstract Book

UNC CHARLOTTE

URC

UNDERGRADUATE RESEARCH CONFERENCE

April 25th, 2023

Popp Martin Student Union

OFFICE OF UNDERGRADUATE RESEARCH UNC CHARLOTTE

UNIVERSITY OF NORTH CAROLINA CHARLOTTE

URC 2023

Welcome to the 2023 UNC Charlotte Undergraduate Research Conference (URC)! The URC 2023 is brought to you by UNC Charlotte's Office of Undergraduate Research (OUR). The URC reflects one of the goals of the OUR, which is to support undergraduate students through opportunities to communicate their research to the wider community. A big thank you goes to Academic Affairs, the Honors College, the Levine Scholars Program, the Mu Chapter of the Phi Beta Delta (PBD) Honor Society for International Scholars, the Phi Kappa Phi (PKP) Honor Society, and urbanCORE for sponsoring the awards that are part of the URC 2023.

The Undergraduate Research Conference would not be possible without the commitment of our UNC Charlotte faculty. The conference has a strong representation from faculty members who participate as research advisors, mentors, and judges. The URC also represents the dedication of UNC Charlotte's staff and graduate students, who participate as mentors and judges. A big thank you to all of you for your service and dedication to undergraduate research and scholarship at UNC Charlotte! Likewise, special recognition goes to the conference organizing committee, the staff in the Office of Undergraduate Research, and the student leaders who all played integral parts in the planning for URC 2023. Most of all, please join us in congratulating our undergraduate researchers for their hard work and efforts! Now engage in the conference presentations, take pictures, and use the #NinerURC23 to share your URC moments on social media.

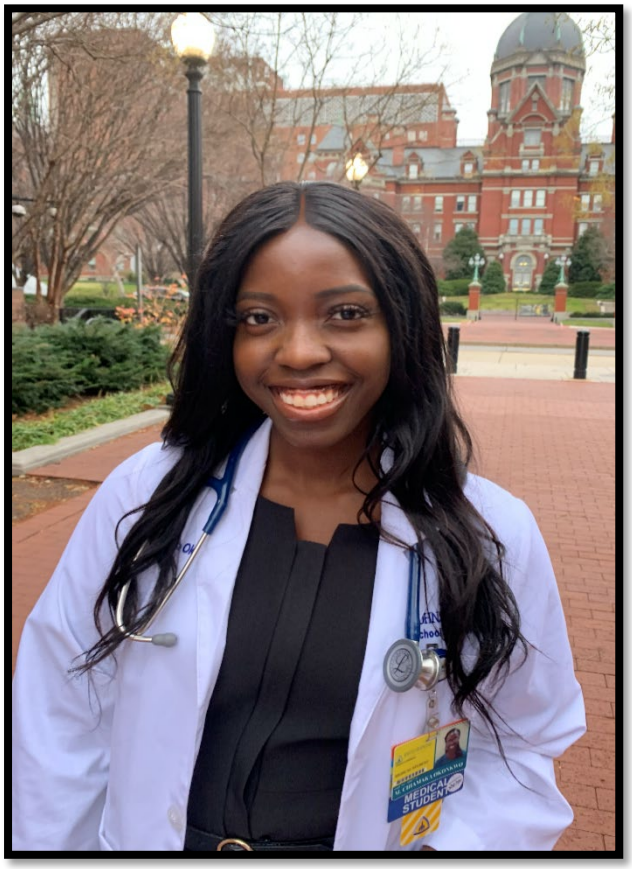
Enjoy your day!
Dr. Erik Jon Byker, Faculty Fellow in the Office of Undergraduate Research and Chairperson of the URC 2023 Organizing Committee

URC 2023 Organizing Committee Members

Dr. Erik Jon Byker, Chair; Cato College of Education, Office of Undergraduate Research
Ms. Sarah Hedrick, Administrative Assistant, Office of Undergraduate Research
Ms. Kirsten Gade, Graduate assistant, Office of Undergraduate Research
Ms. Kathryn Brinegar, Undergraduate Assistant, Office of Undergraduate Research
Dr. Abasifreke Ebong, William States Lee College of Engineering
Dr. Colleen Hammelman, College of Liberal Arts and Sciences
Dr. Diane Zablotsky, Director of the Levine Scholars Program
Dr. Jeffrey Leak, Honors College
Dr. Luke Donovan, College of Health and Human Services
Dr. Mohsen Dorodchi, College of Computing and Informatics
Dr. Tamara Johnson, Academic Planning and Analysis, Office of the Provost
Mr. Ryan Harris, J. Murrey Atkins Library
Mr. Aaron Nance, Doctoral student, Cato College of Education
Student Leadership Team:

Christian Fuselier	Rayney Maxwell	Karlee McMullen
Nicole Wiktor	Samantha Webb	Zoe Parson

Featured Alum Keynote Speaker



Keynote Speaker: Chiamaka Okonkwo

Chiamaka Okonkwo is a Levine Scholar and an alumna of the University of North Carolina at Charlotte from Gastonia, North Carolina. She graduated from UNCC in 2021 with Bachelor of Arts degrees in Biology and in Spanish. Now based in Baltimore, Chiamaka is a rising third-year medical student at the Johns Hopkins University School of Medicine. She credits her undergraduate experience at Charlotte for providing her first forays into translational research that bridges medicine and public health, an interest that she has continued to pursue through research within the Johns Hopkins Hospital Department of Cardiology. She is also deeply energized by work in social justice and advocacy through student organizations such as the Student National Medical Association (SNMA) and Students for a National Health Program (SNaHP). In her free time, Chiamaka enjoys roller skating at the local rink and going on hikes in beautiful places.

URC 2023 Awards and Sponsors

Disciplinary Theme Awards for oral and poster presentations	**Community-Engaged Research Awards**	**Honors College Awards**
Mu Chapter of Phi Beta Delta Global Research Award	**Phi Kappa Phi Award**	**Sustainability Research Award**

URC 2023 Schedule

Tuesday, April 25, 2023, in the Popp Martin Student Union

8:30 AM: URC 2023 Registration opens outside of the 340 Ballroom

9:15 AM – 10:00 AM: Opening Ceremony and Keynote Speech in the 340 Ballroom

Dr. Erik Jon Byker, Chair of URC 2023

Dr. Patrick Madsen, Associate Dean

Keynote Video by Chiamaka Okonkwo, UNC Charlotte Alum and Levine Scholar

Live Q&A with Chiamaka Okonkwo

10:30 AM – 1:00 PM: Oral Presentation Sessions

Session A: Arts, Design, and Algorithms – Room 262

Session B: Health and Social Sciences – Room 263

Session C: Humanities – Room 264

Session D: STEM 1 – Room 265

Session E: STEM 2– Room 266

Session F: STEM 3 – Room 267

10:15 AM - 1:45 PM: Poster Presentation Sessions

10:15 AM – 11:15 AM: Poster Session A in the 340 Ballroom

11:30 AM – 12:30 PM: Poster Session B in the 340 Ballroom

12:45 PM – 1:45 PM: Poster Session C in the 340 Ballroom
*****At the conclusion of this poster session, please breakdown the easel and put it in the easel box. Thank you.

2:15 PM – 3:00 PM: Closing Ceremony and Presentation of Awards*

Dr. Erik Jon Byker, Chair of URC 2023

Mahita Sadula, Honors Student, Class of 2023

Dr. Pinku Mukherjee, Associate Provost & Dean of the Graduate School

Presentation of URC 2023 Awards

*At the conclusion of the Awards Ceremony, we asked that all winners remain in the 340 Ballroom for further instructions about group pictures. Much thanks to Kat Lawrence for providing photography for URC 2023.

Oral Presentation Session A: Arts, Design, and Algorithms
Room 261
Popp Martin Student Union

10:30 AM: Abstract #900 - Tan & Gold: The Decorated Bodies of Precolonial Filipinos by Jonah Sanderson; Faculty Advisor: Dr. Jae Emerling;
Disciplinary Theme: Arts and Design

10:45 AM: Abstract #901 - Mariachi: The History Behind the Genre by Natalia Furman-Felix; Faculty Advisor: Dr. Jay Grymes; Disciplinary Theme: Arts and Design

11:00 AM: Abstract #902 - Frequency Domain Analysis of Fine and Inexpensive Violins by Moosa Azfar; Faculty Advisor: Dr. Jay Grymes;
Disciplinary Theme: Arts and Design

11:15 AM: Abstract #903 - The Importance of Recognizing Maria Greve by Juan Crisostomo; Faculty Advisor: Dr. Jay Grymes;
Disciplinary Theme: Arts and Design

11:30 AM: Abstract #904 – Black Women in Music by J'aimee Tatum; Faculty Advisor: Dr. Jay Grymes; Disciplinary Theme: Arts and Design

11:45 AM: Abstract #905 - The Bold, The Bad, and The Usually Ugly: Character Tropes of an Operatic Basses by Zachary Voigt; Faculty Advisor: Dr. Jay Grymes; Disciplinary Theme: Arts and Design

12:00 PM: Abstract #919 – Spotify for You Algorithms by Lee Caesar; Faculty Advisor: Dr. Jay Grymes; Disciplinary Theme: Math and Computer Science

12:15 PM: Abstract #920 - Rank Minimization Methods for Completion of Irregularly Sampled Integer Sequences by Ethan Nguyen; Faculty Advisor: Dr. Christian Kuemmerle; Disciplinary Theme: Math and Computer Science

12:30 PM: Abstract #921 – Accelerated Matrix ILRS by Nicholas Cassarino; Faculty Advisor: Dr. Tyler Allen; Disciplinary Theme: Math and Computer Science

Oral Presentation Session B: Health and Social Sciences
Room 262
Popp Martin Student Union

10:30 AM: Abstract #907 - A Policy Recommendation for the Lack of Access to Prenatal Genetic Counseling and Testing in the United State by Caitlin Buggeln; Faculty Advisor: Miss Deborah Beete; Disciplinary Theme: Health Sciences

10:45 AM: Abstract #908 - Impact of Perfectionism on the Prevalence of the Female Athlete Triad in Collegiate Athlete by Samantha Brooks; Faculty Advisor: Dr. Joseph Marino; Disciplinary Theme: Health Sciences

11:00 AM: Abstract #909 - The Trend of HBA1C Levels Pre and Post Pandemic by Sam Webb; Faculty Advisor: Dr. Trudy Moore-Harrison; Disciplinary Theme: Health Sciences

11:15 AM: Abstract #910 - The Best Practices for Teaching Cultural Competencies to Emergency Room Staff by Kayla Hensley; Faculty Advisor: Dr. Monica Rodriguez; Disciplinary Theme: Health Sciences

11:30 AM: Abstract #911 – A Study into Gut Microbiome and Major Depressive Disorder by Abby Brewer & Jessica Toukmaji; Faculty Advisor: Dr. Melinda Adnot; Disciplinary Theme: Health Sciences

11:45 AM: Abstract #946 - Urban Policy and Its Effect on National Division by Alexander Toback; Faculty Advisor: Dr. Melinda Adnot; Disciplinary Theme: Social Sciences

12:00 PM: Abstract #947 – Mental Health Outcomes from Participation in Club Sports Among Female College Students by Gabrielle Ruiz; Faculty Advisor: Dr. Megan Smith; Disciplinary Theme: Social Sciences

12:15 PM: Abstract #948 - Investigating the Factors that Influence the Political Ambitions of College Students, with a Focus on Differences in Gender by Emma Wakeman; Faculty Advisor: Dr. Mary Jo McGowan; Disciplinary Theme: Social Sciences

12:30 PM: Abstract #949 - Shamed into Pain: Correlating Christian Influence During Developmental Years and Symptoms of Vaginismus by Sarah Gravesen; Faculty Advisor: Dr. Hannah Peach; Disciplinary Theme: Social Sciences

12:45 PM: Abstract #906 - Perceived Impact of Communication Consultant on Personal and Student Development by April Godfrey, Aylha Pferschy, and George Ade Fru; Faculty Advisor: Dr. Heather Bastian; Disciplinary Theme: Education & Communication

Oral Presentation Session C: Humanities
Room 263
Popp Martin Student Union

10:30 AM: Abstract #912 - Establishing Systematic Speculation on the Future of Taiwan by James Citrin; Faculty Advisor: Dr. Cheryl Brown; Disciplinary Theme: Humanities

10:45 AM: Abstract #913 - Scholarly Shift Towards the Victimized Portrayal of Women Accused of Infanticide in Eighteenth-Century Germany by Mac Bryant; Faculty Advisor: Dr. Amanda Pipkin; Disciplinary Theme: Humanities

11:00 AM: Abstract #914- *La Casa De Las Flores*: A Case Study of Queer Latinx Representation in Millennial Telenovelas by Eric Phann; Faculty Advisor: Dr. David Dalton; Disciplinary Theme: Humanities

11:15 AM: Abstract #915 - Ayni and Camay: Viewing the Inca World Through Two Ritual Objects by Celia Castaldo; Faculty Advisor: Dr. Jeremy George; Disciplinary Theme: Humanities

11:30 AM: Abstract #916 - Butsudan: Modes of Prayer in Japanese Religion by Harrison Wiygul; Faculty Advisor: Dr. Alexandra Kaloyanides; Disciplinary Theme: Humanities

11:45 AM: Abstract #917 - “A Madde Marriage”: Early Contemporary Readership of the Taming of the Shrew in the Meisei Folio by Mary-Catherine Berger; Faculty Advisor: Dr. Kirk Melnikoff; Disciplinary Theme: Humanities

12:00 PM: Abstract #918 - Broken Social Structures: The Carcinogens of André Giroux’s Le Gouffre a Toujours Soif by Joseph Thompson; Faculty Advisor: Dr. Allison Stedman; Disciplinary Theme: Humanities

Oral Presentation Session D: STEM 1
Room 265
Popp Martin Student Union

10:30 AM: Abstract #922 - Light Assisted Drying of Therapeutically Relevant Volumes by Gunnar Olson & Anteneh Tsegaye; Faculty Advisor: Dr. Susan Trammell; Disciplinary Theme: Science, Technology, Engineering

10:45 AM: Abstract #923 - Green Fluorescent Protein as a Correlator to Long Term Oncolytic Viral Replication in Pancreatic Cancer Cell Lines by David Khakhutashvili; Faculty Advisor: Dr. Valery Grdzelishvili; Disciplinary Theme: Science, Technology, Engineering

11:00 AM: Abstract #924 - Understanding the Role of the Ras/MEK Pathway in the Permissiveness of Pancreatic Cancer Cell Lines to Oncolytic Vesicular Stomatitis Virus by Dan Langdon; Faculty Advisor: Dr. Valery Grdzelishvili; Disciplinary Theme: Science, Technology, Engineering

11:15 AM: Abstract #925 - Superposition Effects of Complex Wavefunctions in Bohmian Mechanics by Ethan Keller; Faculty Advisor: Dr. Donald Jacobs; Disciplinary Theme: Science, Technology, Engineering

11:30 AM: Abstract #926 - Defining Immune Profiles for Amine-Terminated Polyamidoamine Dendrimers As Carriers for Nucleic Acid Nanoparticles by Laura Rebolledo; Faculty Advisor: Dr. Kirill Afonin; Disciplinary Theme: Science, Technology, Engineering

11:45 AM: Abstract #927 - Light Activated Chlorin-e6 for the Elimination of Antibiotic Resistant Bacteria by Ashvini Dandapani; Faculty Advisor: Dr. Juan Vivero-Escoto; Disciplinary Theme: Science, Technology, Engineering

Oral Presentation Session E: STEM 2
Room 266
Popp Martin Student Union

10:30 AM: Abstract #928 - Utilizing Integrated Diet and Habitat Use Biomarkers for Fish Life History Reconstruction by Kathryn Brinegar; Faculty Advisor: Dr. Paola López-Duarte; Disciplinary Theme: Science, Technology, Engineering

10:45 AM: Abstract #929 - Energetic Pathways and Trophic Diversity Among Macroinvertebrate Communities in Saltmarshes by Yuleny Gomez Rodriguez; Faculty Advisor: Dr. Paola López-Duarte; Disciplinary Theme: Science, Technology, Engineering

11:00 AM: Abstract #930 - The First Step to Phage Therapy in the Burkholderia cepacia Complex by Niyati Danda; Faculty Advisor: Dr. Todd Steck; Disciplinary Theme: Science, Technology, Engineering

11:15 AM: Abstract #931 - Introduction of λ red protein pKaKa5 plasmid into Burkholderia Species by Joanna Najjar; Faculty Advisor: Dr. Todd Steck; Disciplinary Theme: Science, Technology, Engineering

11:30 AM: Abstract #932 – Dissecting the Relationship Between Pre-mRNA Splicing and DBR by Daniel Faraj; Faculty Advisor: Dr. Kausik Chakrabarti; Disciplinary Theme: Science, Technology, Engineering

11:45 AM: Abstract #933 - Telomerase Expression in the Procyclic and Bloodstream form of Trypanosoma brucei by Anastasia Lozneva; Faculty Advisor: Dr. Kausik Chakrabarti; Disciplinary Theme: Science, Technology, Engineering

12:00 PM: Abstract #934 – Cytosolic Nucleic Acid Receptor-Mediated Detection of Staphylococcus aureus Contributes to Protective Interferon Responses in Murine Osteoblasts by Mary-Kate Key; Faculty Advisor: Dr. Samantha Suptela; Disciplinary Theme: Science, Technology, Engineering

12:15 PM: Abstract #935 - p53 in the DNA Damage Response by Chkylle Boado; Faculty Advisor: Dr. Junya Tomida; Disciplinary Theme: Science, Technology, Engineering

12:30 PM: Abstract #936 – Understanding the Role of Hsp70 as Master Integrator of Signals from Diverse Cellular Pathways by Elizabeth Abedi; Faculty Advisor: Dr. Andrew Truman; Disciplinary Theme: Science, Technology, Engineering

Oral Presentation Session F: STEM 3
Room 267
Popp Martin Student Union

10:30 AM: Abstract #938 - IL-25 Inflammation and Breast Tumor Macrophages by Rose Almasian; Faculty Advisor: Dr. Didier Dréau; Disciplinary Theme: Science, Technology, Engineering

10:45 AM: Abstract #937 - A Novel Method to Sequentially Edit the Yeast Genome by Briggs Yoder; Faculty Advisor: Dr. Richard Chi; Disciplinary Theme: Science, Technology, Engineering

11:00 AM: Abstract #939 - NLRP3 Activation and Phagocytic Activity of Breast Tumor Macrophages by Kaitlyn Moure; Faculty Advisor: Dr. Didier Dréau; Disciplinary Theme: Science, Technology, Engineering

11:15 AM: Abstract #941 - Sexual Dimorphic Responses in Tau Aggregation Post Viral Encephalitis Infection by Kristen Minehart; Faculty Advisor: Dr. Kristen Funk; Disciplinary Theme: Science, Technology, Engineering

11:30 AM: Abstract #942 – Staphylococcus aureus Viability and Invasion Are Necessary for Neutrophil-Recruiting Chemokine Production by Infected Osteoblasts by Kirthi Kaushik; Faculty Advisor: Dr. M. Brittany Johnson; Disciplinary Theme: Science, Technology, Engineering

11:45 AM: Abstract #940 - Understanding the Impact of Force Activation of Notch on Myogenesis by Rida Zainab; Faculty Advisor: Dr. Susan Arthur; Disciplinary Theme: Science, Technology, Engineering

12:00 PM: Abstract #943 – Examining Duffy Status of Plasmodium vivax Infected Individuals by Abdulghani Obeid; Faculty Advisor: Dr. Eugenia Lo; Disciplinary Theme: Science, Technology, Engineering

12:15 PM: Abstract #944 - Investigating Copy Number Variations of Plasmodium vivax DBP1, DBP2/EBP, and RBP2b in Duffy-positive and Duffy-negative Plasmodium vivax Malaria Infections by Rei Rama; Faculty Advisor: Dr. Eugenia Lo; Disciplinary Theme: Science, Technology, Engineering

12:30 PM: Abstract #945 – Food Insecurity and Health in Mecklenburg County during Covid-19 Pandemic by Mariam Jaliawala; Faculty Advisor: Dr. Nicole Peterson; Disciplinary Theme: Science, Technology, Engineering

ORAL PRESENTATIONS

Abstract #: 900

Title: Tan & Gold: The Decorated Bodies of Precolonial Filipinos

Student Author(s): Jonah Sanderson **G, H**

Faculty Advisor: Dr. Jae Emerling

Disciplinary Theme: Arts and Design

In colonial times, nothing was more intriguing than rumors of an overseas nation rich with expensive, luxurious, glittering gold for the taking. Imagine a culture where gold was so readily available that it was an aspect of everyday life as regular as the day's clothes. The 16th century Boxer Codex, a rice-paper manuscript of approximately 300 pages and 70 illustrations includes imagery of what these gold-rich pre-colonial Filipinos looked like to the Spanish. Fascinated with the gold ornamentations that decorated the body, the Spanish exploited many of the islands' diverse ethnic groups. Hundreds of years of trade and many years of colonization allowed Filipinos to refine their craftsmanship of gold ornamentation and revealed influences from trade with other cultures. This develops the question, how can the narrative and forms of precolonial Filipino gold be explored to reclaim a cultural identity? Using the Boxer Codex as a point of commencement, this presentation will explore specific examples of the gold body adornments illustrated on its pages with regard to aesthetics, craftsmanship, and art historical significance. This manuscript offers an element of discussion for colonization, the cause for why this culture's excellent craftsmanship has been erased from mainstream discourse. The limited scholarship from archaeologists and art historians from the Philippines will provide the information that fuels this research inquiry. Through research and aesthetic exploration, the erased history of one of the most gold-rich countries in the world will be explored and provide insights on how its art has been forgotten.

Abstract #: 901

Title: Mariachi: The History Behind the Genre

Student Author(s): Natalia Furman-Felix **G**

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Arts and Design

Mexican culture was created with a mix of the Spanish integrating with indigenous people. while preserving some of indigenous cultures the mix created what is now Mexican culture. Mexican culture is filled with food, life, traditions, dance, and music. Music plays a big role in the heritage of Mexico. Mexico produces many different genres of music such as, Banda, Norteñas, Huapango, etc. A significant genre that was established in Mexico and plays an important role in the heritage is Mariachi music. Mariachi dates back to the 19th century and has evolved over time in the countryside of various regions of western Mexico. The genre consists of instruments, which include the Guitarrón, Vihuela Mexicana, Harp, Guitar, Violin, Trumpet, and Voice. The style of voice is similar to operatic voices in Europe but also consist of lots of belting. Such performances use dancing and outfits to enhance the event. I will further analyze a mariachi piece called “La Cigarra”. The rhythm changes within the song. It is a mixture of 6/8 and 3/4 the rhythm is carried by the guitar or piano. The song consists of six stanzas all in the first person and talks about the deep sorrows of never finding true love. Mariachi has played an important role in Mexican music. The tradition the genre carries not only stays within the country but spreads to others influencing those who are curious to learn about the culture. As a performer, it is important for me to share the beautiful traditions my home country carries.

Abstract #: 902

Title: Frequency Domain Analysis of Fine and Inexpensive Violins

Student Author(s): Mooza Azfar

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Arts and Design

Based on anecdotal claims, violins that are more highly priced are often preferred over those that are not, due to their supposedly higher sound quality. While this may be true when comparing instruments in the $100 range to $10,000 range, this study will explore whether or not high priced violins are objectively better than others in a similar price range. Violins that are worth anywhere from $100 to $30,000+ will be the center of this study. Instruments in the upper echelon of the price range will be compared against each other to determine if there is any objective difference between the sound of the higher level instruments. Digital signal processing will be applied to determine objective differences in sound quality. Sound samples that are recorded with special equipment will be digitally processed and examined in the frequency domain; analysis techniques in the frequency domain used in this study include the Fast Fourier Transform (FFT) and the Short-Term Fourier Transform (STFT). Spectrograms that can visualize the frequency domain of the instruments will be created, from which the intensities of different harmonics can be observed. Having applied this frequency domain analysis, the different harmonic intensities can be cross correlated against the different qualities of wood and methods of construction of the instruments. The end result of this study will be a catalogue documenting different methods of construction and quality of material and how they impact harmonic intensities.

Abstract #: 903

Title: The Importance of Recognizing Maria Grever

Student Author(s): Juan Crisostomo

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Arts and Design

Maria Grever is a Mexican composer who immigrated to the U.S during the Mexican Revolution. Despite the racism and gender discrimination she faced, she still managed to achieve commercial success. It is important to recognize Maria Grever as an important figure in music as she is the first female Mexican composer to achieve success. In a culture where machismo and gender discrimination is common, she was able to overcome all these issues and succeeded. It is also important to recognize the success of Maria Grever because of the lack of representation that minorities have within music. By recognizing Maria Grever there is an important connection that students who are Hispanic are able to have that they normally do not. I plan on using interviews that Maria Grever gave to be able to show her success and the discrimination she faces. I also plan on using existing data on the gender discrimination that is prominent in Mexico, as well as the racism that Mexicans faced in the U.S during the Mexican Revolution. I anticipate that the results will show how incredible it is that Maria Grever was able to succeed in a world that seemed to be against her. There will be more awareness on the gender discrimination that Mexico and the U.S has had against women. I also believe that there could also be a push for more representation so that minority students can connect with these musicians.

Abstract #: 904

Title: Black Women in Music

Student Author(s): J'aimee Tatum

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Arts and Design

I want to discuss the underrepresentation of Black women in the music world and introduce an important black female musician/composer that people may not know. Her name is Florence Price. Florence Price was the first African-American woman to be recognized as a symphonic composer, and the first to have a composition played by a major orchestra. Florence Price paved the way for many African-American composers and musicians today. After graduating from high school, Florence enrolled in the New England Conservatory majoring in piano and organ. In the beginning, Florence passed as Mexican to avoid people's prejudice toward her for being an African American. After graduating from college, Florence continued to face many other adversities that came along with her womanhood and blackness. Despite those challenges, Florence Price made many accomplishments as a musician and composer. Following her death, some of her work was lost, but as more African-American and female composers have gained attention for their works, so has Price. I anticipate doing a lot of online research and reading about Florence Price and her compositions. I will be giving a lecture paired with a performance of a piece by Price and accompanied by artwork that I have made in dedication to her. The goal of my research is to bring to light the influence that Florence Price has had on music. I want to show how important representation and diversity are to music.

Abstract #: 905

Title: The Bold, The Bad, and The Usually Ugly: Character Tropes of an Operatic Basses

Student Author(s): Zachary Voigt

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Arts and Design

The topic of this research presentation will focus on the question, “why are operatic bass singers so often typecast as the same character throughout centuries of development?” I’ll be focusing on one type of character primarily, and that is the man in charge. My research will be done on two operatic arias, specifically “O Isis und Osiris” from The Magic Flute and “Prince Gremin’s Aria” from Eugene Onegin. During the research process I’ll analyze the context of the two arias, compare and contrast the themes of the characters singing them, and of course, shed some light on why a bass’s unique timber is best suited for these roles. From my research I expect to find that we (basses) are typically typecast because of the inherent power of our voices and how our general timber is similar to that of someone dictating orders, naturally making us perfect for characters in a position of authority. The two operas I’ll be referencing however, are separated by almost 200 years of development, yet the character tropes remain the same. Over the centuries it is expected that composers would have at least branched the lower voice type out of the usual but it seems that nothing can replace the inherent effect of a bass’s good low rumble. It is my hope that my research contributions will influence aspiring opera composers to consider writing roles outside of the usual tropes, and thus also influence the zeitgeist along with it.

Abstract #:906

Title: Perceived Impact of Communication Consultant on Personal and Student Development

Student Author(s): April Godfrey, Aylha Pferschy, and George Ade Fru

Faculty Advisor: Dr. Heather Bastian

Disciplinary Theme: Education and Communication

Research has found that peer mentorship can play a valuable role in a student's personal growth and development. At UNC Charlotte, the Communication across the Curriculum (CxC) program trains communication consultants to serve as peer mentors and provide one-on-one support to students within select classes. This applied research project investigates how communication consultants view the impact of their role on personal and student development. Specifically, this study asks: How do consultants perceive the impact of their role on students/peers, and how do consultants perceive the impact of their role on their own development? To answer these questions, consultants (n=47) in Fall 2022 completed an online survey consisting of Likert scale and open-ended questions that asked them to evaluate and reflect on their roles as consultants. This project uses multiple choice demographic information questions, a five-point Likert scale of agreement, and open-coding of free-response questions to categorize and determine perceived impact. While certain demographics of consultants have a higher perceived impact, consultants generally perceive their impact on their own personal development and the development of their peers to be positive and beneficial. The findings suggest that communication consultants have a favorable perception of how their work contributes to their own growth and development. Moreover, consultants express optimism about their impact on students' written and oral communication skills. These results may serve to improve the CxC program through understanding the areas in which communication consultants need encouragement and applying this knowledge in training and professional development activities.

Abstract #: 907

Title: A Policy Recommendation for the Lack of Access to Prenatal Genetic Counseling and Testing in the United States

Student Author(s): Caitlin Buggein **H**

Faculty Advisor: Miss Deborah Beete

Disciplinary Theme: Health Sciences

Genetic counseling is a rapidly growing field within healthcare, especially in the United States. The genetic counseling profession aims to provide a way for patients to understand the results of their genetic test results and discover next steps. Prenatal genetic testing utilizes two categories of testing, screening and diagnostic. If a positive result occurs, this may lead to further testing which may be better comprehended with the help of a prenatal genetic counselor. Unfortunately, many individuals are unable to seek this specialty care because of restrictions due to health insurance status. Medicaid, a public health insurance, limits access to those seeking prenatal genetic counseling due to limited coverage. These obstacles can alter decision making that patients are faced with, either before seeking care or after results are received. The mental health ramifications of the decision making process are crucial to the research of this study as well. The objective of this study is to evaluate the current problems associated with health insurance status and genetic counseling and testing. As the field expands and more people are looking to receive care related to the genetics field, the need for a change in insurance practices becomes more vital and necessary. This study will be used to create policy recommendations that serve the genetic counseling community. Some recommendations may be utilized on a smaller, individual practice scale while others may be implemented throughout the United States. These policy recommendations seek to help genetic counselors find ways to better serve their patients.

Abstract #: 908

Title: Impact of Perfectionism on the Prevalence of the Female Athlete Triad in Collegiate Athletes

Student Author(s): Samantha Brooks **G, H**

Faculty Advisor: Dr. Joseph Marino

Disciplinary Theme: Health Sciences

The female athlete triad is a metabolic syndrome that affects physically active girls and women that is made up of three interrelated components: low energy availability, menstrual dysfunction, and low bone mineral density. The triad can lead to stress fractures, irreversible bone density loss, and complications in almost all other organ systems. While much is known about physical factors that cause triad development, this isn't true for psychological factors. Perfectionism is a personality disposition focused on flawlessness and achieving high standards. Perfectionism can exist in adaptive and maladaptive ways that influence behavior. When perfectionistic strivings become maladaptive, it can cause athletes to develop an obsession over fitness, disordered eating, and overtraining, which could ultimately lead to triad development. The purpose of this study is to investigate triad risk and perfectionistic tendencies in collegiate athletes. The primary focus will be to determine if there is a correlation between perfectionist tendencies and an athlete's risk of developing the triad. This will be determined by measuring an athlete's risk for the triad using a cumulative risk tool and surveying athletes to quantify perfectionism tendencies across varying dimensions in sport. It is expected that athletes with greater perfectionistic tendencies will be at a greater risk for triad development. Findings from this study will lead to a greater understanding of the psychological role perfectionism plays in the development of the female athlete triad. These findings can also help identify behaviors that place athletes at a higher risk, allowing for triad development to be minimized.

Abstract #: 909

Title: The Trend of HBA1C Levels Pre and Post Pandemic

Student Author(s): Samantha Webb **H, S, U**

Faculty Advisor: Dr. Trudy Moore-Harrison

Disciplinary Theme: Health Sciences

BACKGROUND: An HbA1C test is a blood test performed to measure average blood glucose levels over a three month period. This study's purpose was to determine whether there was a trend before and after the coronavirus pandemic in senior citizens. METHODS: The HbA1C test was performed at the health risk assessments at West Charlotte Recreation Center. A blood sample was collected in a small blood collector after participants' finger was pricked by a lancet. It was then lightly shaken with a premixed solution and placed into the portable machine. Sample size was N=19, aged 55 and older. Average age of 75.4 before COVID, and average age of 78.4 after. All participants voluntarily participated in health risk assessments before March 2020 and after the pandemic. Differences in HbA1C levels were measured. RESULTS: Before the COVID pandemic, participants' A1C were in the normal range, or lower range of the prediabetic range. After the pandemic, the numbers were lower than before the pandemic or at the higher range of the normal range. Average A1C levels before the pandemic for those classified in the normal range=5.28, after the pandemic=5.44. Average A1C levels before the pandemic for those classified in the prediabetic range=6.34, after the pandemic=6.07. CONCLUSIONS: HbA1C testing can provide healthcare professionals with a baseline for A1C levels in senior citizens. This provides information on how to proceed with maintaining current levels or developing a plan to lower A1C levels.

