

17th ANNUAL

Student Research **SYMPOSIUM**

FRIDAY, APRIL 5, 2024



UNIVERSITY of ARKANSAS
FORT SMITH.

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Greetings!

The University of Arkansas - Fort Smith proudly welcomes you to the 17th Annual Student Research Symposium. Our faculty and staff are committed to fostering an environment that promotes learning and discovery. As you will see in today's presentations, our students have accepted the challenge, explored unique areas of research, and synthesized their results in the form of lectures, studio art, demonstrations, posters, and performances. These presentations represent the academic diversity of UAFS's programs and the intellectual excellence of our students and their faculty mentors. On their behalf, thank you for your participation. I invite you to engage the presenters during the question-and-answer segments of their presentations. Your active involvement ensures that UAFS remains a dynamic and engaged academic community.

Namárië

A handwritten signature in black ink, appearing to read 'S. Robinson'.

Dr. Shadow Robinson
Provost and Vice Chancellor for Academic Affairs

Oral Presentations

Library 122 – Presentations in Engineering and Computer Science

- Noon Issair Rodriguez, Dylan Jetton, and Alexandria Yang – [Lunar Terrain Vehicle](#)
- 12:30 Chaarlee Hickman, Evan Piovesan, Han Tran, and Alex Tran – [The Autonomous Vehicle Challenge](#)
- 1:00 Carter Freeze, Tahlia Bergeron, Tyler Johnson, and Cody Mizell – [NumaGuard: Automating Shoulder Surfing Attacks on Mobile Phones](#)
- 1:30 Michael Resendiz, Marco Garcia Montes, Josue Martinez, and Cameron Taylor – [NumaFARM: An Autonomous Robotic System for Sustainable Farming Using Artificial Intelligence, Computer Vision, and Deep Learning](#)

Library 202 – Presentations in Electrical Engineering and Control Engineering

- Noon Joshua Bean – [Digitization of Earth Gradient Cable Fault Localization Methods](#)
- 12:30 Michael Arellano, Luis Romero, and Tanner Harmon – [Luminescent Jacket](#)
- 1:00 Christopher Limon, Bryce Barentine, and Felipe Ortiz – [Wireless Incorporated Car Cooler System](#)
- 1:30 Tyler Walker and Bryer Duboise – [Wearable Digital Multimeter](#)

Library 206 – Presentations in Psychology

- Noon Braden Nguyen – [Correlation in Student Involvement on Campus and Student Success](#)
- 12:30 Lilly Brasuell and Jaylin Barroso – [The Neurobiology of Paternal and Maternal Behavior](#)
- 1:00 Taylor Hartsfield and Gabrielle Travise – [The Physiological Process of Emotions and Trauma](#)
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Student Research Symposium

Library 209 – Presentations in English and Literature

- Noon Isabella Serrano – Escaping Blood: The Intersection of Race and Gender Identity in Brit Bennett’s Novel “The Vanishing Half”
- 12:30 Rebecca Morrison – “The pen has been in their hands”: The Preservation of Female Autonomy in Austen’s “Persuasion”
- 1:00 Tatum Leary – Weaponizing Femininity and Romance: Gender as a Performance and Compulsory Heterosexuality in The Hunger Games Trilogy
- 1:30 Gabbie Stokes – “Pride and Prejudice and Zombies”: The Unmentionable Parody Adaptation

Health Science 121 – Presentations in Accounting and Public Transportation

- Noon Noah Ottman – The Current State of Corporate Social Responsibility
- 12:30 Joy Wootton – Accounting for Cryptocurrencies by GAAP Standards
- 1:00 Dalton Oxford – A Study of Crime Relations to Public Transit Commuting in Pre-COVID America

Health Science 124 – Presentations in History, Political Science, and Costume Design

- Noon Korina Lopez – The Nightmare Beyond the Battlefield: A Glimpse into Civil War Prison Camps
- 12:30 Mitchell Collins – The Rise of Political and Social Distrust, Division, and Disenfranchisement in Modern Institutions
- 1:00 Gavin Garrett – Cut, Curate, Costuming: A Costume Designer’s Process

Health Science 133 – Presentations in Chemistry, Biochemistry, and Latino Studies

- Noon Khuong (Peter) Ta – The Interconversion of Cobalt Ammine Complexes that are Linkage Isomers
- 12:30 Lyndsie Hicks – Investigating the Interaction of Human Serum Albumin with Organochlorine Pesticides: A Case of Dynamic vs Static Quenching
- 1:00 Marlene Toledo – La educación de hogar como fuerza sin fronteras (Homeschooling as a Force Without Borders)
- 1:30 Daniela Morales Hernandez – ¡Español para emergencias! (Spanish for Emergencies!)

Poster Presentations Noon to 2 p.m., Boreham Library

- Table 1 – Chemistry:** Sully Sanford – Molecular Dynamics Study of Organochlorine Ligand Interaction with Human Serum Albumin
- Table 2 – Biochemistry:** Luke Jodoin – Investigating Galectin Glycoprotein Interaction with Sialoglycans and Nanoparticles
- Table 3 – Evolutionary Biology:** Armonii Dixon and Kiara Thomas – Phylogenetic Analysis and Molecular Adaptation Events in Whales and Dolphins
- Table 4 – Evolutionary Biology:** Ciera Grijalva – Molecular Evolutionary Analysis of Jellyfish: Insights from COI and cyt-b Gene Sequences
- Table 5 – Evolutionary Biology:** Laney Wagner – Exploring Evolutionary Dynamics in Old-World Mice and Rats: A Molecular Analysis of COI and cyt-b Gene Sequences
- Table 6 – Biology:** Nayda Barbry, Samantha Gates, and Lana Putman – Probiotics: Capsules, Gummies, and Liquids and the Impact of Delivery Methods on Growth Rates
- Table 7 – Biology:** Analise Black, Anna Carden, and Noah Tawney – Land-use and Diffuse Pollination: A Look at Jack Nolan Lake in Greenwood, Arkansas
- Table 8 – Cell/Developmental Biology:** Evan Wittig – Exploring Genetic and Environmental Factors that Control Differentiation of Pseudoplasmodium in Dictyostelium discoideum
- Table 9 – Geoscience:** Kaleb McLaughlin – Distribution of Detrital Sediment Captured in McKay Bay Member Knoll Reef, Upper Peninsula, Michigan
- Table 10 – Geoscience:** Abigale Kelly, Perla Romero, and Matt Van Hook – Testing the Accuracy of Polycam® 3D Scanning Software on LiDAR and Optical Photogrammetry Devices in Field Research

