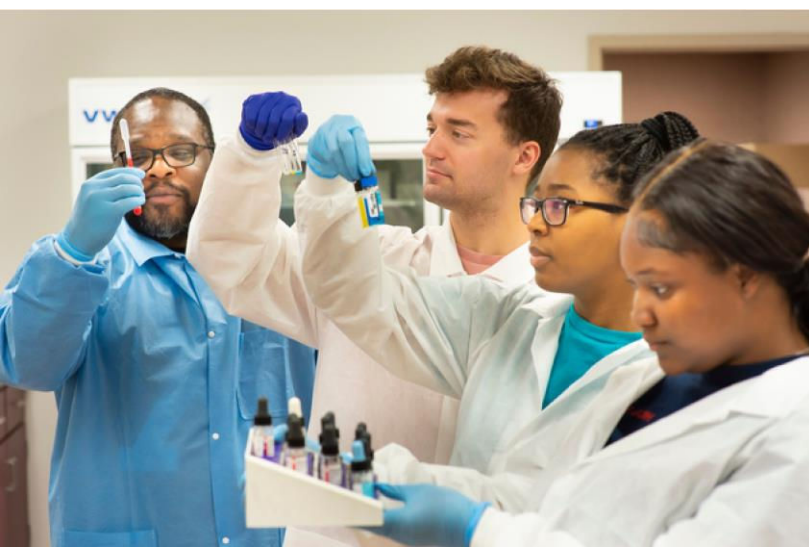# AUM
EXPERIENTIAL EDUCATION AND ENGAGEMENT CENTER

Celebration of Research and Creative Activity

April 28, 2023

Message from the Provost

The Office of the Provost has strong goals for AUM in the area of research and creative activity, both for its faculty and its students. One overarching goal of AUM's strategic plan is to "Enhance a culture/community of scholars whose research and creative activity support teaching and program quality." To help achieve this goal, AUM provides enhanced pre-grant and post-grant support. Part of this support is coming from AUM's Sponsored Programs Administration Development (SPAD) National Institute for Health (NIH) grant--AUM's first ever NIH award. We have hired a new Director of Sponsored Programs and Research, three Research Administrators, and one post-award accountant, with some of these positions partially supported through the NIH SPAD grant. In the time since the creation of AUM's new Office of Sponsored Programs and Research, we have seen a huge increase in both the number of grants submitted and the number of grants awarded, with more on the horizon. In Spring 2022, in connection with the NIH SPAD grant, AUM consulted with Dr. Lori McMahon, Vice President of Research at The Medical University of South Carolina, who provided a half-day workshop to AUM faculty and staff on research in all its facets. She returned in Spring 2023 as part of the Office of the Provost's Celebration of Research Day to give another workshop to our faculty and staff, which served as a continuation of her first visit. The Research Day event also brought to campus Dr. Sydella Blatch, NIH Program Director, who was able to speak to students, faculty, and staff about programs of interest at the NIH and how AUM could go about seeking external funding through these programs. The event also allowed for over 30 students to present their research to faculty and staff at a poster session and also to be recognized by the administration for their efforts in research.

Additionally, in support of the research-related strategic plan goal, AUM has increased its support of both faculty and student research from a monetary standpoint. Our internal Grants-in-Aid program now has a total of $75,000 a year in funds to disperse to faculty scholars in addition to the $1,000 each faculty member can spend towards approved research expenditures each year. AUM is committed to enhancing faculty-led student research opportunities by integrating research in its curricula and offering financial support to its students. A total of $50,000 is now available annually to the Graduate Student Research Advisory Committee for research projects involving graduate students. Likewise, a total of $50,000 is also available to the Undergraduate Research Council Committee for research projects involving undergraduate students. These opportunities for faculty will stimulate research, involve more students in faculty research, and enable students and faculty to share their research at regional and national conferences and symposia. Overall, it is hoped that our initiatives to support research will enhance the quality of teaching and learning at AUM.

I would like to take congratulate you on your participation in the Undergraduate Research Symposium. Thank you for your valuable contributions towards our research goals.

Go Warhawks!
Mrinal M. Varma, Ph.D.

A Message from the Experiential Education and Engagement Center

Thank you for participating in and attending the 3rd Annual Celebration of Research and Creative Activity. This event is made possible thanks to the vision, dedication, and support of Provost and Senior Vice Chancellor Dr. Mrinal Varma. Faculty and students have worked diligently to demonstrate what they have learned and discovered through the process of participating in research and creative activity.

The Experiential Education and Engagement Center seeks to increase student engagement in high-impact learning experiences that allow them to apply the knowledge that they learned in and out of the classroom. Our mission is to increase student retention, persistence, and graduation rates through early engagement and connecting students to campus and community through high-impact practices including research, creative activity, peer mentoring, service learning, and internships.

Event Program: A digital copy of today's program may also be accessed via the QR code below.

Event Survey: So that we can continue to grow and improve this annual event, we ask you to scan the QR code below and fill out a survey to provide feedback after you've attended today's event.

AUM

EXPERIENTIAL EDUCATION AND ENGAGEMENT CENTER

Celebration of Research and Creative Activity
Friday, April 28, 2023
11:00 a.m. – 2:00 p.m.
230 Taylor Center and 205B Goodwyn Hall

Schedule

11:00 a.m.   Poster Presentations (Taylor Center & Goodwyn Hall)

11:30 a.m.   Lunch (Taylor Center)

12:00 p.m.   Welcome: Dr. Mrinal Varma, Provost and Senior Vice Chancellor

Introductions: Amy Ingram, Director, Experiential Education and Engagement Center

12:15 p.m.   Faculty Speaker: Dr. Ann Marie O'Neill, Associate Professor, Department of Biology and Environmental Science

12:45 p.m.   Alumnus Speaker: Omar Brito-Estrada, Ph.D. Candidate at Cincinnati Children's Hospital/University of Cincinnati

1:15 p.m.   MIS Competition Recognitions: Dr. Jim Locke, Department Chair and Assistant Professor, Department of Management Information Systems and Artificial Intelligence Research Laboratory

COS Research Winners: Dr. Greg Ciesielski, Associate Professor, Department of Chemistry

1:30 p.m.   Poster Presentations (Taylor Center & Goodwyn Hall)

Trauma-Informed Supervision: Strengthening the Supervisory Relationship by Creating Collaborative Environments for Employers

Presenter(s):
Laura Barris, Amber Johnson, Jada Pugh, and Amber Watson (Social Work)

Faculty Mentor(s):
Dr. Amber Sutton and Gina Allen

Research has indicated that almost 70% of adults in the U.S. have experienced a traumatic event in their lifetime, while an estimated 85% of social workers have experienced a personal trauma (National Council for Behavioral Health, n.d., LaRowe, 2007 & Armes et al., 2020). Studies have revealed alarming trends for social workers including having higher Adverse Childhood Experience scores (ACEs) and being twice as likely to have PTSD when compared to the general population (Bride, 2007 & Steen et al., 2020). While the potential exists for social workers to experience occupational hazards related to traumatic and work-related stress, there are ways to reduce the detrimental effects.

Given the high likelihood of social workers experiencing trauma at some point, trauma-informed supervision (TIS), is a tool that can strengthen the supervisory relationship by offering providers additional support and creating more collaborative environments for employees. Trauma-informed supervision calls us to challenge the dominant supervision models within agencies and organizations. TIS can help supervisors to better understand the people we are supporting and is a useful tool to incorporate into practice, particularly as we work across multiple generations and experiences By viewing the supervisor role through a social justice lens, we can learn to honor the context of intersectional identities and the positionalities of the supervisors and the supervisees, further ensuring teams are responsive to clients' needs.