Abstract #: 910

Title: The Best Practices for Teaching Cultural Competencies to Emergency Room Staff

Student Author(s): Kayla Hensley **G, H, S, NC, U**

Faculty Advisor: Dr. Monica Rodriguez

Disciplinary Theme: Health Sciences

Cultural competency in hospital settings is critical both for patient care and for overall customer satisfaction. However, when providing care, doctors, physician assistants and nurses, are not always equipped with the necessary tools for treating individuals from diverse backgrounds, cultures, ethnicities, and experiences. The literature has suggested that in environments where the administration is able to provide its employees with appropriate training, they learn to take accountability and develop skills necessary to provide quality care, which in turn enhances patient satisfaction. Cultural competency is thus particularly crucial in medical environments that cater to a large number of underserved minority populations, populations of color, and LatinX communities whose social determinants of health are a contributing factor to overall patient care. In addition to the complex issues posed by the necessity of treating a large population of individuals from diverse backgrounds, however, challenges related to cultural competency are exacerbated in places like the emergency room, since the pace of care and decision-making is relatively faster than outpatient services or other hospital departments. This paper aims to analyze essential best practices that providers can use to ensure culturally-competent healthcare services while serving LatinX and other minority populations successfully. This will be achieved by examining factors such as diversity in leadership, resource management, patient cultural competency, attitudes, willingness, and self-efficacy to help determine what practices can be applied in high-paced care facilities (e.g., emergency room) with a focus on enhancing the patient experience at large.

Abstract #: 911

Title: A Study into Gut Microbiome and Major Depressive Disorder

Student Author(s): Abby Brewer and Jessica Toukmaji **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

The central purpose of this literature review is to examine the relationship between the gut microbiome and major depressive disorder. Our research is composed of findings within the anatomy/biology, nutrition, and psychology fields. While the gut microbiome is responsible for nutrient absorption and digestion, it can also impact stress, anxiety, and depression. Healthy gut microbes are responsible for sending signals to the brain that relate to processes involved in behavioral control and neural transmission. Pathways connected to the neural, endocrine, and immune system are linked to gut microbes and are often noticed to be dysregulated with depressive disorders. Depression is caused by multiple factors and has become more prevalent in recent years. Studies show that diet and the use of probiotics and antibiotics prove to affect the gut microbiome and could contribute to improving major depressive disorder and other similar mental health problems. Dealing with major depressive disorder by changing the composition of the gut microbiome is a new way of dealing with the disorder that could have positive effects that are more accessible. Through learning more about gut microbiome and its correlation to mental illness, readers will be informed and encouraged to make healthier choices for their minds and bodies. Additionally, dietary changes could become an essential part of depression treatment to see better and longer lasting results.

Abstract #: 912

Title: Establishing Systematic Speculation on the Future of Taiwan

Student Author(s): James Citrin **CE, G, H,**

Faculty Advisor: Dr. Cheryl Brown

Disciplinary Theme: Humanities

Taiwan and China have had a long complicated history. Taiwan was ceded to Japan after the first Sino-Japanese War 1894-5 but was eventually returned to Mainland China after World War II. During this period the Nationalist government of the Republic of China, and its ruling party, the Kuomintang (KMT) or Nationalist Party under the leadership of Chiang Kai-shek, was engaged in a civil war with the Chinese Communist Party (CCP) from 1945 to 1949. The CCP, under the leadership of Mao Zedong, came to power on Mainland China, and established the People's Republic of China on October 1, 1949. The Nationalist government, under Chiang Kai-shek's rule, fled to Taiwan also known as Formosa. This was only the beginning of a contentious relationship that has continued throughout the years ranging from military strikes to propaganda campaigns. During this time, Taiwan and the PRC have experienced a shift in their respective relationships with the United States as a pivotal point in the outcome of the two. The perspective of the hegemonic United States was that the communist controlled China was a severe threat to the promotion and continuation of Indo-Pacific democracy. The U.S. choice to support Taiwan would be the precipice of turbulent relations with Mainland China for the next century. In modern times, war is on an apocalyptic scale now that ideological opposition to western democracies yield nuclear capabilities. This fear is heightened by the events unfolding in Ukraine as a sudden invasion commenced and brought the region into chaos. Media outlets have recently covered Taiwan with diligent focus as the thought emerges that a similar outcome may develop as mainland China continues to declare their goals of reunification. This thesis is particularly designed to dissect the complexities surrounding Taiwan and China while producing a prediction of what will unfold next. This author will compile ethnographic data spanning from the 20th century to current geopolitical proceedings to inform readers of the comprehensive situation between Taiwan and China. By understanding the historical context between these two entities and modern-day factors of influence, I ascertain that there is a consistent analysis that allows speculation of Taiwan's outcome. My research will result in the development of a barometer to rate and compare the likelihood among one of the six options coming to fruition. This system will be known as a speculative barometer and serve to be the foundation of my methodology. The six outcomes being assessed are as follows: 1) Reunification by force, 2) Peaceful reunification under Taipei's terms, 3) Nonviolent reunification under Beijing's terms, 4) The absolute independence of Taiwan, 5) Preservation of current situation and 6) A hybrid outcome formed as my thesis. My thesis is with the collective interest to avoid militaristic conflict and economic hindrances, domestic political pressures, and foreign/regional intervention; the status-quo of China and Taiwan's relationship will be preserved for the near future with a trend favoring the eventual separation of political ties but with economic relations kept intact.

CE - Community Engaged **G -** Global **H -** Honors **S** - Sustainability

NC - North Carolina **PKP** – Phi Kappa Phi Member **U** - Charlotte

Abstract #: 913

Title: Scholarly Shift Towards the Victimized Portrayal of Women Accused of Infanticide in Eighteenth-Century Germany

Student Author(s): Mac Bryant **G**

Faculty Advisor: Dr. Amanda Pipkin

Disciplinary Theme: Humanities

The influence Christianity had on eighteenth-century German scholarship is unprecedented; its theology encompassed to define legal, literary, and medical explanations of morality. Infanticide defined by the 1532 Constitutio Criminalis Carolina, adopted by German law, allowed for extreme investigative tactics used to make women accused of infanticide confess to their crime. Scholarship involved in infanticide cases evolved two centuries after the code was instated and established foundations of general consideration for criminal cases categorized to be indiscriminate. The evolution of scholarship resulted from shifts in how women accused of infanticide were depicted. This project will prove the portrayal of women accused of infanticide in eighteenth century Germany shaped by legal, literary, and medical scholarship transformed perpetrators from shameful mothers into victims of material and social circumstances. The framework of this argument utilized policed sexuality explored by Ulinka Rublack, legal and medical developments of infanticide discoursed by Margaret Lewis, and media analyses by Susanne Kord and Lewis. Scrutinization of women's sexual deviance increased over the entirety of modern Europe, especially with ideologies from the Enlightenment on the death penalty and use of torture. Progression in law and medicine in Enlightenment Germany will provide scientific outlooks that humanized women and their treatment to take into consideration women's motivations to commit infanticide. Literature provided an antithetical portrayal of women accused of infanticide to provide a pedagogical example. Fictitious works are contrasted from real experiences to understand where stereotypes of these mothers stem and inaccuracies in their depiction as women who crave redemption and repentance.

Abstract #: 914

Title: La Casa De Las Flores: A Case Study of Queer Latinx Representation in Millennial Telenovelas

Student Author(s): Erik Phann **G, H**

Faculty Advisor: Dr. David Dalton

Disciplinary Theme: Humanities

Telenovelas are a TV genre unique to Latin America and are often colloquially referred to as "Spanish soap operas" since, like US soap operas, they feature a storyline that evolves from episode to episode and airs every weekday. A key difference, however, is that telenovelas highlight Latinx characters and culture and are shorter in episode count, resulting in tighter storyline pacing, which facilitates stronger melodrama and a captivated audience. In recent years, the telenovela has evolved into a new TV subgenre called the "millennial telenovela," in which traditional love plots and themes have been reconstructed to appeal to the millennial demographic. LGBTQ+ characters and issues have only recently taken the spotlight in these millennial telenovelas, however. As a result, there is a lack of research on how such characters have been represented as the telenovela has transitioned from its traditional to its millennial incarnation. This study seeks to examine how LGBTQ+ characters and their storylines have evolved in millennial telenovelas in order to assess how the existence of these characters both reflects and influences contemporary Latin American culture. In reviewing preexisting literature surrounding telenovelas and in conducting a case study on one of the pioneers of millennial telenovela, *La casa de las Flores* (The House of Flowers) by Manolo Caro, this study will reveal how the millennial telenovela both appropriates and innovates upon the traditional telenovela format to promote LGBTQ+ rights and inclusion in Mexican society and culture, where the topic is still exoticized and polarizing.

Abstract #: 915

Title: Ayni and Camay: Viewing the Inca World Through Two Ritual Objects

Student Author(s): Celia Castaldo **G**

Faculty Advisor: Dr. Jeremy George

Disciplinary Theme: Humanities

This paper takes a look into the visual culture of the Inca Empire (1438-1532) through two ritual objects. The Tumi with Two Llamas and a Paccha – both located at the Carols Museum in Atlanta, GA, will be analyzed to uncover how they represent the Incan worldviews of ayni and camay respectively. While these worldviews lack thorough academic analysis, this work primarily utilizes Rebecca Stone-Miller's extensive research to contextualize these concepts within our modern understanding of the world. According to Stone, ayni can be understood via the modern ideas of reciprocity and duality and camay could be understood by creation, manifestation, and spiritual vitality. The tumi is a crescent shaped blade with a long vertical handle, and the paccha (POCK-cha) is a small watering vessel depicting a foot plow, an ear of corn, and a miniature flask. Both of these objects had significant ceremonial functions within the Inca and the greater Andean societies and give us much insight into Andean visual culture. The paccha served to bring life to the essential maize during the first planting, while the tumi took life away during frequent ritual sacrifices. Their diametric purposes may cause viewers to overlook their deeper connections and ramifications within Inca ceremonial culture, but these connections are undeniable. Constructing these connections through the modern understandings of reciprocity and vitality will help us forge a deeper understanding of Incan worldviews and ceremonial culture.

Abstract #: 916

Title: Butsudan: Modes of Prayer in Japanese Religion

Student Author(s): Harrison Wiygul **G**

Faculty Advisor: Dr. Alexandra Kaloyanides

Disciplinary Theme: Humanities

The Buddhist alter known as “Butsudan” is found in homes throughout Japan. These alters are often wooden cabinets housing a Buddha statue or painting where families make offerings like fruit and incense. This research presentation explores a range of contemporary butsudan to ask: What do the materials collected and presented in this worship space suggest about how families interact with it? What Buddhist figures, practices, and communities are made meaningful by this space? While most scholarship on Japanese Buddhism focuses on elite texts and monastic communities, this project brings needed attention to the everyday religious practices of Japanese families from a range of socio-economic positions. By paying attention to the common wooden structures that families install in their domestic spaces and the peculiar kinds of Buddha images and edible and flammable offerings they present to them, this presentation shows how common objects help Japanese Buddhists form powerful connections to religious figures and teachings. This research draws on a close examination of photographs and videos of dozens of butsudan in contemporary Japanese homes, both rural and urban and from regions throughout the country. This presentation argues that a key figure in these special spaces is the “Yorishiro”, a kind of divine intermediary between this world and the spirit world. By revealing the importance of the material culture featuring “Yorishiro”, this presentation contributes to the study of Japanese culture by demonstrating the inseparability of Buddhism, Shintoism, and other forms of ancestor worship in popular expressions of religion.

Abstract #: 917

Title: “A Madde Marriage”: Early Contemporary Readership of the Taming of the Shrew in the Meisei Folio

Student Author(s): Mary-Catherine Berger **H**

Faculty Advisor: Dr. Kirk Melnikoff

Disciplinary Theme: Humanities

It is rare for scholars to have the opportunity to look into the mind of an early modern reader, especially a near-contemporary reader of Shakespeare. The Meisei Folio held in Tokyo, Japan gives us just this kind of opportunity. Containing nearly cover-to-cover annotations from a 1620s Scottish reader (Yamada 2018), the folio offers almost unprecedented access into the mind of one of the earliest readers of Shakespeare’s collected works. This project builds on Akihiro Yamada's analysis of this copy of the First Folio and draws from studies of Early Modern marginalia by William Sherman, Lisa Jardine, and Anthony Grafton to consider the extensive overlines, check marks, and marginal notes left by this early reader in and around The Taming of the Shrew. Together, these marks suggest an extensive and sophisticated engagement with the play. The reader's overlines are indicative of how they formulated their marginal comments, which summarize and often respond to the corresponding action on the page. Working in tandem, the different forms of marginalia present provide insight into this reader's specific reading comprehension strategies through the ways they relate to each other and the text. This detailed examination of a First-Folio copy will help us better understand the reading patterns and behaviors of early modern readers. It will also respond to the growing scholarly interest in early modern plays as texts to be read, not just texts to be performed.

Abstract #: 918

Title: Broken Social Structures: The Carcinogens of André Giroux's Le Gouffre a Toujours Soif

Student Author(s): Joseph Thompson **H**

Faculty Advisor: Dr. Allison Stedman

Disciplinary Theme: Humanities

In the face of an industrializing and urbanizing province, Québec's provincial government under premier Maurice Duplessis (1936-39 and 1944-59) turned towards the past. The government and the Catholic Church embraced an ideology of clerico-nationalism in order to maintain their status by presenting a nostalgic vision of Québécois life, one that was rural, pious, and insulated from anglophone influence. However, the urban Québécois had different every-day experiences, often struggling to support themselves by working for the anglophones who dominated the economy and supported Duplessis in his efforts to crush francophone unions. Between 1937 and 1977, a wave of authors responded to the Duplessis administration by counteracting the idyllic country sides exalted by the government with novels that reflected the harsh urban realities facing many francophones. As Jane Moss has demonstrated, novels written during this time period so often featured characters who were suffering from physical ailments that literary historians refer to these novels as "morbid literature," in which being ill and being Québécois were virtually synonymous. Although morbid novels dominated the 20th-century Québécois literary landscape, they have received little critical attention, with some works, such as André Giroux's Le Gouffre a toujours soif, being ignored almost entirely. My thesis will examine how illness in Giroux's novel served as a metaphor for the social ills harming urban francophones, especially those associated with clerico-nationalism. Particular attention will be paid to the role of the spirit-body connection in the novel: the role of personal beliefs and interpersonal expressions of religion in worsening the sickness.

Abstract #: 919

Title: Spotify for You Algorithms

Student Author(s): Lee Caesar **H**

Faculty Advisor: Dr. Jay Grymes

Disciplinary Theme: Mathematics and Computer Science

The Internet itself is a very simple concept that describes what it means for communication of any sort to occur between servers, domains, or machines. Spotify is one of those domains. This company has used the Internet as a means to collect and distribute music to the populous, and of all the well-known music streaming providers on the Internet is the first company to do so. The question for my topic of research that will be presented in the form of a paper. Is why music streaming works and why the Internet, in particular the development of it over the past few decades, was needed for this business to spread? The way Spotify works is they have a database with the collection of all their users. Every time a user clicks on a song Spotify uses their learning algorithm to recommend music. What is interesting about this is the algorithm itself is being trained by users every time they click a song which has the features of the song analyzed and assigned values. Spotify uses the JSON format which puts all the information collected in a database that their server has access to and is used to transfer information. For this paper, I will be using an open source dataset with 2,017 songs collected at random published by Spotify to make a model that can be used to generate a unique algorithm for music recommendation.

Abstract #: 920

Title: Rank Minimization Methods for Completion of Irregularly Sampled Integer Sequences

Student Author(s): Ethan Nguyen

Faculty Advisor: Dr. Christian Kuemmerle

Disciplinary Theme: Mathematics and Computer Science

Integer sequences such as the Fibonacci sequence or the sequence of triangular numbers have not only fascinated mathematicians for centuries, but also emerge organically in nature. They are examples of constant-recursive sequences, stemming from a linear recurrence relation. Given a sufficient number of consecutive sequence elements, it is well-known how to infer the recurrence relation and, furthermore, how to find an explicit formula for each sequence element, for example via the roots of the characteristic polynomial. However, the question of how to infer sequence elements if the sequence is irregularly sampled has been barely studied in the literature. We use a data-efficient Iteratively Reweighted Least Squares optimization method that leverages the low-rank property of the Hankel matrix associated to a sequence to complete constant-recursive sequences. The result of this optimization is then integrated into a software tool that completes constant-recursive integer sequences and compare the resulting sequence with the database of the On-Line Encyclopedia of Integer Sequences.

Abstract #: 921

Title: Accelerated Matrix ILRS

Student Author(s): Nicholas Cassarino **H**

Faculty Advisor: Dr. Tyler Allen

Disciplinary Theme: Mathematics and Computer Science

Matrix Factorization models are simple, but powerful models for data describing pairwise interactions. These models are most commonly used in machine learning recommendation models but can be used in many other fields such as image processing, and were even the subject of the $1 million Netflix Prize. Alternating least squares (ALS) algorithms are most commonly used to train these models, but they struggle to fit the model for large-scale problems if relatively little data is provided. In previous research, Iteratively Reweighted Least Squares (IRLS) was used as a method for matrix factorization which was more efficient compared to competing algorithms while producing results with similar accuracy. IRLS has been shown to deal with limited data better than ALS models for small-scale problems. Additionally, General Purpose Graphics Processing Unit (GPU) acceleration can be used to speed up IRLS on large data sets through parallelization. In this project, we propose a GPU-accelerated implementation of IRLS, enabling it to handle large-scale recommender system data. This will also enable us to explore the effectiveness of high-throughput IRLS on large-scale problems with limited data.

Abstract #: 922

Title: Light Assisted Drying of Therapeutically Relevant Volumes

Student Author(s): Gunnar Olson and Anteneh Tsegaye **G, H**

Faculty Author and Advisor: Dr. Susan Trammell

Disciplinary Theme: Science, Technology, and Engineering

Protein-based products have been developed to treat a range of conditions and are used in vaccines and assays. The most common method of stabilizing proteins is freeze drying. This process is costly and cannot be used for all proteins as the process can denature some proteins, negatively impacting function. Recent research has demonstrated that anhydrous preservation in a trehalose amorphous solid matrix offers an alternative to freeze drying for the preservation of biologics. Light assisted drying (LAD) is a novel technique to prepare biologics for anhydrous storage. LAD uses a near infrared laser to heat samples and expedite evaporation, creating an amorphous trehalose storage matrix. Previous research has shown that LAD is capable of dehydrating trehalose-protein solutions to consistently produce amorphous matrices for solution volumes up to 250 µL. In this study we apply the LAD technique to larger volume samples (1,000 µL) that are comparable to therapeutic doses. During this study, several laser irradiation times were tested for LAD processing of these large samples to determine the shortest interval that achieved consistent drying. This optimal interval will become the standard drying procedure for any future studies involving large sample volumes. Samples were processed in glass vials and were sealed in low humidity moisture bags at room temperature for four weeks. Samples were then assessed for potential matrix degradation such as crystallization due to insufficient dehydration. The results showed that 2 hours and 30 minutes was the shortest interval capable of producing consistently effective amorphous matrices without crystallization defects.

Abstract #: 923

Title: Green Fluorescent Protein as a Correlator to Long Term Oncolytic Viral Replication in Pancreatic Cancer Cell Lines

Student Author(s): David Khakhutashvili **H**

Faculty Advisor: Dr. Valery Grdzelishvili

Disciplinary Theme: Science, Technology, and Engineering

The Green Fluorescent Protein (GFP) gene is one of the most used reporters virologists utilize to track and measure viral replication. It is a simple and easy method to help visualize viral and cell-to-cell spread using fluorescent microscopy and to quantify it using a fluorescence plate reader especially during various high-throughput screening projects. It has been widely accepted that virus-encoded GFP transgene expression levels very well correlate to viral replication levels. To test this assumption experimentally, we examined replication of a model RNA virus, vesicular stomatitis virus (VSV), in a human pancreatic ductal adenocarcinoma cell line over 13 days, using serial dilutions of VSV encoding GFP reporter, and using various conditions (keeping cell culture media for 13 days, replacing it daily, etc). The cells underwent GFP scans daily to quantify the amount of fluorescence in each well. Interestingly we found that GFP was an accurate reporter of VSV replication only during the first 3-4 days following replication. After 3 days despite no observed replication in infected cells GFP maintained constant in the media at high levels for 13 days, thus giving false positive signals. This issue can easily be addressed by replacing medium every day by simply aspirating. Interestingly the Red Fluorescent Protein (RFP) reporter showed much better correlation to VSV replication in infected cells possibly due to its lesser stability in the medium. These results show that GFP can be a very inaccurate reporter under certain conditions and that medium should be aspirated when correlating GFP to viral replication.

Abstract #: 924

Title: Understanding the Role of the Ras/MEK Pathway in the Permissiveness of Pancreatic Cancer Cell Lines to Oncolytic Vesicular Stomatitis Virus

Student Author(s): Dan Langdon **H**

Faculty Advisor: Dr. Valery Grdzelishvili

Disciplinary Theme: Science, Technology, and Engineering

Pancreatic ductal adenocarcinoma (PDAC) is one of the deadliest cancers due to its resistance to standard cancer therapies. Oncolytic virus (OV) therapy is a new method in the battle against cancer, using viruses as a way to selectively infect and kill the malignant cells. Vesicular stomatitis virus (VSV) is one such OV, and different, clinically relevant, human PDAC cell lines have shown to have different levels of permissiveness to VSV. The major goal of our laboratory is understanding cellular pathways and individual molecules determining permissiveness or resistance of PDAC cells to VSV. An unpublished study in our laboratory screened 1496 approved drugs by the Food and Drug Administration (FDA) to determine how these drugs affect the permissiveness of 4 different PDAC cell lines to VSV. I conducted a critical analysis of the screening results, and I discovered that all drugs that inhibited the Ras/MEK pathway had a strong negative effect on VSV replication in PDAC cell lines. I independently confirmed this finding using one of the PDAC cell lines. Also, I hypothesize that Ras/MEK pathway plays a major positive role in permissiveness of PDAC cells to VSV-based OV therapy. In my project, I will test this hypothesis by testing Ras/MEK inhibitors in a large panel of PDAC cell lines. I will examine specific step(s) of VSV replication cycle affected by Ras/MEK pathway. These studies will allow us to better understand the molecular mechanisms and biomarkers of PDAC permissiveness to oncolytic virotherapy.

Abstract #: 925

Title: Superposition Effects of Complex Wavefunctions in Bohmian Mechanics

Student Author(s): Ethan Keller **H**

Faculty Advisor: Dr. Donald Jacobs

Disciplinary Theme: Science, Technology, and Engineering

Bohmian Mechanics is an alternative interpretation of quantum mechanics, where the positions and momenta of particles are simultaneously known. The Bohmian formulation of quantum mechanics allows for trajectories of quantum objects to be determined. Particle motions are affected by the degree of complexity of the wave function, which is strictly a quantum effect not seen in classical systems. This report will aim to study the dynamics of Bohmian systems of a single free particle guided by superimposed Gaussian wave packets referred to as pulses. Scaling properties that have previously been observed in single-pulse systems are tested for double-pulse systems. It was found that the relationships for timescales and bifurcations remain through the transformation between single and double pulse systems for stationary and identical pulses. The main goal of this work is to extend these scaling relationships to more complex systems including nonzero velocity, acceleration, and phase constant referred to as phi within the pulses. In addition to this, the effects of asymmetric initial conditions, destructive interference, and entanglement with orthogonal degrees of freedom will also be observed with the intention of possibly finding asymptotic limits for dynamics. This is an important area of study as it would allow for scales of quantum mechanical systems to be better understood.

Abstract #:926

Title: Defining Immune Profiles for Amine-Terminated Polyamidoamine Dendrimers As Carriers for Nucleic Acid Nanoparticles

Student Author(s): Laura Rebolledo

Faculty Advisor: Dr. Kirill Afonin

Disciplinary Theme: Science, Technology, and Engineering

Nucleic acid nanoparticles (NANPs) have shown promise as versatile platforms to deliver specific and targeted therapeutic moieties. The immunostimulant properties of NANPs depend strictly on their shape, size, and composition. However, off-target effects involving the immune system response are hindering their progression at a clinical level. Reports show NANP technology as an innovative approach due to its carrier-based customizability. Amine-terminated polyamidoamine (PAMAM) dendrimers are being explored as carriers for NANPs. The tunable properties of dendrimer size and charge allow for the amplification of their low solubility, increasing their biocompatibility and bioavailability. Published work showed that PAMAM dendrimers successfully delivered dicer substrate (DS) functionalized NANPs targeting the downregulation of target proteins in human cancer cells. Our work investigates the complexes' immune profiles using primary cell lines to expand previous studies and thoroughly explore the relationship between carrier-NANP complexes. Toll-like receptors (TLRs) that are important in inflammatory pathways were used, enabling the linkage between adaptive and innate immune responses. This study will provide information on the immune profiles of dendrimer-NANP complexes, addressing the hurdle of immunological properties that remain unclear. Preliminary data investigating the activation of endosomal TLR 3, 7, 8, and cytosolic RIG-I indicate that the generation of dendrimer impacts the level of immune activity while carrying the same NANP structure cargo. Interestingly, different NANP structures still elicit varying immune responses while complexed to the same dendrimer generation. These results are promising and continue to support the findings of how a carrier can influence its cargo’s overall biological and immune profile.

Abstract #: 927

Title: Light Activated Chlorin-e6 for the Elimination of Antibiotic Resistant Bacteria

Student Author(s): Ashvini Dandapani **CE, G, H, NC, U**

Faculty Advisor: Dr. Juan Vivero-Escoto

Disciplinary Theme: Science, Technology, and Engineering

The World Health Organization has reported that antibiotic resistance is one of the biggest threats to global health, food security, and worldwide development. Current treatments for antibiotic resistant bacteria (ARB) involve various interventions that target different bacterial pathways. Treatments such as alternative antibiotics and combination therapy are limited by the increased risk of developing resistance. Likewise, treatments using antimicrobial peptides and bacteriophages are susceptible to proteolytic degradation which compromises their antimicrobial efficacy. Alternatively, nanoparticle-based therapies such as silver nanoparticles (AgNPs) show promising solutions to overcome the challenges in eliminating ARB. The antimicrobial properties of AgNPs are closely associated with the leaching of silver ions. Therefore, by developing alternatives to increase the release of silver ions, the efficacy of AgNPs to eliminate ARB can be improved. The focus of this work deals with the modification of AgNPs with a photosensitizer, chlorin-e6 (Ce6); and the study of its antimicrobial properties under light irradiation. Photosensitizers are molecules that upon light irradiation in the presence of oxygen will generate reactive oxygen species (ROS). The hypothesis supporting this project is that Ce6 after irradiation with light will produce ROS, which will oxidize the surface of the AgNPs and enhance the leaching of silver ions resulting in increased antimicrobial effects. The Ce6-AgNPs will be synthesized and characterized using different analytical techniques. The antimicrobial effect will be evaluated in two antibiotic resistant bacterial strains: Methicillin resistant Staphylococcus aureus (MRSA) and multidrug resistant Escherichia coli (E. coli).

Abstract #: 928

Title: Utilizing Integrated Diet and Habitat Use Biomarkers for Fish Life History Reconstruction

Student Author(s): Kathryn Brinegar **H, S**

Faculty Author: Dr. Jill Olin

Faculty Advisor: Dr. Paola López-Duarte

Disciplinary Theme: Science, Technology, and Engineering

Many fish enter estuaries during the larval stages and remain there throughout the juvenile stage, where they feed and grow before returning to coastal areas as adults. In contrast to these transient fish, permanent fish residents complete their life cycle within estuaries. The first objective of this study is to understand dietary habits of two transient and one resident saltmarsh fish. To that end, fish were collected from three sites at varying distances from the coast. Muscle tissue samples from two transient species at the juvenile stage: spot [Leiostomus xanthurus] (n=19), and sand seatrout [Cynoscion arenarius] (n=15), and one permanent resident at juvenile along with adult stages, Gulf killifish [Fundulus grandis] (n=29) with stable isotopes i.e., δ13C: energy source; δ15N: trophic position, and δ34S: source and trophic level identification, were indicative of diet. Preliminary isotopic results suggest that sand seatrout exhibit more marine signatures and a higher trophic position than the killifish and spot. The second objective of this study is to determine otolith microchemistry differences by species and site. We anticipate fish with more marine dietary markers are more recent arrivals in the marsh, and will have signatures that differ from the marsh resident fish. To evaluate habitat use, we will examine the otolith microchemistry signatures for the same samples. Through the integration of otolith microchemistry and dietary stable isotopes, the life history of the fish will be reconstructed providing insight into habitat use patterns across the salinity gradient.

Abstract #: 929

Title: Energetic Pathways and Trophic Diversity Among Macroinvertebrate Communities in Saltmarshes

Student Author(s): Yuleny Gomez Rodriguez **H, PKP, S**

Faculty Author: Dr. Jill Olin

Faculty Advisor: Dr. Paola López-Duarte

Disciplinary Theme: Science, Technology, and Engineering

Saltmarsh food webs are some of the most productive and complex ecosystems because they sustain both pelagic and benthic communities. Macroinvertebrates are key consumers that link primary productivity in benthic and pelagic communities to higher trophic levels. The energy transfer among macroinvertebrates in saltmarsh food webs is not well understood. Nonetheless, the food web interactions at the macroinvertebrate level are less understood. The gap in knowledge suggests the need for additional research concerning the energetic pathways and trophic linkages macroinvertebrates contribute to saltmarsh food webs. Macroinvertebrates (ants, amphipods, midges, springtails, bristle worms, ticks, and crabs) were sampled at six different saltmarshes in southern Louisiana. Of these, there are two restored and 4 natural saltmarshes. Stable isotope analysis (SIA) of δ13C (energy source) and δ15N (trophic position) was used to trace the trophic pathways throughout each marsh. The first objective of this study is to quantify the relative contribution of pelagic vs. benthic carbon energy sources among macroinvertebrate taxa. We anticipate that saltmarshes with differing abiotic factors will influence the food web structure through variation in carbon sources. The second objective is to determine the trophic level these taxa occupy. It is anticipated that predatory species will occupy higher trophic levels than herbivorous and omnivorous species. Organisms that occupy higher trophic levels have elevated δ15N signatures. Understanding the contributions of macroinvertebrate communities is important because of the complex benthic and pelagic ecosystems they help sustain.

Abstract #: 930

Title: The First Step to Phage Therapy in the Burkholderia cepacia Complex

Student Author(s): Niyati Danda **G, H, NC**

Faculty Advisor: Dr. Todd Steck

Disciplinary Theme: Science, Technology, and Engineering

The Burkholderia cepacia complex (Bcc) presents an explicit treatment challenge for immunocompromised individuals. Individuals with cystic fibrosis (CF) are often threatened by Bcc leading to very high mortality. Bcc is a pathogen that has an innate resistance to many classes of antibiotics due to its primary cellular resistance mechanisms that make antibiotic treatment ineffective. Phage therapy is an innovative alternative to antibiotic treatment. The current issue in advancing phage therapy is finding phages that can effectively clear up bacterial infections. The goal is to isolate as many phages as possible to screen them for those that are most clinically useful. This study will document how to extract and obtain phages that can kill Bcc strains based on methods to find phages in L-Terr, a nonpathogenic bacteria. We examined 21 soil samples isolated across North Carolina to find active lytic phage. Soil samples were prepared using buffer exchange, and chloroform treatment to remove microbial cells, then screened in high throughput screen (HTS), followed by spot test confirmation. This resulted in a total of 12 samples screening positive for phages in HTS and 11 samples successfully clearing in the spot test confirming phage presence and its ability to kill the L-Terr bacteria. Since results obtained with phage screenings done with L-Terr bacteria have been successful in finding phages, we expect these methods will be successful in finding phages for the Bcc with some limitations due to it being a pathogen.