Student Research Symposium

Table 11 – Geoscience: Emily Mero – X-Ray Diffraction and Petrographic Analysis of Magnet Cove Carbonatite Core, Arkansas

Table 12 – Hydrogeology: Abigail Carico – A Darcy Column for Demonstration and Research in Hydrogeology

Table 13 – Hydrogeology: Juan Lopez and Kendal Dixon – A Benchtop Model of Piezometers Used to Determine the Vertical Flow of Groundwater

Table 14 – Nursing: Gracie Larru and Polly Hoang – Pediatric Suicide Risk Associated with Social Media Use: A Literature Review

Table 15 – Nursing: Gerbert Floreschavez – Male-Oriented Recruiting, Job Satisfaction, and Retention Practices in Nursing

Table 16 – Dental Hygiene: Samantha Baughman, Jenny Kindle, and Parker Lemley – The Evolution of Dental Radiology Safety

Table 17 – Dental Hygiene: Dulce Gutierrez, Leslie Guerra, Amy Le, and Abigail Mussett – Look Out Fluoride, There's a New Amino Acid in Town!

Table 18 – Dental Hygiene: Samantha Drain, Aracely Najera-Hernandez, Rudy Vasquez, and Gabriel Woody – Periodontal Tissue Regeneration

Table 19 – Dental Hygiene: Skye Haagenson, Mackenzie McBride, and Alissa Owens – A Comprehensive Evaluation of Fluoride

Table 20 – Music Education, Music Outreach, Community Music: James Estrada – Instrumental Music and You

Library 122 Presentations in Engineering & Computer Science

Noon Issair Rodriguez, Dylan Jetton, and Alexandria Yang

12:30 Chaarlee Hickman, Evan Piovesan, Han Tran, and Alex Tran

1:00 Carter Freeze, Tahlia Bergeron, Tyler Johnson, and Cody Mizell

1:30 Michael Resendiz, Marco Garcia Montex, Josue Martinez, and Cameron Tyler



Student Research Symposium

Lunar Terrain Vehicle

Presented by: Issair Rodriguez, Dylan Jetton, and Alexandria Yang

Faculty Sponsor: Dr. Kevin R. Lewelling

Field of Research: Engineering

UAFS mechanical and electrical engineering students have designed and constructed a Lunar Terrain Vehicle (LTV) as a response to a NASA request for information. This engineering group constructed a full-scale LTV prototype that features a folding mechanism reducing storage space. The current LTV is capable of handling two astronauts at a speed of 5 mph with an expected driving time of 20 hours. The LTV features include all-wheel drive with 360° wheel rotation, LED headlights, rear camera, and a human machine interface.

The LTV has also provided a platform for freshman engineering students to get involved with research and design. Over 75 fall 2023 freshman engineering students were challenged to design and implement unique features on the LTV: these included LED headlights, back up camera, and touch screen controls.

This presentation will review LTV design analysis and construction; how theory, reality, economics influenced the LTV design. We will discuss several things learned when constructing this LTV that will guide a new generation of LTV design. Also, we will discuss future LTV work.

Issair Rodriguez is a junior mechanical engineering student. He is seeking a career in the aerospace or power industries.

Dylan Jetton is a junior electrical engineering student. He is currently interested in the power industry, but has experience in microcontrollers and aerospace-related projects.

Alex Yang is interested in the aerospace industry and hopes to work on future lunar terrain vehicles.

Student Research Symposium

Autonomous Vehicle Challenge

Presented by: Charlee Hickman, Evan Piovesan, Han Tran, and Alex Tran

Faculty Sponsor: Dr. Kevin R. Lewelling

Field of Research: Engineering

A team of University of Arkansas - Fort Smith (UAFS) electrical and mechanical engineering students have entered a competition to design and construct an autonomous vehicle. This vehicle is designed to navigate a 60 ft. by 60 ft. course over ramps and avoid obstacles fully autonomously. The competition will be held this spring on April 18 at UAFS. The autonomous vehicle will use a Raspberry Pi camera, sonar distance sensors, and lidar to navigate the course. Considerable focus has been spent on developing a computer vision model that maximizes the accuracy of obstacle detection and the reliability of the avoidance protocol. Additionally, the vehicle is designed to withstand any terrain and optimize self-sufficiency. The AVC will use a remote-controlled car chassis that has been adjusted to allow microcontrollers to autonomously pilot the vehicle.

Each team member will give an overview of their part of the AVC project in this presentation.

Charlee Hickman is a junior computer science major. She has interned at NASA and hopes for a career in the aerospace industry.

Evan Piovesan is a sophomore electrical engineering student. He is interested in autonomous vehicles and lunar terrain vehicles.

Han Tran is a senior mechanical engineering student. She is interested in autonomous vehicles.

Alex Tran is a senior mechanical engineering student. He is interested in local engineering positions in Fort Smith.

NumaGuard: Automating Shoulder Surfing Attacks on Mobile Phones

Presented by: Carter Freeze, Tahlia Bergeron, Tyler Johnson, and Cody Mizell

Faculty Sponsors: Andrew Mackey and Israel Cuevas

Field of Research: Computer Science

This work presents an approach using artificial intelligence, deep learning, and computer vision to detect a person's mobile phone pin number. Traditional methods of pin number entry on mobile devices are susceptible to shoulder surfing attacks where an attacker can physically view the device screen to obtain sensitive information, such as pin numbers, passwords, etc. By analyzing frames from multiple cameras in parallel, we present a shoulder surfing attack using deep neural networks to automate the detection of a user's pin number. Our proposed model learns how to interpret subtle hand movements and gestures associated with various inputs. We also present our model's robustness to external environmental conditions in detecting pin entries. Finally, we will provide attack mitigation strategies to enhance the privacy and security for mobile device users.

Carter Freeze is a computer science student at UAFS specializing in data science and artificial intelligence and minoring in mathematics. His academic areas of interest are artificial intelligence, computer vision, deep learning, and data science. He is an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree specializing in artificial intelligence and data science.

Tahlia Bergeron is a computer science student at UAFS specializing in data science and artificial intelligence and minoring in mathematics. Her academic areas of interest are artificial intelligence, computer vision, deep learning, and data science. She is an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree specializing in artificial intelligence and data science.

Tyler Johnson is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are artificial intelligence, computer vision, deep learning, and data science. He is an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree specializing in artificial intelligence and data science.