TIS ultimately enhances social workers' practice by reducing the likelihood of burnout, negative staff attitudes, and isolation. Trauma-informed supervision encourages the modeling of healthy relationships between supervisors and supervisees that can have positive effects on the clients, families, and communities we serve.
*Presented at the Alabama Conference of Social Workers, February 2023

Established Beliefs in Trauma

Presenter(s):
Nicole Bloch, Chloe A. Miller-Rhodes, and Timishiyee Walker (Counseling Education)

Faculty Mentor(s):
Dr. Yuh-Jen Guo

Traumatic experience often causes lasting psychological impacts. Individuals with traumatic experiences may develop severe symptoms that meet the diagnostic criteria of Posttraumatic Stress Disorder (PTSD). Currently, the treatment model of Eye Movement Desensitization and Reprocessing (EMDR) has been empirically studied and supported as an effective trauma treatment process. EMDR theorizes that information processing after trauma serves as a critical factor in posttraumatic symptoms. Beliefs generated through information processing remain in daily operation of cognitive functioning, and the negative beliefs transcend through time and space to influence one's normal development and functioning. Literature indicates that traumatized victims hold these negative beliefs long after traumatic events ended. Studying the beliefs established in traumatic events may collect critical information for enhancing trauma treatment. This research is interested in exploring the established beliefs resulting from a traumatic experience. A survey is composed to guide participants in identifying their established beliefs and rating the influences of these beliefs. The outcomes of this study are expected to inform clinicians and researchers regarding information processing and established beliefs and their roles in trauma treatment.

**Increasing Availability of Evidence-Based Information
on Sexual Health and Condom Access Within a University Health Clinic**

Presenter(s):   *Faculty Mentor(s):*
Dawneese Bowen   *Dr. Julie Freeman*
(Nursing)

Numerous colleges and universities provide health clinics offering various services, promoting healthy sexual behavior, sexually transmitted infections (STI) screening, and free condoms for students. In a southeastern university health clinic, students experienced obstacles to accessing sexual health information and free condoms within the clinic outside normal clinic hours. This project focused on removing barriers by placing condoms in more campus locations and providing easy access to evidence-based sexual health information to reduce the rate of STIs.

Over a three-month period, in addition to the waiting room containers, seven easily accessible containers filled with condoms were placed in four clinic exam rooms and restroom and male and female restrooms outside the clinic. Containers were monitored and replenished weekly. The number of students screened and testing positive for a sexually transmitted infection between 2021 and 2022 were compared. The clinic's website was updated to include evidence-based sexual health information and visits to the website were tracked. Quantitative data were collected and analyzed. Condom removal from all private clinic area containers was substantially greater compared to the clinic waiting room containers. Condoms outside the clinic had the greatest number of removals compared to all the containers inside the clinic, with more removed from the male restroom than female restroom. There was a 4.8% decrease in the rate of STIs during the implementation period from the prior year. Overall, results indicated that the removal of barriers to condom access was successful. This project has implications for expansion campus-wide.

The Shady Street Trailhead and Park

Presenter(s):   *Faculty Mentor(s):*
JaQuan Brown and Cameron Kincey   *Breuna Baine*
(Graphic Design)

The Shady Street Trailhead and Park is a riverfront trail from half a mile to the north to a new trailhead and park near the Montgomery Marina on the Alabama River. Our challenge is to get people there from downtown with a wayfinding system. The main target is the general public: people like runners, bike riders, and parents with children. Our environmental signage is family-friendly, with a color-coded wayfinding map. Each major location is marked by an icon and each icon correlates with the characteristics of the area. For example, the Osprey tower is represented by an illustration of an Osprey. Every characteristic of the map is illustrated in a 2D fashion. Next to the map are representations of wayfinding signposts, which also include illustrative icons that represent the location in which the arrow is pointing. The sign boards on the left side represent the wayfinding posts that will be displayed at the Pavilion. The front side includes a miniature-sized map of the park and fun facts about Shady Street's origin and landmarks. This group was also in charge of illustrating a postcard for the people at the visitor center. The front of the card is a collage of what Shady Street entails. It also includes illustrations of trains that pass through Montgomery, an illustration of an Osprey, the river, etc. On the back of the postcard is a QR code. Visitors would be able to scan the code using their mobile device and it will transport them to google maps in order to locate Shady Street Park.

**Do Group Use of Contingencies and Positive Behavior Supports
Curb Attention Deficit Disorder (ADHD)? A Look at the Data**

Presenter(s):
Chloe' Burwell
(Special Education)

Faculty Mentor(s):
Dr. Sara Bicard and Dr. Kate Simmons

Many teachers have stated concerns regarding classroom management due to the amount of chain reaction off-task behaviors. A disorder that is seen to be on the rise for school-age children is ADHD or attention deficit hyperactivity disorder. In the general education class, students who may have ADHD or have an Individualized Educational Plan (IEP) for off-task behavior may cause a distraction to the remainder of the class during instructional time or group activities. Many teachers are now wondering what the best way is to redirect students; while also keeping the remainder of the class focused on the task at hand.

The Impact of Recognition Memory Instructions on Eyewitness Lineup Choices

Presenter(s):
Jordan Cargile and Elizabeth Buchli
(Psychology)

Faculty Mentor(s):
Dr. Rolando N. Carol and Dr. Jessica
Stagner Bodily

An extensive body of research on eyewitness decision-making shows that witnesses who choose quickly are more likely to be accurate than witnesses who spend more time choosing. A rapid lineup choice is likely the product of witnesses having a recognition experience, that is, a quick, "pop out" effect when the witness sees the familiar face, (i.e., the perpetrator of the crime). Additionally, the instructions that witnesses receive before a lineup task can impact their accuracy, by increasing the likelihood of choosing an innocent suspect, for instance. The present study investigated the potential impact of a novel lineup instruction on mock witnesses' lineup choices; specifically, an instruction that teaches witnesses about evidence-based indicators of eyewitness accuracy like decision speed and experiencing a "pop out" effect. Participants (N= 450) viewed a mock crime video, and were then randomly assigned to one of the following three instruction groups: (1) Instructions that educate them about eyewitness recognition memory, (called "Recognition instruction group") (2) "Take as much time as you need to look at each photograph", and (3) a control group, who received no additional instructions. Next, participants were presented with a simultaneous photo lineup, which was either target-present or target-absent. Then, participants answered various questions about their lineup decision and confidence. Our primary hypothesis was not supported as participants in the recognition instructions group were not more likely than the other groups to reject a target-absent lineup. However, we did find that participants who received the recognition instructions were significantly more likely to report having a "pop-out" experience than participants in the other groups. Additionally, participants who reported having a "pop-out" recognition experience were significantly more likely to be accurate in their choices than those who did not report the same experience. Further, and consistent with prior research, higher confidence was a significant predictor of accuracy for those who viewed a target-present lineup; that is, witnesses who were more confident in their choice were more likely to be accurate than those who were less confident in their choices. Lastly, faster identifications were significantly more likely to be accurate than slower identifications.

Physical Activity Guidelines for Very Young Children from Birth to Age 5

Presenter(s):   *Faculty Mentor(s):*
Kylee Christianson and Amana Diab   *Dr. Angela Russell*
(Kinesiology)

The purpose of this review study was to examine the literature to determine the physical activity needs and guidelines of very young children from birth to age 5. It was hypothesized that although there might be less information available for children this young compared to children of other ages, there would be sufficient evidence available to support guidelines for engaging the youngest children in physical activity. Methods: A search of the literature was conducted using pubmed.gov and the following terms and phrases were entered into the search function: "infant physical activity guidelines," "toddler physical activity guidelines," "preschool physical activity guidelines," "physical activity in very young children," "physical development of young children" and "infant and toddler physical development." Resources from SHAPE America were also consulted. Results: Sixty-seven research articles from pubmed.gov provided information determined to be relevant to the review. SHAPE America provided additional relevant information and links to additional relevant organizations. Sufficient evidence was obtained to support both general physical activity guidelines for very young children as well as specific guidelines for three distinct developmental phases: infancy, toddlerhood, and preschool. Ample opportunities for both structured and unstructured movement experiences with an emphasis on play should be provided to young children daily in short sessions, with intensity largely determined by the children themselves. Conclusions: The traditional model (FITT) of exercise prescription for older children and adults appears to be inappropriate for this age group. Instead, the promotion of physical activity in very young children should emphasize play and encourage children's innate desire to move and explore the world around them.