Abstract #: 931

Title: Introduction of λ red protein pKaKa5 plasmid into Burkholderia Species

Student Author(s): Joanna Najjar **H**

Faculty Advisor: Dr. Todd Steck

Disciplinary Theme: Science, Technology, and Engineering

Over the past decades, the lifespan of individuals with CF has dramatically improved through improvements in diagnosis, antibiotic treatment, chloride transport therapies, and better care delivery. However, until gene editing can correct the DNA mutation(s) responsible for the disease, none of the current or anticipated improvements in treatment strategies will eliminate chronic bacterial lung infections. This project aims to confirm that manipulation in bacterial genomes can be done in a Burkholderia species obtained from clinical trials via λ Red recombineering using a procedure established for a different Burkholderia species. λ Red recombineering has been limited to the γ-proteobacteria class, and this project works on expanding the use of λ Red recombineering to non-naturally transformable β-proteobacterial species such as B. multivorans. The first step to test the hypothesis that recombineering can be performed in multiple Burkholderia species is to introduce a plasmid carrying the recombineering genes (pKaKa5) into B. multivorans strains using electroporation. Primers specific for the edited regions are used to verify successful editing in the genome. To our knowledge, there are no naturally competent strains within the B. multivorans strains yet described. Thus, the ability to make these Burkholderia species uptake DNA would be very significant in manipulating their genomes. Performing this study can help achieve the long-term goal of developing a personalized long-term antibiotic therapy based on the genome of the primary pathogen in chronic infection.

Abstract #: 932

Title: Dissecting the Relationship Between Pre-mRNA Splicing and DBR1

Student Author(s): Daniel Faraj **H**

Faculty Advisor: Dr. Kausik Chakrabarti

Disciplinary Theme: Science, Technology, and Engineering

Intron splicing is an essential aspect of decoding an organism's genome into proteins. The splicing pathway depends on the RNA lariat debranching enzyme DBR1. DBR1 plays a key role in the post-excision debranching of intron lariats, and also possesses splicesome regulatory function that is important for the proper intron splicing pathway. Plasmodium falciparum, the model organism for this study, has a genome that employs an intron excision pathway to maintain its metabolic function. As such, in order to dissect the relationship between pre-mRNA splicing and DBR1, the use of known splicing inhibitors on Plasmodium falciparum cultures will be utilized to gain a better understanding as to where DBR1's regulatory role within the splicing pathway exists, and to potentially uncover the exact splicing pathway steps that DBR1 helps regulate. Two different splicing inhibitors will be assessed; Isoginkgetin, a known splicing inhibitor that has been shown to prevent the recruitment of an essential ribonuclear protein, and Pladienolide B, an SF3B1 inhibitor that targets U4 snRNA. Blocking two discrete steps of the pre-mRNA splicing process with both of these inhibitors and investigating DBR1 expression in those two steps in Plasmodium falciparum's splicing reaction cycle will provide us with clues as to how DBR1 partakes in splicing regulation. Overall, these findings will demonstrate the essential function of the DBR1 enzyme in the biology of malaria parasites and could also be potentially targeted for future therapeutics.

Abstract #: 933

Title: Telomerase Expression in the Procyclic and Bloodstream form of Trypanosoma brucei

Student Author(s): Anastasia Lozneva **G, H, S**

Faculty Advisor: Dr. Kausik Chakrabarti

Disciplinary Theme: Science, Technology, and Engineering

Eukaryotic cell DNA replication causes chromosomes to shorten with every round of replication. These cells contain caps with long repetitive DNA sequences on the ends of chromosomes to prevent degradation and maintain genome integrity. Those protective caps are also known as telomeres. This study focuses on African sleeping sickness, which is caused by a parasite Trypanosoma brucei. It mainly attacks the circulatory and lymphatic systems of individual organs and is fatal if left untreated. Trypanosoma brucei is known to exist in two major proliferative forms that can be adopted for in vitro culture. The first is from insect host (TseTse fly) or Procyclic Form, and the second is from mammalian (often human) host or Bloodstream Form. Trypanosoma brucei's main strength is avoiding the host immune system by switching its expression of its major surface antigens, VSGs (Virulent SurfaceGlycoproteins). The main factors that play a role in regulating and silencing the VSG antigen are the telomere length and telomere associated proteins. Therefore, in order to understand the mechanism of telomere synthesis and how VSG gene switching works in Trypanosoma brucei, I seek to investigate the function of Telomerase RNA-protein enzyme that controls telomere length. My hypothesis is that changes in expression and function of telomerase components will affect telomere length maintenance and VSG switching events in Trypanosoma brucei. My work will expand the knowledge of the intracellular interactions of TR and TERT and deepen the understanding of the mechanistic basis of telomerase function in Trypanosoma brucei.

Abstract #: 934

Title: Cytosolic Nucleic Acid Receptor-Mediated Detection of Staphylococcus aureus Contributes to Protective Interferon Responses in Murine Osteoblasts

Student Author(s): Mary-Kate Key **H**

Faculty Author(s): Dr. Samantha Suptela, Dr. Brittany Johnson, and Dr. Ian Marriot

Faculty Advisor: Dr. Samantha Suptela

Disciplinary Theme: Science, Technology, and Engineering

Osteomyelitis is an inflammation of the bone due to infection, with approximately 80% of cases caused by the bacterial pathogen Staphylococcus aureus. Osteoblasts are resident bone cells that express pattern recognition receptors (PRRs), which can recognize and respond to pathogens. We have recently reported that S. aureus infected osteoblasts produce type I interferons that limit intracellular bacterial burden. However, the mechanism underlying initiation of interferon responses by osteoblast is uncharacterized. In this study, we address the hypothesis that PRR detection of S. aureus by osteoblasts promotes initiation of protective interferon responses. We first examined expression of the cytosolic nucleic acid sensors, retinoic acid inducible gene-1 (RIG-I) and cyclic GMP-AMP synthase (cGAS) in murine osteoblasts. Our results indicate that osteoblasts have low constitutive expression of these sensors that is further elevated following S. aureus infection. Next, we examined the role of these sensors during S. aureus infection of osteoblasts using an siRNA approach to knockdown protein expression of RIG-I and cGAS. Knockdown of RIG-I and cGAS resulted in a significant reduction of interferons released by osteoblasts following bacterial challenge. Our data show that both RIG-I and cGAS significantly contribute to interferon production by infected osteoblasts, and suggests a role for these nucleic acid sensors in limiting bacterial burden. Taken together, this data indicates that RIG-I and cGAS contribute to osteoblast responses to S. aureus challenge and could be potential targets for future therapeutic interventions in osteomyelitis.

Abstract #: 935

Title: p53 in the DNA Damage Response

Student Author(s): Chkylle Boado **H**

Faculty Advisor: Dr. Junya Tomida

Disciplinary Theme: Science, Technology, and Engineering

DNA carries genetic information and is constantly threatened by various factors, such as chemical agents and UV light, which can lead to DNA damage and alterations. DNA damage and alterations are significant challenges that have been heavily researched for decades. The field is constantly evolving due to new findings since it has been linked to several diseases, such as cancer. Every day, there are an average of 1,600 deaths due to this disease. As cancer has a significant global impact and affects millions of people, it has been imperative to find more appropriate solutions for different types of treatment. Known as the “Guardian of the Genome,” p53 is a tumor suppressor that regulates various cellular pathways, such as apoptosis, DNA repair, and the cell cycle. Further research has found that over 50% of people with cancers have a missing or damaged p53 gene. If p53 has a mutation and cannot bind to DNA, the cells will continue to multiply, causing tumors to grow and develop rapidly. In this study, we are focusing on the effects of p53 in the DNA damage response pathway. We will use biochemical and molecular biology techniques, including protein purification, Glutathione-S-transferase (GST) pulldown assays, and immunoblotting. Determining the function of p53 will lead to a better understanding of the cellular pathways that play a role in DNA damage. The results of our study may also further the development of better treatment options for cancer.

Abstract #: 936

Title: Understanding the Role of Hsp70 as a Master Integrator of Signals from Diverse Cellular Pathways

Student Author(s): Elizabeth Abedi **G, H, S**

Faculty Author(s): Siddhi Omkar and Dr. Andrew Truman

Faculty Advisor: Dr. Andrew Truman

Disciplinary Theme: Science, Technology, and Engineering

Cells must be able to respond rapidly to environmental challenges such as high temperatures and chemical exposure. This can be accomplished by inducing the expression of the Hsp70 chaperone protein which helps refold damaged proteins, ultimately restoring the integrity of the cell. This process is controlled by the major transcription factor Hsf1 and is known as the Heat Shock Response (HSR). After stress, Hsp70 binds Hsf1 and deactivates it, allowing cells to recover. It is currently unclear how different kinds of stress can activate HSR. Recent studies have identified numerous phosphorylation sites on Hsp70 that are triggered by a range of cell stresses, such as DNA damage, cell cycle progression, and heat and nutrient availability. To understand how Hsp70 phosphorylation may alter HSR, we created a collection of 146 yeast-expressing mutations in Ssa1 phosphorylation sites (73 phospho-mutants, 73 phospho-mimics). We exposed this “Hsp70 chaperone code collection” to heat shock at 39˚ C and identified several Hsp70 phospho-mutants that were impaired for high-temperature growth. We have now mapped these sites to the Hsp70 structure to identify core regulatory regions for correct HSR and are characterizing the physiological relevance for chaperone code control of HSR. Going forward, we will screen this heat-sensitive yeast for HSR activation using a real-time transcriptional reporter assay. Taken together our working model is that phosphorylation of Hsp70 by diverse stress signaling pathways alters Hsp70-Hsf1 interaction and the global HSR transcriptional program.

Abstract #: 937

Title: A Novel Method to Sequentially Edit the Yeast Genome

Student Author(s): Briggs Yoder **H**

Faculty Advisor: Dr. Richard Chi

Disciplinary Theme: Science, Technology, and Engineering

Saccharomyces cerevisiae (budding yeast) is an excellent model organism that has been utilized to understand many human diseases such as cancer, heart disease, and neurodegenerative diseases such as Alzheimer's, Parkinson's, and others. Budding yeast was the first eukaryotic completely sequenced and has since become a pioneering genetic system. A standard practice in many yeast labs across the world is to modify yeast using genetic markers that can be amplified and inserted into the genome using homologous recombination; However, genetic marker availability upon sequential genomic edits limits the number of edits a researcher can do. Our lab has recently developed a novel CRISPR-Cas9 method that can be used to remove these markers thus creating a markerless modification. However, multiple edits using this novel method is still unknown. The goal of this study is to determine the effectiveness and efficiency of our CRISPR-Cas9 method to sequentially knockout three target genes. To test this, the genes PRC1, PEP4, and PRB1 were targeted to be removed. These genes code for proteases which break down proteins in the vacuole. Removing these protease genes and their markers allows researchers to isolate protein complexes without degrading them while conserving marker availability. Current DNA polymerase and gel electrophoresis results indicate genes PRC1 and PEP4 were knocked out and made markerless using our novel CRISPR-Cas9 protocol.

Abstract #: 938

Title: IL-25 Inflammation and Breast Tumor Macrophages

Student Author(s): Rose Almasian **CE, G, H, PKP**

Faculty Author(s): Julia Roberson

Faculty Advisor: Dr. Didier Dréau

Disciplinary Theme: Science, Technology, and Engineering

Breast cancer remains a leading cause of women's deaths. The incidence of breast cancer in the United States has been rising at an annual rate of 0.5% over the past few decades. The purpose of this research is to identify the role of the proinflammatory cytokine IL-25 in tumor cell progression. Breast cancer progression is promoted by an inflammatory breast tumor microenvironment; in particular, the inflammatory cytokine signaling between tumor-associated macrophages and tumor cells that are facilitated by tumor growth. Past research suggests that pro-inflammatory cytokines such as IL-1 beta play a role in cancer progression. Recent data suggests that members of the IL-17 cytokine family including IL-17A and IL-17E, i.e. IL-25, may also play a role in cancer progression. We assessed through immune analyses whether IL-25 secretions and IL-17R expressions were altered in both breast tumor cells and macrophages treated in vitro with secretomes from macrophages and tumor cells, respectively. Our preliminary data suggests that tumor and macrophage secretomes altered both IL-25 and IL-17R expression in J774 macrophage and 4T1 mammary tumor cells. We expect that our continued research will be consistent with these findings. These results further our understanding of the interplay between tumor cells and macrophages within the breast tumor microenvironment and provide evidence of a possible role of IL-25 and IL-17R in breast cancer progression. Moreover, this research may lead to novel targeted cancer immunotherapy to control tumor growth.

Abstract #: 939

Title: NLRP3 Activation and Phagocytic Activity of Breast Tumor Macrophages

Student Author(s): Kaitlyn Moure **H**

Faculty Author(s): Julia Roberson

Faculty Advisor: Dr. Didier Dréau

Disciplinary Theme: Science, Technology, and Engineering

Cancer is comprised of a multitude of complex diseases that encompass various factors. Breast cancer, in particular, is one of the leading causes of female mortality, with the incidence increasing globally. The growth and progression of breast cancer are influenced by the development of inflammation within the breast tumor microenvironment. Macrophages, i.e., innate immune plastic cells, recognize and engage with cellular debris, degraded cells, and pathogens to serve essential roles in maintaining homeostasis. Within the breast tumor microenvironment, tumor-associated macrophages display an M2-like phenotype that is associated with immunosuppression and reduced phagocytic activity that favors tumor progression. Whether the breast tumor cell secretome alters the macrophage toward an M2-like phenotype activities is unclear. Here we assessed macrophage phenotype and phagocytic activity in vitro following incubation with tumor secretomes through immune-analysis and flow cytometry. In addition, the effects of calcium deposits, i.e., monosodium urate and hydroxyapatite were tested, as they are associated with proinflammatory macrophages that is correlated to a poor prognosis and clinical cancer progression. Preliminary data suggests that 4T1 secretomes along with hydroxyapatite will promote an M2-like phenotype in J774 macrophages. Moreover, NLRP3 inflammasomes were activated leading to increased proinflammatory IL-1beta and IL-18 cytokine secretions. Lastly, activated macrophages appeared to display decreased phagocytosis. The data extends our understanding of the interplay between tumor cells and macrophages within the breast tumor microenvironment and support further assessment of inflammasome-driven proteins as potential therapeutic to improve upon current means of monitoring progression and treatments.

Abstract #: 940

Title: Understanding the Impact of Force Activation of Notch on Myogenesis

Student Author(s): Rida Zainab **H**

Faculty Advisor: Dr. Susan Arthur

Disciplinary Theme: Science, Technology, and Engineering

Notch signaling is an essential component of the skeletal muscle repair system, and plays a critical role in cellular fate determination. The mechanistic function of Notch across development and myogenesis is not well defined. Myogenesis requires the activation and proliferation of adult skeletal muscle stem cells, which fuse into myotubes. Notch is suggested to promote satellite cell activation yet be an inhibitor of myotube formation. The mechanistic target of rapamycin, or mTOR signaling, is also suggested to play a role in myotube formation and muscle repair. However, its relationship to Notch during myogenesis is unknown. This study aims to test a novel force-activating Notch technique in myotubes and measure its effect on myogenesis and mTOR signaling. We hypothesize that force activating Notch in myotubes will result in decreased expression of myogenic proteins and mTOR targets. A force-activating ligand of Notch, termed JAGGED-1, will be used via cell culture methods involving the C2C12 mouse muscle cell line. C2C12s will be seeded on plates coated with JAGGED-1 and collected post-differentiation. Myogenic proteins and markers of mTOR signaling will be quantified using Western Blot analysis. We expect that JAGGED-1 will result in increased Notch activity, decreased expression of embryonic myosin heavy chain (a marker of muscle repair), and decreased mTOR signaling in response to Notch force activation. The findings of this study will expand our understanding of Notch force activation in muscle cells along with the novel JAGGED-1 ligand and its subsequent impact on myogenesis as it relates to degenerative muscle conditions.

Abstract #: 941

Title: Sexual Dimorphic Responses in Tau Aggregation Post Viral Encephalitis Infection

Student Author(s): Kristen Minehart **H, PKP**

Faculty Author: Trevor Price

Faculty Advisor: Dr. Kristen Funk

Disciplinary Theme: Science, Technology, and Engineering

Alzheimer's disease (AD), a progressive neurodegenerative disorder, is the most common form of dementia worldwide, accounting for 60-70% of yearly cases. Furthermore, significant disparities in AD prevalence, incidence, and symptom progression exist between males and females for unclear reasons. Pathological hallmarks of AD include the aggregation of two proteins, Amyloid-β, which aggregates extracellularly into senile plaques, and Tau, which aggregates intracellularly into neurofibrillary tangles. These protein aggregates lead to neuronal death, causing AD. While the biological mechanisms triggering Amyloid-β and Tau aggregation are unknown, recent research focuses on viral encephalitis contributing to AD pathology. Numerous studies associate Amyloid-β with viral infections; however, there is little known about Tau and viral infections. We hypothesize that sexual dimorphic responses to viral infection contribute to sex differences observed in AD pathology, specifically Tau aggregation. To investigate this, we used a murine model of neurotropic viral infection using an attenuated strain of West Nile virus with transgenic mice that express a disease-associated mutation in human Tau. To evaluate sex differences in recovery from viral encephalitis, we compared female and male mice survivorship and weight change until 30 days post-infection. To characterize sex differences in Tau aggregation in vitro and in vivo, we performed Western Blot analysis and immunohistochemistry for Tau protein. To determine if sex differences are due to Tau gene transcription, we performed quantitative real-time polymerase chain reaction. Our results show differences among male and female mice in survivorship, recovery, Tau aggregation, and Tau gene expression.

Abstract #: 942

Title: Staphylococcus aureus Viability and Invasion Are Necessary for Neutrophil-Recruiting Chemokine Production by Infected Osteoblasts

Student Author(s): Kirthi Kaushik and Sophie Sipprell **H**

Faculty Advisor: Dr. M. Brittany Johnson

Disciplinary Theme: Science, Technology, and Engineering

Osteomyelitis is a serious infection that occurs in the bone and joints associated with persistent inflammation. Staphylococcus aureus (SA) is the main causative agent of osteomyelitis cases. Infection can be spread to the bone from surrounding infected tissue, as well as through trauma or surgery, resulting in disease that is often refractory to treatment. As such, defining the pathogenesis of this disease is critical. It is now appreciated that resident bone cells including osteoblasts contribute to the initiation of immune responses to SA infection. Resident bone-forming osteoblasts can recognize SA via pattern recognition receptors and produce immune mediators. We have previously shown that SA-infected primary murine osteoblasts produce neutrophil-recruiting chemokines. Neutrophils are innate immune cells that can contribute to both bacterial clearance and/or host inflammation. Notably, the mechanism underlying production of neutrophil-recruiting chemokines is undefined. Here, we present data indicating SA intracellular invasion of osteoblasts is necessary for stimulation of neutrophil-recruiting chemokines. Compared to challenge with viable SA, osteoblasts exposed to heat-inactivated SA produce significantly less neutrophil-recruiting chemokines. Notably, heat-inactivated SA have a reduction in intracellular invasion of osteoblasts. In agreement with these observations, pharmacological inhibition of actin-dependent SA invasion resulted in a significant decrease in neutrophil-recruiting chemokines by osteoblasts. Collectively, these data support that SA intracellular invasion of osteoblasts is required for stimulation of neutrophil-recruiting chemokines that initiate the corresponding recruitment of immune cells. Ongoing studies will examine the molecular mechanisms required for chemokine production and assess the contribution of neutrophil recruitment to bacterial clearance and host inflammation.

Abstract #: 943

Title: Examining Duffy Status of Plasmodium vivax Infected Individuals

Student Author(s): Abdulghani Obeid **G, H**

Faculty Author and Advisor: Dr. Eugenia Lo

Disciplinary Theme: Science, Technology, and Engineering

Malaria is a major public health crisis in sub-Saharan Africa and this disease kills around 600,000 people a year, mostly young children. There are five Plasmodium parasites that cause malaria in humans, among them Plasmodium vivax is the most widespread form of malaria and invades preferably young red blood cells that contain a Duffy receptor on the RBC surface. The expression of the Duffy receptor is governed by the promoter of the DARC gene. It was previously thought African individuals lack Duffy expression (i.e, Duffy-negative) and thus immune to P. vivax malaria. However, recent findings have indicated that Duffy-negative can be infected with P. vivax malaria likely in the absence of the Duffy receptor expression. These infections were also shown with significantly low parasitemia compared to Duffy-positive infections. The purpose of this study is to compare the prevalence of P. vivax in Duffy-negative individuals among various clinics and hospitals in Ethiopia. DNA is extracted from dried blood spots from febrile patients that have malaria-like symptoms. To identify Duffy status, Taqman qPCR was conducted to reveal the DARC genotype of samples and SYBR qPCR to identify and quantify P. vivax parasitemia. Variations in P. vivax prevalence could be associated with ethnic group distribution and transmission intensity of malaria of the areas. The expected result is that individuals in sub-Saharan Africa who are negative for the Duffy gene are also at risk of contracting malaria even when lacking the receptor to where the parasite binds.

Abstract #: 944

Title: Investigating Copy Number Variations of Plasmodium vivax DBP1, DBP2/EBP, and RBP2b in Duffy-positive and Duffy-negative Plasmodium vivax Malaria Infections

Student Author(s): Rei Rama **G, H**

Faculty Author(s): Kareen Pestana and Dr. Eugenia Lo

Faculty Advisor: Dr. Eugenia Lo

Disciplinary Theme: Science, Technology, and Engineering

Plasmodium vivax is the most widespread human malaria parasite and is particularly resilient to current elimination efforts. Red blood cell invasion by P. vivax requires interaction between the Duffy Antigen Receptor for Chemokines (DARC) and Duffy Binding Protein (DBP). Erythrocyte Binding Protein (DBP2/EBP) has been shown to moderately bind to Duffy-negative erythrocytes in prior in vitro studies. The interactions of reticulocyte binding protein 2b (RBP2b) with Transferrin Receptor 1 (TfR1) also play a role in Duffy-positive erythrocyte invasion. High-order PvDBP and PvEBP copies were reported in P. vivax from Madagascar and Cambodia. While the exact mechanisms of erythrocyte invasion in Duffy-negative infection remain unclear, multiplications of PvDBP, PvEBP, and PvRBP2b may influence the capability of P. vivax to invade Duffy-negative erythrocytes. This study examines copy number variations of these three genes in Duffy-positive and Duffy-negative P. vivax infections from Ethiopia. The correlation of copy number variation with parasitemia (i.e., the number of infected RBCs as a proxy for invasion capability) is also examined. A TaqMan assay was used to determine the Duffy genotype and 18s quantitative PCR to measure the density of P. vivax samples. Amplifications using primers flanking PvDBP tandem repeats were conducted to detect PvDBP multiplications. Copy number variation of PvDBP, PvEBP/DBP2, and PvRBP2b, was assessed by a qPCR-based protocol developed for each gene using plasmids and samples of which copy number was confirmed by whole genome sequencing (WGS) as positive controls. These genetic findings are essential to evaluate the effectiveness of the PvDBP-based vaccine and other potential candidates across Africa.

Abstract #: 945

Title: Food Insecurity and Health in Mecklenburg County during Covid-19 Pandemic

Student Author(s): Mariam Jaliawala **CE, H, NC, U**

Faculty Advisor: Dr. Nicole Peterson

Disciplinary Theme: Science, Technology, and Engineering

Food insecurity has been linked to various health problems due to the lack of access to affordable nutritious food. The Charlotte-Mecklenburg Food Policy Council aims to understand how food security has been affected by the pandemic. The purpose of this research is to understand the root problems of food insecurity, the perspectives of the Charlotte residents, the toll the pandemic has had on marginalized population and the approaches used to overcome these obstacles. To understand the local challenges, a team of UNC Charlotte researchers worked with the Charlotte-Mecklenburg Food Policy Council and other food organizations around the area to document how households are responding to the pandemic, and as a way to better understand the root problems of food insecurity. To approach this project, we generated a survey in collaboration with multiple organizations and with Charlotte Mecklenburg Food Policy Council to assess residents above the age of 18 living in Mecklenburg County. The survey included questions such as “Are there times where you or your family did not have access to nutritional and safe foods?” We found that food insecurity is associated with increased risk of chronic illnesses. The responses were analyzed for geographical food insecurity trends and parameters involved in food scarcity and inaccessibility. Data collected will improve our understanding of the communities around Charlotte and provide insight into their eating habits, access to healthcare, housing and transportation. We expect this research will help lead to efforts to improve the health of Charlotte’s citizens and strengthen the local economies.

Abstract #: 946

Title: Urban Policy and Its Effect on National Division

Student Author(s): Alexander Toback **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

Urban policy is the set of governing rules and regulations that dictate overall societal structure in the region where the policies are implemented. Since the conception of the United States, urban policy has been a source of controversy that has led to discriminatory practices that target minority racial groups, the underprivileged, and the LGBTQIA community. This literature review showcases these connections between urban policy and discrimination as well as highlighting how these discriminatory effects relate to political division at the national level. I will look at why urban populations as well as marginalized groups have a strong tendency to favor more democratic policies as opposed to more suburban and rural populations favoring more republican policies. This overall concurment of opinions depending on regional location has an important effect on urban policy and cultivates an us vs. them mentality. This literature review looks to fill a void in the research by connecting these dots between urban policy and national division. Much of the previous research regarding these matters focuses primarily on urban policy and discrimination without considering the effects that policy has on national societal outlooks. Lastly, this literature review showcases how urban policy can be societally conscious and what measures need to be taken in order to reach this point.

Abstract #: 947

Title: Mental Health Outcomes from Participation in Club Sports Among Female College Students

Student Author(s): Gabrielle Ruiz **H**

Faculty Advisor: Dr. Megan Smith

Disciplinary Theme: Social Sciences

Female college students' mental health has been positively impacted by participation in physical activity, with low levels of physical activity promoting worse mental health and self-reported depression, compared to women who are partaking in physical activity almost every day. Similarly, a positive relationship has been found between social support and mental health. Because a positive relationship exists among these factors, this research will examine how participation in club sports impacts self-reported mental health among female college students at the University of North Carolina. In order to evaluate this relationship, surveys will be distributed to all currently enrolled female students who participate in club sports on campus. In addition, participants will have opportunities to participate in one-on-one interviews; to further explore the quality of their self-reported mental health in association with their involvement in club sports. The expected result of this research will show female college students that participate in club sports will report high levels of positive mental health in connection with the social support in their sports club. Mental health is vital in the overall well-being of a person; this research will help contribute to understanding how women can improve or balance their mental health through social support in college. In addition, research findings will be part of understanding how to achieve elevated well-being through ways that potentially have not been considered to play a role in their mental well-being during college.

Abstract #: 948

Title: Investigating the Factors that Influence the Political Ambitions of College Students, with a Focus on Differences in Gender

Student Author(s): Emma Wakeman **H**

Faculty Advisor: Dr. Mary Jo McGowan

Disciplinary Theme: Social Sciences

College students are a crucial group of individuals that represent the political trends and issues of the future. Therefore, it is necessary to understand the factors that influence their decision to pursue or avoid a career in politics. The inspiration for this study came from a personal connection. The College Republicans student organization at UNC Charlotte reported only having one female member in the 2021-2022 academic year, which has become the norm for this organization. Membership in collegiate political organizations may be one way to predict the likelihood of pursuing a career in politics. This study aims to understand the factors that have the most significant impact on selecting a career in politics and analyze the differences by gender. Using a survey, we examine three components that may lead college students to choose a career in politics: their background, their comfort in taking risks, and their strength in connections with others, including family members, friends, and the people with whom they interact with in organizations of their choosing. We hope by learning more about students who do and do not seek a career in politics, we learn how to close the gap between the number of men and women who hold elected office.

Abstract #: 949

Title: Shamed into Pain: Correlating Christian Influence During Developmental Years and Symptoms of Vaginismus

Student Author(s): Sarah Gravesen

Faculty Advisor: Dr. Hannah Peach

Disciplinary Theme: Social Sciences

Vaginal pain is a deeply intimate struggle that individuals may suffer from. Limited studies have been performed to assess possible risk factors for symptoms of vaginismus, and this study aimed to increase the global knowledge on the topic. Assessing the correlation between exposure to Christianity during developmental years (birth until 18) and symptoms of vaginismus, the hypothesis was that exposure to Christianity would be positively correlated with symptoms of vaginismus. The sample included participants (N = 41) ranging from 19 to 50 years old (M = 35.12) who self-selected to complete the online survey when it was shared on various social media platforms. The study utilized mixed-method collection, creating a measure to assess the overall exposure and commitment participants had with Christianity as well as an inventory for symptoms of vaginismus. Further measures included the 10-item Gender Role Beliefs Scale and a qualitative assessment of sexual health, including sex education. The hypothesis was rejected due to the lack of a significant correlation, however an unforeseen association between gender role beliefs and symptoms of vaginismus produced a negative correlation. Exploratory analysis revealed that participants who were taught conservative gender role beliefs were more likely to experience symptoms of vaginismus than those who were taught more liberal or egalitarian gender role beliefs. Despite the rejection of the original hypothesis, this study has produced valuable information surrounding rigid belief systems and vaginal pain that could be enlightening for future research studies.

POSTERS

Session A

CE - Community Engaged **G -** Global **H -** Honors **S** - Sustainability

NC - North Carolina **PKP** – Phi Kappa Phi Member **U** - Charlotte

Abstract #:100

Title: The Innovation of the Tuba

Student Author(s): Lily Cagle **CE, G, H, S**

Faculty Advisor: Dr. Joe Skillen

Disciplinary Theme: Arts and Design

From the early 1960's to the 1970's/80's, there was a period of innovation, experimentation, and musical growth for tubists. The tuba, a bass voice, in music has held the bass foundational role in musical literature ranging from the romantic period to the early days of jazz. Tuba curiously disappeared from the genre of jazz for about 25 to 30 years, and reemerged to be known as an artistically capable instrument within various genres. Founding jazz tubists redefined the tuba's role outside of the classical realm. Since that time from the back row, tubists have been expressing a desire to be melodically equal to the other instruments within ensembles. With ever evolving innovation, many qualified tubists have emerged. The goal of my research is to highlight these tubists and their achievements for the wider music community, especially for developing musicians, in addition to exploring this unique technical and melodic development through innovation. From reading and reviewing historical articles, journals, websites, and theses, I conclude that tubists were indeed present, during the seeming jazz hiatus, honing their skills behind the scenes and working to become the musical equals of their peers who chose more melodically idiomatic instruments. Prior to researching, I expected to only find tuba gaining strides within jazz, but was able to discover tubist pioneers in popular music. My research aims to trace the path of innovation and honor those who provided my instrument a melodic voice in popular music and jazz.

Abstract #:101

Title: The Effects of Travel Intermediary Applications on the Inclination of Undergraduate Students to Study Abroad

Student Author(s): Briana Gray **H, PKP**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Education and Communication

Travel intermediary applications (TIAs) provide access to information for all three phases of travel decision making: Pre-Trip, Post Trip, and During Trip. The purpose of this literature review is to assess the scholarly literature on the use of travel apps as tools in order to encourage studying abroad. The influence of TIAs on the inclination of undergraduate students to study abroad was examined. Two important factors that influence mobile app adoption are its ease of use and usefulness. Previous studies show that social media has become a major communication and informational tool and can benefit students' experiential learning. Study abroad benefits for undergraduate students and the impact of social media influencers on their motives to travel are also discussed in this review. From a marketing perspective, intermediary apps are an effective way to increase business and competition between companies in the travel industry. Current travel information is widely based on user generated content and social media has elicited greater availability of information. Researching TIAs can also provide marketers with methods to increase customer satisfaction. An increase in freshman study abroad students and their cultivation while overseas is expected, following their newfound knowledge of travel apps. Traveling is an important form of experiential learning that allows students to apply what they have learned to their lives in their home country. This literature review aims to determine the effect of TIAs and how study abroad instructors can better integrate technology into the curriculum, as the world has become progressively media focused.