Cody Mizell is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are artificial intelligence, computer vision, deep learning, and data science. He is an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree specializing in artificial intelligence and data science.

Student Research Symposium

NumaFARM: An Autonomous Robotic System for Sustainable Farming Using Artificial Intelligence, Computer Vision, and Deep Learning

Presented by: Michael Resendiz, Marco Garcia Montes, Josue Martinez, and Cameron Taylor

Faculty Sponsors: Andrew Mackey and Israel Cuevas

Field of Research: Computer Science

Autonomous robotic systems powered by artificial intelligence and computer vision provide new pathways for sustainability in farming for the state of Arkansas. In this presentation, we present NumaFARM, an autonomous robotic system that is capable of automating farming practices using artificial intelligence, computer vision, and deep learning. Our proposed system autonomously manages crops for crucial farming operations, including planting, irrigation, and harvesting. Through real-time monitoring of crop health to automated harvesting using autonomous robotics, NumaFARM seeks to improve efficiency, productivity, and resource allocation for one of Arkansas's largest industries.

Michael Resendiz is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are artificial intelligence, information retrieval, natural language processing, deep learning, and data science. He is currently an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree with a specialization in artificial intelligence and data science.

Marco Garcia Montes is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are artificial intelligence, machine learning, deep learning, and data science. He is currently an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree with a specialization in artificial intelligence and data science.

Josue Martinez is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are computer vision and graphics, machine learning, and robotics. He is currently an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree with a specialization in artificial intelligence and data science.

Cameron Taylor is a computer science student at UAFS specializing in data science and artificial intelligence and minors in mathematics. His academic areas of interest are in artificial intelligence, machine learning, deep learning, robotics, and data science. He is currently an active member of the UAFS Artificial Intelligence Research Lab and intends to pursue a graduate degree with a specialization in artificial intelligence and data science.

Library 202 Presentations in Electrical Engineering & Control Engineering

Noon Joshua Bean

12:30 Michael Arellano, Luis Romero, and Tanner Harmon

1:00 Christopher Limon, Bryce Barentine, and Felipe Ortiz

1:30 Tyler Walker and Bryer Duboise



Digitization of Earth Gradient Cable Fault Localization Methods

Presented by: Joshua Bean

Faculty Sponsor: Dr. Kiyun Han

Field of Research: Electrical Engineering

Since the 1970s earth gradient techniques have been fundamental in locating cable faults. These techniques typically involve A-Frames, which utilize a transmitter to send a high voltage pulse through a faulted cable. The receiver then measures the voltage generated in the soil as it returns to the transmitter, indicating the fault's location. Traditionally, such devices employed analog displays, like galvanometers, to provide visual feedback to the user. However, with the evolving industry landscape, these analog components are increasingly difficult to procure, prompting a growing demand for digital solutions. This presentation aims to highlight the advantages of developing a digital fault locator that leverages this traditional method. It will delve into the challenges encountered in designing such a device, the solutions implemented to overcome these obstacles, the rationale behind specific design choices, and, finally, the presentation of a fully functional digital fault locator prototype.

Joshua Bean is currently concluding his senior year at the University of Arkansas - Fort Smith, where he is pursuing a major in electronics engineering technology complemented by a minor in computer science. He is a student co-founder of the GoBabyGo program at UAFS, where he harnesses his expertise to create meaningful change. His involvement includes transforming electric toy cars into adaptive vehicles that provide physical and mental stimulation for children with disabilities.

Professionally, Joshua is making his mark as an electrical engineer and programmer at Innovative Utility Products Corporation in Van Buren, Arkansas. This position keeps him satisfied with increasingly complex projects and problems to solve. Looking ahead, Joshua is committed to furthering his career at IUP after graduation. He is particularly excited about contributing to the expansion and success of the Research and Design department, where he aims to leverage his expertise to drive innovation and excellence.

Student Research Symposium

Luminescent Jacket

Presented by: Michael Arellano, Luis Romero, and Tanner Harmon

Faculty Sponsor: Dr. Kiyun Han

Field of Research: Control Engineering

Traversing on roadways requires crucial communication between all roadway users to ensure the utmost safety for everyone. An estimated combined 85,000 motorcyclists/cyclists are involved in an accident each year according to multiple sources. We determined that the Luminescent Jacket would be a great starting place to address this matter. The Luminescent Jacket would allow users to enhance their sense of safety and be able to operate their respective form of transportation by wearing the jacket the rider will be more visible while also accurately depict in which direction the user will be traversing. The desired outcome of this product is to not only increase the confidence of the riders, but also help in reducing the amount of motorcycle and bicycle accidents.

Michael Arellano graduated from Van Buren (Arkansas) High School in 2020. Being a first-generation student, Michael is currently a senior in the electrical engineering technology program. He is currently employed with Rheem Manufacturing as an engineering intern in the Residential Heating Department.

Luis Romero graduated in 2020 from Van Buren (Arkansas) High School and continued his education in electrical engineering technology at UAFS. He is currently employed at Rheem Manufacturing in Fort Smith as an engineering intern in residential splits/commercial package.

Tanner Harmon is a 21-year-old Van Buren (Arkansas) High School graduate who is attending UAFS to study electrical engineering technology. He is currently interning at Rheem Manufacturing on the commercial splits team, but ultimately hopes to get more into the control and automation systems side of engineering.

Student Research Symposium

Wireless Incorporated Car Cooler System

Presented by: Christopher Limon, Bryce Barentine, and Felipe Ortiz

Faculty Sponsor: Dr. Kiyun Han

Field of Research: Electrical Engineering Technology

In response to the intense and continuously increasing summer heats, the WICCS (wireless Incorporated Car Cooler System) was developed to combat excessive internal car temperatures as shades do not provide comfortable entry to a vehicle during the hottest months of the year. Our design uses water as the circulating coolant and utilizes gel-based ice packs. A small water pump is used to circulate water through a mini radiator, fans are used to circulate hot air from the car across the fins of the radiator. The system will be comprised of a main unit and controller unit, these units will be able to communicate via LoRa based communication modules. Through study and experimentation, our project will provide data on the overall usefulness of a product such as this one at varying temperatures. Implementation of this design allows us to record useful information about the effectiveness of hardware such as Arduino, power supplies and communication modules when subjected to extreme/maximum temperature values. Statistics recorded for temperature differential achieved using sun blocking shades with versus without our intended design will be the focus for this research project.

Christopher Limon Jr. is a senior pursuing a bachelor's degree in the electrical engineering technology program. He is currently employed at Casey's in Van Buren, Arkansas, and is looking for an industry-based job. He spends his extra free time engaged in personal projects.