Talking at Parties: Bureaucratic Language in Response to Party Control Changes

Presenter(s):   *Faculty Mentor(s):*
Bobby Crawford   *Dr. Tracey Bark*
(Political Science)

Recent scholarship has considered the strategic actions taken by bureaucrats in response to the political environment (Boushey and McGrath 2020; Potter 2019). However, this literature has focused primarily on tangible actions such as the issuance of regulations. In this paper, we examine a much more subtle type of bureaucratic response—tone shifts in annual reporting. Specifically, we use sentiment analysis to gauge adjustments to bureaucratic language after a change in party control of government. The sample includes the text of reports from higher education agencies in five states over an extended period, enabling an assessment of language used in relation to 30 substantive topics in higher education policy. We argue that bureaucrats modify the framing of policy issues in order to appeal to the perspective of the party in power. The results further the notion that bureaucratic actors are acutely aware of and reactive to their political surroundings in a variety of ways, adding to the emerging literature about bureaucrats as strategic actors. Furthermore, the findings broaden our understanding of bureaucratic politics by including a relatively unexamined institutional tool and by investigating agency actions at the state level.

A Transformer-based Language Model for Sentiment Classification
for Low-Resource African Languages: Nigerian Pidgin and Yoruba

Presenter(s):
Tharalillah Dauda, Nathaniel Hughes, Aditya Singh,
and Aryavardhan Singh
(Computer Science)

Faculty Mentor(s):
Sutanu Bhattacharya

Sentiment Analysis is an aspect of natural language processing (NLP) that has been a topic of research. While most studies focus on high-resource languages with an extensive amount of available data, the study on low-resource languages with insufficient data needs attention. To address this issue, we propose a transformer-based method for sentiment analysis for low resources in African languages, Nigerian Pidgin, and Yoruba. To evaluate the effectiveness of our multilingual language models for monolingual sentiment classification, we participated in the AfriSenti SemEval shared task 2023 competition. On the official evaluation set, our group (named as Bhattacharya_Lab) ranked 1 out of 33 participating groups in the Monolingual Sentiment Classification task (i.e., Task A) for Nigerian Pidgin (i.e., Track 4), and in the Top 5 among 33 participating groups in the Monolingual Sentiment Classification task for Yoruba (i.e., Track 2) respectively, demonstrating the potential for our transformer-based language models to improve sentiment analysis in low-resource languages. Overall, our study highlights the importance of exploring the potential of NLP in low-resource languages and the impact of transformer-based multilingual language models in sentiment analysis for the low-resource African languages, Nigerian Pidgin and Yoruba.

Comparison of Peak Force During the North-South Elbow
and Hammer Fist Strikes in Different Positions

Presenter(s):
Amana Diab and Kylee Christianson (Kinesiology)

Faculty Mentor(s):
Dr. Angela Russell

According to the current Unified Rules and Regulations of mixed martial arts (MMA), the North-South Elbow (NSE) is a foul and can result in penalties as it has been deemed too dangerous for competition. To date, however, no research has investigated the possible differences in force between the NSE and other legal strikes. PURPOSE: The purpose of this study was to determine if there are differences in peak force production between the NSE and the hammer fist (HF) strikes when performed in the full mount and side control positions. METHODS: Twenty men (age 27.7 ± 11.5 years) participated in the study and completed one visit to the lab. Height (1.76 ± 0.15 m) and weight (75.7 ± 5.9 kg) were measured along with body fat percentage (15.2 ± 3.25 percent), which was assessed using air displacement plethysmography. Subjects then struck a padded force plate (Vernier) using the NSE and HF in the full mount and side control positions while wearing regulation-compliant gloves. Strike and position order was randomized for each subject. A five-foot-long body pillow was used to simulate a person, and the force plate was placed at the location of the head. A one-way analysis of variance was performed to determine if there were differences in peak force between the NSE and HF strikes in the full mount position and in the side control position. RESULTS: There was no difference in peak force between the NSE (2667.15 ± 1006.20 N) and the HF (2971.15 ± 629.63 N) in the full mount position ($F = 1.312$, $p = .259$). However, the peak force was higher during the HF (2974.70 ± 618.12 N) compared to the NSE (2322.75 ± 828.21 N) in the side control position ($F = 5.705$, $p < .022$), and the effect size was medium to large ($\eta^2 = 0.13$). CONCLUSIONS: The peak force generated during a legal strike (HF) and an illegal strike (NSE) was different in the side control position, with individuals striking with more force during the legal strike. PRACTICAL APPLICATIONS: Practitioners should take into consideration that although strikes such as the NSE

may be illegal, other legal strikes may generate greater force, at least in certain positions. However, strike technique during an actual fight, positioning of the head (against the ground vs. in the air), the surface area of the striking body part, and the part of the body struck must also be taken into account when determining the safety of a strike in MMA.

Policies to Reduce Gender Discrimination in the Workplace

Presenter(s):
Daesha Eddins (Human Resource)

Faculty Mentor(s):
Dr. Christine Harrington

This study explores whether gender discrimination exists in the workplace, the consequences of discriminating against a particular gender, and policies that firms can put in place to promote gender equality. Prior research finds that gender discrimination harms women in terms of respect and economic well-being. Policies that incentivize men to be allies for gender equality may reduce these negative workplace outcomes for women.

The Effect of a Token Economy on In-Class Participation Among College Students

Presenter(s):
Christopher Alex Ennis (Psychology)

Faculty Mentor(s):
Dr. Jessica Stagner Bodily

Reinforcement theory states that the use of reinforcement following a behavior will increase the likelihood of that behavior occurring in the future. Positive reinforcement and token economies, or a reinforcement system in which the learner earns tokens that can be traded in for desired reinforcers, are commonly used in educational settings to shape and maintain positive classroom behaviors. By the time students reach college, the type of reinforcement used by instructors is likely to be both qualitatively and quantitatively different than what students may have experienced early in their education. The current pilot study employed an ABAB design to examine the effect of a token economy on classroom participation. Undergraduate students enrolled in a college course at AUM were recruited as participants and were given a data sheet each day that instructed them to mark the sheet each time they participated. During "A" phases, participation was recorded. During "B" phases, participation was recorded, and participants could exchange three marks for a reward. Reward options included candy, school supplies, and various "play items". Student participation during each phase will be discussed and considerations for a future study to be conducted in the Fall of 2023 will be proposed

Preliminary Effects of Naturalistic Teaching Strategies During Repeated Readings
of a Storybook on the Expressive Language of Preschool Children with Language Delays

Presenter(s):
Kipp Griggs (Special Education)

Faculty Mentor(s):
Dr. Sara Bicard and Dr. Kate Simmons

Students who have more language as preschoolers have better language comprehension when in third and fourth grades (Hagan, 2018). Therefore, it is critical to provide early intervention in all aspects of the child's life to improve communication skills (Towson et al., 2021). A single-case multiple baseline across subjects design was used to determine if naturalistic teaching strategies within a shared storybook routine (Bradley, 2000) would impact expressive language skills of young children with language delays in a rural setting. The participants were four young children with developmental delays who ranged in ages from 4- to 6-year-old. Each attended a rural elementary school. The

dependent variables were Point to and Identify objects in the book (e.g., Ball), a descriptive word (e.g., red ball), and target behavior three: point to and identify objects in the book with a verb (subject + verb) ball bounce.The experimental conditions consisted of a baseline, intervention, and post-intervention condition. During the baseline and post- intervention phases, the experimenter read one page of the book and respond to the child's comments by pausing, commenting, and asking probed questions. If the child did not comment, the experimenter would continue to read. During the intervention phase, if the child did not comment, the experimenter would use techniques that include prod modeling, expansion, praise, time delay, and repeated readings of the book. The intervention phase took place during the first ten pages of the storybook session. The remaining five pages of the storybook made up post-intervention. During post-intervention, experimenter behaviors returned to that of the baseline condition. All participants increased their use of the target language behaviors.