Abstract #: 102

Title: American Education Practices vs. The World

Student Author(s): Christian Lattimore **G, H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Education and Communication

The purpose of this literature review is to understand the history of education practice in the American education system. There has been a stereotype that, as Americans, we are number one in everything. According to Business Insider assessment, the United States once ranked 6th in education worldwide; as of 2018, the nation ranks 27th. In this literature review, I will use peer reviewed articles and statistics from academic studies from around the world to better understand how U.S. schools compare in academic performance to other countries. I will review research that compares the United States to other countries regarding educational performance and practice with the goal of describing how U.S. high school graduates compare with high school graduates worldwide. This begs the question “how does the American curriculum prepare students to be globally competitive?”. I expect that my research will show that America needs more tools and resources to improve our relative standing in education. Many research studies comparing the United States to other countries show that we under invest in educational innovation and over invest in test scores/ results. The contribution of my research involves synthesizing scholarly articles to better understand the flaws of the American educational system. Also, by taking the research and results from studies, it will give readers a better understanding of the importance of ensuring the future generation is prepared to be competitive in an academic international setting.

Abstract #:103

Title: How Do Youth Councils in Non-profit Organizations Impact Young Adults Aged 11–18 in Charlotte, NC?

Student Author(s): Elena Palmietto **CE, S, NC**

Faculty Advisor: Dr. Susan Harden

Disciplinary Theme: Education and Communication

In this study I investigate how youth councils in non-profit organizations impact young adults aged 11-18 in Charlotte, NC. In my review of previous research, I uncovered the best practices, strategies to organize, and successful programs in other states. Also included in my research is a couple different questions, is there any existing policy template that outlines the use and roles of a council in relation to a nonprofit, and will incentives be needed in order to get youth involved? Using a literature review and qualitative research methods like interviews, I will investigate and recommend how a local non-profit, A Giving Heart Project, can implement a youth council to improve participant outcomes. A Giving Heart Projects mission is "to serve our community by providing sustainable solutions to eliminate barriers and disparities." This project will also utilize community engaged research methods like proposal development and event planning in equal partnership with my community partner, A Giving Heart Project. The research generated from this study will be used by the partner to create a youth council. The program hope to positively impact youth by making them aware of community resources and empowering the voices of youth. The hope following my research will be to develop a youth advisory council for A Giving Heart Project and be able to understand the proper steps in the formation, including what works and what does not.

Abstract #:104

Title: The Effect of Racial Injustice on the Emotional Well-Being of Black Women

Student Author(s): Ja'Bria Farmer

Faculty Advisor: Dr. Susan Harden

Disciplinary Theme: Education and Communication

Previous research has revealed generational trauma as a significant factor to the long-term well-being of Black women. Racial injustice of Black and Brown individuals within underserved communities creates opportunities for generational trauma to persist in unhealthy ways. Psychological stress is another outstanding factor that affects the emotional balance of aged Black women. Due to self-blame and a feeling of responsibility over the experience, guilt and shame may develop. Internalized racism is the term for this self-blame and sense of guilt in relation to racism. In my research, I will use multiple literature reviews and qualitative methods to investigate the impact of racial injustice in Black women over 59 years of age within a nonprofit community organization in Charlotte, North Carolina called She Speaks, a program implemented through QC Family Tree. QC Family Tree is a neighborhood-based community development organization working at the intersection of faith, culture, and social change who serve marginalized groups. The mission of She Speaks is to elevate the voices of Black women by building confidence through public speaking. I will also use community engaged research methods like proposal development and event planning in my research project. The findings of my project will be disseminated to the participants of She Speaks through a community performance. The women of She Speaks will be informed of research findings and benefit from it through more relevant programs that cater to the emotional and social well-being of older Black women.

Abstract #:105

Title: Racial Disparities within School Discipline

Student Author(s): Mela Barnes **U**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Education and Communication

The research in this presentation describes and reports on the national challenge of racial disparities within school discipline. The purpose of this research project was to compare on the national and district level the racial disparities within school discipline. Some questions that guided my research were: Why is it that most schools with a large population of students of color in urban areas only have school law enforcement officers (SLEOs) and not guidance counselors? Have there been any attempts to solve this issue in the past? Another question that guided my research was how do these racial disparities implicate structural racism? For this research project, I compared data collected by the United States Department of Education on equity and opportunity gaps in United States public schools and data collected from Charlotte-Mecklenburg County. I discovered nationally, 6% of all K-12 students suffer disciplinary action at school as compared to 10-18% of black students; locally, 68.2% of black students received at least one Out of School Suspension, thus, the disproportionality rate is currently above target. This presentation offers an examination into how such racial disparities affect students and the education system. It will highlight the importance of access to mental health resources and support for creating a culturally responsive school environment and increasing student self-efficacy. The overall contribution of this research study is to help prepare me as a researcher and a future educator to use data for decision-making and to face these inequities head on to advocate for all students.

Abstract #:106

Title: Impact of Unsafe Abortion in Global Society

Student Author(s): Emily Cooke, Angelique James, and Amanda Moraes **G, S, NC**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Education and Communication

In this poster our group describes and reports on the global challenge of unsafe abortion in the global society. The purpose of our research project was to compare the status of our global issue from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? The purpose of this project is to show the risk of unsafe abortion and the risk of this procedure, and to also go over what abortion rates were in the past to what they are now. To answer our questions and address our purpose, our group analyzed recent and older empirical research. We discovered the unsafe abortion rate is higher in developing countries. Our findings are important because the data could be used to develop safe alternatives for pregnant women, resulting in lower or none maternal death. The overall contribution of this research study is that it helps to prepare us as researchers and as global citizens we should care and do our best to create a better world for everyone. We see a change of life if we can pay attention to preventable death in our global society.

Abstract #:107

Title: Expanding Your Horizons, the Next Generation of Women in STEM.

Student Author(s): Anna Lee and Annika Utt **CE, S, U**

Faculty Advisor: Dr. David Pugalee

Disciplinary Theme: Education and Communication

In this poster presentation we will be explaining how STEM education provided by the campus chapter, Expanding Your Horizons, makes a significant impact on the young girls from local underprivileged communities. The mission of the nonprofit organization, Expanding Your Horizons (EYH), is to empower girls from low-income communities to achieve upward mobility and financial stability by providing them with gateways into the science, technology, engineering and mathematics (STEM) field. Every semester EYH hosts a camp for these purposes. During these camps, attendees are given surveys before and after to gauge their understanding of STEM concepts. In this presentation, we will include data collected from the most recent EYH camp that took place in April 2023, as well as data collected from the two previous EYH camps. Our data is currently limited by its dependence on self-reported data (surveys). However, we plan on implementing a wider range of methods when collecting data on future EYH events. Surveys suggest that the education provided by EYH increases both general understanding of STEM concepts and the overall academic confidence of participants. We hope to identify the areas of STEM in which these students are most commonly under informed and create an environment that fosters the development of knowledge in these areas. EYH programs make a concentrated effort to implement a diverse curriculum; covering more traditional aspects of STEM as well as specific subjects. Through these UNCC assisted programs, students are instilled with critical skills that they can utilize throughout their lives.

Abstract #: 108

Title: The Privilege of Health in America: An Overview of the Intersection Between Health and Poverty

Student Author(s): Katherine Kessler **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

“We treat health as a privilege rather than a right.” People living below the poverty line are more likely to experience poor mental and physical health than their affluent counterparts. Access to healthy and affordable food options, quality living conditions, affordable and quality health care, and access to health education can all impact an individual's ability to maintain a healthy lifestyle. This literature review focuses on the dimensions of poverty that influence the health of the 46 million Americans living in poverty. Through an examination of scholarly research discussing the health status and quality of life of Americans living in poverty, this paper aims to explore health as a human rights issue and to understand where equitable solutions and prevention of poor health outcomes can be improved. Preliminary research shows that impoverished communities in America are facing health disparities that can be worsened by race-related socioeconomic factors that compound the effects of poverty on minority groups. Poor physical health can lead to a range of other issues, such as decreased quality of life, increased risk of disability, and even premature death. These individuals can increase their quality of life by ensuring that impoverished communities have access to the resources they need to improve their physical and mental health. By utilizing literary research, we can better understand why different dimensions of poverty affect health, creating a domino effect of problems, and where this can be stopped to improve human life.

Abstract #: 109

Title: Understanding the Role of Canonical Wnt Signaling and DKK-1 Inhibition of Myogenesis

Student Author(s): Fowsia Mahamed, Rida Zainab, and Sarah Aguirre

Faculty Advisor: Dr. Susan Arthur

Disciplinary Theme: Health Sciences

Sarcopenia is characterized by the loss of skeletal muscle mass and function with age. A contributing factor to sarcopenia is the decreased capacity of aging muscles to heal following injury. Impairment in skeletal muscle development and repair amplifies the effects of several disorders. Muscle repair and growth depend on the Notch, Wnt, and mTOR signaling pathways, but how these signaling pathways interact is unclear. Using the Wnt signaling inhibitor Dickkopf1 (DKK1), this study aims to understand the role of Wnt on Notch and mTOR during myogenesis. The C2C12 muscle cell line was used to seed cells in growth media, proliferate to confluence, and allowed to differentiate. At the onset of differentiation, C2C12 cells were treated every 48 hours with one of the following conditions: 100 ng/mL of DKK1 (Wnt inhibitor), 200 ng/mL of DKK1 (Wnt inhibitor), and/or a control condition. Following treatment, the C2C12 cells were collected for Western blot analysis on day four post-differentiation. Protein concentrations of Wnt, Notch, and mTOR were measured. We hypothesize that utilizing the inhibitor DKK1 to block the Wnt signaling pathway will lead to an increase in Notch and a decrease in mTOR. Since the particular mechanism by which DKK1 participates in this process is unclear, we hope to enhance the understanding and facilitate the development of efficient treatment approaches for enhancing skeletal muscle repair and overall quality of life for sarcopenic individuals.

Abstract #:110

Title: Increased Wnt Signaling in Notch Inhibited Exercised Muscle

Student Author(s): Kamia Washington, Alexa Tokofsky, Carl Williams, and Joshua Huot

Faculty Advisor: Dr. Susan Arthur

Disciplinary Theme: Health Sciences

PURPOSE. Notch, Wingless (Wnt), and Mechanistic Target of Rapamycin (mTOR) signaling pathways have been suggested to be dysfunctional during the regeneration of aged skeletal muscle. Little is known about the interaction of Notch, mTOR, and Wnt during muscle repair. The purpose of this study is to determine the effect of Notch inhibition on active Wnt signaling (GSK3B) and a downstream target of mTOR eIF4E binding protein 1) (4EBP1). METHODS. Young (2-4 months) male C57BL/6 mice were injected with 100,000 TUs of shRNA Notch1 inhibitor into the left gastrocnemius (Control vector in right) for five consecutive days. Mice were exposed to an injurious bout of downhill running. On day 5 of injection, animals were subsequently euthanized over the next 4 days (24hr, 48hr, 72hr, 96hr). For western blots, tissues were homogenized and markers of protein synthesis, mTOR, and Wnt signaling were measured (phospho- and Total mTOR, phospho- and total-4eBP1, and phospho- and total GSK3BetaSer9). Data was analyzed using a two-way repeated measures ANOVA (n = 6 per group). RESULTS. With the inhibition of notch a significance in the phosphorylated GSK3B involved in Wnt signaling was found relative to control ($p < 0.05$). CONCLUSION. The inhibition of notch significantly inhibits the synthesis of GSK3B in Wnt signaling. This suggests the notion that notch interacts with mTOR to play a role in protein synthesis. Supported by UNC Charlotte’s Faculty Research Grant to STA.

Abstract #:111

Title: The Effect of Exercise During a Pandemic

Student Author(s): Kira Chiles **CE, H, PKP**

Faculty Author: Dr. Colby Ford

Faculty Advisor: Dr. Candace Brown

Disciplinary Theme: Health Sciences

Employment, which was greatly impacted by the COVID-19 pandemic, caused alterations to the 'work-from-home' culture, and resulted in increased time sitting and decreased time in leisure activities, like exercise. This study explored the relationship of full-time employment, intrinsic motivation, and self-efficacy to exercise during the pandemic. Methods: Online data was collected from U.S. exercisers (N= 427) using the Exercise Self-Regulation Questionnaire and Self-Efficacy for Exercise Scale in April 2020 and February 2022. Results: MANOVA results revealed a significance in intrinsic motivation ($p < .001$) in 2020 to exercise when gyms and outdoor spaces were closed. The greatest determinants of not achieving self-efficacy to exercise in 2022, when gyms and outdoor spaces were reopened, included "being bored" (36.1%) and "not enjoying" (29.6%) the activity. Conclusion: Results suggest that full time employees endorse high levels of personal accepted values and goals to exercise that are enjoyable, to them, for continued self-efficacy to exercise.

Abstract #: 112

Title: The Effect of Stress on the Mental Health of College Students

Student Author(s): Enny Ogunyemi

Faculty Advisor: Dr. Kim Buch

Disciplinary Theme: Health Sciences

In the year 2020, the National Institute of Mental Health reported about 17 percent of the US population between 18-25 years have been diagnosed with depression. College attendance has been correlated with elevated stress levels for young adults. The purpose of the present study was to test the hypothesis that college students who experienced high levels of stress were more likely to demonstrate high levels of depression. The study consisted of 61 college students between the ages of 18-25 from the University of North Carolina at Charlotte. Participants completed two surveys assessing stress and depression: Perceived Stress Scale (PSS) and Patient Health Questionnaire (PHQ-12). The results of the correlational analysis showed a significant positive correlation (r=.72) between stress and depression levels. This result is important in that it suggests that as students' stress levels increase, so do their levels of depression. This can start a spiral of negative mental health outcomes because depressed students tend to exhibit less effective coping strategies, which in turn can lead to higher levels of depression. Previous research has shown the negative effects of both of these mental health indicators on student success and retention. These findings have important implications for all university stakeholders and mental health providers in higher education. Future research should replicate the findings with a more diverse demographic. It should also seek to identify the sources of the stressors so that interventions can be designed to improve the mental health of college students.

Abstract #:113

Title: Diversity of Bacterial Communities in Soil Samples

Student Author(s): Enny Ogunyemi, and Isabelle Hamm **G**

Faculty Advisor: Dr. Sharon Bullock and Dr. Michelle Pass

Disciplinary Theme: Health Sciences

The Global Network Learning Lab (GNL) studies the diversity of bacterial communities in soil samples collected from the University of North Carolina at Charlotte (UNC Charlotte) and the University of Lagos, Nigeria (UNILAG) soil. A research study done by Fierer & Jackson (2006) highlighted how the diversity and richness of soil bacterial communities is correlated to environmental factors and soil health. In addition, the diversity is correlated to ecosystem type and soil characteristics such as pH. Soil samples were collected from the botanical garden on the campus of UNC Charlotte and various locations on the campus of UNILAG. The physical and chemical characteristics of soil samples were analyzed using the feel test, mason jar test, pH, moisture, and temperature. Through these tests, we were able to identify the type and composition of the soil. Bacterial communities were isolated using culture-based and molecular-based assays. This research is important because it shows the diversity in bacterial communities on the UNC Charlotte campus and the UNILAG campus. Our findings can be used to better understand how bacterial communities in the soil correlate to soil health and plant diversity and growth. This work will extend our understanding of continental soil microbial diversity which is an area that is lacking in broader research.

Abstract #: 114

Title: Interagency Mental Health Collaboration Project: Investigating Barriers of Interagency Collaboration among D.S.S., Mental Health Providers, and School Workers

Student Author(s): Heather Dodson and Katherine Bolt **CE, S, NC, U**

Faculty Advisor: Dr. Ticola Ross

Disciplinary Theme: Health Sciences

Youth mental health concerns are currently on the rise. According to the CDC (2022), mental illness rates were increasing prior to the COVID-19 pandemic and have increasingly escalated since then. With the increase in the need for services, mental health providers have forged extensive waitlists (APA, 2021). Further, evidence suggests that underserved populations have a more difficult time accessing mental health services (Mongelli et al., 2020). The primary purpose of this research is to discover the benefits and barriers of mental health providers by working with the Department of Social Services (D.S.S.) and school workers. To obtain a better understanding of the benefits and barriers, several different interviews will be conducted among multiple mental health providers, as well as organizational staff employees. Once consent to record is obtained by the interviewer, the interviews will proceed accordingly. After interviews are completed, data will be transcribed, coded, and then analyzed using Reflective Thematic Analysis (Braun & Clarke, 2021) to uncover common themes. Based on prior research and current trends, the authors expect to find similar variables such as a lack of knowledge of agency policies, communication issues, and a limited workforce. Reducing interagency barriers can lead to streamlined service delivery for youth that are in need of mental health services. The findings of this study will contribute to possible solutions of interagency collaboration issues and the body of literature surrounding youth mental health services.

Abstract #:115

Title: How Does Society Define Animal Cruelty and Animal Neglect?

Student Author(s): Alexa Kane and Julie Hwang **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Humanities

Animal cruelty and neglect are often used interchangeably on the internet. Since the prevalence of social media makes it easier for information to be spread, it is important to use the correct terminology. Legally and socially, there are varying degrees of punishment for each, therefore incorrectly labeling the action may lead to wrongful punishment. Additionally, people argue about whether what they see is considered animal abuse or not, which begs the question of what is classified as animal cruelty and animal neglect and why it occurs. Numerous research articles agree that the topics have been explored to a limited degree. Understanding animal cruelty and animal neglect, and why it occurs, can help us understand key differences in people's values and their actions. One particular study highlights the trends of animal cruelty and intimate partner violence (Fitzgerald, 2019). Another paper explains that while people generally classify animal cruelty and animal negligence as separate actions, how they are defined is based on different standards (Henry 2008). The definitions of animal cruelty and animal neglect will be viewed from a moral perspective and legal perspective. Through reviewing various literature, we aim to find commonalities to more definitely understand what constitutes animal cruelty and animal neglect.

Abstract #:116

Title: Research and Applications of Machine Learning in Air and Water Pollution

Student Author(s): Sidney Nesbitt **H, S**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Math and Computer Sciences

In order to demonstrate how recent technological advances have the potential to solve complex environmental problems, this literature review will describe how utilizing machine learning can be effective in aiding efforts to identify and eliminate air and water pollutants. Machine learning is a branch of artificial intelligence that allows for data to be fed to algorithms resulting in the computer detecting patterns that a human never could. For this reason, machine learning models are often used to make relatively accurate predictions as well as detect things imperceptible to us. These models, when supplied with environmental data (such as weather, population data, proximity to power plants, etc.) can be used to predict our impact on the environment. Predictions and findings can then assist companies, governments, and researchers in formulating solutions to problems before they can arise or worsen. Research gathered through peer reviewed sources asserts that prediction models can accurately predict future range and scale of harmful pollutants in the air and water. Additionally, classification models are developing increasing accuracy in differentiating between different harmful and non-harmful compounds as well as determining sources of pollution. Gathered research also shows how the knowledge learned through implementing machine learning practices can be applied to improve air and water quality in various locations. This synthesis of current research will aid in displaying how machine learning practices can be applied to the complex issue of pollution detection and management to help better maintain our environment.

Abstract #:117

Title: Accelerated Hashing: A Case Study on High-Throughput Hashtables for Highly-Parallel Architectures

Student Author(s): Brody Tingle

Faculty Advisor: Dr. Tyler Allen

Disciplinary Theme: Math and Computer Sciences

With the increased use of Graphics Processing Units (GPUs) in accelerating large computational problems, there is a growing focus on the need for efficient data structures to support a diverse range of applications. Data structures and algorithms that are built for the CPU do not effectively convert over to the GPU because of its unique architecture that requires special attention to maximize its performance. Our research is focused on studying and improving GPU data structures to enable the acceleration of new categories of problems and increase the overall throughput of existing applications. In this work, we improve upon the efficiency and usability of existing hashtable algorithms, a core data structure for database processing and big-data problems. Our results demonstrate the state-of-the-art in GPU-based hashtables, and showcase the methodology for our proposed new approach.

Abstract #:118

Title: Comparative Study of Text Clustering Using Extracted Sentiments

Student Author(s): Nicole Wiktor

Faculty Advisor: Dr. Mohsen Dorodchi

Disciplinary Theme: Math and Computer Sciences

This research investigates the application of clustering techniques on student reflections in different courses, aiming to extract insights about students' impressions, emotions, and thoughts while taking a course. Clustering is a useful method to group similar students' reflective texts and gain a quick overview of their opinions. Our study uses a dataset of student reflections about a course, including student's self-reported emotions. We attempt to apply clustering methods on various different features, such as different self-reported emotions and corresponding textual reflections to evaluate their effectiveness in uncovering meaningful patterns in the reflections for the course instructors. Besides overviewing the approach and discussing thoroughly on the results, the implications of the findings and ideas for future research are provided. The research aims to discover how we can use clustering to gain insight on student reflections as well as help instructors to better understand their students' emotional experiences and reasons why they feel that way about the course.

Abstract #:119

Title: Machine Learning-Based Parameter Ranking in HPC I/O Stack

Student Author(s): Sumi Verma **G**

Faculty Advisor: Dr. Hasanur Rashid

Disciplinary Theme: Math and Computer Sciences

Parameters greatly influence the performance of a storage system like the parallel file system in high performance computing (HPC). The default parameters of the parallel file system often deliver sub-optimal performance due to the heterogeneity of executing applications and variability in the HPC environment. Tuning parameters can contribute to significant performance improvement for the parallel file system. Auto-tuning parallel file systems using machine learning (ML) and deep learning (DL) methods have become increasingly popular. Unfortunately, due to many tunable parameters in the parallel file system and the non-linear relationship between the parameters and file system performance, the auto-tuning methods face difficulties while trying to find an optimal configuration from the massive configuration space of file system parameters. On the positive side, it is well-known that not all parameters significantly impact system performance. We aim to utilize this window of opportunity to identify and rank important file system parameters. To achieve the ranking of the file system parameters, we plan to build an observation dataset by sampling a limited amount of information from our prototype HPC cluster. We intend to utilize samples dataset with different ML models to map the parameters' correlation to the performance. Using multiple ML methods will help us compare the efficacy of various ML models and gain a better insight into the relationship of the parameters to the file system performance. Furthermore, ranking file system parameters and filtering out less influential parameters will help reduce the configuration space and improve the accuracy of parameter auto-tuning methods.

Abstract #:120

Title: Profiling and Visualizing I/O Access Patterns of HPC Applications

Student Author(s): Abby Kapocius

Faculty Advisor: Dr. Hasanur Rashid

Disciplinary Theme: Math and Computer Sciences

I/O performance remains a critical point of investigation in high performance computing (HPC). The exponential increases in computing power in HPC systems have made I/O performance the bottleneck of HPC facilities. Moreover, the accelerated innovations in the hardware design, platform architecture, and software ecosystem of HPC facilities, as well as the diversity of HPC applications, keep the trends of I/O performance continuously evolving. As leading HPC facilities continue scaling, we must understand the existing trends of I/O performance to improve resource allocation strategies and alleviate possible I/O contentions observed in a parallel file system. The imbalance of I/O operations across shared storage in a parallel file system can severely impact the performance of scientific applications. The dynamic nature of I/O behaviors, along with the necessity of understanding I/O performance, motivates us to investigate the current I/O access pattern trends with the help of recently developed advanced tools. Our work aims to characterize and profile I/O access behaviors of traditional HPC applications, I/O benchmarks, and machine learning applications. We will monitor, collect, and analyze I/O behaviors with state-of-the-art profiling tools like Darshan. With the help of supplemental tools like DXT-Explorer and Drishti, we will create visuals and ultimately seek out I/O patterns that lead us to strategies that will help improve the parallel file system performance. Our findings will contribute to a better understanding of I/O performance and achieve more efficient and accelerated application run times.

Abstract #:121

Title: Evaluating Lustre Parameter Tuning Through Deep Reinforcement Learning-Based Framework

Student Author(s): Connor Carroll

Faculty Advisor: Dr. Hasanur Rashid

Disciplinary Theme: Math and Computer Sciences

The efficiency of the parallel file system is critical to the performance of the I/O subsystem in high performance computing (HPC) facilities. Due to the exponential improvement in computing, the I/O subsystem often becomes the bottleneck in HPC facilities. Computing resources often sit idle, awaiting the responses of requested I/O operations made to the parallel file system. Lustre, the most common parallel file system in Top100 supercomputers, offers many tunable parameters to help improve I/O performance. Unfortunately, many users of HPC facilities possess limited knowledge of tunable parameters, and the complex interactions of parameters with the highly variable HPC environment make it extremely difficult for the users to tune parameters effectively. Auto-tuning frameworks utilizing machine learning methods have recently been introduced to automate the parameter-tuning process. CAPES, a deep reinforcement learning-based (DRL) parameter tuning framework proposed by Li et al., has demonstrated abilities to guide parameter tuning without any manual input while addressing the dynamic nature of the HPC environment. Being implemented in a prototype environment and tested with a limited number of tunable parameters, we believe there are many avenues of improvement possible over the current CAPES framework. We plan to evaluate the CAPES framework with different combinations of system observations, diverse sets of tunable parameters, various compositions of DRL layers, and distinct values of hyperparameters to observe their impact on system performance. Our detailed evaluations will contribute to defining strategies for effectively adopting the CAPES framework in HPC facilities.

Abstract #:122

Title: Elucidation of the Virosphere via DeGenPrime – the Future of Viromic Amplicon Studies

Student Author(s): Sophie Tanker and Bryan Fulghum

Faculty Advisor: Dr. Richard Allen White III

Disciplinary Theme: Math and Computer Sciences

The virosphere, the collection of all Earth's viruses (1031), represents the greatest challenge of tackling diversity. No single viral marker has ever been found to amplify a large representative collection of viruses. However, markers for capsid, terminase, and polymerases have shown promise but they fail to capture a vast diversity due to lack of robust degeneracy analysis of the alignments. Our software tool DeGenPrime utilizes integrative convolutional neural networks to robustly score alignments in order to best capture diversity with minimal degenerate bases. Degenerate bases are useful minimally to capture more diversity but counter-productive if high levels are needed. It also checks for primer dimerization, a common primer problem in which primers stick to themselves instead of sticking to the target DNA sequence. DeGenPrime provides the user friendliness of Primer3, but captures the diversity of MetaFunPrimer in a more streamlined user experience. In the future, this technology can be used to streamline PCR within labs, as it eliminates the possibility of a primer failing due to degenerate bases.

Abstract #:123

Title: Procrastination and Mental Health: How Mental Health Impacts Productivity in College Students

Student Author(s): Emily Keck **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Science, Technology, and Engineering

The purpose of this project is to explore the relationship between mental health issues and procrastination and productivity levels in college students. Research in this area contains a significant link between procrastination and several mental health conditions. These conditions include: depression, self-esteem, suicidal ideation, resilience, fear of failure, and others. One study focused on how depression and self-esteem influence procrastination, and found that depression directly and indirectly affects procrastination through self-esteem. Another study looked at how depressive symptoms and suicidal ideation play a role in procrastination. They found that procrastination was positively correlated with PANSI (Positive and Negative Suicidal Ideation Inventory). Studies show that mental health issues directly impact procrastination, usually negatively. Research has provided a strong relationship between mental health conditions and procrastination; however, we do not have a full understanding of the process for which this occurs. In this literature review, I will attempt to provide insight on the existing relationships between work in a psychology field with work in a field that focuses on health and the brain, to better describe how these relationships coincide. I expect that having a strong understanding of depression and anxiety will be crucial; both because of how common these mental health issues are in college students, and because research shows a strong correlation between these mental health issues and academic procrastination. This research is important to the understanding of mental health issues in university students. Understanding these correlations will provide a framework to start helping reduce procrastination in college students.

Abstract #:124

Title: The Effect of Climate Change in National Parks across the US

Student Author(s): Asma Patel **H, S**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Science, Technology, and Engineering

The impact of climate change has affected national parks in the United States, particularly impacting the vegetation and the way other living organisms interact with the environment. The goal of this literature review is to examine the impact that climate change has on vegetation and organisms in national parks in the U.S. Recent research has found that climate change impacts the growth of plants in national parks both through erosion and changes in soil texture. In addition, wildfires caused by warming temperatures and decreasing precipitation levels have both reduced vegetation and increased tree mortality in national parks. The water loss will impact the wildlife in national parks as evaporation increases and precipitation decreases, decreasing plant and animal diversity. This impacts other organisms as these organisms die off or are stripped of their resources from that environment. Additionally, this disrupts the food chain which decreases species richness and diversity. The effect of climate change on national parks is increasingly essential to many stakeholders, including many state troopers, park rangers, and scientists. My literature review will contribute to the continuing studies on climate change in national parks by examining the effect that climate change has had on our national parks and the drastic changes that have occurred over the last century on plants and animals.

Abstract #:125

Title: Flooded Road Detection Using Computer Vision and Autonomous Drones

Student Author(s): Ninh Nguyen

Faculty Advisor: Dr. Srinivas Akella

Disciplinary Theme: Science, Technology, and Engineering

Floods are one of the most common and devastating natural disasters affecting communities worldwide. The increasing frequency and severity of flooding events in urban areas have led to a growing need for effective and efficient methods for detection and mapping activities. This research project aims to develop a novel approach for detecting flooded road segments using real-time computer vision images from drones. In this study, we create a terrain 3D map with detailed elevation data of UNC Charlotte. We also develop a deep learning computer vision model that is integrated into a mobile application designed for detecting and tracking flooded road segments using a DJI drone. Additionally, the program will compute the shortest and safest route to a target point for a ground vehicle. This project will contribute to the development of effective and efficient methods for monitoring and responding to the impact of flooding on transportation infrastructure, ultimately leading to improved safety rescue activities.

Abstract #:126

Title: The Variation of Natural Killer Cell Receptors in African Individuals Infected with Malaria.

Student Author(s): Exaucee Kandolo, Cheikh Dieng and Kareen Pestana **G, S**

Faculty Authors: Dr. Eugenia Lo

Faculty Advisor: Dr. Danillo Augusto

Disciplinary Theme: Science, Technology, and Engineering

Natural killer (NK) cells, key immune system components, recognize and eliminate abnormal cells in an organism. NK cells play a critical role against Plasmodium during the liver stage of malaria. We aim to study the genetic variation of the NK cell receptors in the population living in malaria-endemic regions to improve basic knowledge relevant to therapeutics or vaccination targets. We will examine the genetic diversity of the killer-cell immunoglobulin-like receptor (KIR) family in malaria-infected and non-infected individuals from areas of high and low transmission intensity in Ghana. There are reports of KIR association in malaria; however, the past studies failed in high-resolution genotype KIR and analyzing large. Therefore, the effect of the KIR polymorphism in malaria remains vastly unknown. We will fill this gap by applying cutting-edge sequencing technology and State-of-the-Art bioinformatic pipelines to study all 13 KIR genes in the context of allelic variation, copy numbers, and haplotypes at maximum resolution. We will analyze 400 samples collected from children 3-12 years in Ghana between 2017 and 2019. First, DNA is extracted from blood for library preparation and hybrid capture enrichment. Finally, libraries are sequenced using the Illumina platform with paired-end 250 bp chemistry. After processing raw reads and determining genotypes, we will apply regression analysis to search for genetic associations comparing malaria-infected and non-infected individuals and different transmission settings. Our findings will provide novel results in the search for immunogenetic variants that will unveil pathogenic mechanisms. Studies like this are crucial in finding new therapeutic targets against malaria.

Abstract #:127

Title: Machine Learning on Battery Cycling Data for Health Estimation

Student Author(s): Jay Sakarvadia **H, S**

Faculty Advisor: Dr. Anthony Bombik

Disciplinary Theme: Science, Technology, and Engineering

Lithium-ion batteries (used for electric vehicles and consumer electronics), alongside their main electrochemical reactions, suffer from complex side reactions of different, immeasurable sorts. These side reactions lead to battery degradation, the shortening of the battery's capacity through the use of the unit. This type of degradation can lead to system failures, property damage, and even personal injury; better-predicting lithium-ion batteries' state of health (SOH) quickly becomes a central challenge. Due to the ambiguous nature of battery degradation, we can employ deep learning techniques such as neural networks (that bypass the ambiguity obstacle), which utilize large amounts of battery cycling data to discover aging trends that aid in SOH estimation. We begin with a battery cycling data set of three variables: capacity, voltage, and current. These are valuable inputs that will eventually be used to train and test a neural network that predicts SOH. From this raw battery cycling data, we will compute the battery state of charge (SOC), another useful input that will later be used to test/train a neural network created to predict battery SOH. Another innovative technique for accumulating significant data is taking the derivatives of voltage and current (dv/dt & di/dt). This brings our total input variables to 5 (voltage, current, SOC, dv/dt, and di/dt). These six input variables, coupled with a well-trained and tested neural network, could be innovative when predicting battery SOH. Accurate SOH prediction is critical to extending a lithium-ion battery’s lifetime, which has enumerable positive effects on the environment.