Bryce Barentine is a senior pursuing a bachelor's degree in the electrical engineering technology program set to graduate in December 2024. He attended UAFS throughout high school via the WATC program, taking classes in welding. Bryce is currently working at Rheem Manufacturing in Fort Smith as a laboratory engineering intern.

Felipe Ortiz graduated from De Queen (Arkansas) High School in 2021. He is currently a junior at UAFS pursuing a Bachelor of Science in electrical engineering technology.

Student Research Symposium

Wearable Digital Multimeter

Presented by: Tyler Walker and Bryer Duboise

Faculty Sponsor: Dr. Kiyun Han

Field of Research: Electrical Engineering Technology

The digital multimeter (DMM) is a ubiquitous tool within modern industry, used by the local HVAC company as much as NASA; however, despite how common it is, it still has its faults. With our project, the “Wearable Digital Multimeter,” we hope to solve at least one of them by making it far easier to access both out in the field and inside the factory by attaching the very same tool to a technician’s wrist in a way that is both convenient and safe for any environment they might find themselves in. This project uses a standard PCB board, an LCD display, a spring mechanism for retractable wire leads, a flashlight, and self-fastening straps. The retractable wire leads of the device will be used to measure resistance, voltage, current, and continuity and display the results on the backlit LCD screen, all while being conveniently attached to the user’s wrist via simple straps that can be easily undone in case of emergency. This device will help technicians in situations where a more traditional DMM might be inconvenient to use, such as tighter spaces or higher locations requiring ladder climbing.

Tyler Walker is a senior non-traditional student enrolled in the Bachelor of Science in electrical engineering technology program at the University of Arkansas - Fort Smith. He will graduate in the fall of 2024. Tyler is currently working as a meat and produce associate at Walmart in Van Buren, Arkansas.

Bryer Duboise is a senior student enrolled in the Bachelor of Science in electrical engineering technology program at the University of Arkansas - Fort Smith.

Library 206 Presentations in Psychology

Noon Braden Nguyen

12:30 Lilly Brasuell and Jaylin Barroso

1:00 Taylor Hartsfield and Gabrielle Travis

1:30 Madison Cossey



Student Research Symposium

Correlation in Student Involvement on Campus and Student Success

Presented by: Braden Nguyen

Faculty Sponsor: Dr. Nicha Otero

Field of Research: Psychology

While undergraduate students across universities perform poorly, possibly leading to academic failure, research studies have explored one factor to explain student success, which is campus involvement. Although it is impractical to identify a single measure of student success or lack thereof, grade point average (GPA) is one of many indicators of how well a student is succeeding. Longitudinal research studies have also been conducted that tracked students and their GPA and how it corresponded with involvement on campus. The current study examined the relationship between student involvement and student success. We hypothesize that there is a positive correlation between student involvement and student success. Students from the University of Arkansas – Fort Smith were asked to complete a six-item demographic questionnaire along with two surveys asking about their involvement. The results revealed there was a strong positive relationship between student involvement and student success. Previous works from Bergen-Cico and Viscomi (2012-2013) support the findings that students' participation in activities enhances the likelihood of doing well in their courses. Future research will investigate if there is a true difference between student classification and involvement with student success, types of involvement, and recommended quantity of such involvement.

Braden Nguyen, raised in Fort Smith, is a junior at UAFS pursuing a Bachelor of Arts in psychology with a minor in applied statistics. He is a first-generation student with goals to further his education. Upon graduation in fall of 2024, Braden will continue his academic journey in a Ph.D. program specializing in clinical psychology and dreams to open a center for psychological testing, evaluation, and assessment. In addition, he'd like to teach as a college professor. Braden enjoys pickleball with his friends in his free time.

Student Research Symposium

The Neurobiology of Maternal and Paternal Behaviors

Presented by: Lilly Brasuell and Jaylin Barroso

Faculty Sponsor: Dr. Nicha Otero

Field of Research: Psychology

This research review covers the neurobiology of maternal and paternal behaviors. The cause of this neurobiological shift is within the complexities of the social learning processes, brain circularity, and hormonal regulations. Many of these behavioral shifts are due to survival instincts that people have naturally. These natural instincts are what make it possible for offspring to thrive, grow, and adapt in the real world. The study will also show the positive impacts these parenting behaviors have on the child and parent. Many parenting behaviors are known to influence and shape the child's characteristics. These behaviors may arise due to biological factors such as hormones. Particularly, oxytocin, estrogen, progesterone, prolactin, testosterone, and vasopressin. The areas of the brain that undergo these changes include the hypothalamus, amygdala, prefrontal cortex, and the nucleus accumbens. These regions of the brain are highly active in maternal and paternal behaviors. The research will investigate the different parenting styles that occur because of these biological influences.

Lilly Brasuell was born and raised in Van Buren, Arkansas, and is a full-time student at the University of Arkansas - Fort Smith while also working part-time at River Valley Floral Distributors. She currently has an Associate of Arts degree, but is also planning to obtain a Bachelor of Arts in psychology. Lilly is a junior psychology major with a minor in social work, and she plans to work toward a master's at the University of Central Arkansas in hopes of becoming a school counselor. Lilly has been awarded several scholarships including the Arkansas Academic Challenge, Academic Excellence, and Harry O'Hamm Scholarship from Van Buren (Arkansas) High School, from which she graduated in 2021 in the top 10 percent of her class.

Jaylin Barroso is currently a full-time student at the University of Arkansas - Fort Smith. Born and raised in Fort Smith, she graduated with honors from Northside High School in 2019 and is currently a first-semester senior at the university. While in college Jaylin won first place in a Spanish poetry contest in the fall of 2022. In May 2023 she obtained an associate degree and next semester will receive a bachelor's degree with a minor in social work. Upon graduate Jaylin hopes to help more in the field and community. She currently works for KidsABA Services, which uses applied behavioral analysis to reshape the behaviors of children with autism. She is training to become a registered behavioral technician and hopes to begin supervisory training after receiving her bachelor's degree. Jayling enjoys working with children and hopes for the opportunity to continue following her passion.