AUM Long-Term Ecological Research Experiment (LTERE) to study Reptile and Amphibian Diversity in AUM's Urban forest

Presenter(s):
Courtney Hamrick (Biology and Chemistry)
Ryan McMichael (Biology)

Faculty Mentor(s):
Dr. M. Florencia Breitman and Dr. Justin C. Bagley

Alabama has a rich and diverse herpetofauna with ~166 species and the highest diversity in the Southeastern Coastal Plain (SCP) biodiversity 'hotspot'. Many of these species are now threatened or endangered because of the impacts of urbanization and other human activities. Auburn University in Montgomery (AUM) is located in the city of Montgomery and has a ~250-acre secondary urban forest. Urban forests have emerged as habitats that can balance the negative effect of urbanization on diversity, and reptiles and amphibians are considered model organisms for studying ecological and evolutionary patterns, including ecosystem health and function in natural and urban areas. Here, we set out to understand the community composition of the AUM forest herpetofauna, as well as its genetic diversity under different management treatments (invasive species removal, prescribed burns, prairie habitat, and control). In this presentation, we will give the first update on construction of the Long-Term Ecological Research Experiment (LTERE) studying herp diversity in the AUM forest using pit-fall trap surveys. So far, we have installed 9 traps in the forest and started preliminary surveys of the pitfall traps. Specimens are identified, measured, and released. Our study will allow us to make recommendations regarding conservation, preservation, and management of habitats. In addition, our study allows for students and classes to work on campus on relevant ecological questions, increasing AUM student representation in science. In this work, we will present an update on the state-of-the-art of the LTERE, challenges encountered, and expected results.

Applying Machine Learning to Caenorhabditis elegans Genomics

Presenter(s):
Jessie Harris
(Biology)

Faculty Mentor(s):
Dr. James Locke

As artificial intelligence increasingly proves its capacity for meeting and, in some respects, exceeding human attention to detail while rapidly processing large quantities of information, researchers seek to find more applications of machine learning algorithms to molecular genetics and adjacent disciplines. The focus of this independent study seeks to investigate and open discourse on the use of an algorithm, running via a "Jupyter Notebook" to compare various published genome sequences of a model organism, Caenorhabditis elegans, with points of interest indicated by the algorithm then

cross-referenced with existing literature to establish its use case in molecular genetics research. This research is still in progress, and primarily limited by the scarcity of whole genome sequences of a variety of C. elegans worms.

Family Literacy Engagement

Presenter(s):
Grace Harvey
(Early Childhood Education)

Faculty Mentor(s):
Dr. Traci Kell

Parents play a key role in early literacy. Literacy is the foundation of children's learning and progressing academically. Parents need more support in teaching their children literacy skills at home. Biemiller (2005a) estimates that the bottom 25 percent of students begin Kindergarten with 1,000 fewer root-word meanings than average students. Parents may feel overwhelmed with the load of working and trying to support their children at home. Another factor is children of disadvantaged homes have a knowledge gap versus children from advantaged homes. This stresses even more the importance of providing parents with the necessary literacy tools early. There are simple activities for parents to support their children in building the foundation of reading: Reading stories, reciting nursery rhymes together, playing word games, and conversation. Starting from birth, children are learning the foundation of literacy through sound and speech. Parents playing a key role in early literacy will promote the foundation for reading and language development. In a research-based project, It was found early literacy in homes, support children reading without difficulty. It is proven that homes with a literacy and language environment are more powerful than a classroom when setting the foundation for reading. Teachers creating a partnership with families in early literacy produces successful outcomes for students in reading.

Body Mass Index (BMI) Positively Correlates with Preference for More Calorically Dense Foods in Undergraduate Students

Presenter(s):
Jamos Hauk, Naomi Wrench, Ay'lanna Turner,
Noah Bricker, (Psychology)

Faculty Mentor(s):
Dr. Jessica Stagner Bodily

The aim of the current study was to investigate the possible relationships between Body Mass Index (BMI), food choices, body state satisfaction, and attitudes towards body positivity. Undergraduate participants were given an online questionnaire inquiring about their food preferences. Specifically, participants were asked over a series of 20 questions to choose between two food items, one more and one less calorically dense. In addition, body state satisfaction ratings and attitudes regarding body positivity were collected. Participants were separated into two groups, those indicating that their BMI was under 25, or in a medically healthy range, and those indicating their BMI was over 25, or a medically unhealthy range. Participants with a BMI of over 25 were more likely to choose more calorically dense food items and report higher body state satisfaction than participants with a BMI of under 25. Moreover, white participants reported higher body state satisfaction and scored higher on attitudes towards body positivity than African American/Black participants. Lastly, participants identifying as male scored higher in attitudes towards body positivity than female-identifying participants. These findings support that BMI is correlated with food choices, body state satisfaction, and future body goals. Additionally, demographic characteristics such as gender identification and race were related to body state satisfaction and attitudes towards body positivity.

Future research should focus further on the examination of gender identification, race, cultural, and environmental factors as they contribute to food choice, body state satisfaction, and body attitudes.

Population Dynamics and Sex Ratios of Western Mosquitofish (Gambusia Affinis: Poeciliidae) in Central Alabama

Presenter(s):
Kailey Higgins (Biology)

Faculty Mentor(s):
Dr. Justin C. Bagley

Western Mosquitofish (Gambusia affinis) is a small livebearing freshwater fish that has become a model organism in ecology, evolution, and toxicology. Gambusia affinis is native to the central and southern U.S. but has been introduced around the world for mosquito control. While the life-history, population dynamics, and evolutionary ecology of G. affinis populations have been intensively studied, most studies have emphasized the species invasion history abroad, leaving factors driving population regulation within the species native range poorly known. Here, we present an overview and preliminary results from the start of a two-year field study of population dynamics and sex ratios from 6 native G. affinis populations in Central Alabama. We have begun using mark–recapture experiments to tag G. affinis with visible implant elastomer (VIE) tags and estimate the sizes and sex ratios of multiple study populations. During procedures, specimens are measured (standard length and total length), sexed (male, female, and juvenile), weighed, and tagged, and habitat characteristics are recorded. We show that our preliminary results are consistent with a priori expectations under our hypotheses (1) that G. affinis population dynamics will exhibit asynchronous numerical dynamics in the study area, and (2) that sex ratios will be female-biased, in general, irrespective of absolute differences in population sizes. Our study will provide the first data on inter-annual patterns of variation in G. affinis from Alabama, and it will also permit greater understanding of the demographic features of native G. affinis populations, including the above parameters as well as mortality rates in the wild.

Shady Street Trailhead Park

Presenter(s):
CyRosia Hill and Alexis Davis
(Graphic Design)

Faculty Mentor(s):
Breuna Baine

Shady Street Trailhead Park is a project aiming to reestablish a community. The historical background of Shady Street begins with a once thriving, black neighborhood before the arrival of interstates caused vacancy. The overall goal of the project is to develop wayfinding systems to aid in navigation throughout the park and surrounding areas. Our primary target audience is everyone who is interested in outdoor activities or nature. The demographics of our target audience were designed for those of all ages and genders to represent an all access community.
Shady Street could use more decorative elements to stand out from the rest of the businesses/ parks in Montgomery. In the future, there could be an area for people to play with their dogs and take them on a walk. Our research is composed of looking around the area at Shady Street Park and internet research is also very useful when it comes to looking up information on the area and coming up with a strategy based on visualization and location.

The Women: The History of Suffrage in Alabama

Presenter(s):   *Faculty Mentor(s):*
Kailey Hill (English)   *Dr. Heather Witcher*
Hailey Whitlock (Exercise Science)

In our project we are looking at and attempting to reconstruct the Women's Suffrage Movement in the state of Alabama. While the movement and many figures are well known, most people overlook the efforts of local organizations as well as the opposition that they faced. In Alabama, the nineteenth amendment was put off for thirty-three years due to the efforts of anti-suffragist and anti-ratification organizations. In this project, we seek to illuminate both sides of this fight and understand how these rival organizations impacted each other and the suffrage movement as a whole.