Abstract #:128

Title: Biodegradable Dissolved Organic Carbon in Stream Outflow of Urban Stormwater and Beaver Ponds

Student Author(s): Jordan Landis **S, NC, U**

Faculty Advisor: Dr. Sandra Clinton

Disciplinary Theme: Science, Technology, and Engineering

Urbanization increases runoff from impervious surfaces which contributes to the degradation of local streams. In response, urban areas rely on stormwater infrastructure to retain runoff in ponds. However, stormwater ponds receive elevated concentrations of dissolved organic carbon (DOC) from urban runoff, and combined with high algal production, may have higher quality DOC than naturally occurring ponds. Elevated concentrations of higher quality DOC could accelerate microbial processing rates and affect sequential carbon and nutrient cycling in-pond and downstream. Beaver ponds are a natural alternative to stormwater ponds and have the potential to abate microbial processing rates. This study quantifies biodegradable dissolved organic carbon (BDOC) at downstream progressions of urban stormwater and beaver ponds. BDOC samples were collected from in-flow, in-pond, and out-flow sites of one urban stormwater and beaver pond. Each sample was filtered to remove microbes, incubated containing an inoculum curated of microorganism colonies native to each pond, and were measured intervally for DOC concentration and quality. Experimental data were summarized as percent DOC loss (BDOC) to investigate the relationship between DOC concentration and quality. Preliminary data, representative of the growing season (June 2022), showed beaver sites had a higher average BDOC than the stormwater sites. BDOC data are currently being collected for the non-growing season (February 2023). These findings will generate a better understanding of how DOC concentration and quality in urban stormwater and beaver ponds can impact DOC processing, which can provide insight to the sequential carbon and nutrient cycling that occur in these freshwater ecosystems and downstream.

Abstract #:129

Title: Mineralogical Influences on Cracking and Fracture in Granitic and Carbonate Rocks

Student Author(s): Patrick Webb

Faculty Advisor: Dr. Martha Eppes

Disciplinary Theme: Science, Technology, and Engineering

Mineralogy plays a crucial role in rock identification and understanding geological history, but it may also be a key characteristic contributing to cracking habits and erosional processes when rocks are exposed at the Earth's surface. How a rock chemically and mechanically responds to external forces like climate or tectonics is related to its primary mineralogy and to secondary alteration of in-situ mineral grains. We hypothesize that rock mineralogy correlates with microcracking morphology and density. To explore these relationships, we conducted petrological analysis on 31 thin sections of granitic rocks and 8 thin sections of carbonate rocks. Thin sections were cut from loose clasts collected from stable depositional surfaces at three sites in Eastern California. Oriented thin section billets cut at 1.5 cm depth and parallel to the natural upward-facing rock surface were processed from the rough samples. Granitic samples exhibited some variations in non-QAP mineralogy, mainly attributed to biotite and chlorite compositions. Cracking occurred along grain boundaries in both granites and carbonates, with alteration occurring within feldspar and amphibole grains most frequently, with the youngest carbonates exhibiting the highest density of calcite veins. Comparisons based on manual workflows designed to structure and verify A.I. software were used to process results of crack features, as well as analysis of grain size and microcrack frequency. Understanding the mineralogical controls of cracking can help better predict and understand geomorphology.

Abstract #:130

Title: Bidirectional Steering for Semi-Autonomous Vehicle

Student Author(s): Marcus Neacsu **NC, U**

Faculty Advisor: Dr. Amirhossein Ghasemi

Disciplinary Theme: Science, Technology, and Engineering

Remote control operation is seen throughout technology such as remote-control cars and drones. The capability of remote control allows for the removal of a human operator inside a life-sized vehicle. This project aims to establish a bi-directional radio communication to enable the remote control of a ground vehicle. To this end, two motorized steering wheels, one on the vehicle and one off the vehicle, are equipped with encoders. To enable the bi-directional steering control of both motorized wheels, two algorithms are developed. The first control algorithm-named control algorithm is a proportional-integral-derivative controller. The goal of this controller is to steer the vehicle with a desired steering command received from the other steering wheel. To prevent instability such as steering wheel oscillation, this process would be controlled using a PID controller. The first algorithm consists of receiving the encoder value of the other steering wheel, sending this information to the control algorithm, receiving the current angle of the steering wheel, and transmitting back to the other wheel. Essentially, the steering angle's from both the control station and vehicle would always be the same from either end. This would also allow for haptic feedback to simulate the resistance of the vehicle's steering rod assembly from the control station. To evaluate the efficiency of the controller, the encoder values for both steering wheels would be plotted over time, and adjusted to reduce the amount of error between both steering wheels while decreasing both response time and instability from different types of disturbances.

Abstract #:131

Title: Investigation of Host Cell Cytokine Directed Changes in Neisseria meningitidis Gene Expression

Student Author(s): Krishna Majithia and Quinton Krueger **H**

Faculty Advisor: Dr. Brittany Johnson

Disciplinary Theme: Science, Technology, and Engineering

Bacterial meningitis causes 1.2 million cases globally and 250,000 deaths each year. Neisseria meningitidis is a gram-negative commensal bacterium that resides in the nasopharynx and causes roughly 42% of all meningitis cases. Previous data indicates that in response to N. meningitidis infection, resident brain cells release immune mediators that contribute to neuroinflammation. These inflammatory responses are initiated due to the recognition of pathogen-associated molecular patterns (PAMPs) by host pattern recognition receptors (PRRs). One such PAMP is lipooligosaccharide (LOS) that is recognized by the PPR, TLR4. Activation of PRRs induces the production of immune mediators that may serve as environmental cues to regulate bacterial gene expression. In this study, we investigated the hypothesis that LOS from commensal and disease isolates of N. meningitidis alter glial cell inflammatory responses which drives changes in bacterial gene expression and virulence. First, glial cells were treated with increasing concentrations of LOS from commensal and disease isolates. Immune mediator production in response to LOS stimulation was characterized using enzyme-linked immunosorbent assays. We observed LOS from both commensal and disease isolates stimulated dose-dependent production of immune mediators. Next, we used an RNA sequencing approach to compare differences in transcriptome-wide gene expression profiles for N. meningitidis grown in the absence and presence of immune mediators. Interestingly, we identified 656 and 550 differentially expressed following treatment with pro-inflammatory and anti-inflammatory, respectively. Ongoing studies will confirm differential gene expression for novel gene clusters or molecular pathways associated with N. meningitidis virulence and immune stimulation.

Abstract #:132

Title: Modern Social Media and its Effects on Society, Well-being, and Economics

Student Author(s): Zachary Shank, Dan Rueda, Charlie Arthur, and Logan May

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Science, Technology, and Engineering

In this poster our group describes and reports on the global challenge of Modern Social Media and its effects on today's society. The purpose of our research project was to compare the status of our global challenge from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? For this research project, we used critical systems thinking (CST) to examine the global challenge of social media that has been implemented in today's society. To answer our questions and address our purpose, our group examined the different areas that social media has an impact on in today's society such as companies and firms, mental health, and news sources. We discovered that social media has had mostly positive effects on politics and companies, but has also had significant negative effects on mental health and news platforms. Our findings are important because we need to be aware of how social media is affecting us all in these different areas. The overall contribution of this research study is that it helps to prepare us as researchers to recognize how social media has influenced certain changes in how people view companies and support politics, as well as how it has a negative impact on people's mental health and the quality of the news sources people use.

Abstract #:134

Title: Long-Term Changes of Snowfall Event Characteristics in High-Elevation Colorado

Student Author(s): Sean Guo **S**

Faculty Advisor: Dr. Jack Scheff

Disciplinary Theme: Science, Technology, and Engineering

The effect of the changing climate on snowfall event size in high-elevation, mountainous areas is not well known and of concern to winter recreationalists. Previous studies have suggested that in snowy areas, global warming will decrease the magnitude of average snowfall events, but have less of a decreasing effect (or even an increasing effect) on the magnitude of extreme snowfall events. In this study, I analyze whether or not these trends are found in the daily snowfall event observations, from around 1960 to 2022, of three National Weather Service stations in the Colorado Rockies, and I also examine the snow-water ratio patterns of these events. To do this, I compute long-term trends over yearly average event size, single and multiple-strongest event sizes, event frequencies, and snow-liquid ratios for each of the three stations. In contrast to prior work, my results show a marked size decrease in snowfall events of any kind: when averaged across the three stations, yearly average event sizes have declined by 20.12%, while the sizes of the 10-largest yearly events have declined similarly by 14.05%. One station in particular has seen a slightly greater decrease to its extreme event size than its average event size. Meanwhile, patterns in frequency and snow-water ratio are inconsistent and offer no shared, notable trend. Finally, the frequent gaps and discontinuities found in the snowfall (and other) data of many NWS observing stations suggest that measuring and recording protocol should be made more consistent in the future.

Abstract #:135

Title: Instrumentation and Control Platform Integration for Industrial Automation Applications to Enhance Process Performance

Student Author(s): Christopher Schultz **NC**

Faculty Advisor: Dr. Michael Smith

Disciplinary Theme: Science, Technology, and Engineering

Water quality metrics–such pH, electrical conductivity (EC), and other measurable parameters–are crucial factors in determining the health and viability of North Carolina coastal fisheries. In particular, oyster and other shellfish farms are susceptible to changes in water quality, and farmers are often faced with the choice of relying on publicly-available data or investing in expensive commercial monitoring buoys. By gaining accurate localized knowledge of process conditions, effective control methods can then be implemented to maintain optimal process conditions for improved performance and support data-driven decision making. This project focuses on the integration and testing of modern Internet-of-Things (IoT) technologies, open-source instrumentation, and automated data collection. The produced device in this work consists of a cost-effective PVC frame to support an Arduino-based data collection system. The data collection system monitors and collects seven water quality metrics: Dissolved Oxygen, EC, Oxidation Reduction Potential, pH, Total Dissolved Solids, Temperature, and Turbidity. An LTE connection is used to relay the collected metrics and buoy location. The MQTT protocol is used to transmit the data, and a PC receives and translates the data into human-readable graphs and measures. An open-source user interface was developed in Python to allow the user to view plots of the data over time, see a go/no-go status with regards to pre-defined upper and lower control limits, and view the location of the buoy on a map. This work focuses on the physical construction and testing of the device components and systems to support preparation for future field deployment.

Abstract #:136

Title: Tracing the Fate of Phosphorus during Seafloor Weathering under Varying Oxygenated Conditions

Student Author(s): Stephen Lail

Faculty Advisor: Dr. Drew Syverson

Disciplinary Theme: Science, Technology, and Engineering

Phosphorus is a critical nutrient in biogeochemical cycles, being utilized in bone structure, DNA, and the ATP of cells. In the modern environment, bioavailable phosphorus is delivered to seawater mainly through continental weathering. In contrast, seafloor weathering is considered a significant sink of bioavailable phosphorus due to the precipitation of iron-oxide minerals, which scavenge bioavailable phosphorus. However, during the Archean, exposure of continental crust above sea-level is considered minimal and that a source of phosphorus to the marine biosphere remains uncertain. On early Earth, oxygen dissolved within the oceans was negligible from the lack of photosynthetic life. If there was no to very little oxygen present, then iron-oxide minerals would not form, effectively preventing the scavenging of bioavailable phosphorus liberated during seafloor weathering. We tested this hypothesis by performing an experimental study that mimics weathering of oceanic crust under a range of oxygenation conditions representative of early and modern Earth to evaluate the fate of phosphorus. We used a novel 29Si tracer in our experiments to measure the amount of silicate mineral dissolution in the system. For our simulated seafloor we used olivine as it is a common mineral in oceanic crust. By quantifying olivine dissolution with the measured amount of dissolved phosphorus with reaction progress, we determine whether phosphorus is liberated into solution or adsorbed onto the iron-oxides. These results have important implications for our understanding of the phosphorus cycle on early Earth and the habitability of water-rich exoplanets.

Abstract #:137

Title: Polarities Role in Substrate Selectivity with Phosphoglycosyltransferases.

Student Author(s): Hope Clements **H, S**

Faculty Advisor: Dr. Jerry Troutman

Disciplinary Theme: Science, Technology, and Engineering

Antibiotics used to fight infectious diseases rarely target specific bacteria and can lead to complications due to the ability to impact symbiotic organisms in addition to the infectious organism. The purpose of the research conducted in our lab is to find new targets for antimicrobial agents that are selective for specific organisms. Bactoprenyl phosphate (BP) is a very common lipid carrier that is essential to the assembly of polymers on the cell surface. I specifically use fluorescent BP (fl-BP), which is easier to detect when analyzing. These are important for cell survival and play an infectious role in many viral and bacterial cells. My research focus is on important enzymes from the pathogenic organism Campylobacter jejuni and other phosphoglycosyltransferases (PGTs). These enzymes catalyze the transfer of hexose-1-phosphates or N-acetylhexosamine-1-phosphates to bactoprenyl phosphate (BP). The PGTs that I will be using include WecA from E. coli, WecP from Aeromonas hydrophilia, Wbap from Salmonella enterica, and HfsY from E. coli. My goal is to test whether these enzymes can select for the small differences in sugar substrate. In addition to this I want to better understand how polarity affects enzymatic activity and determine if this can be exploited to target one organism over the other. The methods that are developed from this the project can be used with many different kinds of bacterial enzymes to advance the understanding of targeting specific bacteria.

Abstract #:138

Title: Targeting Prion Disease through Manipulation of the Chaperone Code

Student Author(s): Ainella Rysbayeva, and Siddhi Omkar **H, S**

Faculty Advisor: Dr. Andrew Truman

Disciplinary Theme: Science, Technology, and Engineering

Prions are infectious proteins that cause fatal neurological diseases in humans. Despite several decades of research, no therapies that target prions have been identified. Recent studies have demonstrated the importance of molecular chaperones such as Hsp70 in regulating the formation and spreading of prions in cells. Improvements in proteomic technologies have fostered the discovery of over eighty post-translational modifications (PTMs) on the Hsp70 protein, which we have termed the Hsp70 “chaperone code”. Despite substantial research efforts, fewer than 20 of these modifications have been fully explored in terms of regulation and function. In the model organism budding yeast, the Sup35 protein is critical for translational termination. In yeast Sup35 can fold into a prion form which is inactive. Readthrough of premature termination codons in adenine synthesis genes is then sufficiently frequent that the cells are Ade+ and look white on solid yeast media. If Sup35 prion formation is disrupted, Sup35 is active and terminates transcription of adenine synthesis genes making the yeast turn red. To understand how the chaperone code may impact prion formation and propagation, we mutated all 73 known phosphorylation sites on budding yeast Hsp70 (Ssa1) to either alanine (phospho-mutant) or aspartate/glutamate (phospho-mimic) in our yeast reporter system. After screening the 146 mutants, several were impacted for prion propagation (were red on yeast media). Currently, we are mapping these sites to the structure of yeast Hsp70 to understand if any specific regions of Hsp70 are important in this process. Going forward, we will examine biochemically how chaperone phosphorylation may alter protein folding and prion formation. Taken together, our work may provide a path forward for the treatment of prion-based human diseases by manipulating chaperone phosphorylation.

Abstract #:139

Title: Influence of Bulk Density on Piedmont Groundwater Storage Properties Due to Landscape Position and Depth at Redlair Observatory

Student Author(s): Isabella Balch, Dominick Castillo, Shelby Chester, Sarah Holloway, Stephen Lail, Mckenzie Miller, Kortnee Newby, Jack Rizzolo, Madeline Sesma, Ashlyn Tickle, Patrick Webb, and Wayne Wilkins **S, NC**

Faculty Advisor: Dr. David Vinson

Disciplinary Theme: Science, Technology, and Engineering

Ground water storage in the urbanizing Piedmont region, which occurs primarily in the porous saprolite zone consisting of residual weathered bedrock, affects streamflow, drought response, and drinking water resources. To quantify storage properties along a hilltop-midslope-riparian transect, we subsampled cores up to 70 m depth from Redlair Observatory, a long term research site in Gaston County, NC, and analyzed them for bulk density and porosity. We sought to characterize the relationship between the subsurface water storage properties and depth in the subsurface weathering profile. We predicted with increasing depth, bulk density would increase and porosity would decrease. We collected 65 sub-samples of soil, saprolite, and weathered rock from four cores ranging in depth to 21.2 meters, oven-dried them at 105ºC, and analyzed bulk density using the paraffin clod method. We calculated porosity from bulk density using the gravimetric method. From surface to 21.2 m depth, bulk density generally increased (1.3-3.0 g/cm3). Porosity generally decreased along the same depth (0.51 to undetectable). These results suggest that ground water storage ability is higher in the shallower depths. Our porosity results, although internally consistent, were lower than some previously published data. It is possible that rock type, which varies across the region, also affects porosity development. These findings can be used to make predictions about ground water storage, and the depths where it occurs, in the urbanizing Piedmont region.

Abstract #:140

Title: Optimizing Organic Photocatalytic Chemical Reactions

Student Author(s): Nick Eberwein, and Thomas Perrell

Faculty Advisor: Dr. Michael Walter

Disciplinary Theme: Science, Technology, and Engineering

Photoredox catalysis is a chemical process that uses the energy from light to excite a catalyst to initiate and control chemical reactions. Unlike other photocatalysts that use rare earth and expensive materials, thiazolothiazole (TTz) is an organic dye this is an attractive photocatalyst due to its low cost, simple synthetic procedure, and its highly photostable TTz heterobicyclic core. Current work by the Walter Research Group has shown that an alkylated dipyridinium TTz functions as a highly effective photocatalyst to drive the addition of potassium organoborates (alkyl-BF3K) to imines with high yields (80-90%) while using low mol% (0.1 mol%) of photocatalyst. Initial development of these TTz photocatalyst driven reactions required long reaction times (up to 48 hours) to access a high product yield. However, there has been no investigation in optimizing the reaction conditions to enable high product yields over shorter periods of time. We wish to conduct studies on TTz photocatalysts when exposed to light for less than 48 hours. After exposing a reaction containing a TTz photocatalyst to a light source for a shorter period of time (5 minutes), we will measure the yield of the product via GC-MS and NMR analysis. This data will be used to optimize conditions of the reaction such as light source used, concentration of reaction species, and critical intermediates that will enable higher yields of product.

Abstract #:141

Title: Advances in Color-Changing Photofluorochromic Thiazolothiazole Films

Student Author(s): Mia Baliukonis, Maithili Acharya, Tyler Adams, Naz Tumpa, and Quy Nguyen

Faculty Advisor: Dr. Michael Walter

Disciplinary Theme: Science, Technology, and Engineering

Color-changing thiazolothiazole films are fluorescent and photochromic films that can be used for various applications such as energy production, smart windows, eyeglasses, and oxygen sensing. When included in a device, these materials may be put on a window to tint and reduce solar heat gain in buildings, reducing energy usage. Additionally, these materials may produce energy as well. The term “photochromic” refers to the ability for the films to change color when exposed to as little as 5 seconds of illumination. After light exposure their fluorescence can also be turned off, by over 90% after one minute. The active compound in our films is dipyridinium thiazolothiazole, which is a water-soluble organic compound. When combined with a polymer, like polyvinyl alcohol/borax, can be made into a film. These films have the advantages of being relatively cheap, easy to prepare, and water processable. After a short period of illumination, the thiazolothiazole compound gains two electrons and changes color from yellow to blue. This can be reversed back in less than 24 hours. The primary reason why these films have the ability to return to their original color yellow is because of exposure to oxygen. If the films do not get exposed to oxygen they stay blue and that can be used for oxygen sensing applications such as smart packaging and medical equipment. We can also change the properties of the films by changing the concentrations or additives in the composition of the polymer films.

Abstract #:142

Title: The Shortage of School Psychologists

Student Author(s): Ethan Evans

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

The purpose of this literature review is to analyze the different factors that contribute to the shortage of school psychologists in public schools in the United States. The National Association of School Psychologists recommends having one school psychologist for every 500 students. The current national average is 1:1211. Much of the literature on this topic focuses on retention rates and job burnout rates amongst practicing school psychologists. Job experiences of current school psychologists may also play a role in why some choose not to go into the field. The recruitment of school psychologists is also influenced by graduate programs and the lack of distance education. Some of the preliminary findings have shown that the lack of access to graduate programs, as well as the programs themselves have a significant impact on the shortage. They also focus heavily on the potential for distance/online programs and opportunities, which the field lacks. This literature review will provide a concise review of all of the factors that play into the shortage, and give analysis into each one, while also providing ways to change these factors to lessen the shortage. One other major focus was on administration of school districts, and the lack of power they have in the shortage. This research is important because the shortage of school psychologists has a negative effect on children in the school system, and is a major factor in helping them succeed in their education.

Abstract #:143

Title: How do Gender Roles Impact One's Attachment Style and Overall Relationship Satisfaction?

Student Author(s): Evelyn Yang and Emy Oakley

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

Bowlby's four attachment styles–secure, anxious-ambivalent, disorganized, and avoidant–are used to explain the behaviors individuals have with their romantic partners based on their relationship with their parents during early childhood. With the emphasis on parental influences, gender roles that are reinforced during childhood upbringing will impact one's attachment style. This is often due to gender stereotypes where men are expected to suppress their emotions while women are to be expressive. Previous studies have found that men more often have an avoidant attachment style while women are more likely to have an anxious attachment style. However, when men and women have opposite attachment styles, the level of satisfaction in a romantic relationship is higher only when the man has the anxious attachment style rather than the woman. In this literature review, we will examine why gender differences exist in attachment styles and how childhood upbringing plays a role. Furthermore, we will investigate how specific attachment styles can correlate with different levels of relationship satisfaction, specifically how higher levels of satisfaction in the relationship arise when the woman has an anxious attachment style than men since the research in this area is limited. It will also help further discover the gender differences within the same attachment style, specifically among undergraduate college students.

Abstract #:144

Title: Investigating and Comparing Sustainable Development Goal # 10 in Germany and the United States

Student Author(s): Precious Allah*, Cameron Hendrix*, Can Noah Gülya**, & Vera Aichinger** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #10: Reduced Inequalities. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #10: Reduced inequalities? What are the differences? Are the countries on track to make progress on SDG # 10 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG 10: Reduced Inequalities by the 2030 goal year.

Abstract #:145

Title: Investigating and Comparing Sustainable Development Goal #3

Student Author(s): Jake Johnson*, Connor Ayscue*, Patrick Hannon*, Josefine Hamann**, Magdalena Rottenburger**, and Ayse Blasiny** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #3: Good Health and Well-being. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #3: Good Health and Well-being? What are the differences? Are the countries on track to make progress on SDG #3 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #3: Good Health and Well-being by the 2030 goal year.

Abstract #:146

Title: Investigating and Comparing Sustainable Development Goal #15: Life on Land in Germany and the United States

Student Author(s): Trevor Kowalski*, Evan Pulido*, Stefanie Liedtke**, and Max Linke** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #15: Life on Land. This SDG is about protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss in Germany and the United States The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #15: Life on Land? What are the differences? Are the countries on track to make progress on SDG # 15 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. We report the comparative findings of our GNL project. The research includes a discussion of the challenges and possibilities in meeting selected target goals of SDG #15: Life on land by the 2030 goal year.

Abstract #:147

Title: Investigating and Comparing Sustainable Development Goal # 11 in Germany and the United States

Student Author(s): Jaiden Ramseur*, Nihal Mohammed*, Mario Manzocco**, and Dilara Cebeciogullari** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) # 11: Sustainable Cities and Communities. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal # 11: Sustainable Cities and Communities? What are the differences? Are the countries on track to make progress on SDG # 11 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG # 11 in order to make cities and human settlements inclusive, safe, resilient and sustainable by the 2030 goal year.

Abstract #:148

Title: Rumination and Responses to Partner Transgressions in Romantic Couples

Student Author(s): Bryan Perez, Kryschelle Fakir, and Sudhanshu Deshpande **CE, H, NC, U**

Faculty Advisor: Dr. Amy Canevello

Disciplinary Theme: Social Sciences

What predicts whether people forgive, retaliate against, and avoid their romantic partners following a relational transgression? After a transgression, people tend to think deeply, or ruminate, about the situation. Rumination can occur in at least two forms: recurring thoughts about negative events that are involuntary and uncontrollable (i.e., intrusive rumination) or thoughts that are active and purposeful (i.e., deliberate rumination). We argue that intrusive rumination, which provides repeated reminders of a painful or upsetting event, may reinforce feelings of distress, leading to a desire to retaliate against or avoid partners after a transgression We also argue that deliberate rumination or thinking in a purposeful manner should allow for the careful consideration of the details of that event, which should lead people to forgive partners following transgressions. In this study, both members of 62 romantic couples described their partners' recent transgression. They then completed measures of intrusive and deliberate rumination about that event and reported their levels of forgiveness, retaliation, and avoidance toward their partners. Findings from mixed models support our hypothesis that intrusive rumination predicts greater retaliation toward partners following transgressions. Unexpectedly, intrusive rumination was unrelated to avoidance of partners and deliberate rumination was unrelated to forgiveness. Thus, the ways that people ruminate about relationship transgressions are differentially linked to their responses to these events. Specifically, uncontrollable thoughts about transgressions are associated with seeking retaliation, but deliberately considering the transgression is not linked to forgiveness.

Abstract #:149

Title: Identifying Mechanisms of Employment Socialization in Mother-Child Dyads in Sociology

Student Author(s): Lyba Qureshi

Faculty Advisor: Dr. Candace Miller

Disciplinary Theme: Social Sciences

In this study, we examine how Black mothers' work experiences shape the discussions that they and their children have about work to better understand the intergenerational impact of racialized and gendered work experiences. For many Black families, 'the talk' extends beyond interactions with law enforcement to include guidance on how to navigate other dimensions of social life. These talks that black mothers have to their children about work are part of a broader conversation that binds generations and has several implications for future work decisions. To explore how racialized and gendered work experiences shape the messages, behaviors, and values that Black Mothers convey about work and race to their children, we conducted semi-structured interviews with Black Mothers-child dyads. Preliminary findings indicate that mothers' work experiences shape the themes that show up in the messages, behaviors, and values emphasized during the work socialization process.

Abstract #:150

Title: “Why so Serious?”: Antisocial Trolling Behavior and Its Relationship with Everyday Psychopathy and Sadism

Student Author(s): AJ Siegel

Faculty Advisor: Dr. Hannah Peach

Disciplinary Theme: Social Sciences

Trolling is an antisocial form of online communication in which users, known as trolls, initiate negative and taunting interactions to disrupt digital communication. While trolling is a common online practice ranging from innocent to potentially dangerous, it is considered antisocial and antagonistic, meaning it is crucial to understand trolls’ underlying motivations for the behavior. This study sought to explore how particular personality traits are related to trolling engagement. It was hypothesized that higher rates of everyday psychopathy and everyday sadism would be positively associated with trolling behaviors. The sample included students (N = 50) from the University of North Carolina at Charlotte between the ages of 18 and 34 (SD = 3.39). Participants completed an online survey through Google forms that measured the personality traits of psychopathy and sadism, as well as trolling tendencies. Personality traits were measured via the Comprehensive Assessment of Sadistic Tendencies, the Short Dark Triad Scale, and the Short Sadistic Impulse Scale. Trolling was measured via the Global Assessment of Internet Trolling and the iTroll Questionnaire. Both hypotheses were supported, as the results indicated a significant, positive correlation between everyday psychopathy and trolling, as well as everyday sadism and trolling. These findings support the literature, which has repeatedly found a positive correlation between trolling and personality traits like psychopathy and sadism. This similarity suggests that the link between antisocial personality traits and trolling engagement is reflected even among college students. Understanding trolling can help make online spaces safer and provide insight into trolls’ offline behavior and values.

Abstract #:151

Title: Comparing Volunteer Management Data Before and After COVID-19 Pandemic

Student Author(s): Lawrence Stevens

Faculty Advisor: Dr. Jaclyn Piatak

Disciplinary Theme: Social Sciences

The COVID-19 pandemic affected volunteer management and nonprofit organizations nationwide. Volunteer managers indicated that their operations were affected by COVID-19, which led to more community members needing more assistance. In this study, I will examine volunteer management before and after the pandemic to offer several solutions to better manage the growing need for volunteers. This study draws upon recent literature and a survey of volunteer managers on how nonprofits and volunteer management changed their operations in response to the pandemic and to help the community better. Volunteer management is essential for several reasons, including for those of lower social and socioeconomic backgrounds who often rely on volunteer organizations to help with food costs and distribution. For instance, those relying on volunteers or volunteer management would have experienced a delay or no help during the COVID-19 pandemic, as is the case with many others. From a social perspective, volunteering and volunteering management bring the community together with even the most minor tasks or goals. However, volunteer managers indicated that virtual volunteering did increase due to the pandemic. In conclusion, like other critical components in American society, volunteering management was devastated by COVID-19. This research aims to understand better how volunteering management can improve for future generations.

Abstract #:152

Title: Intricate Factors to Intimate Partner Violence

Student Author(s): Nanthana Sureshkumar, Brinda Patel, Emma Wical, Gracie Bayne, and Sam Zambrano Herrera **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Disciplinary Theme: Social Sciences

The United Nations has 17 Sustainable Development Goals, also known as SDGs that tackle various issues that many nations deal with on a daily basis that can vary from environmental issues to healthcare issues. One of the SDGs we are analyzing is Gender Equality. This concept is an umbrella term for global issues, such as intimate partner violence, gender wage gaps, and a lack of women's rights across different aspects of society. According to the United Nations, more than 1 in 4 women have experienced intimate partner violence at least once in their life. Many countries around the world have different factors, such as unstable governments in the Democratic Republic of the Congo, international conflict in Ukraine, population growth in India, food insecurity in Haiti, and patriarchal societies in South Korea. The purpose of this project is to analyze how regions around the world have different factors leading to intimate partner violence. In order to do this, governmental and nongovernmental sources will be analyzed to compare and contrast gender equality across various regions. The findings from this study will provide insight into influencing factors of intimate partner violence and potential solutions.

Abstract #:153

Title: The World for Water: Responses to a Precious Resource

Student Author(s): Kirsten Babsa-ay, America Chavez-Cabrera; Jeremy Nhyira, and David Tunstall **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Disciplinary Theme: Social Sciences

As a resource crucial for survival, water remains limited. Plagued by sanitation, pollution, and mismanagement, citizens remain bereft. In this project, we ask: what role do the government and NGOs play in addressing the water problem in our specific countries? Using the case studies of Tajikistan, Hawai'i, Chile, Mexico, and Ghana, we anticipate varying responses to the water problem depending on NGOs and government cooperation. Ghana, a country in western Africa, suffers from continuous droughts and deforestation from gold mining and urbanization. The government prioritizes building houses and establishments over water conservation. Tajikistan, a country with high elevations and many rivers, is adversely affected by pollution and the extreme reduction of the Aral Sea. Drought and earthquakes continually impact the nation's development, including its farms and hydroelectric power production. Central Chile has low amounts of water due to past governments' policies, and water has just become a public issue this past year, meaning citizens can now vote on reforms. The main water issue in Mexico are droughts. The water reservoir is running low and the government is not reliable in bringing its citizens water. Lastly, the Kingdom of Hawai'i is becoming a contaminated ecosystem with water that will make you sick after drinking one glass. To find evidence of the relationship between governments, we will be looking at government and NGO initiatives in each country. In countries with little cooperation, we expect that efforts become ineffective. Conversely, in countries with high collaboration, there is measurable improvement in the water.

Abstract #:154

Title: Examining the Associations of Gendered Racial Socialization and Mindful Self-Care with the Well-Being of Black College Women

Student Author(s): Bliss Dowden

Faculty Advisor: Dr. Jennifer Webb

Disciplinary Theme: Social Sciences

Intersectionality theory advocates a sensitized awareness of how both gender and race combine to influence the identity-related experiences of Black women which have meaningful implications for their well-being. At the same time, contemporary mindfulness-based approaches to self-care have been advanced as adaptive, embodied practices for bolstering health and wellness yet have not been widely explored in diverse samples. Therefore, the present study seeks to provide an integrative approach to conceptualizing well-being among Black college women that takes into account both more distal developmental factors (e.g., parental gendered racial socialization messages) and proximal behavioral practices (e.g., mindful self-care). This study will use the Gendered Racial-Ethnic Socialization Scale (GRESS-BW), the Mindful Self-Care Scale Brief (MSCS-B), and the Mental Health Continuum Short Form (MHC-SF) to assess how gendered racial socialization and mindful self-care correlate to psychological, emotional, and social well-being in a sample of 200-300 Black emerging adult college women. Pearson's correlations will be computed to examine the linear associations among all study variables. Hierarchical linear regression models will be conducted to determine whether dimensions of gendered racial socialization account for an incremental proportion of the variance in measures of well-being beyond the contribution of mindful self-care. Results will be discussed in the context of previous research and strengths, limitations, clinical implications, and future directions will be offered.