Student Research Symposium

The Physiological Process of Emotions and Trauma

Presented by: Taylor Hartsfield and Gabrielle Travis

Faculty Sponsor: Dr. Nicha Otero

Field of Research: Psychology

This paper is a systematic review of previous research that aims to explore the physiological processes involved in the experience of emotions and stressful or traumatic events, which can lead to long lasting responses to our environment. Physiological processes, regarding trauma and emotions, are complex. Trauma and emotions may be either temporary or chronic and trigger different parts of our nervous system, including the autonomic nervous system (both the sympathetic and parasympathetic divisions), limbic system, and hypothalamic-pituitary-adrenal (HPA) axis. The body's physiological responses to stress, also known as emotions and trauma, influences the long-term outcomes for itself. Dysregulation between stress responses may cause other mental health issues as well. This may affect cardiovascular health, the immune system, emotional responses, memory, regulation, and overall well-being of a person. Furthermore, understanding the intricacies of the different systems involved within stress responses may also help further the research and progress for the treatment of individuals with post-traumatic stress disorder.

Taylor Hartsfield is a senior psychology major, born and raised in Greenwood, Arkansas. She plans to do something within the teaching realm, as her passions lie within teaching, voice acting, streaming, psychology, and gaming. After obtaining a bachelor's degree in psychology, she hopes to go to graduate school for either a master's or Ph.D.

Gabrielle travis was born in Muskogee, Oklahoma, and raised in the small town of Gore, Oklahoma. She is currently a non-traditional student and a standing senior with a major in psychology and minor in criminal justice. Her favorite schools of psychology are developmental psychology and behavior neuroscience, and she hopes to pursue a career in either field. After graduating with her bachelor's degree, Gabrielle hopes to get a master's degree in clinical psychology from the University of Central Oklahoma.

Student Research Symposium

Generational and Historical Trauma Affecting Native Americans

Presented by: Madison Cossey

Faculty Sponsor: Dr. Nicha Otero

Field of Research: Psychology

To what extent does the enduring legacy of generational and historical trauma significantly shape the contemporary well-being, mental health, and cultural resilience of Native American communities today? Native Americans continue to experience the detrimental impacts of generational and historical trauma, as evidenced by persistent mental health disparities, social challenges, and cultural disruptions within their communities. This project is a quantitative and qualitative research design that used google forms as a survey tool and interviews for a more in-depth perception. The survey and interviews were conducted virtually and in-person to anyone willing to participate. Findings indicate that Native American individuals and communities are indeed impacted by the lingering effects of generational and historical trauma. This underscores the significant impact of generational and historical trauma on Native American communities. The data highlights the enduring influence of historical events on the well-being and experience of Native individuals. Recognizing and understanding these challenges is crucial for developing targeted interventions and support systems that address the unique needs arising from the complex interplay of generational and historical trauma within Native American communities. The data advocates for proactive measures to disrupt the continued perpetuation of trauma and to promote healing and resilience among Native communities.

Madison Jade Cossey is a senior psychology major at the University of Arkansas - Fort Smith. She is 22 years old and from Spiro, Oklahoma. She is a Native American, both Choctaw and Chickasaw. Today she will be presenting research on generational and historical trauma affecting Native Americans.

Library 209 Presentations in English & Literature

Noon Isabella Serrano

12:30 Rebecca Morrison

1:00 Tatum Leary

1:30 Gabbie Stokes



Escaping Blood: The Intersection of Race and Gender Identity in Brit Bennett's Novel "The Vanishing Half"

Presented by: Isabella Serrano

Faculty Sponsor: Dr. Lindsay Lawrence

Field of Research: English

In "The Vanishing Half" (2020), Brit Bennett explores how different dimensions of identity intersect, specifically the intersection of race and gender. Bennett positioned her novel during the second half of the twentieth century to reflect the overlapping strands of racism and sexism faced by her dual protagonists Desiree and Stella. "The Vanishing Half" is a part of a long history of narratives exploring how racial passing as white alters a character's identity beyond just their race, in particular the passing of whiteness alters a woman's experiences in sexism. Racial passing occurs when a person classified as a member of a racial group is accepted or perceived as another. Bennett reimagines the well-worn elements of racial passing literature through one of her protagonists Stella. Stella Vignes is a light-skinned black woman who passes as white, whereas her identical twin sister, Desiree stays true to her roots and remains a black woman. Desiree and Stella serve as the perfect foil to one another, although their womanhood is uniting, the white privileges granted to Stella and not to Desiree create a divide.

Drawing primarily from the work of Kimberlé Crenshaw's intersectionality theory, along with Simone De Beauvoir and bell hooks, Crenshaw's term "intersectionality" (1989) suggests that there is double discrimination of racism and sexism faced by black women. Therefore, to only contemplate Desiree and Stella's female identity as molding their daily experience would be a misdiagnosis, because the sexist discrimination Desiree and Stella face is heavily influenced by their racial identities as black and white women. Desiree's discrimination as a female is compounded by her race, whereas Stella only considers her womanhood as causing her unjust treatment rather than how her passing whiteness contributes to her sexist inequality. I argue that in Bennett's novel "The Vanishing Half," Desiree and Stella's diverse experiences exemplifies that sexism is not monolithic, but heavily impacted by other points of advantages and disadvantages in their identity, primarily their race.

Isabella Serrano is originally from Amarillo, Texas, and decided to come to UAFS primarily for the opportunity to play on the women's tennis team. She is passionate about reading and writing. Her time at UAFS has allowed her to understand that she can be more than just a tennis player. She has found that she was academically able to achieve things that seemed outside her reach.

“The pen has been in their hands”: The Preservation of Female Autonomy in Austen’s “Persuasion”

Presented by: Rebecca Morrison

Faculty Sponsor: Dr. Lindsay Lawrence

Field of Research: English

Jane Austen’s 1880 novel “Persuasion” satirizes nineteenth century society’s perceptions of gender. The protagonist, Anne, is believed to have missed her opportunity to find security and fulfillment through marriage. Eventually, she finds love with a man who completely respects and admires her despite Anne being in her late twenties – an incredibly progressive narrative choice for the time. Many scholars, including Warhol and Morrison, have previously analyzed Anne’s portrayal and gender in “Persuasion,” but my focus is on how Austen uses the confines of a socially-acceptable, heterosexual relationship to demonstrate the potential for equality within marriage. Utilizing works of feminist theory by Butler and de Beauvoir, as well as articles from scholars such as Warhol and Brown, I suggest that Austen’s masterful depiction of a relationship in which female autonomy is prioritized is invaluable to those within a patriarchal society. My stance is staunchly in opposition to critics who have condemned Austen’s work as anti-feminist. I argue through the use of essentialist and constructionist theory that Austen, while still upholding certain traditional beliefs, helps argue for improved conditions for women within the parameters of a socially acceptable marriage by crafting a successful, nonconforming relationship in her novel “Persuasion.”