An Interactive Real-Time Protein Folding and Visualization Tool with Enhanced Alignment Prediction Capabilities

Presenter(s):   *Faculty Mentor(s):*
Nathaniel Hughes, Aryavardhan Singh, and Aditya   *Sutanu Bhattacharya*
Singh (Computer Science)

While many programs exist that can predict protein three-dimensional (3D) structures, not many show the process live or are very interactable. To fill in this gap, GoFold is a new real-time protein folding program and educational tool, which enables users of varying skill levels and backgrounds to manipulate and visualize protein structures in two- and three-dimensions. With three modes of play, GoFold is capable of target and template matching using either 3D structures or 2D distance maps, as well as visualization of proteins by their residues and bonds in 3D space, providing multiple variants of visualization of protein structures. GoFold also holds the capability of calculating the contact map overlap (CMO) score between two protein contact maps by utilizing a double dynamic programming approach. Over multiple datasets, GoFold statistically significantly outperforms the state-of-the-art method, map_align, in predicting high-quality target-template contact maps alignments. GoFold also has minimal dependencies and an easy installation process, making it an accessible tool for researchers and educators.

Shady Street Trailhead and Park Wayfinding Project

Presenter(s):   *Faculty Mentor(s):*
Kristina Ingram (Graphic Design)   *Breuna Baine*
Rhianna Ragan (Graduated)

The overall goal of the design project is to allow the target audience to find their way around the area that encompasses Shady Street Trailhead and Park. We want to let the audience know how close they are to the Marina, Capitol Oyster Bar, and downtown Montgomery.Design for the park will focus on the unity between nature and human beings. The location's history involves transitioning from a neighborhood to an industrial area. Much of this has everything to do with the river. The river and the railroad make up a sandwich, with the neighborhood in the middle. Therefore, this unique location offers a different view of man versus nature than other parks.
The park should feel like an inviting, inspiring, educational family space. The park will bring people together in new ways, celebrating the "vibrant ecology and rich cultural history of the neighborhood."

The design goals for this project include following the Osprey theme. Therefore, the materials used throughout the system will be metal, granite, and wood. This will connect new signage to old elements of the park.

Health Effect of Drinking Beverages: Role in Suppression of Reactive Oxygen Species

Presenter(s):   *Faculty Mentor(s):*
Alexandra Jackson (Biology)   *Dr. Daniel Kim*

   The intake of water, either plain water or beverage, is a necessary means of hydration for a healthy human life. There is increasing evidence that reactive oxygen species, mainly produced in mitochondrial activities in the human body, are involved in several inflammatory and degenerative diseases. In beverages, antioxidants are defined as substances that, in small quantities, are able to prevent or significantly reduce the oxidation of easily oxidizable fats as inhibitors. Measurement of antioxidant capacity was measured by suppressing Reactive Oxygen Species (ROS) in beverages by using ultrasonic irradiation to the commercial beverage-containing waters. Fluorometric measurement was applied to measure the amount of hydrogen peroxide and organic peroxides in water after the ultrasonic irradiation. It is proven that vitamin C is a very powerful antioxidant and deeply colored natural juices with a high level of antioxidant capacity.

Shady Street Park

Presenter(s):   *Faculty Mentor(s):*
Kayla Jenkins and Gloria Schiffer (Graphic Design)   *Breuna Baine*

      The City of Montgomery is extending its Riverfront Trail half a mile to the north to a new Trailhead and Park near the Montgomery Marina at Shady Street. Getting there, to and from downtown, is a Wayfinding challenge. Perhaps even more critical is realizing where you are when you get there- just two blocks to the Alabama River! Also invisible to the unknowing eye are the rich cultural history of the former neighborhood and vibrant ecology of the landscape.
      Our objective is to create a wayfinding system that is simple to use and visually fits within the history and atmosphere of Shady Street Park. Our main audience is the general public that makes use of parks- runners, bike riders, parents with children, un-homed people looking for respite, the congregation of Saint James church mostly Black seniors who remember when the middle lot was Billingslea School and the neighborhood was full of family life and gardens. Our competition is Oak Park that has the benefit of being the first park in Montgomery, it has more trees and covered shelters with access to a pond and a planetarium. However, it does not have a very special wayfinding system that is tied to the identity of the park. After meeting with the client, we went back ourselves to investigate and research the area for the wayfinding signs. We had to do more thorough research on the park itself and visit the competition to look at their wayfinding to devise a good system that is tied to the identity of Shady Street Park and is easy to understand.

Preliminary Effects of Digital Platforms on Engagement and Motivation in Special Education Students within an Inclusive Classroom

Presenter(s):
Joanna Jones (Special Education)

Faculty Mentor(s):
Dr. Sara Bicard and Dr. Kate Simmons

The digital platforms of Blooket and IXL were implemented in an alternating treatment design within an inclusive classroom setting for six weeks to determine the effects on math deficits in multiplication facts of six participants with disabilities.

Getting the Message? TV Advertising in State-Wide Primary Elections

Presenter(s):
Nathan Jordan (Political Science)

Faculty Mentor(s):
Dr. Nicholas Howard

Televised campaign advertisements are a key element of political campaigns for candidate strategy and voter information. Our understanding of these effects is murky given the differing findings for turnout and election outcomes across studies such as Ansolabehere et al. (1999) and Goldstein and Freedman (2002). This lack of clarity in general election's omnipresent messaging environment leads us to explore advertisements' effects from a new perspective: statewide primary elections. These races provide an environment with fewer resources, no partisan affiliation difference, and likely multi-candidate contests. Candidates must therefore appeal to voters in different fashions and be strategic about how they deploy their more limited resources. We leverage variation in campaign advertising across media markets by building on Hall and Snyder (2015) to explore how the extent and content of advertising available to voters in a county affects turnout and election results to answer three questions. First, what is the pattern of advertising across counties in these elections? Second, what effect do advertisements have in state-wide primary elections? And finally, how do candidate and race characteristics (incumbent, candidate home county, quality of primary competition, etc.) shape the presence and effect of campaign advertising in primary elections? These results shed light on the link between campaign messaging strategies and election results in these low-information environments.

Antimicrobial Resistant Trend of E.coli and ESKAPE Pathogens from Urine Cultures in Central Alabama

Presenter(s):
Angelique Korbecki, Ngoc Le, and Ann Chambers
(Medical & Clinical Laboratory Sciences)

Faculty Mentor(s):
Dr. Li Qian

The purpose of this research is to investigate the antimicrobial resistant trend for Escherichia coli and ESKAPE (Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter spp.) organisms in urine samples recovered from Central Alabama to provide scientific evidence for improving antimicrobial therapy. A total of 3498 organisms in 2020 were identified by MALD-TOF MS and the sensitivities were performed on MicroScan WalkAway 96 using the CLSI microdilution method. The identified organisms were from clean-catch midstream, Foley Catheter, and straight catheterized urine. Chi-square test or Fisher's exact t-test was used to determine the significant difference on IBM SPSS ($p \leq 0.05$). E. coli contributed to 69.4% of all the infections. Among the 920 ESKAPE identified organisms, K. pneumoniae was the most common organism at 50.9%, followed by P. aeruginosa (22.7%). E. coli isolates were the most

sensitive to Cefepime, Ertapenem, Meropenem, Ceftazidime, Ceftriaxone, and Piperacillin/ Tazobactam at 99-100%, followed by Nitrofurantoin at 98%. In contrast, Ampicillin/Sulbactam had the lowest sensitivity at 54% ($p < 0.05$). For the ESKAPE pathogens, E. faecium was most sensitive to Daptomycin at 100% and 92% was resistant to Ampicillin ($p < 0.05$); S. aureus was most sensitive to Vancomycin, Ceftriaxone, and Cefazolin at 100% and 93% was resistant to penicillin ($p < 0.05$); K. pneumoniae was most sensitive to Cephalosporins, Aminoglycosides, and Quinolones at 97-100%, its sensitivity to Nitrofurantoin was 35% ($p < 0.05$); A. baumannii was sensitive to antibiotics tested (86-100%), but not enough samples for statistical analysis; P. aeruginosa was most sensitive to Tobramycin at 96% and 32% was resistant to Levofloxacin ($p < 0.05$); Enterobacter species had sensitivity to Meropenem at 100%, but its sensitivity to Ertapenem was only 83% ($p < 0.05$). Our findings indicated E. coli did not have increased resistance to antibiotics and the ESKAPE organisms were comparable to those reported globally and nationally.