POSTERS

Session B

CE - Community Engaged **G -** Global **H -** Honors **S** - Sustainability

NC - North Carolina **PKP** – Phi Kappa Phi Member **U** - Charlotte

Abstract #: 200

Title: Developing a Security and Privacy Intervention for Senior Citizens

Student Author(s): Laura Medina

Faculty Advisor: Dr. Cori Faklaris

Disciplinary Theme: Arts and Design

The rate at which technological advancements are occurring increases security and privacy risks for all users of technology. However, research has shown that senior citizens tend to be at greater risk than their younger counterparts because of less computing know-how and greater financial assets making them an attack target. They also constitute an underrepresented group within the technology sector. Previous research on this topic suggests that senior citizens feel most comfortable seeking tech help from close family and friends, and that seniors who have been early adopters of technology are willing and able to provide this help to peers. While most of the existing research aims to familiarize senior citizens with new technologies, we delved further to develop and ideate an intervention that can address the unique security and privacy needs of residents and staff in senior communities. Our study focused on a local senior residence in Matthews, NC. We conducted generative and formative research with the local residents, leading to the development of a “tech helper” app which integrates an aspect of service design as one of its main functionalities. We expect this app to bring value on both the business and user fronts, allowing residences to cut down on their overhead expenses by utilizing an application that acts as a free technological help resource for its residents, while the residents’ experience of seeking and providing help is facilitated. Our work adds to what is known about how to design for senior citizens experiencing tech difficulties in residential communities.

Abstract #: 201

Title: Choreographing My Calling: An Exploration of Sacred Dance and Protestant Liturgical and Sacred Dance Through History and Movement

Student Author(s): Alexandria Schultz **H, PKP**

Faculty Advisor: Dr. Tamara Williams

Disciplinary Theme: Arts and Design

This thesis project investigates the origins of sacred dance, specifically the history of liturgical dance in the Protestant church and Christian sacred dance outside of the church. Liturgical dance is a type of sacred dance with a focus on “the ministry aspect of dance” (Hardy 8), anything that takes place alongside the official religious services and ceremonies. A process of sacred dance creation and personal exploration will accompany such historical research, to transverse my role as a sacred dancer called by the Lord to spread the gospel of Jesus Christ. The following inquiry question will be answered throughout the research and product creation: “What does it mean to be a sacred Christian dancer in 21st century America?” An exploration of the following research guided questions steer the main inquiry question: “How has sacred dance, in particular Christian liturgical and sacred dance, been used in history and to what extent is it a part of present-day worship in Churches and beyond?” The research guided questions will be addressed by a literature review on sacred dance and Christian liturgical and sacred dance history. To address the main inquiry question, the second phase of the project includes a choreography centered movement exploration based on the initial research and additional personal introspection. The choreography investigation will culminate in the creation of a worship set that is around 30 minutes long, drawing from my movement experimentation, personal prayer, meditations on Scripture, and literature review.

Abstract #: 202

Title: Exploring the Impact of COVID-19 on the Economic Growth and Mobility among Women Population in the Charlotte Metropolitan Area

Student Author(s): Catherine Luba and Mahita Sadula **CE, H, S, NC, U**

Faculty Advisor: Dr. Monika Sawhney

Disciplinary Theme: Business and Economics

Over the last several decades, the Charlotte Metropolitan Area continually experienced exponential growth which has contributed to the ongoing housing crisis, and socioeconomic and health disparities, thus impacting economic mobility among women. The women population that seems to bear this impact also faces the double burden of living in poverty and the inability to move upwards out of this cycle of poverty. The COVID-19 pandemic exacerbated the issues surrounding economic mobility, including loss/change of employment, employment-based healthcare coverage, post-pandemic work environment, workforce migration, and end of unemployment benefits. The purpose of this pilot (ongoing) study is to explore the intersection of issues surrounding economic mobility among women in the Charlotte Metropolitan Area. Specific objectives include: 1) Change in economic well-being 2) Health care 3) Family well-being 4) Infrastructure and clean environment. A cross-sectional, anonymous survey through an electronic application (Qualtrics®) is administered to a sample of female essential workers. Demographic information and economic well-being characteristics are collected through the self-administered online questionnaire including the Perceived Stress Scale, Oldenburg Burnout Inventory, and the Impact of Event Scale-Revised to evaluate the perception of stress, burnout, and distress caused by traumatic events, respectively. The preliminary results show that COVID-19 has changed economic mobility for women in the Charlotte Metropolitan area, especially in areas of socio-economic and health disparities. Results from these studies will assist stakeholders in planning, developing, and implementing strategies/interventions that support improved economic mobility, while reducing socio-economic and health disparities for the women population in the Charlotte Metropolitan Area.

Abstract #: 203

Title: Motivational Factors and Challenges Faced by First-Generation College Students: Overcoming Obstacles to Achieve Higher Education

Student Author(s): Bianka Escobedo Cortes **H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Education and Communication

First-generation college students face many challenges as they navigate through higher education. The adjustment to a new academic and social environment is only one of many components. Many first-generation students have limited resources and support systems compared to their peers. They may feel pressure from their families and/or even communities to succeed and face added stress along the way. Literature suggests that first-generation college students are motivated by the desire to improve their social and economic status, achieve personal goals, and make a difference in their communities. In addition, many may also be motivated by the belief that education will provide opportunities for them that their parents didn't have. Although many of the motivational factors for first-generation college students are similar to students who are not first-generation, the challenges faced are not the same. This is due to the lack of financial resources, limited access to information about college, and limited family support at times. The goal of this literature review is to describe the motivational factors for first-generation college students. The implication of this research is centered in correlation that with the right support, resources, and implantation, first-generation students can overcome obstacles to achieving academic and personal goals despite challenges in which they are able to succeed in gaining higher education.

Abstract #: 204

Title: Educational Disparities: Access to Higher Education Among Underserved Communities

Student Author(s): Aamyria Lattimore **CE, H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Education and Communication

The purpose of this project is to examine the causes and effects of racial disparities for African American high school students in the American education system. Research has shown that African American students, especially in rural, underserved areas, have lower rates of graduation and access to resources for higher education preparation. It is a common belief that the entire system itself is to blame for the observed educational inequities, because it begins in the classroom itself, and the way students learn from a young age, eventually follows them throughout their entire educational journey. This is due to various factors including, but not limited to, residential location, socioeconomic status, funding availability for learning resources such as books, laptops, and quality teachers who are culturally aware and competent. This project includes research on educational disparities, policies, and strategies and solutions to implement from various scholarly sources such as peer-reviewed journal articles and is compiled into a literature review for reference. Several policies were proposed and implemented such as the “No Child Left Behind Act,” but there is little evidence of effectiveness and, there is more that can be done to address the long-term effects the current education system has already imposed on students in their high school years. The findings explored in this literature review can be utilized for promotional and awareness purposes regarding educational disparities and the issues thereof, identifying potential areas of inquiry, and bridging the gap between the urban and rural underserved educational institutions to improve higher-education access.

Abstract #: 205

Title: Addiction: The Impact of Stigmas and Stereotypes

Student Author(s): Briana Wilson **H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Education and Communication

Many individuals struggle with substance abuse in the United States. Discussions of addiction commonly involve stereotypes, stigma, and prejudice. This literature review will focus on how stereotypes and stigmas impact individuals battling addiction. Many factors, including social, biological, psychological, and cultural factors, influence an individual's experience with addiction. The peer-reviewed journal articles used in this literature review discuss many different experiments performed to discover more information. For example, one study uses gambling as a measure of addiction and has participants gamble while the researchers measure their cognitive processes. Another study measures how race and gender impact the likelihood of an individual becoming addicted. While the results from studies in this paper vary, the goal of this literature review is to improve our understanding of the different factors that contribute to the continuation of addiction. Substance abuse is a severe disease that impacts the lives of many people. This paper will dive further into how recovery is being restricted, and how successful rehabilitation centers are. An outcome of this literature review is a better understanding of addiction could reduce stigma. The topic of addiction has many misconceptions, but anyone can develop an addiction.

Abstract #: 206

Title: Investigating and Comparing Sustainable Development Goal #4 in Germany, the United States, and Vietnam

Student Author(s): Chymay Thao* and Jenny Sauer** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Education and Communication

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #4: Quality Education. The main research questions for our international comparative study is: What are the similarities among Germany, the United States, and Vietnam related to the aspects of Sustainable Development Goal #4? What are the differences? Are the countries on track to make progress on SDG #4 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. We also engaged in a Global Networked Learning (GNL) experience with university students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting SDG #4 by the 2030 goal year.

Abstract #: 207

Title: Investigating and Comparing Sustainable Development Goal # 4 Quality Education in Germany and the United States

Student Author(s): Arielle Brown*, Kamea Fleming*, Ximena Rivera-Romero*, Jenny Sauer**, and Rachel Topfstedt** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Education and Communication

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #4: Quality Education. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #4 Quality Education, guarantee quality and equitable education while creating educational opportunities for all? What are the differences? Are the countries on track to make progress on SDG #4 Quality Education by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG 4 Quality Education, guarantee quality and equitable education while creating educational opportunities for all by the 2030 goal year.

Abstract #: 208

Title: Investigating the Intersection of UDL and Digital Technologies

Student Author(s): Ciena Tineo

Faculty Advisor: Dr. Erik Jon Byker

Disciplinary Theme: Education and Communication

One of the biggest challenges elementary teachers face today is being able to meet the learning needs of all students who have a wide range of interests and abilities. Some students struggle academically, some have difficulties with engagement, and others may need more challenges. This study investigates the Universal Design for Learning (UDL) framework, a “no-barrier” approach to learning, and its impacts on student learning compared to traditional instruction. It also examines digital technologies as a means of enhancing the learning experience throughout the UDL principles. This includes enhancing student engagement, representation of context, and expression of understanding. The purpose of this study is to implement the research into my student teaching classroom in order to reduce the barriers that interfere with my students' learning in all subject areas. This study is based on action research through field observations and comparative research that is guided by the following questions: (1) What are the intersections between UDL and the integration of digital technology in instruction? (2) How can digital technology be integrated into the principles of UDL as a means of enhancement compared to traditional practice? And (3) How can digital technology be used in those same areas in order to improve the effectiveness of both teaching and student learning? The expected results will show an increase in student engagement and understanding in relation to the intersection of UDL and digital technology.

Abstract #: 209

Title: Examining the Conflicts between Russia-Ukraine and its Impact on Everyone

Student Author(s): Ethan Ippolito, Gage Cottrell, Mason Little, Tanner Willis, and Trevor Scofield **G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Education and Communication

In this poster our group describes and reports on the global challenge of the Russia-Ukraine conflict. The purpose of our research project was to compare the status of our issue from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? The central question/purpose of this project is to look into the Russia-Ukraine conflict as individuals on the outside and try to raise awareness for Ukraine and the innocent citizens/refugees who were taken from their homes. For this research project, we were trying to better understand this conflict and who is impacted the most by it to examine the global challenge of the Russia-Ukraine conflict. To answer our questions and address our purpose, our group started broadly with the conflict, and narrowed down on certain issues, looking into conflicts from when they were one nation, to current day where they are separated. We discovered the economic turmoil caused by the war. Our findings are important because of how it is affecting the people of Ukraine and its impact on the world. The overall contribution of this research study is that it helps to prepare us as researchers to assess global events and determine how they affect ourselves and others, what we can do to help those disenfranchised, and how to prevent similar issues going forward.

Abstract #: 210

Title: Family Planning: Contraception

Student Author(s): Mackenzie Manherz, Sydney Auzenne, and Aniya Phillips-McNeil

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Health Sciences

In this poster our group describes and reports on the global challenge of Family Planning: Contraception. A purpose of our research project was to compare the status of our global challenge of contraception advancements from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? What are the negative and positive uses of contraceptives? Another question that guided our research was How does contraception impact the population? In order to explore how contraception has changed over the years and demonstrate how it has impacted the present population, we employed a systems thinking technique for our research project and focused on the minority of the sex industry. To answer our questions and address our purpose, our group explored contraception in education, society, environment, the economy, and recent advancements. We found that the recent advancements in contraception increased unintended pregnancy rates but lowered the overall population. Our findings are important because it can help the future generations with sex education. The overall contribution of this research study is that it helps to prepare us as researchers to equip future generations with basic knowledge of sexual education on contraception and family planning.

Abstract #: 211

Title: Decreasing Readmission Rates for COPD Patients After Receiving Home Equipment

Student Author(s): Kayla Smith **G, NC**

Faculty Advisor: Dr. Christopher Mayo

Disciplinary Theme: Health Sciences

For my capstone project, I plan to research and gather data on readmission rates on COPD patients after receiving home equipment. Chronic obstructive pulmonary disease affects many people in the United States and is a leading cause of admissions to hospitals. My project is based on how to prevent these patients from being admitted as often. I will be working with pulmonary navigators at my current job to retrieve this data and track readmission rates for patients who receive home equipment. Examples of this home equipment are ventilators, bipaps, vest, and oxygen. My hopes are that I can prove that when patients receive equipment for home, they are less likely to be readmitted to the hospital.

Abstract #: 212

Title: Fast GPU Programming

Student Author(s): Ryan Bass

Faculty Advisor: Dr. Tyler Allen

Disciplinary Theme: Math and Computer Sciences

Large scale computational problems, such as climate modeling, molecular dynamics, and deep learning, require constant performance improvement to increase their efficiency and enable more advanced and precise algorithms to be implemented. In order to meet the performance demands, these applications have adopted the use of highly parallel Graphics Processing Units (GPUs) to achieve the desired performance gains. However, traditional software abstraction methodologies, such as those used in common computational software libraries, limit the overall GPU performance by obfuscating potential low-level performance optimizations. We propose an automated method to automatically “unfold” and combine GPU functions used within user code. Merging functions automatically can speed up a program by enabling several code optimizations, such as increased data reuse and shared memory, while allowing software developers to maintain their existing human-readable software abstractions. In order to demonstrate the effectiveness of this method, we have evaluated the performance of some existing library functions in comparison to their “merged” function equivalents. For this scenario, we focus on linear algebra, which is highly utilized in scientific computing, graphics, and machine learning. We compare a standard series of linear algebra operations with the default configuration against a manually “fused” kernel to demonstrate the performance speedups that we can achieve. We are now working towards optimizing kernels automatically with these techniques at compile time. This solution can potentially serve as a drop-in performance solution to benefit scientific and machine learning applications.

Abstract #: 213

Title: Creating a Framework for Classifying Dangerous and Hateful Memes

Student Author(s): Britt Field and Sarah Tabassum

Faculty Advisor: Dr. Cori Faklaris

Disciplinary Theme: Math and Computer Sciences

Due to the increasing spread of misinformation and hate speech online, and the advances in artificial intelligence (AI) technology, demand has increased for AI content moderation capable of processing multimodal content. Our research is an expansion on the challenge set forth by Meta's 2020 Hateful Meme Challenge, in which researchers were tasked to develop machine learning models to detect hate speech in multimodal memes. Prior work has created datasets of memes to be utilized for developing models to detect hate speech. We seek to expand on these by defining a category for "Dangerous" memes. This research utilizes the Dangerous Speech Project's definition of Dangerous Speech, "Any form of expression (e.g. speech, text, or images) that can increase the risk that its audience will condone or commit violence against members of another group", and prior research analyzing links between Population Replacement Conspiracy Theories (PRCT), extreme elements of incel ideology, and mass shootings. We developed a codebook of terminology and themes to be used as flags to categorize if a meme is hateful, dangerous, not sure, or other. This research will be used to create labels to categorize memes to be used in a multimodal machine learning model, to be used in content moderation, avoiding taking down or censoring lawful and/or useful polarized speech and memes, while zeroing in on and addressing hateful and dangerous speech. Future research will train a model on our work in order to determine its accuracy.

Abstract #: 214

Title: Enabling Adoption of High-Performance Centrality Tools

Student Author(s): Alexander Palmer

Faculty Advisor: Dr. Erik Saule

Disciplinary Theme: Math and Computer Sciences

Graphs are a set of nodes connected by edges. They can be used to model and analyze the structure of a network and show how those nodes are connected. They are used in medical research such as tracking the spread of diseases or to discover new pharmaceutical drugs, as well in social networks, and intelligence operations. To find important nodes in a graph, Centrality measures are crucial. For instance, when identifying potential drug targets, researchers construct a protein-to-protein interaction network. Influential proteins can be identified with Centrality measures and potential drugs can be discovered. For a 4.8 million edges graph it can take more than 5 days to measure the Centrality. With BADIOS, a research prototype framework made up of high-performance algorithms written in C++, the calculation time for the 4.8 million edges graph reduces from 5 days to 16 hours. Tools like BADIOS are often research prototypes with little real-world deployment. Gephi is a popular open-source software written in Java for graph and network analysis. Its strength includes the ability to produce very high-quality visualizations, but its analysis is limited due to the time it takes to compute measures like Centrality. We will take the research prototype BADIOS and create a plugin to integrate the highspeed C++ algorithms into Gephi. This will benefit scientists and researchers by enabling them to compute large complex scientific and engineering problems using off-the-shelf technology. This plugin will reduce computation from 5 days to 16 hours on a 4.6 million edges graph.

Abstract #: 215

Title: Misinformation in Science: Causes and Implications

Student Author(s): Aylha Pferschy **H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Science, Technology, and Engineering

Science and research are crucial for establishing facts, debunking theories, and providing a shared understanding of what is true. The problem is science evolves, as the community discovers more technology and innovative techniques, prior ‘facts’ are found to be partially, or wholly incorrect. This effect can be exacerbated by publication bias created through research that is funded by corporations and individuals that have a vested interest in the results. The instability of the scientific consensus can cause misinformation in the general public. In some cases, misinformation can be close to harmless, but in other situations can be fatal. Prior research has shown misinformation can undermine policy surrounding public and ecological health, and suggests a connection between misinformation and decline in pure democracy. In this literature review, I will explore What causes the dissemination of misinformation in the scientific community, how this impacts current scientific and societal views, and how it can be prevented.

Abstract #: 216

Title: Programmed Translational Frameshifts and Termination-Reinitiation in Bacteriophage Culver

Student Author(s): Amber Brumfield, Jaden Anderson, Tiffany Cook, and Gregory Ethridge

Faculty Authors: Dr. Ellen Wisner and Dr. Tonya Bates

Faculty Advisor: Dr. Ellen Wisner

Disciplinary Theme: Science, Technology, and Engineering

Temperate bacteriophages switch between lysogenic and lytic cycles. The lytic cycle spreads the phage to other bacterial hosts, while the lysogenic cycle interlinks the phage genome with the host genome. Phages use an immunity integration cassette (IIC) to integrate the phage genome into the host genome. The integration cassette mobilizes integrons for recombination of the phage DNA once inserted into the host. The cassette typically consists of integrase, immunity repressor, and excise genes. In this study, we will investigate the bacteriophage Culver and use bioinformatic tools to compare other closely related phages and determine if these immunity repressors and related genes within the immunity integration cassettes are present in Culver. We will annotate the genes using tools like Phamerator, DNAMaster, Starterator, and HHPred to help identify starts, stops and functions of genes and compare the genes to closely related phages. We hypothesize that we will find the genes associated with immunity integration cassettes in our target region. Also, due to the transposable nature of gene cassettes, it is possible that these functions are found in other regions of the genome and will need further investigation. This research allows us to obtain a better understanding of the genome of the phage, its relationship with bacteria, and the consequential impact on the environment. We can potentially use this knowledge to manipulate and treat bacterial infections using the components of phage integration and replication.

Abstract #: 217

Title: The Secret to Replication: Uncovering the Genes Responsible for Immunity Integration

Student Author(s): Emily Gailey, Rianna Allen, Emily Gailey, Phillip Souza, Briggs Yonder

Faculty Authors and Advisors: Dr. Ellen Wisner and Dr. Tonya Bates

Disciplinary Theme: Science, Technology, and Engineering

Temperate bacteriophages switch between lysogenic and lytic cycles. The lytic cycle spreads the phage to other bacterial hosts, while the lysogenic cycle interlinks the phage genome with the host genome. Phages use an immunity integration cassette (IIC) to integrate the phage genome into the host genome. The integration cassette mobilizes integrons for recombination of the phage DNA once inserted into the host. The cassette typically consists of integrase, immunity repressor, and excise genes. In this study, we will investigate the bacteriophage Culver and use bioinformatic tools to compare other closely related phages and determine if these immunity repressors and related genes within the immunity integration cassettes are present in Culver. We will annotate the genes using tools like Phamerator, DNAMaster, Starterator, and HHPred to help identify starts, stops and functions of genes and compare the genes to closely related phages. We hypothesize that we will find the genes associated with immunity integration cassettes in our target region. Also, due to the transposable nature of gene cassettes, it is possible that these functions are found in other regions of the genome and will need further investigation. This research allows us to obtain a better understanding of the genome of the phage, its relationship with bacteria, and the consequential impact on the environment. We can potentially use this knowledge to manipulate and treat bacterial infections using the components of phage integration and replication.

Abstract #: 218

Title: Comparing Seasonal Changes in Total Phosphorus in Urban Beaver and Stormwater Ponds

Student Author(s): Rayney Maxwell **S, NC, U**

Faculty Advisor: Dr. Sandra Clinton

Disciplinary Theme: Science, Technology, and Engineering

Phosphorus is an essential nutrient necessary to sustain life on Earth. Its recent overuse, however, especially in urban and agricultural areas, has resulted in severe negative impacts on freshwater ecosystems. High phosphorus levels cause excessive algal growth, resulting in blooms that ultimately lead to decreased oxygen concentrations in ponds which can degrade aquatic ecosystems. In cities, beaver and stormwater ponds mitigate stormwater runoff by retaining sediment and phosphorus. Beaver dams potentially act as natural filtration systems, removing phosphorus and other pollutants from waterways. In contrast, stormwater ponds allow phosphorus to settle at the bottom of the pond, preventing phosphorus from washing downstream. This study was conducted to test the effectiveness of these two types of ponds to determine which does a better job of removing and filtering phosphorus. We collected surface water from the inflow, pond, and outflow of a beaver pond and a stormwater pond once a month for a year. The total phosphorus concentrations of the water samples were analyzed using an acid persulfate digestion method. Preliminary findings show that stormwater ponds have higher total phosphorus concentrations than beaver ponds, suggesting beaver ponds do a better job of filtering phosphorus out of water. Given the negative impacts of excessive amounts of phosphorus on freshwater ecosystems, finding solutions for removing phosphorus from waterways is necessary for maintaining ecosystem health. Comparing the effectiveness of beaver and stormwater ponds at removing phosphorus can help us determine where to focus our efforts to prevent harmful algal blooms from endangering freshwater ecosystems.

Abstract #: 219

Title: Inflammation, Epithelial Growth Factor and Breast Cancer Progression

Student Author(s): Madison Eley

Faculty Advisor: Dr. Didier Dréau and Dr. Julia Roberson

Disciplinary Theme: Science, Technology, and Engineering

Breast cancer progression is promoted by stromal secretions within the tumor mass. Among the numerous factors that immune cells, particularly macrophages, secrete is epidermal growth factor (EGF). EGF is a ligand that promotes tumor growth through signaling via its cognate receptor, EGFR. Interestingly, EGFR signaling alterations are associated with breast cancer progression. It is unclear whether macrophages secrete EGF differently based on their subtypes and/or their activation. In the present study, macrophages' secretions of EGF were assessed in vitro following incubation with known activators of inflammasome activity along with tumor secretomes. Results will be discussed in the light of the key role macrophages play in promoting breast cancer progression.

Abstract #: 220

Title: Optimizing Zeolite Functionalization to Remove Water Contaminants

Student Author(s): Jenna Barilovits **G, H, S**

Faculty Advisor(s): Dr. Jordan Poler and Dr. Raghav Dosi

Disciplinary Theme: Science, Technology, and Engineering

There has been an increasing need to meet clean water demands in a sustainable way. Because of industrialization and urbanization, water sources are becoming increasingly contaminated. There are a variety of water contaminates present in water that filtration and water utility plants cannot remove. Many of these compounds are harmful to human health at extremely low concentrations. It is therefore imperative that water purification processes be improved. Zeolite nanoparticles have a variety of properties that make them advantageous as water adsorbents. Zeolite particles display high surface area, porosity, low toxicity, and can be functionalized with a variety of organic compounds to alter their selectivity and function. The Poler research group has focused their efforts on determining how to make zeolite materials have the best water purification performance. Zeolite nanoparticles are functionalized in two steps: silanization followed by polymerization. Our work has focused on optimizing the different variables in these processes. We are working toward determining which class of silane compounds are the most efficient in a gas phase reaction. Both vinyltrimethoxysilane, trimethoxysilane, and allyl(chloro)dimethylsilane have been studied and the hydrophobic character and spectroscopic analysis will be presented. These data help us determine which method of functionalization provides better performance between the grafting from and grafting to method. We have carried out the reaction on different grain sizes of the natural zeolite. We will present data on the synthesis and characterization of these novel materials and on their adsorption properties. Future studies will focus on maximizing regenerability and commercialization.

Abstract #: 221

Title: Degradation of Polyfluorinated Substances with nano Zero Valent Aluminum

Student Author(s): Emily Hayden **G, H, S, NC**

Faculty Advisor: Dr. Jordan Poler

Disciplinary Theme: Science, Technology, and Engineering

Degradation of polyfluorinated substances (PFAS) has gained interest recently as PFAS does not break down naturally in the environment and is related to various health problems and cancers. The current methods for degrading PFAS are costly and require large amounts of energy. Using nano zero valent aluminum (nZVAl) to degrade PFAS is beneficial as it is cost effective and easy to synthesis. Aluminum is capable of forming plasmonic hotspots that generates an extremely large electric field enhancement, creating a small spot of very large temperatures for small periods of time. This temperature is large enough to degrade PFAS without needing the amount of energy that current methods require. nZVAl has recently shown to be successful at removing contaminants and soluble organic matter from water samples. It is hypothesized that nZVAl will be able to degrade PFAS effectively. Synthesis and characterization of the nZVAl will be presented, including chemical yield, melting point, elemental analysis, and electron microscopy data. PFAS degradation is monitored by a special mass spectrometry method. As the nZVAl synthesized does oxidize over time when exposed to the air, a method will have to be developed to study how the oxidized aluminum affects the efficiency of degrading PFAS. Electron microscopy proved that the synthesis of nZVAl was successful, as only Aluminum and Oxygen are being detected. This method could lead to improvements of removing PFAS from the environment and can be used at water treatment centers.

Abstract #: 222

Title: Genetic and Mechanical Analysis of Predatory Glues from Terrestrial Invertebrates

Student Author(s): Ella Kellner and Abby Warren **NC**

Faculty Advisor: Dr. Sarah Stellwagen

Disciplinary Theme: Science, Technology, and Engineering

Several groups of invertebrates use glue as a predatory mechanism in order to capture prey. We are studying the genes and biomechanical properties that encode for these sticky proteins from two species of onychophorans (velvet worms), three species of Keroplatidae (predatory fly larvae), two species of opilionids (Daddy-Long-Legs), and three species of Araneae (spiders). We are currently studying two species from the US and Jamaica and, in the future, we will be collecting species from the other parts of the US, Jamaica, and Australia. Silk genes, specifically of spiders, are incredibly long and repetitive, and are some of the largest genes ever researched. Long read sequencing technology is being used in order to understand and analyze how these genes are expressed and how they may differ from each other. Recently, the complete genes were sequenced for aggregate glues from the brown house spider, Parateatoda tepidariorum, the first for a cobweb weaver. Furthermore, these organisms use their glues in different environments, of which differing humidity and temperatures affect the strength and elasticity. Droplets produced by our research organisms are probed using force transducers under a microscope. In order to preserve the integrity of the experiment and the glues, they are tested within an environmental chamber that mimics the humidity and temperature of the organisms' natural habitats. We aim to study the properties of silk genes and glue droplets on both a molecular and biomechanical level so that we may draw conclusions about these organisms' evolutionary patterns and ecological behaviors.

Abstract #: 223

Title: Spilling the Tea on tRNA: Phage Edition

Student Author(s): Joshua Nguyen, Will Alexander, Giana Dana, and Rebekah Netzley, E

Faculty Author: Dr. Tonya Bates

Faculty Advisor: Dr. Ellen Wisner

Disciplinary Theme: Science, Technology, and Engineering

Bacteriophages are viruses that selectively target and infect bacterial cells. They are the most abundant biological entity on the planet with more estimated phage in existence than all other organisms combined [1]. Despite their abundance, fewer than 1% of all phages have been characterized. In recent years, phage research has grown through programs such as SEA-PHAGES, which works to discover and annotate the genomes of novel phage. In this project, the CQ1 cluster phage Culver was annotated and investigated, specifically looking at its transfer RNA (tRNAs) genes. Generally, transfer RNAs carry amino acids, the building blocks of proteins, to the biological machinery that make proteins. The presence of tRNAs in bacteriophage is unusual because they replicate by hijacking the host machinery since they do not have their own. To identify tRNA sites in Culver, genomic analysis softwares tRNAscan-SE and Aragorn were used, which utilize primary and secondary structure information to search for tRNA genes [2]. It is expected that these locations will be highly conserved across members of cluster CQ and subcluster CQ1. Previous research suggests that one of the main functions of phage tRNA is to provide codons for amino acids that the phage has biases for. It can be inferred that highly conserved tRNA genes across phages provide them with competitive advantages over other phages [3]. Overall, this project looks to contribute to an area not well established in scientific literature by furthering the understanding of tRNA presence in temperate bacteriophage.

Abstract #: 224

Title: Development of Lightweight Scooters Powered by Structural Batteries

Student Author(s): Josh Liang

Faculty Advisor: Dr. Jun Xu

Disciplinary Theme: Science, Technology, and Engineering

Batteries are the cornerstone of energy storage systems. They provide energy for a bunch of engineering applications from electric cars to planes. However, the weight that these batteries provide for these applications affects the performance of the user's movements and therefore, the overall range of which these vehicles can go. Along with that, batteries tend to fracture easily when it is impacted which affects the overall health of the battery. But what if the battery itself can also act as a structure while maintaining its role as an energy storage system? Structural batteries are the response to fulfilling that role and can reduce the burden of weights and potentially increase the range of which these vehicles can go.

Abstract #: 225

Title: Discrimination Behaviors Against Black Women

Student Author(s): Adira Abdullah **G, H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

The quest to end discriminatory behaviors, such as racism and sexism, is an ongoing struggle faced by African American women in the United States. Women in marginalized groups are at a uniquely high risk of stalking, incest, the risk of battering, rape, and sexual harassment. Bringing greater awareness to the discriminatory behaviors Black women encounter is critical in bringing awareness to these inequalities. Culture and race have not figured centrally enough within the analysis of the causes and consequences of gender violence. As a result, Black women are at a greater risk of physical, sexual, and emotional violence that is frequently ignored. Therefore, to learn about the lived experiences of Black women in Chicago, I propose to collect qualitative research through semi-conducted interviews. This is to question public policy and gender violence as well as learn about the various forms of discrimination towards Black women. The research will focus on the impacts of discrimination through stressful events, sexual harassment, intimate partner violence, mental health issues, and stereotypes. AT URC, I will review existing literature regarding how Black women are impacted by their intersectionality in preparation for conducting interviews next fall. This is a call to action for change to end discriminatory behaviors with the relationship between sexism and racism specifically towards Black women, such as myself.

Abstract #: 226

Title: How Political Barriers and Anti-Immigrant Attitudes Are Affecting the Wellness of the Latinx Community and Their Access to Health Care

Student Author(s): Yuliana Ganan **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

The United States is often referred to as a melting pot of diversity and cultures, where everyone is welcomed. However, within the political and societal climate, many marginalized groups experience racial bias which negatively impacts different aspects of life. Although America may rhetorically seem accepting of immigrants, U.S. policy in fact restricts and discourages immigration. The focus of this research is on the Latinx population and how anti-immigrant attitudes impact wellness and access to health care. This literature review will examine previous studies to investigate the extent to which anti-immigrant policies and attitudes negatively impact the overall health of Latinx communities, and discourage them from seeking health care. Specifically, these policies make it difficult for undocumented immigrants to access needed resources for healthcare, such as health insurance or a driver's license. In addition, the presence of immigration enforcement creates fear of deportation because of documentation status and political climate. For example, in 1996 the Personal Responsibility and Work Opportunity Reconciliation Act (PROWRA) was passed which restricts undocumented immigrants from accessing federal insurance programs such as Medicaid. This research shows that anti-immigrant attitudes and policies result in barriers to accessing health, poor mental health, not feeling like you belong, and overall a decline in wellness. The overall contribution of this literature review is to bring awareness to the impact policy and societal attitudes have on the Latinx community, and to begin working towards solutions to improve the wellness of this community.