Rebecca Morrison is currently enrolled as a senior at UAFS majoring in English with a minor in history. She finds the most academic satisfaction when these two fields of study intersect. When she is not reading classic literature or critiquing films, she is likely working as a library assistant at the Fort Smith Public Library. Upon graduating with her B.A., Rebecca hopes to continue her education and attain an M.A. or MLIS.

Weaponizing Femininity and Romance: Gender as a Performance and Compulsory Heterosexuality in The Hunger Games Trilogy

Presented by: Tatum Leary

Faculty Sponsor: Dr. Laura Witherington

Field of Research: English/Literature

Suzanne Collins's *The Hunger Games* Trilogy swept the nation when the first novel was released in 2008 and again when the first of four films was released in 2012. This series features Katniss Everdeen as she fights her way through the death match of "The Hunger Games," the rough political climate of "Catching Fire," and the warfare of "Mockingjay." I argue Katniss weaponizes femininity and heterosexuality through performing aspects of gender to survive and then overthrow an oppressive government. Specifically, I address the evolution of her performance across the trilogy. Katniss moves from a dainty, little lovesick girl in "The Hunger Games," to a woman preparing for her wedding and being a mother in "Catching Fire," and finally to the face of the rebellion in "Mockingjay."

Tatum Leary is currently a senior pursuing a bachelor's degree in English with a creative writing minor. After college she plans to pursue a master's degree in English with a focus on women, gender, and sexuality studies. Her favorite part of the writing process is the research.

Student Research Symposium

“Pride and Prejudice and Zombies”: The Unmentionable Parody Adaptation

Presented by: Gabbie Stokes

Faculty Sponsor: Dr. Cammie Sublette

Field of Research: English

Reviews of “Pride and Prejudice and Zombies” are mixed; while many in the academic world and those who are faithful fans of Jane Austen approach this adaptation with disdain, there exists another group of Austen fans who appreciate and look forward to any media that alludes to or draws inspiration from Austen’s world. Austen’s divided fanbase does not have much overlap with the zombie crazed fans of the apocalypse, so the ability for “Pride and Prejudice and Zombies” to draw from all three groups shows the breadth of appeal that this adaptation has on fanbases and fidelity. Drawing from Henry Jenkin’s work on convergence culture and scholarly analyses of the response of fans of Jane Austen to “Pride and Prejudice and Zombies,” this paper will discuss the influence of convergence culture and fandom in the discourse surrounding the 2009 novel adaptation “Pride and Prejudice and Zombies” as well as its subsequent film adaptation in relation to the fidelity the adaptations pay to the original text.

Gabbie Stokes is a junior English major with a minor in diversity studies at UAFS and is a member of the Myles Friedman Honors Program. She is the president of Anonymous Was A Woman Book Club, social media manager of Hmong Student Association, and a member of Sigma Tau Delta. She works at the UAFS Writing Center as a writing tutor and can often be found there in her free time. After graduation Gabbie plans to attend graduate school to continue her education. Her hobbies include sewing, gardening, reading, and spending time with her friends and family.

Health Science 121 Presentations in Accounting & Public Transportation

Noon Noah Ottman

12:30 Joy Wootton

1:00 Dalton Oxford



Student Research Symposium

The Current State of Corporate Social Responsibility

Presented by: Noah Ottman

Faculty Sponsor: Dr. Randall Stone

Field of Research: Accounting

This scholarly investigation analyzes the contemporary landscape of Corporate Social Responsibility (CSR), a concept that obligates enterprises to uphold a heightened level of accountability transcending governmental mandates. CSR posits businesses not merely as entities functioning within society but as integral components thereof. Given the disparate regulatory frameworks established by diverse organizations and governmental bodies pertaining to CSR, this investigation endeavors to dissect the manner in which distinct industries and nations navigate and adhere to CSR principles. This study undertakes a comparative analysis of CSR models to furnish a more nuanced understanding of the concept and its ramifications. Moreover, this inquiry adopts a holistic perspective by examining CSR through the lens of both the stakeholder and corporate entities, with a particular focus on Tesla, Inc.'s impact on stakeholders and the perspectives and implementations of CSR by financial analysts and accountants. The conclusions drawn from this investigation underscore the exigency for further systematic inquiry into the subject matter, thereby advocating for enhanced scholarly attention to the concept of CSR.

Noah Ottman is a sophomore business administration student with a concentration in accounting. He is part of the Myles Friedman Honors Program and works as a tutor and resident assistant on campus. He is currently delving into corporate social responsibility through the Honors Program. Upon graduation from UAFS, he aspires to pursue a Master of Accountancy and become a CPA, aiming for a career in audit.

Student Research Symposium

Accounting for Cryptocurrency by GAAP Standards

Presented by: Joy Wootton

Faculty Sponsor: Dr. Randall Stone

Field of Research: Accounting

The goal of my research is to determine the accounting methods that should be used to record transactions of cryptocurrency, such as Bitcoin, based on the United States Generally Accepted Accounting Principles (GAAP). It is important for investors, bookkeepers, tax professionals, and other stakeholders to have a clear understanding of the principles of accounting for these types of assets in order to remain compliant. There is much debate in the regulatory world regarding the classification of cryptocurrency and whether or not changes need to be made to accommodate the continuing growth in its popularity. As cryptocurrency was only very recently introduced, there are no existing standards specifically tailored to its unique characteristics. To determine whether cryptocurrency should be classified as foreign currency, intangible assets, or some other type of asset, I have studied its characteristics and matched them to GAAP definitions of various assets. My support and conclusions are drawn from existing GAAP standards and regulations for financial assets, potential legislative updates specific to cryptocurrencies, and consulting previous related research of other accounting scholars and professionals.

Joy Wootton began her accounting education at the University of Arkansas - Fort Smith in August 2020. She will graduate with a bachelor's degree in May of 2024 and continue her education through the Master of Accountancy program at the University of Central Arkansas in order to meet certain requirements for CPA certification. In her time at UAFS and through the internship opportunities she has taken, not only has she been taught the fundamentals and complexities of accounting, but she has also discovered in herself a passion for accounting and a desire to understand it to the best of her ability. She makes a strong effort to stay in tune with new and upcoming changes in accounting practice, especially in the realm of taxation, which is an area in which she has taken a particular interest.

Student Research Symposium

A Study of Relations Between Crime and Public Transit Commuting in the Pre-COVID U.S.