Cooperative Learning in the Classroom

Presenter(s):   *Faculty Mentor(s):*
Grace Langston   *Dr. Nicholas Bourke*
(Elementary Education)

Shifting away from the focus of individualistic and competitive learning, the use of group and cooperative learning has been on a rise with classrooms all over. The benefits of cooperative learning are numerous and have been backed up by various case studies and research as one of the most powerful tools in the classroom. However, there has been challenges with implementing cooperative learning and utilizing it in a way that benefits all students and can be held accountable. Kagan's Cooperative Grouping Structures has offered solutions to use cooperative learning in the classroom in a structured way. As teachers are discovering these Kagan Structures, they are using them in their classrooms and there has been notable changes with their students. There has also been impacts on English Language Learner (ELL) students. The purpose of this research was to explore the effects of Kagan Cooperative Grouping Structures with the general student population, with ELL students, and with teachers.

McDowell Farm School – Positive Impact on Students' Knowledge of Sustainable Agriculture?

Presenter(s):   *Faculty Mentor(s):*
Kristi Leavins and Malesha Mennifield   *Dr. Nicholas Bourke*
(Master of Elementary Education)

McDowell Farm School offers a unique farm-to-table educational program focusing on creating awareness of and usable knowledge of sustainable agriculture. The McDowell Farm School is unique in that their programs are multi-day, overnight residential education programs. Students spend three days and two nights fully immersed in hands-on activities related to our environment and sustainable agriculture.

Our case study focused on the impact of the Farm School's residential program in improving students' knowledge and attitudes towards sustainable agriculture. Our graduate research team spent two days and one evening participating in the Farm School activities along with the visiting teachers, parents of student campers and student campers.

Using a utilization focused program evaluation model, we interviewed numerous staff members, visiting teachers, and the parents of student campers. We also conducted a pre-camp and post-camp

student survey. The overall results have been remarkably promising and reflected a positive shift in students' attitudes and knowledge of sustainable agriculture.

With the results of this case study, we anticipate further research studying long-term effects of overnight farm-to-table programs such as the McDowell Farm School.

Income Inequality & Crime: An Empirical Analysis

Presenter(s):   *Faculty Mentor(s):*
Nicole Luther   *Dr. Agnitra Roy Choudhury*
(Economics)

This paper considers the relationship between inequality and crime using panel data from 50 US states. The Gini index per state is used to quantify income inequality. The results show Inequality has a significant impact on violent crimes but an insignificant effect on property crimes. As income inequality increases the rate of violent crime increases. I also used a series of specific types of crimes other than violent and property crimes, which yielded insignificant results. I used multiple regression specifications to conduct my analysis, controlling various state-level factors that are correlated with crime.

Preliminary Effects of Self-Monitoring in an Elementary Resource Room

Presenter(s):   *Faculty Mentor(s):*
Sarah Mann   *Dr. Sara Bicard and Dr. Kate Simmons*
(Special Education)

This study utilized a repeated measure, single-subject reversal design. Baseline (no self-monitoring) and self-monitoring were systematically withheld and implemented. The experimental conditions alternated between weeks or until stable responding had occurred in each condition to determine the effects on the academic engagement of the participants.

Audio Analysis using AI and Machine Learning

Presenter(s):   *Faculty Mentor(s):*
Charlie Mcjunkin   *John Locke*
(Computer information systems)

Most people know what beat and tempo are when listening to music, but the question is can we measure it numerically? With the help of Audio analysis and machine learning we can determine if common correlations, as measured by beats per minute, tempo, chroma mel-frequency cepstral coefficients (MFCCS) and spectral contrast, exist among Oscar Movie Score of the Year winners from 2013 through 2023. I want to understand if common patterns exist among winning scores, as compared to their fellow nominees, to determine if one (or more) themes among these parameters is a factor amongst winners. By using Librosa (a python machine learning plug in) this will convert soundtracks into audio files that Librosa will scan through and chart these characteristics numerically. From there we can run a principal component analysis. This reduces the dimensionality of the data set by taking multiple variables and condensing them into one variable that maintains the structural integrity of the data set. Once we get our data set reduced, we can run a discriminant function analysis. This will

classify certain songs into certain groups based on the similarities of the set parameters. These techniques will provide initial insights into whether common themes in movie soundtracks may influence industry nominations and awards. Future research, such as Fourier Analysis, time-series analysis, sentiment analysis, and other techniques, whether ensembled or stand alone, can help researchers determine if biases toward certain correlated theme components influence award voting among awarding organizations specifically and among consumers.

Interactive Parent-Child Engagement as A Factor in Improving Children's Misbehavior

Presenter(s):
Chloe Miller-Rhodes, Timishiyee Walker, and Nicole Bloch (Counseling Education)

Faculty Mentor(s):
Dr. Yuh-Jen Guo

Parenting serves as a critical component in children's development (Frosch et al., 2021). Parenting contributes a great number of influences to children's overall wellbeing and growth (Frosch et al., 2021). While the quality of parenting may be impacted by internal and external factors, such as financial stress or parents' dysfunctional family of origin (Khan & Renk, 2019; Miller et al., 2021), it is important to help parents regain the insights of effective parenting through the encouragement of parent-child engagement (Steinberg et al., 2021). The increase of parent-child engagement will play a role in guiding children's normal development and functioning (Mifsud et al., 2021). Our research intends to recruit 4 to 5 families where parents look for improving the children's behavior patterns and functioning. In the first five weeks, parents will engage in 30 minutes daily activities (e.g., play board games, read a book, take a walk, etc.) that do not include the use of electronic media. Parents will increase to one-hour engagement for another 5 weeks. Researchers will conduct a mid-term interview and a final interview to collect qualitative information regarding how parents perceive the effectiveness of parent-child engagement. We expect the research will provide rich information that indicate the importance of parent-child engagement, and the structured engagement activities may increase children's overall functioning and behavioral health. The outcomes will bring insights into the effort of reducing children's misbehaving and increasing health parenting and child development.

Resilience in Global Supply Chain

Presenter(s):
Chaitanya Kumar Panguluri
(Masters in Management Engineering and Masters in Management Information Systems)

Faculty Mentor(s):
James M. Locke

Supply Chain and Supply chain Management have played a significant role in corporate efficiency and have attracted the attention of numerous academicians over the last few years. Academic literature review discloses an important spurt in research in practice and theory of Global Supply Chain (GSC) and Global Supply Chain Management (GSCM). Connecting and informing on Supply Chain, Supply Chain Management and distribution Management characteristics have contributed to the Supply Chain integration. This integration has generated the approach of extended corporate and the supply chain is nowadays manifested as the cooperative supply chain across intercorporate borders to increase the value across of the whole supply chain.

This paper seeks to introduce supply Chain and Global Supply Chain Management. A Supply Chain and Supply Chain Management definition, theoretical, practical and measurement analysis are proposed. Several randomly selected refereed academic articles were methodically analyzed.

A number of key findings have arisen: the field is a comparatively new one; several researchers have different perception of the discipline; the consensus is lacking on the definition of the terms: the Supply Chain and Supply Chain Management are widely defined; contextual focus is mainly on the manufacturing industry; research methods employed are mostly theoretical conceptual; the findings also suggest that undertaking a theory view could make important contributions towards defining the scope of supply chains.

Blockchain serves as an immutable ledger which allows transactions take place in a decentralized manner. Blockchain-based applications are springing up, covering numerous fields including financial services, reputation system and Internet of Things (IoT), and so on. Furthermore, technical challenges and recent advances are briefly listed. We also lay out possible future trends for blockchain.

The use of blockchain technology in supply chain management is making huge waves in this era of globalization. Connecting people, products, data, and processes on a global scale using traditional methods is becoming increasingly costly, complicated, and time-consuming. Implementing the blockchain technology in automotive industry and food industries and showing how blockchain is resolving the challenges.