Abstract #: 227

Title: Biological Constitution and Political Values of Violent American Criminal Offenders

Student Author(s): Hannah Gleason and Weylin Johns **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

The average demography of violent criminal offenders in the United States of America has been extensively explored in a plethora of areas such as race, gender, and socioeconomic status. However, literature denoting the intersectionality of these demographics is sparse. More specifically, there is not an abundance of synthesis as it relates to political values and biological constitution. This literature review and capstone project, as a whole, serve to further the synthesis of criminology with the political inclination and biological predispositions of violent criminal offenders. The bonds of society solidify politics and biology with crime. Hirschi's social bond theory states that social bonds such as attachment, commitment, involvement, and belief prevent actors from behaving defiantly. Given the scope of our research and Hirschi's social bond theory, we contend that political and biological disposition should be considered when predicting proneness to violent criminality. Through our literature review and subsequent podcast denoting our findings, we desire to demonstrate and broadcast the applicability of these traits to criminal offenders. It will pave the path to include political association and preference and biological factors in the mainstream study of criminal behavior. In addition, our project allows the public to better understand potential risk factors of crime and gives insight into new laws and programs that can be developed to detect deviant traits and behaviors in individuals and create opportunities to intervene before the onset of criminal activity.

Abstract #: 228

Title: Investigating and Comparing Sustainable Development Goal#5 in Germany and the United States

Student Author(s): Sam Akers*, Katie Reynolds*, Jordyn Hill*, Alina Kominis**, and Hannah Reinhard** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #5: Achieve gender equality and empower all women and girls. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #5: Gender Equality? What are the differences? Are the countries on track to make progress on SDG #5 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #5 Achieve gender equality and empower all women and girls by the 2030 goal year.

Abstract #: 229

Title: Investigating and Comparing Sustainable Development Goal #12 in Germany and the United States

Student Author(s): Shaan Khanna*, Abdullah Alrayyes*, Katharina Höhn**, and Laura Fitzek** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #12: Responsible Consumption and Production. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #12 Ensure sustainable consumption and production patterns? What are the differences? Are the countries on track to make progress on SDG #12 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #12: Responsible Consumption and Production by the 2030 goal year.

Abstract #: 230

Title: Investigating and Comparing Sustainable Development Goal (SDG) 1#: No Poverty

Student Author(s): Shaun Lowry*, Amaris Wilkins*, Connor Rosekraans*, Pauline Pfister**, and Rebekka Bechtle** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) 1#: No Poverty, which means to end poverty in all forms everywhere. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #1: No Poverty, which is about eliminating poverty wholesale according to the UN definition? What are the differences? Are the countries on track to make progress on SDG 1# by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #1: No Poverty by the 2030 goal year.

Abstract #: 231

Title: Investigating and Comparing Sustainable Development Goal #13 in Germany and the United States

Student Author(s): Helena Moretz*, Chas Purrington*, Caelan Walsh*, Alina Basic**, and Lisa Halmschlag** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #: 13 Climate Action. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal # 13 Climate Action? What are the differences? Are the countries on track to make progress on SDG # 13 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG 13 Climate Action by the 2030 goal year.

Abstract #: 232

Title: Investigating and Comparing Sustainable Development Goal #16 in Germany, Myanmar, and the United States

Student Author(s): Biak Par*, Fam Tha Meng*, Hunter Shelby*, Siobhan Paradis**, and Fatma Inci** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #16: Peace, Justice, and Strong Institutions. The main research questions for our international comparative study are: What are the similarities among Germany, Myanmar, and the United States related to target goals for Sustainable Development Goal # 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels? What are the differences? Are the countries on track to make progress on SDG # (16) by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG '# 16: Peace, Justice, and Strong Institutions by the 2030 goal year.

Abstract #: 233

Title: Mental Health & Self Care in Black Women

Student Author(s): Tashanya Parks **CE**

Faculty Advisor: Dr. Susan Harden

Disciplinary Theme: Social Sciences

In this study, I investigate the following research question: “How do Black Women within the working- and middle-class community take the initiative of self-care for the benefit of their own mental health?” Prior research indicates that depression and other mental health challenges are prevalent among the black community especially in women influenced by systemic oppressors that black women have to face daily in their lives. Research also reveals that engaging in self-care is stigmatized for black women who see themselves as having to be the “strong” person in the family group and acknowledging the need for self-care is seen as problematic. I will utilize research methods learned in my Sociology major to gather data from sociologist perspectives on what social systems lay the foundation for mental health. Using qualitative and community engaged research methods, I will conduct interviews individually with women from various age ranges to investigate how their mental health is being taken care of through self-care. I will list an array of questions that ask specifically how these particular women are affected and what ways they try to improve their status of mental health using self-care techniques. The women I will be interviewing are a part of an organization in Charlotte North Carolina named “She Speaks” which is a collective of black women who meet once a week to express their feelings and opinions on how they live within racist, sexist, and classist social systems. The findings from my research will be used to improve programs for She Speaks going forward.

Abstract #: 234

Title: Documenting Pro-immigration Politics and Advocacy

Student Author(s): Katherine Bolt

Faculty Advisor: Dr. Alexander Kustov

Disciplinary Theme: Social Sciences

Over the past century, restrictive immigration policies have been implemented in the U.S. and other wealthy countries. These policies act as a harsh barrier for immigrants, effectively prohibiting much of the global population from moving to high-income countries. Historical trajectories of anti-immigration politics are indicated by political histories, like the nativism of Known Nothings from the 1850s to Donald Trump and Brexit. However, systematic evidence of existing reverse political trends is relatively rare. The purpose of this project is to document all major pro-immigration politicians, parties, advocacies, their platforms, and legislative outcomes across the U.S. and other major immigrant-receiving countries over the past century. A literature review and qualitative analysis of existing articles will be conducted. Through this, a new database of pro-immigration politics will be compiled based on existing party manifestos, candidate profiles, and historical records. The collected data will be used to examine the historical and contextual correlates of pro-immigration as opposed to anti-immigration politics. We expect to find pro-immigration politics undergoing a continual change of support across the past century due to the nature of political parties and time periods. The findings of this study will contribute to the growing body of literature surrounding pro-immigration politics.

Abstract #: 235

Title: Homeless in the United States

Student Author(s): Aline Andaa, Maro Kawamura Sandrini, Ava Jackman, and Jonathan Norris

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster, our group describes and reports on the global challenge of homelessness in the US. The purpose of our research project was to inform people about homelessness by comparing the status of this global challenge from the past to our current day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? Another question that guided our research was what health issues do homeless people deal with? Why do more people end up in the street than in shelters? To answer our questions and address our purpose, our group examined different perspectives on homelessness. Someone did research on the health of homelessness, another person researched shelters and people living unsheltered, and another group member researched homelessness globally. We discovered that yes, the homeless population has been decreasing in the United States but it is still a huge problem, especially since the pandemic. The community is overlooking the homeless population because they feel it doesn't affect them. Our findings are important because anybody can be affected by homelessness, and we have to do more like countries like Finland to decrease the homeless population. The overall contribution of this research study is that it helps to prepare us as researchers to be more aware of issues that are going on in the United States and globally.

Abstract #: 236

Title: The Effects of Non-renewable Resources

Student Author(s): Adrienne Kelly, Malcolm Hill, and Tatiana Salgado **G, S**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of fossil fuel pollution. A purpose of our research project was to compare the status of our global challenge from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? And how fossil fuel pollution impacts our world. Another question that guided our research was how can we fix this issue? For this research project, we used the iceberg model to get to the bottom of the effects of fossil fuel pollution. We used future, environmental, and personal perspectives to examine the global challenge of fossil fuel pollution. To answer our questions and address our purpose, our group researched the major effects and then went into depth about how they affect our world's future, environment, and us as humans. We discovered how much we use these resources and how we can address this global challenge by using renewable resources instead of non-renewable resources. Our findings are important because the non-renewable resources will run out and energy is important for us as humans. The overall contribution of this research study is that it helps to prepare us as researchers to keep researching and get a present and future perspective of where our energy comes from and how we can find more sustainable energy sources.

Abstract #: 237

Title: Examining the Factors of Climate Change: Planet Management

Student Author(s): Dillon Syhavong, Tracy Bui, Liam Halberstadt, and Cyrus Bakhteyar **G, S**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of planet management. The purpose of our research project was to compare the status of our global issue from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? How has the past dealt with the challenge of planet management? What are we doing now in terms of the issue? Another question that guided our research was how are we going to move forward from where we are at now? For this research project, we used a systems thinking methodology of root cause analysis to examine the global challenge of planet management. To answer our questions and address our purpose, our group's research process entailed viewing and reading government and educational news articles on each of our subtopics. We discovered that there are a lot of improvements needed to help manage our planet. Our findings are important because people need to be informed on this reoccurring issue of climate change and pollution. Without informing and creating a community to help our planet, the issue would constantly keep growing. The overall contribution of this research study is that it helps to prepare us as researchers to have a global perspective and to be more aware of the global issues around us.

Abstract #: 238

Title: Social Inequalities in the World

Student Author(s): Jaelah Rigby, Aleeza Cabahug, and Abby Noblitt **G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of social inequalities. The purpose of our research project was to compare the status of our global challenge from the past to our current-day. Also, to identify and acknowledge social inequalities that are still recurring in society today. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? Another question that guided our research was, how inequalities are violated? For this research project, we used a systems thinking methodology of analytical thinking to examine the global challenge of social inequalities. To answer our questions and address our purpose, our group used a reliable source (Atkins Library) and found articles as well as different websites where we got our information, graphs and maps. We discovered gender, children and sexual orientation discrimination within the nation that has a significant impact regarding abuses. Our findings are important because fundamental human rights are violated every day and it's imperative that we protect the rights we need. The overall contribution of this research study is that it helps to prepare us as researchers to gain a better understanding of inequalities in the workforce.

Abstract #: 239

Title: Impact of Politics on Sustainable Development Goals

Student Author(s): Diana Lozova, Teagan Wise, and Christian Youssef **S**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of Political impact of politics on the sustainable development goals. The purpose of our research project was to compare the status of our global challenge from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? We discovered it was important to educate others of the global involvement of sustainable development goals and we hoped to inspire our audience to help out others through community involvement. For this research project, we used our curiosity and desire to learn more about this topic to expand our knowledge as well as used an open-minded perspective to examine this global challenge. To answer our questions and address our purpose, our group utilized databases to search for scholarly articles that pertain to our topic. We discovered that the United Nations is currently working on 17 goals that help to eliminate hunger, poverty, lack of education and more. Our findings are important since we discovered the importance of sustainable development and the negative and positive effects of politics and informed others on why these things need our attention. The overall contribution of this research study is that it helps to prepare us as researchers to understand the importance and urgency of sustainable development.

Abstract #: 240

Title: Food and Hunger in Ghana, USA and South Sudan

Student Author(s): Aryan Mantri **G**, **NC**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of Food Insecurities in Ghana, South Sudan, and the U.S. A purpose of our research project was to compare the status of our global challenge from the past to our current-day within each country. A question that guided our research was: What are the issues of food insecurity within Ghana, South Sudan, and the U.S. By doing so, we can see how even though the U.S. is a developed country, hunger is an ongoing struggle that we need to tackle. Our group compared and contrasted the state of each country previously to the present day. Although hunger is slowly improving in the U.S., there is little to no improvement within South Sudan and Ghana. Individuals who rely on cheap labor and wealthier countries benefit from this detrimental issue. For this research project, we used a systems thinking methodology of breaking apart a global topic to cover more detail. Our findings are important because global citizens aren't aware of what scale food insecurity is taking over the world. There are countries that are getting close to no help and it's time people are made aware so all of us can do our part to help solve this global catastrophe. The overall contribution of this research study is that it helps to prepare us as researchers to be more aware of the issues going on globally.

Abstract #: 241

Title: Chemical Pollution

Student Author(s): Jadon Chanthavong, Milagros Marrero, and Tessa Greenwood **NC**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of Planet Management. A purpose of our research project was to compare the status of our global issue Chemical Pollution from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? How have efforts to prevent and clean chemical pollution altered throughout time? Another question that guided our research was How aware is the public of chemical pollution and its presence in our daily lives? For this research project we used a perspective of the past vs. the present to examine the challenge of Chemical Pollution. To answer our questions and address our purpose, our group utilized peer-reviewed articles and credible articles to supplement our research. We discovered that chemical pollution is an extremely widespread issue and it is present in nearly every person's life around the world. Our findings are important because the effects of chemicals are extensive and not fully realized yet. It would be irresponsible to not control the issues when we have the capability to do so. This especially concerns large manufacturers of chemicals and companies that heavily incorporate them into their products. The overall contribution of this research study is that it helps to prepare us as researchers to prevent chemical exposure to the general population.

Abstract #: 242

Title: Local Institutions and Global Problems – Progress Towards a Better and Sustainable World

Student Author(s): Maddie Kepley, Dory Souphanthavong, Alex Polo, and Maxime Sinski **CE, G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Disciplinary Theme: Social Sciences

The UN's Sustainable Development Goals (SDGs) address some of the biggest issues facing countries around the world, including sustainability issues such as global warming, water quality, and renewable energy. Although these are global problems and goals, they play out differently in various countries and regions in the world. In this project, we explore how local and national institutions affect a country's ability to make progress on these SDGs. Based on four countries with unique institutional contexts – Italy, Colombia, Nigeria, and Haiti – we examine how each approaches the issues differently. In Italy, water pollution can be considered a major concern; clean energy and sustainability are challenges in Colombia and Haiti; and in Nigeria, like in many West African countries, desertification and access to clean water are top priorities. Although the countries differ in several ways, they all confront sustainability challenges that require institutional capacity to address effectively. To address our question, we will collect information about the government structure and policy in each country with data about progress on these issues. We are interested in whether countries choose to manage the problems globally and work with other countries, through government initiatives and policy, or in collaboration with non-governmental organizations (NGOs). The results of this project may show us how those specific governmental institutions and policies actually come into play, and if they are effective or ineffective for that given country and situation in place.

Abstract #: 243

Title: Ethiopia and It's Struggle for a Greater Access to Clean Water

Student Author(s): Deseree Mumby, Ruhika Nagarkar, Sandra Mwanje, and Jinisha Sohal **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Disciplinary Theme: Social Sciences

The United Nations' sixth Sustainable Development Goal aims to achieve universal access to safe drinking water in all countries by 2030. Access to clean water affects other important goals, such as those related to public health and quality education. Yet in countries like Ethiopia, gaining access to clean water remains a challenge for many of their citizens, especially in rural areas. In urban areas, 97% of Ethiopians have access to clean water in contrast to only 57% of people who live in rural areas. In this project, we focus on what the government and nongovernmental actors are doing to help close this gap and increase the percentage of Ethiopians with access to clean and sanitized water. Resolving this problem will require significant improvements to the water infrastructure in rural areas as well as efforts to educate communities about the importance of proper sanitation. Although the World Health Organization (WHO) recognized Ethiopia for progress in clean and safe water increasing from 14% of the population in 1990 to 57% in 2015, it still has progress to make and villagers continue to get sick. We analyze progress made toward this goal in Ethiopia since 2015 and identify ways the Ethiopian government and nongovernmental organizations can increase access to clean water and proper sanitation. Our research will allow us to have a deeper understanding of why only 74% of the global population has safe drinking water and why Ethiopia specifically is facing difficulties with providing access to clean drinking water to its population.

Abstract #: 244

Title: Measuring the Emotional Experiences of LGBTQIA+ Adults

Student Author(s): Jacqulyn Stelmack **H**

Faculty Advisor: Dr. Lisa Walker

Disciplinary Theme: Social Sciences

Past studies on gender and emotional experiences have found evidence that women experience negative emotions more frequently than men, supporting Kemper's structural theory of emotion (stating that structural factors such as status and power impact individual emotional experiences), and the idea that women inhabit low-status roles more often than men (Simon and Nath 2004). However, much of the research in this area focuses on binary gender identities and heterosexual relationship dynamics. There is little research that takes other sexual and gender identities into account when considering gendered differences in emotional experiences. The current study will examine how frequencies of various emotions may differ in individuals in heterosexual relationships and non-heterosexual relationships, with an interest in how gender roles within different types of relationships, and the impact they have on emotions, may differ. A survey was used to collect data on a recent emotional experience using measures from Affect Control Theory. Participants rated the emotion on three scales (Evaluation, Potency, and Activity), and these ratings and the emotions they are associated with were compared with the label participants chose for the emotion. The survey also collected demographic information including detailed options for self-identifying gender and sexuality. Descriptive statistics and regression analyses were used to analyze the data in SPSS. In addition to expanding the knowledge base for gender-emotional research, this study is a step towards making research more informed and gender-diverse.

POSTERS

Session C

CE - Community Engaged **G -** Global **H -** Honors **S** - Sustainability

NC - North Carolina **PKP** – Phi Kappa Phi Member **U** - Charlotte

Abstract #: 300

Title: Modeling Moretti: Architectural Analysis of a Mid-Century Masterwork in Rome

Student Author(s): Mia Todd

Faculty Advisor: Dr. Jeffery Balmer

Disciplinary Theme: Arts and Design

Fascist era neo-rationalist architect, Luigi Moretti designed and oversaw the construction of more than eighteen public building projects between 1933 and 1954, several of which were constructed in Rome. Moretti's designs for both private and public spaces often emphasized fascist ideals and philosophies. Despite his association with these groups, Moretti's projects are considered to be incredibly influential to the development of Italian modernism. Some of his career-defining buildings include, Casa delle Armi (1934), Gioventù Italiana del Littorio Center-Trastevere (1936), and Il Girasole (1949). My research will focus on the documentation of these buildings through the creation of detailed drawings. These drawings will derive information from existing archival orthographic drawings that are largely disorganized and missing information. The construction of additional, more-detailed drawings will increase the resources available for those interested in Moretti's works.

Abstract #: 301

Title: Azteca Run

Student Author(s): Cecilia Munoz **G**

Faculty Advisor: Dr. Jessica Burke

Disciplinary Theme: Arts and Design

This project was created in response to the history, misconceptions, and residual problems of inaccuracies associated with Aztec Mythology and history. In an attempt to gamify history and approach a complex topic, Azteca Run is a board game aimed at school-age children, that introduces some of the various figures prominent in Aztec Mythology and traditional Mexican culture. Beyond their dedication to faith, the Aztecs also focused heavily on expanding their influence across the Mesoamerican region. This is referenced as players of the game must navigate the immense but verdant environment of the board by running away from Spanish conquistadors. All of the symbolic visual imagery was inspired by indigenous culture in order to prioritize authentic culture over colonization. The game highlights Huitzilopochtli, Chalchiuhtlicue, Tezcatlipoca, Tonatiuh, Tlaloc, and Quetzalcoatl. Each god is depicted in traditional dress and surrounded by the palette and landscape most associated with them in historic depictions. All of the elements represented on the board have symbolic meaning as either cultural artifacts or symbols. The box cover shows the threat of the Spanish conquistadors, represented by spears and destructive flames. Accompanying these works is a promotional poster illustration inspired by the tragic story of an Aztec warrior named Popocatépetl and a princess Iztaccíhuatl- a famous subject found throughout the country like the famous mural inside the municipal palace of Atlixco, Puebla. Using game design and associated commercial illustration as a research model helps ask questions like "How can we create a means to investigate cultural appropriation and misrepresentation?”

Abstract #: 302

PRESENTATION WITHDRAWN

Title: Mythology and Board Games

Student Author(s): Jorge Sanchez Matos **G**

Faculty Advisor: Dr. Heather Freeman

Disciplinary Theme: Arts and Design

The purpose of my project is to expose more people to Mesoamerican Mythology through the medium of board games. When talking about mythologies people tend to know more of the common ones such as the Greek Mythos but not much involving other cultures mythologies such as Pre-Columbian. The medium of board games can allow the viewer to engage more with the material where other areas may not. For inspiration I have researched the Aztec 5 Suns mythology, Mayan tales, along with Taino Creation Myths. I also examined Pre-Columbian Art History taking examples from lectures, codices, and books. When people hear of civilizations such as the Aztecs they only think blood rituals and heart sacrifice. I hope with my game I may better put into perspective the ideas going through the time. By the end, I shall have a board game that will give anyone that plays it a general understanding of Mesoamerican Mythology.

Abstract #: 303

Title: How Can Financial Literacy Impact the Financial Security of College Students?

Student Author(s): Emely Bueno Abreu and Kylie Johnson **H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Business and Economics

College students are often faced with financial decisions and investments that exceed the knowledge of many young adult students entering the reality of real-world money management. In this literature review, we explore the potential advantages of improving financial literacy by implementing personal finance courses or seminars within the college curriculum that are geared toward college freshmen and 1st-year students. The brief financial knowledge that students are exposed to in their earlier education has very little effect on their long-term understanding of personal money management, thus exposing a problem. In our research, we found that Universities that make financial programs easily accessible to their students can increase their students' success rate as they continue their path toward graduation and beyond. The methodology used to gather this information, focuses on sampling young adult students and examining their financial knowledge through written tests, and interviews. Based on this, our suggestion is to prioritize financial education early and throughout the college experience. Understanding the importance of financial literacy and improving these programs, benefits students by giving them the information needed to make smarter spending decisions, understand the economic environment they live in, avoid scams, accrue less debt, and gain financial peace of mind.

Abstract #: 304

Title: Investigating and Comparing Sustainable Development Goal #4 in Germany, South Korea, and the United States

Student Author(s): Zoe Ziegler* and Jenny Sauer** **G, H, PKP**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Education and Communication

This research aims to investigate and compare aspects of the United Nations Sustainable Development Goal (SDG) #4: Quality Education in three different countries: the United States, South Korea, and Germany. The SDGs were developed to guide and measure the progress of nations in implementing initiatives for a more sustainable future. SDG #4 specifically focuses on ensuring all people have access to a quality education, no matter their circumstances. The main research questions for this international comparative study are: What are the similarities among these three countries related to the aspects of SDG #4? What are the differences? Are the countries on track to make progress on SDG #4 by the 2030 goal year? To conduct this research, an annotated references document was written and a literature review was conducted to research, design, and develop an executive summary of our findings. Research was also conducted by engaging in a Global Networked Learning (GNL) experience with students at the PH Ludwigsburg University of Education in Germany. The research includes an examination and discussion of the challenges and possibilities in meeting SDG #4 by 2023 for each country analyzed, with preliminary research showing that these countries have robust education systems, but changes are still necessary to meet SDG #4 by the goal year. Additionally, the Covid-19 pandemic has presented new challenges that must be urgently addressed to ensure access to quality education in these countries.

Abstract #: 305

Title: Social Justice in English Language Arts

Student Author(s): Tara Gabriel **CE, H, NC**

Faculty Advisor: Dr. Heather Coffey

Disciplinary Theme: Education and Communication

Research indicates a need for middle and secondary teachers to become aware and knowledgeable about how to teach for social justice. The two researchers take the position of a Middle Grade and Secondary college professor and a pre-service student teacher. This study explores current challenges, strategies, and perspectives of critical English Language Arts (ELA) pedagogy through the lens of culturally relevant teaching practices. With purposeful criterion sampling, the researchers gathered current practitioners who have completed the Middle Grades or Secondary ELA methods courses at a large public research university in the southeastern United States. Using qualitative research methods, researchers are currently analyzing responses from pre- and post-experience surveys and eight total transcripts from monthly virtual discussions, focusing on the perspectives of practicing teachers who identify as justice-oriented or ascribe to a social justice orientation to teaching. A comparative analysis of one virtual discussion with six participants is in its early stages of progression. Each researcher analyzed the transcript to identify consistent themes that apply to their positionality within the field of education. The following findings are emerging: mentorships can help guide teachers through implementation of authentic teaching practices, teachers find the need to support the whole child learning through their interests, and there is an instructional focus on reading and writing skills due to an immense learning gap recently occurring. Further analysis is needed to identify the similarities and differences between participant and researchers' social justice ideologies.

Abstract #: 306

Title: Food Insecurity

Student Author(s): Jnaya Brent, Ali Moukahl, and Zelle Morrisey **G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Education and Communication

In this poster our group describes and reports on the global challenge of Human needs and Quality of Life. A purpose of our research project was to compare the status of our global issue of food insecurity from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? Our goal is to make others aware of this problem, and make it possible for others to start treating this issue. Another question that guided our research was how is it affecting our world right now as a whole? For this research project, we used a global citizen's perspective to examine the global challenge of Human needs and Quality of Life. To answer our questions and address our purpose, our group looked into everything about the topic and looked into solutions and what makes it better for the public. We discovered that the issue is actually being resolved because of programs and government aid that is helping out the public. Our findings are important because if food insecurity was not being treated or spoken about, then people would be starving and the supply and demand of the world would be way off the charts. The overall contribution of this research study is that it helps to prepare us as researchers to prevent food insecurity from getting out of control.

Abstract #: 307

Title: Disability and Literacy Awareness in Patient Education: A Literature Review

Student Author(s): Alyssa Cain **H**

Faculty Advisor: Dr. Mindy Adnot

Disciplinary Theme: Health Sciences

Poor patient education is a contributing factor to healthcare disparities for individuals with disabilities and lower literacy levels. Patient education is the process of providing knowledge to people seeking healthcare services about their plan of care and the necessary skills to improve their health. Past literature concludes that while appropriate patient education benefits patient recovery, it is becoming increasingly difficult to achieve due to constraints in the current healthcare system and professional education. Further investigation into the educational needs of at-risk populations, such as those with disabilities and a low literacy level, will contribute to the discussion of patient education as the current research focuses more on the precipitating factors to this issue and less on the patient experience. This literature review will describe gaps in quality patient education delivery, as documented in peer-reviewed journals, and complement this research with patient testimonials gathered from the public domain. A review of the current literature shows that lasting effects on a patient's health and well-being occur when their healthcare team fails to provide adequate teaching about their care. Such effects extend beyond the time spent in a clinical setting and are thus underreported. To address the issue, it is necessary to integrate further education on effective communication strategies for at-risk groups into professional training and implement systemic solutions within the healthcare system. Consequences such as frequent hospital readmissions and overall patient dissatisfaction, fear, and confusion may occur when the healthcare team fails to confirm patient understanding of health maintenance guidelines before discharge.

Abstract #: 308

Title: Ending Disparities in United States Healthcare: How Race and Socioeconomic Status Affect Health

Student Author(s): Reese Cassidy **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

This literature review closely examines the relationship between socioeconomic status (SES), race, and health, and demonstrates how a person's ability to have access to healthcare and a healthy lifestyle in the United States varies by race and income. I will also describe current policies and programs that aim to lessen this gap, and how they could potentially be improved. Research over the past two decades clearly demonstrates that African Americans and individuals from lower-income backgrounds receive diminished healthcare. For instance, this can be seen through lower patient perception of care, higher rates of illness, and earlier onset of illness in these populations. Moreover, these communities may also face barriers outside of the medical system, such as lower access to transportation, healthy food options, and environmentally safe living conditions. Looking into policies that are continuously being implemented to reduce the impacts of race and SES on health, it is found that most implementations have at least one flaw. Serval initiatives have been focused on correcting disparities in healthcare, but many need a vast amount of time and money to implement, as well as communication between patient and provider that is lacking in the United States healthcare system. In this literature review, I hope to provide a bridge between existing initiatives and future ideas, with a focus on the background knowledge of how race and income status affect health and overall quality of life.

Abstract #: 309

Title: America's Public Health Crisis: A Transgenerational Analysis of Black Maternal and Infant Mortality

Student Author(s): Jordan McDaniel **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

It is no secret that the United States is a country built on the backs of oppressed people. Since 1619, Black people have been manipulated, fear-mongered, and force-fed the ideology that they are physically and intellectually inferior to their white counterparts. This white superiority complex was not only adopted by many white Americans for centuries to excuse the brutal and unjust nature of American slavery but used as the bedrock of racist policies still seen today in our schools, court rooms and hospitals. This literature review will explore the relationship between the legacy of slavery and black maternal and infant death rates in the United States by surveying scholarly sources. Literature on the legacy of enslavement and maternal and infant mortality currently discusses how the disparities seen between black and white women are due to numerous factors such as discrimination from healthcare workers, lack of access to care and ineffective patient education. However, this literature review aims to highlight the contributing factors behind these statistics and how, if at all, the lasting impact of slavery and Anti-Black racism plays a role. The main goals of this literature review will be to explore the severe racial gap between infant and maternal mortality rates for Black and white women and infants in the United States, the legacy of abusing black bodies in science and medical practice, and how these topics coincide in the United States healthcare system, all while focusing the dialogue around anti-Black racism. The goal of this analysis, using reliable sources, is to provide a cohesive understanding of why Black women and their babies are dying at alarming rates in the United States healthcare system and what has been and can be done to remedy the systemic racism that this country and its healthcare system was built on.

Abstract #: 310

Title: Racial Disparities in U.S. Maternal and Fetal Health

Student Author(s): Nyla Ngofa **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

The purpose of this literature review is to formulate an in-depth understanding of the institutional and systemic racism that exists within the field of maternal medicine between women of color and white women. Notably, emphasizing the racial disparities in maternal health outcomes, the New York Times article “Childbirth is Deadlier for Black Families Even When They’re Rich” reported on a recent study that suggested that the richest Black mothers have a 437 per 100,000 infant death rate, while the poorest White mothers have a 350 per 100,000 infant death rate. In order to gain a more cohesive, detailed perspective on this issue, I have gathered scholarly literature ranging from journals and books to articles and documentaries. To contextualize my research findings, I paired them with a diverse compilation of publicly-shared personal accounts from ordinary, everyday women like Tara Ervin to notable figures like world-class tennis champion Serena Williams. Expected results for the research project centers around showcasing the harmful effects of institutionalized and systematic racism in the field of medicine, especially the field of maternal and fetal medicine. My preliminary research shows that there is a significant positive relationship between the increase of infant mortality rates and the reported cases of maltreatment by medical professionals for women of color. This research project will bring awareness to an issue that has affected and continues to affect the lives of women from all over the globe, especially for women of color in the United States.

Abstract #: 311

Title: The Impact of Doula Care on Maternal Disparities

Student Author(s): AnnaMarie Rohrs **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Health Sciences

This literature review will discuss the impact of doula care on Black maternal health disparities, focusing on what doulas are, their impact on maternal health disparities, and the work that needs to be done to implement these findings. Black mothers are four times more likely to experience serious complications or death during pregnancy and childbirth and their babies are twice as likely to die, with each being compared to their white counterpart. Research describes how a variety of factors, such as socioeconomic status, health literacy, and implicit bias in healthcare, may play a role. The research will predominantly focus on these minority communities but will also include statistics involving other communities to compare statistics and resources. As Black women are impacted the most by maternal health disparities, the research will focus on how and why this community is affected the most and strive to give an answer as to how to improve these disparities. Preliminary research suggests that doula care can be an important support to families in low-income areas and minority communities. Doulas provide emotional and physical support, impacting the care that the mother receives while also lowering rates of cesarean sections and unnecessary birth interventions. Doulas provide holistic care, focusing on the whole person, which fills the gap commonly found in the professional clinical setting. With the synthesis of the research as a whole, this project aims to make an impact on maternal health disparities through education.

Abstract #: 312

MOVED TO ORAL PRESENTATION SESSION

Title: Telomerase Expression in the Procyclic and Bloodstream form of Trypanosoma brucei

Student Author(s): Anastasia Lozneva **G, H, S**

Faculty Advisor: Dr. Kausik Chakrabarti

Disciplinary Theme: Health Sciences

Eukaryotic cell DNA replication causes chromosomes to shorten with every round of replication. These cells contain caps with long repetitive DNA sequences on the ends of chromosomes to prevent degradation and maintain genome integrity. Those protective caps are also known as telomeres. This study focuses on African sleeping sickness, which is caused by a parasite Trypanosoma brucei. It mainly attacks the circulatory and lymphatic systems of individual organs and is fatal if left untreated. Trypanosoma brucei is known to exist in two major proliferative forms that can be adopted for in vitro culture. The first is from insect host (TseTse fly) or Procyclic Form, and the second is from mammalian (often human) host or Bloodstream Form. Trypanosoma brucei's main strength is avoiding the host immune system by switching its expression of its major surface antigens, VSGs (Virulent Surface Glycoproteins). The main factors that play a role in regulating and silencing the VSG antigen are the telomere length and telomere associated proteins. Therefore, in order to understand the mechanism of telomere synthesis and how VSG gene switching works in Trypanosoma brucei, I seek to investigate the function of Telomerase RNA-protein enzyme that controls telomere length. My hypothesis is that changes in expression and function of telomerase components will affect telomere length maintenance and VSG switching events in Trypanosoma brucei. My work will expand the knowledge of the intracellular interactions of TR and TERT and deepen the understanding of the mechanistic basis of telomerase function in Trypanosoma brucei.