Presented by: Dalton Oxford

Faculty Sponsor: Dr. Bun Song Lee

Field of Research: Public Transportation

Public transportation has served an important role in media and historical development as a cheaper and often faster method of transportation. However, America lags behind other countries in the success of public transportation due to both funding factors and commuting preferences. The paper is an analysis of the influence of basic socioeconomic variables and crime rates on the public transit commuting rates and whether a negative relationship exists between crime and public transit ridership rates, particularly among women and the elderly. Regressions and other common statistical methods are used on national-level data provided by the American Community Survey and the National Incident-Based Reporting System for 2015 to 2019. Research results should emulate the relationship between crime and public transit commuting, providing insight for public policy and future endeavors.

Dalton Oxford is a computer science major with a concentration in data analysis and a minor in applied statistics. He is an undergrad research aid for agrant hosted by the UAFS Business Department. He likes to work out in his free time.

Health Science 124 Presentations in History, Political Science, & Costume Design

Noon Korina Lopez

12:30 Mitchell Collins

1:00 Gavin Garrett



The Nightmare Beyond the Battlefield: A Glimpse into Civil War Prison Camps

Presented by: Korina Lopez

Faculty Sponsor: Dr. Evan Rothera

Field of Research: History

Who was the only Confederate officer executed for war crimes committed during the U.S. Civil War? The response is not Jefferson Davis or Robert E. Lee, but instead Henry Wirz. Wirz's role as commandant of Andersonville, a Confederate prison camp, led to his execution. Wirz's execution reveals the critical role that prison camps played in the U.S. Civil War. This paper examines the U.S. Civil War from the perspective of the prison camps by analyzing the camps' functions and structure, the prisoners' lives, and the consequences and memory of the camps. The Union and Confederacy each developed camps to hold prisoners of war. Some may view the existence of these camps as logical as there was a need to keep prisoners detained. However, through a deeper evaluation of these camps it becomes evident that these camps could be death sentences. These camps were often underfunded and unsanitary which created heavy death tolls and prolonged periods of suffering for prisoners. Through researching both Union and Confederate camps, new layers of the war are uncovered, providing a glimpse into the horrors beyond the battlefield.

Korina Lopez is a 21 year old from Elkins, Arkansas. She is a first-generation student, which has fueled her drive and passion for education. She is pursuing her bachelor's in political science with a minor in history and will be graduating in May 2024. Korina is a member of the Myles Friedman Honors Program and serves as the director of membership for the Campus Activities Board. After graduating from UAFS, she intends to further her education at the University of Arkansas School of Law and pursue a career as an immigration lawyer.

The Rise of Political and Social Distrust, Division, and Disenfranchisement in Modern Institutions

Presented by: Mitchell Collins

Faculty Sponsor: Dr. Eric Baker

Field of Research: Political Science

This paper, in exploring the rise of political and social distrust, division, and disenfranchisement in modern institutions, as well as its sources and causes, is composed of three sections to (1.) consider what various academic journal articles, studies, and a notable book on the matter have to say regarding this rise; (2.) present the methods and research of a survey of University of Arkansas - Fort Smith (UAFS) students, staff, and faculty conducted for this paper; and (3.) record firsthand accounts from academic experts and politicians on their perspectives and knowledge of this rise. As a whole, this paper outlines some of the sources and causes of today's distrust, division, and disenfranchisement, defines — in a snapshot — the views of various demographic groups on political and social institutions, and in doing so, reflects upon this research alongside thoughtful accounts from those in academia and politics on when, how, and why Americans began to lose faith in not only the government, but in the culture of society itself.

Mitchell Collins is a political science major with a minor in professional writing at UAFS. He has worked as a tutor at The Writing Center for the past year and has previously worked in homecare and landscaping. He is originally from the Pacific Northwest, but has moved a lot, spending most of his time in Idaho, Oregon, and now Arkansas for the past six years.

A big part of his life is that he's played a primary role in caring for a sibling with autism, essentially acting as a surrogate parent, which has helped shape him and his future goals, which include law school and a public interest career.

Student Research Symposium

Cut, Curate, Costuming: A Costume Designer's Process

Presented by: Gavin Garrett

Faculty Sponsor: Dr. Elizabeth Momand

Field of Research: Costume Design

For centuries the costumes of theatrical productions have evolved from the simplicity of the Ancient Greek and Roman style to the exaggerated fashion of the Renaissance to the realistic style of contemporary and modern theatre. With the director's vision, the goal of a costume designer is to accurately portray the actor as their character in the correct time-period and within the given circumstances of the text. When costuming a show, a designer can take one of two routes: curating and crafting. Crafting consists of designing patterns, choosing fabrics, and completing the construction of every garment, while curating is like a game of search and rescue for the perfect pieces.

My process as the costume designer for the UAFS Music and Theatre production of "9 to 5: The Musical" has been one of curation. Following my director's vision, I have had to curate this show by searching through our costume shop, thrifting pieces that fit into the 1970s style, as well as find pieces that support the fantasy section of the musical. With a cast of 22 people and each person having more than one costume, this task has proven to be a challenging, yet rewarding experience.

Gavin Garrett is currently a senior pursuing a bachelor's degree in theatre. During his time at UAFS, Gavin has been active in all areas of production including acting, directing, stage management, lighting design, and costume design. After graduation Gavin hopes to start working in the theatre industry or attend graduate school for directing.

Health Science 133 Presentations in Chemistry, Biochemistry, & Latino Studies

Noon Khuong (Peter) Ta

12:30 Lyndsie Hicks

1:00 Marlene Toledo

1:30 Daniela Morales Hernandez



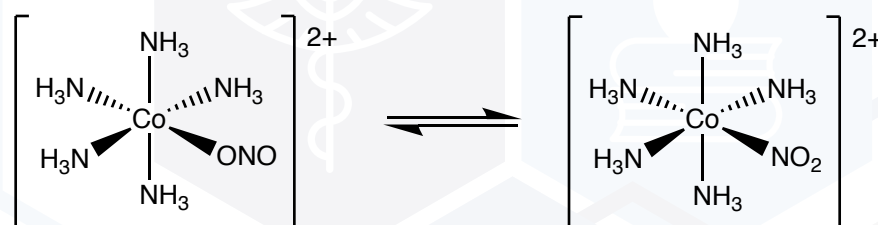
The Interconversion of Cobalt Ammine Complexes that are Linkage Isomers

Presented by: Khuong (Peter) Ta

Faculty Sponsor: Dr. David J. Burkey

Field of Research: Chemistry

The results of our investigation into the interconversion and equilibrium dynamics for the two cobalt ammine complexes, $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$ and $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$, will be presented. These two complexes are linkage isomers—they differ only in the atom (either an oxygen or a nitrogen) of the NO_2^- ligand that is bonding to the cobalt in the complexes. The methods of synthesis for pure samples of each isomer will be discussed, and the effect of various conditions (temperature, exposure to light) on their interconversion and equilibrium in the solid state, will be reviewed. Initial attempts at extending this research to other types of linkage isomers for the cobalt ammine complexes will also be presented. This study contributes further insights into the equilibrium dynamics associated between different linkage isomers, which has potential applications in materials science and sensors.