The present scope of the technology implementation is shown, and the future scope is shown. The conclusion and the references of the report are mentioned in the end of the documentation.

Reason for Emergence of Race-Related Social Movements
Based on Ingroup-Outgroup Comparison and Relative Deprivation Theory

Presenter(s):   *Faculty Mentor(s):*
Logann Shorter   *Dr. Brett Lehman*
(Interdisciplinary Studies)

Social movements are often driven by a force that creates a sense of solidarity among movement participants. More salient factors such as racial grouping often facilitate the informal creation of these groups. In the case of the Black Lives Matter (BLM) and White Lives Matter (WLM) movements, research suggests that there is a sense of fear at the core of the emergence of these movements. Relative deprivation may often create a feeling of fear among a social population when individuals perceive they are being deprived of a resource. Evidence of negative race relations and a lack of social justice has been named as one of the driving influences for the BLM organization's emergence. Other aspects such as a diminished hand in governmental and social power as a result of social justice protests hosted by the BLM movement likely influenced the WLM movement's emergence. The fear associated with perceived deprivation may foretell negative events between the two organizations as it is likely that relatively deprived individuals, and thus the social grouping they belong to, may resort to risky behavior. This research further analyzes findings from other researchers who have noted connections between relative deprivation and society. These studies and results show outcomes of relative deprivation and their connection to politics in both the United States and in the African country of Siera Leone.

Screening for Level of Physical Activity (PA) as a
Vital Sign Measurement in a Rural Primary Care Setting

Presenter(s):   *Faculty Mentor(s):*
Freda Simmons   *Dr. Julie Freeman*
(Medical Laboratory Science)

Physical activity has been linked to a variety of advantages throughout one's life. Because physical activity levels appear to be insufficient in rural populations, the implementation of effective interventions aimed at improving or maintaining activity levels is a major health concern for primary care providers. Physical activity is a strategy to lose and weight in patients who are obese. The effectiveness of physical activity depends on the patients' consistent use of an exercise regimen. Increasing physical activity is a primary method health care providers incorporate with care to reduce the rising obesity rates. Adopting a physical activity screening tool is an approach to address physical inactivity of patients in primary care. Furthermore, the patients will receive optimum support to promote and maintain weight loss or lower blood pressure or lower blood glucose levels. To determine the efficacy of incorporating a Physical Activity Vital Sign Tool at every patient encounter, an evidenced-based quality improvement (QI) project was conducted at a community healthcare facility. Participants were administered a physical activity assessment survey to assess the level of physical activity. The participants received information on walking tips and a physical activity log as recommended from the CDC.BMI, or blood pressure, or blood glucose were reviewed in the participants electronic medical records for participation in QI project. Individuals who met criteria followed up on month 2 and month 3 to review progress, complete vital sign tool, and to provide any needed support. Individuals were asked to improve physical activity to at least 3 days per week, 20-30 minutes per day to improve overall health.

Teaching Data Visualization with Netflix: A Teaching Case using Kaggle and Power BI

Presenter(s):   *Faculty Mentor(s):*
Julia Simoes   *Dr. Zack Jourdan*
(Information Systems)

This study is based on a teaching case that can be used by many professionals in the education field as a resource for teaching data analysis and data visualization courses. The case is built by giving real world scenarios which will help students to apply their knowledge in actual life situation. I used publicly available data sets from Kaggle, and I ultimately displayed an example of its use for the creation of Dashboards and visual reports in Power BI.

Studies towards the Synthesis of the Ralfuranones

Presenter(s):   *Faculty Mentor(s):*
Daniel Spain, Shubham Pathak (Biology)   *John Hutchison*
Rachel Davis (Chemistry)

The Ralfuranones are aryl-substituted furanone secondary metabolites of the Gram-negative plant pathogen Ralstonia solanacearum and play an important role in the virulence of this bacterium. As part of an on-going project involving organic synthesis, we sought to develop a general synthetic strategy for this family of natural products. Our approach involves two different routes to obtain the

Ralfuranone base structure (4-phenylfuranone). From the base structure, we should be able to access several of the Ralfuranone family members by Aldol, oxidation, and Wittig reactions.

Shady Street Trailhead and Park

Presenter(s):   *Faculty Mentor(s):*
Kendra Stewart and Annie Cobb   *Breuna Baine*
(Graphic Design)

    Montgomery is creating a trail and park near the marina on the Alabama River called Shady Street Trailhead and Park. The challenge is that it is difficult for visitors to understand how close they are to the Alabama River and downtown when they are at the park. Our target audience is citizens of Montgomery who enjoy outdoor activities, joggers, and families. This project's scope is the new park at Shady Street and the surrounding area like the Montgomery Marina and Osprey tower. Research has been done and will continue in this area to uncover its history and find the best solution for wayfinding. The design represents the flora and fauna of the area and attempts to include historical aspects of the site.

Preliminary Effects of Concrete and Virtual Manipulatives on Solving Algebraic Equations in Students with Disabilities

Presenter(s):   *Faculty Mentor(s):*
Jessica Thomas   *Dr. Sara Bicard and Dr. Kate Simmons*
(Special Education)

    A single subject alternating treatments design was used to analyze the effects of a concrete and virtual manipulatives on the percent of correctly solved linear equations per session by three middle school students with disabilities. Use of concrete manipulatives was defined as physically manipulating algebra tiles to solve an equation. Use of virtual manipulatives was defined as using a Chromebook to manipulate the virtual algebra tiles presented on the BrainingCamp website. Virtual and concrete manipulatives were each randomly alternated to assess student performance in solving one and two-step algebraic equations.

Thirteen Bridges Review - Website and Magazine Design

Presenter(s):   *Faculty Mentor(s):*
Kendra Toles   *Dr. Kent Quaney*
(Graphic Design)

    Kendra has been working with Dr. Quaney for two semesters to reboot and revamp our professional literary journal. Kendra has designed a website, is currently working as a webmaster, and has started on the design process for a print version of the journal.

Real-Time American Sign Language Detection using Convolutional Neural Networks for Improved Accessibility

Presenter(s):
Hang Tran
(Information Systems)

Faculty Mentor(s):
James Locke

American Sign Language (ASL) is a vital means of communication for the deaf and hard of hearing communities. However, interpreting ASL can be a significant challenge for those who do not know the language. In this paper, we propose a deep learning-based approach for ASL detection using Convolutional Neural Networks (CNN). Our proposed approach is designed to recognize ASL hand signs and convert them into text or speech in real-time. We utilize the ASL alphabet dataset to train our CNN model, and we achieve a high accuracy rate for ASL sign detection. Our approach has the potential to facilitate communication between the deaf and hearing communities by providing a fast and reliable way to interpret ASL. We also discuss the limitations of our approach and suggest possible future directions for improving ASL detection accuracy, including the use of more extensive datasets and combining multiple modalities such as hand motion and facial expression in ASL interpretation. Overall, our approach provides a promising foundation for real-time ASL detection using CNNs, with potential applications in education, healthcare, and accessibility technology.

Real-Time Object Detection: Achieving High Accuracy in Detecting Intruders in Video Streams using YOLOv7

Presenter(s):
Duc Tran
(Information Systems)

Faculty Mentor(s):
James Locke

Real-time object detection is a critical task for a wide range of applications, including security, surveillance, and autonomous vehicles. In this paper, we propose a novel approach for achieving high accuracy in detecting intruders in video streams using YOLOv7, a state-of-the-art deep learning-based object detection framework. Our approach leverages the strengths of YOLOv7, including its high detection speed and accuracy, and adapts it to the specific task of intruder detection in real-time video streams. We introduce a new dataset of intruders in indoor and outdoor environments, and demonstrate the effectiveness of our approach in accurately detecting intruders in real-time. We compare our approach to other popular object detection frameworks, including Faster R-CNN and SSD, and show that our approach outperforms them in terms of both accuracy and speed. Our results demonstrate the potential of our approach for use in real-world applications where accurate and timely detection of intruders is critical. We also discuss some of the limitations of our approach and highlight opportunities for future research in this area.