Abstract #: 313

Title: Immediate Effects of Yellow and Blue Light Exposure on Alertness and Wellbeing

Student Author(s): Alexander Litovchenko **NC, U**

Faculty Advisor: Dr. Mark Faust

Disciplinary Theme: Health Sciences

This pilot study aims to investigate the impact of color order in short-term light exposure on individual alertness. Exposure to different colors of light can affect an individual's sleep-wake cycle, circadian rhythm, and overall alertness. This study will investigate the effects of short-term light exposure on alertness in two groups of participants exposed to different sequences of red and yellow light. The Karolinska Sleepiness Scale (KSS) will be used to measure subjective sleepiness at five different time points during the experiment. The results of this study may have implications for various fields, including lighting design, shift work, and aviation. The study will be conducted with undergraduate students from the University of North Carolina at Charlotte, with the data analyzed using IBM SPSS statistical software.

Abstract #: 314

Title: The Corruption of The American HealthCare System

Student Author(s): Kimberly Perez, Morgan Masson, Hannah Krafcik, Ellis Weathers, and Daisy Salas-Huerta

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Health Sciences

In this poster our group describes and reports on the global challenge of corruption and capitalism within healthcare. The purpose of our research project was to compare the status of our global issue from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? We want to bring awareness to a topic that the average person does not hear much about, that being the underbelly of the healthcare system. Another question that guided our research was what is the real reason that healthcare does what it does. For this research project, we used a consumerism perspective to examine the global challenge of corruption and capitalism within the world's healthcare system. To answer our questions and address our purpose, our group analyzed statistics of these healthcare systems as well as research on real life events. We discovered large discrepancies within the validity of healthcare systems and how transparent they are with their consumers. Our findings are important because it affects everyone in some way at some point in their life and for other groups it proportionally affects them. We also wanted to bring awareness about this topic to help those that are struggling due to this system. The overall contribution of this research study is that it helps to prepare us as researchers to fully understand the system that we are partaking in so we can hold the government and these big corporations accountable.

Abstract #: 315

Title: Comparison of Asthma Patient Visits By Demographics for COACH McLungs Implementation

Student Author(s): Dhairya Desai **CE, H, U**

Faculty Advisor: Dr. Heather Smith

Disciplinary Theme: Health Sciences

This state-wide study summarizes the demographic characteristics of asthma-related patient visits over the past 5 years. It serves as a pre-analysis of the demographic statistics before the implementation of Coach McLungs. Coach McLungs is a virtual program that generates treatment plans for patients and providers with both inputs. A final sample of 21 family medicine and pediatric clinics in Charlotte and its surroundings was recruited in 2022 to provide demographic information of their patients aged 5 to 17. This sample allows for an exceptional analysis of the patient's race, sex, ethnicity, and gender in relation to asthma treatment documentation. The research showed that over the past 5 years, 60.9% of total visits were made by male patients, while the other 39.1% were female patients. The analysis of race showed that White/Caucasian patients contributed to 44.3 % of visits and Black/African American patients, 44.5%. However, White/Caucasian patients had an average of 5.0 outpatient visits, while Black/African American patients had an average of 5.7 visits. These results suggest that Black/African American patients have more outpatient utilization than White/Caucasian patients. A two-sample t-test resulting in a p-value of 0.1004 showed that there is no significant difference between the average number of outpatient visits by race. In conclusion, race disparities do present themselves with outpatient utilization, but not at a significant level. Currently, further research is being conducted on the significance of sex disparities.

Abstract #: 316

Title: Islamophobia

Student Author(s): Mohammad Alaradi and Saleh Khader

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Humanities

In this poster, our group describes and reports on the global challenge of Islamophobia and the struggle of Muslims in non-Muslim countries. The purpose of our research project was to compare the status of our global challenge from 9/11 to the present. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? Another question that guided our research was What is Islam? For this research project, we used our own perspective as Muslims in the U.S to examine the global challenge of Islamophobia. To answer our questions and address our purpose, we examined resources from the UNCC library. We discovered that the effect of 9/11 to Muslims is still going on. There are still Muslims changing their names and not identifying as Muslims. Our findings are important because as a Muslim we thought we were past 9/11 and people know the real Islam. Yet, that is not the case. The overall contribution of this research study is that it helps to prepare us as researchers to give Non-Muslims an explanation of Islam and how Islam really is, not what they see on the news or social media.

Abstract #: 317

Title: Comparative Study of Protein-DNA Interactions

Student Author(s): Zarin Khan

Faculty Advisor: Dr. Jun-tao Guo

Disciplinary Theme: Math and Computer Sciences

Hydrogen bonds are critical in protein folding and protein-ligand interactions, especially in specific protein-DNA recognition. It also plays a significant process in various biological activities, such as gene expression regulation, DNA replication, repair, transcription, recombination, and chromosomal DNA packaging. Protein DNA-binding proteins are diverse in binding affinity and specificity to both single-stranded DNA (ssDNA) and double-stranded DNA (dsDNA). Nevertheless, the distribution of hydrogen bonds, especially hydrogen bond energy (HBE), among the different protein-DNA complexes, needs to be further investigated. This project aims to investigate the difference in hydrogen bonds in protein-ssDNA and protein-dsDNA interactions. We will analyze the HBE distribution of various protein-DNA interactions. Specifically, we will compare HBE between protein-ssDNA and protein-dsDNA interactions, grouping them into specific and non-specific categories. Specific DNA-binding proteins have a particular DNA target sequence, while non-specific DNA-binding proteins bind DNA sequences indiscriminately. The overall outcomes of this project will enhance our understanding of hydrogen bond energy in protein-DNA interactions.

Abstract #: 318

Title: Rank Minimization Methods for Completion of Irregularly Sampled Integer Sequences

Student Author(s): Ethan Nguyen

Faculty Advisor: Dr. Christian Kuemmerle

Disciplinary Theme: Math and Computer Sciences

Integer sequences such as the Fibonacci sequence or the sequence of triangular numbers have not only fascinated mathematicians for centuries, but also emerge organically in nature. They are examples of constant-recursive sequences, stemming from a linear recurrence relation. Given a sufficient number of consecutive sequence elements, it is well-known how to infer the recurrence relation and, furthermore, how to find an explicit formula for each sequence element, for example via the roots of the characteristic polynomial. However, the question of how to infer sequence elements if the sequence is irregularly sampled has been barely studied in the literature. We use a data-efficient Iteratively Reweighted Least Squares optimization method that leverages the low-rank property of the Hankel matrix associated to a sequence to complete constant-recursive sequences. The result of this optimization is then integrated into a software tool that completes constant-recursive integer sequences and compare the resulting sequence with the database of the On-Line Encyclopedia of Integer Sequences.

Abstract #: 319

Title: Nature versus Nurture: Understanding the Chemistry of Leadership and Followership

Student Author(s): Camille Clark **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Science, Technology, and Engineering

This literature review explores the biochemical basis of leadership and followership, culminating in a discussion of how this information can increase the effectiveness of both leaders and followers. Theories on an individual's leadership potential often fall under either a nature or nurture approach. Nature approaches focus on the biochemical basis and personality traits ascribed to leaders while nurture approaches focus on individual motivations. The biochemical basis is rooted in the connection between leadership behaviors and neurochemicals, such as endorphins, dopamine, oxytocin, and serotonin. The nature viewpoint theorizes that these chemicals lead to dominant traits for leaders and submissive traits for followers. Early trait-based leadership theories, such as the Great Man Theory of Leadership, are consistent with a nature-based view of leadership. In contrast, other leadership theories emphasize the role of nurturing or developing leadership capabilities by emphasizing leadership as a learned skill, increased through experience and practice. The nurture theory also involves discussion of the motivations for individuals to become leaders or followers, such as a drive for power and focus on coordination, respectively. Because of the interdependence between both groups, an exploration of the biochemical basis and motivations for an individual to be a leader or a follower will bring an increase in effectiveness. An understanding of the nature and nurture approaches will allow thoughtfulness in actions and decision-making by leaders and followers, instead of encouraging helplessness in the face of neurochemical factors.

Abstract #: 320

Title: Investigating the Roles of Telomerase RNA (TR) Structural Domains on TR Structure and Telomerase Activity in the Parasitic Protozoan, Trypanosoma brucei

Student Author(s): Prashant Jha and Kaitlin Klotz **H, NC**

Faculty Advisor: Dr. Kausik Chakrabarti

Disciplinary Theme: Science, Technology, and Engineering

Each time eukaryotic cells divide a small amount of DNA is lost from the chromosomal ends. This occurs because DNA polymerase is unable to perfectly replicate the chromosome ends, a phenomenon known as the end replication problem. As telomeres shorten, genes are damaged, leading to cell death. To prevent the degradation of genes, cells have caps of non-coding, repetitive DNA called telomeres at the chromosome ends to serve as a buffer. Telomeres are added to chromosomes by the ribonucleoprotein (RNP) complex, telomerase. Telomerase consists of telomerase RNA (TR) and the telomerase reverse transcriptase (TERT) enzyme, which maintain telomere length and genome stability. The TR provides a template for the addition of telomeric repeats to the chromosome ends while the TERT catalyzes the addition of repeats, thereby extending the proliferative capacity of cells. When either component is missing or mutated, telomerase function is compromised. Rapidly dividing cells rely on telomerase to extend their telomeres and support indefinite proliferation. Dysfunction of the telomerase complex has been linked to diseases including cancer, age-related disorders, and genetic syndromes. Understanding the role of telomerase RNA is crucial for developing new therapies to prevent or treat these conditions. Our research works to better understand the functions of discrete TR structural domains and their impacts on TR structure and telomerase activity in the parasite Trypanosoma brucei. We examine the impact of distinct TR domains on telomerase function. This work, along with planned studies will aid in understanding the telomerase RNA structure, and its distinct functions.

Abstract #: 321

Title: Urban Development and Stormwater Sediments: Identifying Vulnerable Populations in Charlotte, NC

Student Author(s): Chandler Horton **S, NC, U**

Faculty Advisor: Dr. Fushcia-Ann Hoover

Disciplinary Theme: Science, Technology, and Engineering

Charlotte, NC is one of the fastest growing cities in the United States. This rapid development often comes at a cost, leading to inequitable growth and environmental issues related to urban sprawl. While numerous studies have evaluated the impacts of urbanization and increased impervious area on stormwater and hydrologic function, including the socioeconomic factors influencing stormwater risk, more research is needed to better understand the intricacies of stormwater and environmental justice impacts which vary spatially and by water quality parameters. In Charlotte, sediment is a primary water pollutant of concern, evidenced by the several Mecklenburg County watersheds impaired due to elevated turbidity levels from sediment loading. These impaired watersheds coincide with multiple minoritized communities. Despite the potential risk to these communities and the environmental injustice concerns, research from a spatial and socioeconomic lens is lacking. Our project examines stormwater as a spatially oriented sector that involves both public and private entities, which often place stormwater management at the intersection of environmental and social issues. We use existing publicly available data on in-stream water quality, impervious surface cover, city parcel data, and census tract demographics to 1) identify spatial patterns of sedimentation within Charlotte, 2) determine which communities are most at-risk for ill-effects from sedimentation, and 3) assess how Charlotte's stormwater ordinances and zoning practices will impact future sedimentation in urban waterways, based on current best-management practice (BMP) investments. Our preliminary hypothesis is that more impaired sub-watersheds will have fewer BMPs and will coincide with areas of higher residents of color.

Abstract #: 322

Title: Technocratic Revolution

Student Author(s): Colin Erickson, Will Chaney, Clifton Thompson, and Timothy Praviseth **G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Science, Technology, and Engineering

In this poster our group describes and reports on the global challenge of advancement of technology. A purpose of our research project was to compare the status of our global challenge from the past to the present and how the challenges of technology have shifted. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? How is technology affecting us? Another question that guided our research was, has technology progressed too far? For this research project, we used a systems thinking methodology of past versus present to examine the global challenge of technological advancement. To answer our questions and address our purpose, our group evaluated articles and various studies which provided vast amounts of information. We discovered technology can have negative effects on society even though the purpose is to supply its users with satisfaction. Our findings are important because technology is continually progressing and being integrated more into our daily lives. The overall contribution of this research study is that it helps to prepare us as researchers to better our understanding of technology and how it can affect society.

Abstract #: 323

Title: Analyzing Soil Bacterial Communities from Different Environments

Student Author(s): Emilio Salazar Garduno and Areena Moshawi **CE, G**

Faculty Advisor: Dr. Michelle Pass and Sharon Bullock

Disciplinary Theme: Science, Technology, and Engineering

Soil microorganisms are correlated to the health of the soil, plant health, and overall growth. In this research, we will analyze the similarities and differences between two soil bacteria communities with different environmental conditions. Those samples will be collected from the University of Lagos (UNILAG), in Nigeria, and the University of North Carolina at Charlotte, in the United States. The research will provide insight into the different plant species that can grow in each area. Soil samples will be collected and characteristics such as pH, moisture, temperature, and texture will be analyzed to define the environment of optimal bacterial activity and plant growth. Then the bacteria in the samples will be isolated and characterized for classification. Culture-based and molecular-based assays were used to determine bacterial type. It is predicted that bacterial diversity will be greater in areas with higher moisture content as opposed to drier more arid areas. The study will further allow us to identify any bacteria unique to each area. This research is important because soil bacteria play a critical role in the remediation of soil pollutants within the rhizosphere (Hayat et. al., 2010). Future studies in this field can explore the overall effect soil bacteria have on ecosystems.

Abstract #: 324

PRESENTATION WITHDRAWN

Title: Identifying Mutations Within Burkholderia Multivorans Strains Using Collateral Sensitivity and Whole Genome Sequencing

Student Author(s): Kayla Skinner **G, S**

Faculty Advisor: Dr. Todd Steck

Disciplinary Theme: Science, Technology, and Engineering

Burkholderia multivorans is a bacterial pathogen that has a high natural resistance to antibiotics. In cystic fibrosis patients with chronic lung infections, the constant exposure to drugs creates an environment that leads to additional antibiotic resistance. One strategy to combat multi-drug antibiotic resistance takes advantage of a phenomenon known as collateral sensitivity. Collateral sensitivity (CS) is the acquired resistance to a treatment antibiotic (drug A) that results in a decreased resistance to an otherwise non-treatment antibiotic (drug B). By determining CS patterns for B. multivorans and examining possible mutations associated with antibiotic resistance within the bacteria, we will be able to suggest treatment regimens that are clinically feasible and sustainable for patients with a B. multivorans-related respiratory infection. The preliminary results suggest that there is an insertion/deletion mutation that may account for the switching between resistance to drug A and sensitivity to drug B. An insertion/deletion (indel) mutation occurs when a nucleotide is inserted or deleted from the bacteria's DNA sequence when exposed to drug A, causing increased or decreased resistance to drug B. We predict that this will identify a target gene that is associated with antibiotic resistance, paving the way for more effective antibiotic therapies. Increased antibiotic resistance has impacted every region of the world. Without more knowledge on the topic, antibiotic resistance will continue to spiral out of control. This research will further research worldwide regarding possible mechanisms and mutations behind antibiotic resistance in bacteria.

Abstract #: 325

Title: Biosynthesis of Non-native Campylobacter Jejuni Glycans in Escherichia Coli **H**

Student Author(s): Claire Moneghan

Faculty Advisor: Dr. Jerry Troutman

Disciplinary Theme: Science, Technology, and Engineering

Bacteria produce many biomolecules on the surface of their cell membranes that serve a wide range of functions like sensing nutrient sources, adherence to surfaces, and formation of biofilms. Many of these biomolecules are glycans that interact with host organisms. Interactions between bacterial glycans and host organisms can be beneficial (anti-inflammatory) or be harmful (causing illness). When a bacterium uses enzymes to assemble a glycan, this is called biosynthesis. It is possible to copy the genetic material from a desired bacterium's chromosomal DNA and assemble it in an engineered bacterial plasmid, called a vector. When this vector is transformed, or inserted, into a viable strain of Escherichia coli, it can be trained to produce a desired glycan. Previous work in this lab has shown that entire biosynthesis pathways can be introduced through plasmids to E. coli to produce fully assembled bacterial glycans. Using E. coli as cell factories of biomolecules bypasses many steps that would be needed to chemically synthesize them. Four vectors were designed and assembled to start a library of E. coli that produce intermediate building blocks (uridine-diphosphate and undecaprenyl-diphosphate linked sugars) to be combined to form functional glycans from the bacterial strain Campylobacter jejuni. Current work on this project is to confirm creation of each vector and troubleshoot production and harvesting of the resulting products. This fully assembled surface oligosaccharide from C. jejuni can be used to confirm enzyme activity and potential development of vaccines that would instill immunity against host-cell interactions that cause disease.

Abstract #: 326

Title: Understanding the Role of Chaperone Phosphorylation in the Activation of the Oncogenic Kinase v-Src

Student Author(s): Ashley Choi and Megan M. Mitchem

Faculty Advisor: Dr. Andrew Truman

Disciplinary Theme: Science, Technology, and Engineering

The v-Src kinase is encoded by Rous Sarcoma Virus (RSV) and causes cancer by promoting uncontrolled cell division. Previous studies determined that the Hsp70 and Hsp90 molecular chaperones are key for the folding and activity of V-Src. Although substantial research has gone into identifying inhibitors of chaperones to treat cancer, these have failed in clinical trials due to patient toxicity. Our lab has been a main proponent of the idea of the “Chaperone Code”, that chaperone activity can be fine-tuned through post-translational modifications such as phosphorylation. In this study, we set out to determine if phosphorylation of Hsp70 was important for v-Src activity. To achieve this goal, we used the model organism budding yeast, in which expression of v-Src protein is toxic and results in cell death. We inducibly expressed v-Src in yeast containing mutations in 73 Hsp70 phosphorylation sites to either non-phosphorylatable or constitutively phosphorylated forms (146 mutants total). In contrast to wild-type yeast, we identified over 40 phosphorylation site mutants in Hsp70 that allowed yeast to grow in the presence of v-Src. We are currently mapping these mutations to the structure of Hsp70 to determine regions of the chaperone responsible for v-Src activity. Going forward, we will determine the molecular cause for immunity to v-Src toxicity in both yeast and mammalian cells. Although still in the early stages, our data suggest that manipulation of chaperone phosphorylation may provide a novel anticancer strategy.

Abstract #: 327

Title: The Development of Enzyme Derived Urea and Creatinine Biosensors

Student Author(s): Shirish Yasa **G, S**

Faculty Advisor: Dr. Jun Wang

Disciplinary Theme: Science, Technology, and Engineering

Determination of urea and creatinine in whole blood and saliva is of great importance for the assessment of renal function. Herein, a point-of-care enzymatic biosensor for the quantification of urea will be introduced for disease diagnosis and to track the efficacy of treatment options. The most common quantitative method for urea utilizes spectrometry, which is costly, laborious, and requires trained personnel, excluding its measurement in developing countries. The developed biosensor provides a rapid, convenient, low-cost, sensitive, and selective means to quantitatively assess urea levels in whole blood and saliva. This biosensor functions via a gold-plated interdigitated electrode coated with a transducing carbon nanotubes and polyaniline nanofibers (CNT/PAnNF) film. The enzymatic reaction between urease and urea yields ammonia which then deprotonates the polyaniline, resulting in a decrease in conductance which can be correlated to urea concentration in a sample. Biosensor measurements can be affected by film thickness, nanocomposite composition, protective membrane types, protective membrane thickness, and enzyme activity. Optimization of the CNT/PAnNF film thickness was performed by examining the change in resistance with solutions of pH 7 through 9. Optimization of biosensor components was done and ideal film thickness and enzyme concentration were found.

Abstract #: 328

Title: Gender Disparities within STEM

Student Author(s): Zaneta Yanzu **H**

Faculty Advisor: Dr. Melinda Adnot

Disciplinary Theme: Social Sciences

University undergraduate programs present students with a variety of majors to choose from; however, there seems to be a split in the female to male ratio depending on which major is chosen. For example, nursing is considered to be a female dominated major or career-with males being the minority. In majors or careers such as engineering or computer science, however, female students are classified as the minority. This research will focus on determining if there is a disparity between computer science, engineering, and nursing majors (ie STEM majors) from a gendered perspective. Implications of this literature review may be specific to recommendations that could be implemented in the University of North Carolina at Charlotte policy or to other universities. If there is a disparity in these specific STEM majors, this article will also assess if this is a social, cultural, or individual issue or preference. Reeves (2022) provides background on his son who was astonished that males could be physicians or even nurses; and also mentions how some jobs or careers can often be associated with a specific sex. Additionally, although not correlated with the STEM field, Reeves (2022) also mentions that his son sees more female teachers in contrast to male teachers. The source mentioned above will be used as an additional perspective for assessing if there are gender disparities within STEM; and it will be viewed from an undergraduate level.

Abstract #: 329

Title: Investigating and Comparing Sustainable Development Goal #6 in Germany and the United States

Student Author(s): Trever Farkas*, Victor Sandoval*, Carson Skopelitis*, Sultan Basar**, and Sonja Eberhardt**** G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The research purpose is to investigate and compare aspects of the Sustainable Development Goal (SDG) #6: Clean Water and Sanitation. The goal is to ensure access to safe water sources and sanitation for all. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #6: Clean Water and Sanitation? What are the differences? Are the countries on track to make progress on SDG #6 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #6: Clean Water and Sanitation, which should ensure availability and sustainable management of safe water sources and sanitation for all by the 2030 goal year.

Abstract #: 330

Title: Investigating and Comparing Sustainable Development Goal # 2: Zero Hunger

Student Author(s): AnaCarolyna Harris*, Kayla Barbee*, Maria Borrowman*, Gabriella Crentsil*, Margarita Bublik**, and Kira Boshart** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

Our research investigates and compares aspects of the Sustainable Development Goal (SDG) #2: Zero Hunger, where the goal is to “end hunger, achieve food security and improve nutrition and promote sustainable agriculture”. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #2: Zero Hunger?” What are the differences? Are the countries on track to make progress on SDG #2: Zero Hunger, where the goal is to “end hunger, achieve food security and improve nutrition and promote sustainable agriculture” by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday’s (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG #2: Zero Hunger by the 2030 goal year.

Abstract #: 331

Title: Investigating and Comparing Sustainable Development Goal # (7) in Germany and the United States

Student Author(s): Sean Simms*, Neil Huntley*, Esther Woitanowski**, and Lena Peuser** **G**

Faculty Advisor(s): Dr. Erik Jon Byker* and Dr. Benjamin Ade-Thurow**

Communication Consultant: Mahita Sadula

Affiliations: UNC Charlotte* and PH Ludwigsburg, Germany **

Disciplinary Theme: Social Sciences

The purpose of our research is to investigate and compare aspects of the Sustainable Development Goal (SDG) #7: Affordable and Clean Energy. Our SDG (#7) and its description is to ensure access to affordable, reliable, and sustainable energy for all. The main research questions for our international comparative study are: What are the similarities among Germany and the United States related to target goals for Sustainable Development Goal #7l? What are the differences? Are the countries on track to make progress on SDG # 7 by the 2030 goal year? To conduct this research, we wrote an annotated references document and used a literature review research design to develop an Executive Summary of our findings. The literature review included international reports and the method was framed by Bereday's (1964) Comparative Model. The research was part of a semester-long Global Networked Learning (GNL) research collaboration among students at UNC Charlotte with and students at the PH Ludwigsburg in Germany. A GNL project is a collaborative approach to learning that enables students and instructors from different locations around the world to participate in learning and creation of knowledge together. GNL allows for access to international experiences for all students. In our research, we report the comparative findings of our GNL project. The research includes an examination and discussion of the challenges and possibilities in meeting selected target goals of SDG (#7) in order to ensure access to affordable, reliable, and sustainable energy for all by the 2030 goal year.

Abstract #: 332

Title: Trust, Commitment, and Responses to Partner Transgressions in Close Relationships

Student Author(s): Kryschelle Fakir, Thao Nguyen, and Daniel Jackson **H**

Faculty Advisor: Dr. Amy Canevello

Disciplinary Theme: Social Sciences

In general, relationships are good for people, but even in the closest relationships, partners can do things that are hurtful. Are there properties of relationships that might protect people from responding to partners' transgressions by retaliating against or avoiding partners? We argue that relationship trust and commitment may mitigate retaliation and avoidance following transgressions because they promote forgiveness. That is, when trust is high, people may be more likely to forgive partners because they believe that their partners ultimately have their best interests in mind. Further, people may be more likely to forgive partners when they want their relationships to last over the long-term (i.e., high commitment). In turn, forgiving partner transgressions should reduce people's desires to hurt and avoid their partners. In this study, both individuals from 62 romantic couples completed measures of trust and commitment. Two days later, they described a recent transgression by their partner and completed measures of forgiveness, retaliation, and avoidance following the event. Results from mixed models suggest that trust was related to greater forgiveness following the transgression; unexpectedly, relationship commitment was unrelated to forgiveness. In turn, forgiveness predicted less retaliation and avoidance of partners. These results support our assertion that trust may lead to forgiveness, which alleviates desires to retaliate and avoid partners, while also suggesting that the feeling of wanting the relationships to last long term is not associated with forgiving of partners' transgressions.

Abstract #: 333

Title: Conflict and Its Control

Student Author(s): Archana Annadurai, Megan Bullis, Summer Dallaire, and Ethan Howard **CE, G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of conflict and control. A purpose of our research project was to compare the status of our global challenge from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? What forms of conflict and control are there? Another question that guided our research was how do we deal with conflict and control issues today vs twenty years ago? For this research project, we used a perspective that examined governments and organizations and how they take advantage of conflict for personal gain of resources or political power. To answer our questions and address our purpose, our group researched our topic using scholarly peer reviewed articles. We discovered that conflict and control is a global issue and runs deeper than what we know. Our findings are important because it's important that we understand conflicts happening between the U.S. and the world. The overall contribution of this research study is that it helps to prepare us as researchers to be able to identify the issues going on in our world and what they mean.

Abstract #: 334

Title: Global Belief Systems

Student Author(s): Ojonugwa Kadiri, Rose Diagne, and Qeesha Jones **G**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster, our group describes and reports on the global challenge of misunderstanding major world belief systems and how lack of knowledge about belief systems leads to misunderstanding among people of different beliefs. The purpose of our research project was to compare the understanding of global beliefs from the past to our current day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? Another question that guided our research was: Why is there a strain in connecting with people outside of different religions? For this research project, we used a system thinking methodology of interconnections to compare and contrast the global challenge of global belief systems. To answer our questions and address our purpose, the group decided to break up into three smaller groups. Each teammate researched the top three beliefs systems - Islam, Christianity, and Atheism. We discovered that there are multiple subsections to all religions and that most people are inclined to think their religion is the correct one. Our findings are important because they highlight the main reason why there is misunderstanding among people with regards to belief systems. The overall contribution of this research study is that it helps to prepare us as researchers to be more aware of our biases and how to connect with others even with different belief systems.

Abstract #: 335

Title: What is Hindering Africa's development

Student Author(s): Aiden Price **G, S**

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster our group describes and reports on the global challenge of why continental Africa is behind in development when considering the rest of the world. The purpose of our research project was to compare the status of our global challenge/issue/problem economic systems from the past to our current-day. Some questions that guided our research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? The purpose we identified was that Africa is behind in development technologically, and economically. Another question that guided our research was the reason for why Africa as a continent has still not developed as well as first world countries despite having plenty of resources. For this research project, we used a systems thinking methodology of economics and technology approach. We used a broad perspective of Africa in order to examine Africa's underdevelopment. To answer our questions, our group went on our own different research paths and sources to answer a number of different concepts about our topic. We discovered Africa face's many factors that have hindered its development. Our findings are important because it explains why Africa is behind globally. The overall contribution of this research study is that it helps to prepare us as researchers to get a better understanding of how the world works.

Abstract #: 336

Title: Population Growth: Why Overpopulation Is a Problem and How It Will Affect Our Future

Student Author(s): Kris Vanamali

Faculty Advisor: Dr. Adriana Medina

Disciplinary Theme: Social Sciences

In this poster, I described and reported on the global challenge of population growth and how overpopulation will affect our future. The purpose of my research project was to compare the status of my global challenge/issue/problem, the increase of population rate, from the past to our current-day. Some questions that guided my research were: Are the issues the same then as they are now? Have any issues been solved? Who benefits from these issues? Who is disenfranchised by them? For this research project, I used a perspective of examining the previous questions asked based on academic resources to examine the global challenge of overpopulation. To answer my questions and address my purpose, I looked at the sources previously stated from websites and books with credibility to deduct our research. This includes Harvard and the United Nations for my data to be accurate. I discovered that although overpopulation is decaying, there is still a lot of work that needs to be done in order to continue reducing population growth. My findings are important because if the population keeps increasing rapidly, then our resources will be depleted and future generations will not be sustained. The overall contribution of this research study is that it helps to prepare myself for a sustainable future by controlling overpopulation and reducing the depletion of resources.

Abstract #: 337

MOVED TO ORAL PRESENTATION

Title: Food Insecurity and Health in Mecklenburg County during Covid-19 Pandemic

Student Author(s): Mariam Jaliawala **CE, H, NC, U**

Faculty Advisor: Dr. Nicole Peterson

Disciplinary Theme: Social Sciences

Food insecurity has been linked to various health problems due to the lack of access to affordable nutritious food. The Charlotte-Mecklenburg Food Policy Council aims to understand how food security has been affected by the pandemic. The purpose of this research is to understand the root problems of food insecurity, the perspectives of the Charlotte residents, the toll the pandemic has had on marginalized population and the approaches used to overcome these obstacles. To understand the local challenges, a team of UNC Charlotte researchers worked with the Charlotte-Mecklenburg Food Policy Council and other food organizations around the area to document how households are responding to the pandemic, and as a way to better understand the root problems of food insecurity. To approach this project, we generated a survey in collaboration with multiple organizations and with Charlotte Mecklenburg Food Policy Council to assess residents above the age of 18 living in Mecklenburg County. The survey included questions such as “Are there times where you or your family did not have access to nutritional and safe foods?” We found that food insecurity is associated with increased risk of chronic illnesses. The responses were analyzed for geographical food insecurity trends and parameters involved in food scarcity and inaccessibility. Data collected will improve our understanding of the communities around Charlotte and provide insight into their eating habits, access to healthcare, housing and transportation. We expect this research will help lead to efforts to improve the health of Charlotte’s citizens and strengthen the local economies.

Abstract #: 338

Title: Lacking in Learning- How Educational Inequality and Lack of Safety Affects Children in Syria and Nigeria

Student Author(s): Emma Huffman, Jenna Zuraiki, Jira Thepamnuay, and Vivian Barnes **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Disciplinary Theme: Social Sciences

A child lacking education is a child lacking a future. Ensuring quality education for all is one of the sustainable development goals adopted by the United Nations. In the case of Syria and Nigeria, educational resources are limited or even withheld from children who are married off or sent into the labor force at an early age. In both countries, we ask: how do inequality and political conflict affect access to quality, safe education? What is being done to address these problems? In this project, we examine how Nigeria's educational system came to be characterized by unequal access, underfunding, and lack of safety for pupils. In the case of Syria, we focus on how the long-standing civil has affected both physical educational centers and the workforce supporting education. In Nigeria, the UN is making an effort to provide international scholarships and various resources for children to access education in a country where the government has put schooling low on its list of national priorities. In Syria, there are various non-governmental organizations (NGOs) building schools that children can travel to safely without the threat of violence. We compare the key educational challenges and solutions in Nigeria and Syria, the main responses to their respective crises, and examine how well the solutions are working in making quality education more available in the two countries. Our results aim to display how quality education is possible in all circumstances.

UNC CHARLOTTE

UNDERGRADUATE RESEARCH CONFERENCE