Bioelectricity from Sediments and Soil Microbial Fuel Cell

Presenter(s):
Katrina Vance, JoAnna Sheffield, Meghan Frazier,
Daveenyah Primm, Olivia Taylor, and Joy Odoms
(Biology)
Christopher Kirk (Chemistry)

Faculty Mentor(s):
Dr. Benedict Okeke

Bioelectricity is the electrical current produced by living systems. The production of electricity through the use of microbial metabolism has gained increasing research attention. In a microbial fuel cell (MFC) exoelectrogenic bacteria (exoelectrogens) catalyze the catabolism of nutrients releasing electrons that flow from the anode to the cathode generating electrical current. Protons (H+) move to the cathode where electrons reduce oxygen to water. We utilized the MudWatt MFC to examine sediments and soil samples for bioelectricity production. Potential bioelectricity-producing bacteria were selected and identified using 16s rRNA gene sequence analysis. Biomass-hydrolyzing bacteria were isolated from soil MFC and identified. Based on our initial studies on soil and sediments MFC, we adapted Mudwatt for the construction of a prototype MFC with 3 cathode and 3 anode electrodes. Further work will involve "bioaugmentation" of the sediments and soil MFC by adding selected bacteria, and "biostimulation" by adding low-cost nutrients to improve bioelectricity production in MFC.

Selection of Soil Microbes for Production of L-Asparaginase in Liquid Culture

Presenter(s):
Katrina Vance, Asya Davis, and JoAnna Sheffield
(Biology)

Faculty Mentor(s):
Dr. Benedict Okeke

Asparaginase (L-Asparagine aminohydrolase, E.C. 3.5.1.1) is a biocatalyst that catalyzes the conversion of L-asparagine to ammonia and L-aspartate. L-asparaginase has health-related applications. L-asparagine is an amino acid that human cells synthesize for use in protein synthesis. Lymphoblastic leukemia cells cannot synthesize L-asparagine and depend on L-asparagine present in the blood to synthesize proteins. L-asparaginase can be used to deplete blood levels of L-asparagine and is hence deployed in the treatment of acute lymphoblastic leukemia among other uses. Acrylamide is a potential carcinogen and neurotoxin that can be formed through the reaction of asparagine with carbohydrates due to high temperatures in food processing. Asparaginases are also useful in food processing to reduce the heat-initiated accumulation of acrylamide. In this study, we isolated asparaginase-producing microorganisms (bacteria and fungi) from soil environments using serial dilution and phenol red dye-based plate screening assay. Selected potential asparaginase-producing bacteria and fungi were examined for asparaginase production in liquid culture. Further studies will involve the identification of the L-asparaginase producing-bacteria and fungi by PCR amplification and sequence analysis of the 16s rRNA gene and the intergenic spacer region (ITS) DNA, respectively.

Fine-tuning a Deep Neural Network Model to Recognize Monetary Bills and its Deployment for On-Device Applications

Presenter(s):
Jonathan VanErmen (Mathematics)
LaMarcus Stubbs and Sunny Patel (Pre –
Engineering)

Faculty Mentor(s):
Dr. Yi Wang

The use of deep neural networks has become widespread and rapidly advancing, driven in particular by recent advancements in large language models, such as OpenAI's GPT-4. At the core of a deep neural network is the idea of identifying a non-linear function f that maps input x to output y using many variables (parameters). The training dataset (x, y) typically consists of high-dimensional data. Once this function is identified through training, it can be used to accurately predict outcomes for new inputs. In this project, our goal is to fine-tune state-of-the-art, general-purpose deep learning models for the specific task of classifying different kinds of monetary bills. We evaluated the

performance of several pre-trained models, including EfficientNet, MobileNetV2, ResNet50, and InceptionV3, which have up to 8.9 million parameters. However, using transfer learning techniques, we were able to fine-tune only ~6,000 parameters and achieve highly accurate models. Our fine-tuned models were then converted to TensorFlow Lite format, suitable for deployment on edge devices such as iPhones, Android devices, or Raspberry Pi devices. Finally, we successfully deployed our fine-tuned models to a Raspberry Pi device.

Electronic and Social Media Overstimulation on Attention Span

Presenter(s):
Timishiyee Walker, Chloe A. Miller-Rhodes, and
Nicole Bloch (Counseling Education)

Faculty Mentor(s):
Dr. Yuh-Jen Guo

Modern use of electronic and social media brings a mix of benefits and challenges. The overstimulation comes with the use of media while individuals are conditioned to the stimulation patterns. A major challenge arises from such overstimulation. Attention span may have become an area that is adversely impacted by the overstimulation. When persons increase the time spent on electronic media, their attention span will be influenced due to overstimulation. Our study is interested in this wide spread phenomenon and will investigate the association between the time spent on media and the status of attention span. This study is important to examine how adults' attention span could be affected by the use of media. The outcomes may inform the public regarding the effective use of media in order to maintain proper attention span for daily tasks.

Virtual Reality Applications in Selling Products

Presenter(s):
Yu Wang (Marketing)

Faculty Mentor(s):
Dr. Christine Harrington

In virtual reality and augmented reality, consumers are provided with remote pre-purchase trial and customization, saving customers' time cost and unnecessary waste of resources. For retailers and e-commerce, it provides consumers with more display platforms and gimmicks to attract consumers and saves stores the time and cost of communicating with customers, increases work efficiency, and reduces the subsequent disputes caused by communication errors.

Helping the Helpers: Evaluation of a Support Group for IPV Advocates in Alabama

Presenter(s):
Amber Watson (Social Work)

Faculty Mentor(s):
Dr. Amber Sutton

This project focuses on creating, facilitating, and evaluating a 6-session virtual support group for domestic violence advocates in Alabama.

Implementing a Referral Process to a National Diabetes Prevention Program for Pre-Diabetic Individuals in a Family Practice Setting

Presenter(s):   *Faculty Mentor(s):*
Latonya Wilkerson   Dr. Julie Freeman

Careful examination of the prediabetes data revealed that the ensuing complications are a burden in Alabama. The literature found that obesity, physical inactivity, and poor eating habits contribute to prediabetes. This quality improvement (QI) project focused on implementing a referral process for individuals with prediabetes to a National Diabetes Prevention Program (NDPP) to prevent progression to type 2 diabetes mellitus (T2DM). Participants enrolled in the NDPP participated in the Centers for Disease Control and Prevention (CDC) approved program and received lessons, handouts, and resources that assisted the individuals in making healthy lifestyle changes. In addition, the participants had access to trained lifestyle coaches who helped the participants navigate the program, learn lifestyle modification skills, set attainable goals, and help keep the participants motivated. Participants in this QI project also had access to support groups that provided additional support. Participants who completed the lifestyle modification program quality of life improved. According to the CDC (2021), individuals who lose weight and increase physical activity can lower the risk of prediabetes developing type 2 diabetes mellitus by more than 58%.

Identification of Novel Substrate for the Tid1-based Quality Control System in Human Mitochondria

Presenter(s):   *Faculty Mentor(s):*
Monia Yousef (Chemistry)   Dr. Grzegorz Ciesielski
Lama Fariss (Biology)

Mitochondria are cellular organelles that supply energy for the entire human body. In consequence of this, defects to the mitochondrial function result in the development of human disorders, which range from debilitating muscle weakness to severe multisystemic syndromes and premature death. Importantly, there is no treatment for any of the mitochondrial defects, nor for the associated human disorders.

Tid1 is a mitochondrial protein, which either preserves and corrects the structure of other mitochondrial proteins, or aids their elimination if these cannot be corrected. Because of this role as a "general guardian of the mitochondrial proteome" Tid1 is essential for the mitochondrial function and its defects can result in human disorders. Despite this essential role, little is known about the exact molecular processes, for which Tid1 is important and only a few 'client' proteins have been identified to date. In the course of our studies we discovered that Tid1 may promote degradation of a subunit of pyruvate dehydrogenase, which is the major enzymatic complex regulating energy production. Our observation implies that Tid1 may be an important regulator of mitochondrial metabolism in response to environmental conditions.