Khuong (Peter) Ta was born in Cantho, Vietnam. After finishing his junior year at Ly Tu Trong High School, he moved to the United States as an exchange student. He is currently pursuing a degree in biochemistry at UAFS. He also works as a student worker in the Physical Sciences Department. Peter is a member of the Vietnamese Student Association and Pi Kappa Phi fraternity. He is the communications specialist for the UAFS League of Legends eSports Program. In his free time, he enjoys watching movies, studying history and political science, listening to music, and hanging out with friends.

Investigating the Interaction of Human Serum Albumin with Organochlorine Pesticides: A Case of Dynamic vs Static Quenching

Presented by: Lyndsie Hicks (co-researcher Luke Jodoin)

Faculty Sponsors: Dr. Rahul Yadav and Dr. Archana Mishra

Field of Research: Biochemistry

Human serum albumin (HSA) is the most abundant plasma protein. It binds and acts as a transporter/reservoir of endogenous ligands such as fatty acids, heme, bilirubin, prostaglandins, metal ions, etc. HSA also binds to various exogenous ligands, including pharmacological drugs, affecting their pharmacokinetics/ADME. HSA is a 66 kDa monomeric, multidomain (domains I, II, and III) protein and characterized by two main ligand binding sites, Sudlow I and II. The Sudlow I binding site contains the only tryptophan (Trp214) present in the HSA, which is often used as a probe to determine ligand binding in Sudlow I site. Here, we have determined the molecular interaction of an organochlorine class of herbicide and insecticide, quinclorac (QUC) and 4,4 dichlorodiphenyldichloroethane (4,4-DDD), with HSA using fluorescence spectroscopy. These organochlorines have high toxicity (low LD50) and long half-life and can remain in soil, water, and organisms for an extended period of time.

The quenching of intrinsic tryptophan fluorescence of HSA upon QUC and 4,4-DDD binding shows both ligands binding to the Sudlow I binding site. The affinity constant ($< 100 \mu\text{M}$) and stoichiometry of binding (1:1) were determined at three different temperatures based on tryptophan quenching. The thermodynamic parameters for ligand binding were determined from van't Hoff equation that showed free energy (ΔG) of -6.5 kcal/mol for the interaction of QUC with HSA, which is driven by favorable enthalpy. Moreover, the interaction of QUC and HSA is characterized by static quenching; in contrast, the interaction of 4,4-DDD with HSA is characterized by dynamic quenching, indicating a different binding mechanism for both ligands. These results indicate differences in the binding mechanism of two organochlorine ligands with HSA.

Lyndsie Hicks is a graduating senior majoring in biochemistry with a minor in psychology. While she only just started doing research last summer, she has always been interested in doing research with cancer and nanomedicine. She is also involved on campus as treasurer of the Student Veterans Organization. After she graduates she plans to continue doing research either as a graduate student or a research assistant.

La educación de hogar como fuerza sin fronteras / Homeschooling as a Force Without Borders

Presented by: Marlene Toledo

Faculty Sponsor: Dr. Mary Sobhani

Field of Research: Latino Studies

Las familias hispanas en Estados Unidos, particularmente inmigrantes recién llegados, tienen el derecho saber de sus opciones para la educación y crianza de sus hijos. Estar bien informados capacita a cada familia a tomar el mejor rumbo de aprendizaje para las necesidades de esa familia. A pesar de que hay un crecimiento de familias eligiendo la educación en hogar -- ya que permite moldear un plan de estudio que de otra forma no reciben en las escuelas publicas -- existe una falta de familias hispanas en las comunidades de educación de hogar. Este trabajo de investigación argumenta que esto se debe en gran parte a la falta de información y recursos para esta población hispano-hablante. La educación de hogar fortalece los lazos entre la relación de padres e hijos lo cual puede contribuir positivamente a la sociedad y promover el bienestar y desarrollo económico de nuestras comunidades.

Hispanic families in the United States, particularly immigrant families who have just arrived to this nation, have the right to know all their options for the education and upbringing of their children. Possessing information on educational options equips each family to decide the best path of learning for its needs. Although there is an increase in the number of families choosing homeschooling -- as it allows parents to customize a curriculum that their children might not otherwise receive in public schools -- there is a lack of Hispanic families in homeschool communities. This study argues that this is due in part to the lack of information and resources available for this population. Homeschool education strengthens ties between parents and children which can contribute positively to society and promote well-being and economic development in our communities.

Marlene Toledo es una alumna no-tradicional en la Universidad de Arkansas - Fort Smith. Tiene treinta y cinco años y tiene cuatro hijos. Tiene una passion por la educacion de hogar pero lamenta que no encuentre muchas familias hispanas. Espera que con su licenciatura de español pueda ayudar no solo a estudiantes a aprender español pero también a animarlos a explorar la herencia de la cultura de sus padres, sin importar si es europea, asiatica o hispana. Marlene disfruta explorar diferentes culturas y le gusta aprender de todo tipo de gente sin dejar de estar orgullosa de ser hispana y estadounidense.

Student Research Symposium

¡Español para emergencias! / Spanish for Emergencies!

Presented by: Daniela Morales Hernandez

Faculty Sponsor: Dr. Mary Sobhani

Field of Research: Latino Studies

“Necesito a alguien que hable español para hablar con mi paciente...” Esta es una de las frases más comunes que se puede escuchar en un hospital localizado en una región con alta población hispana. En este estudio el objetivo principal fue investigar la necesidad de intérpretes médicos en nuestra región. Los intérpretes médicos son necesarios para asegurar el cuidado médico adecuado y la recolección correcta de los historiales médicos de nuestra comunidad hispano-hablante. En este trabajo se argumenta que la eliminación de las barreras del idioma es sumamente importante para el bienestar de nuestra región. Esta investigación se debe en gran parte a los estudios de Tunay Oguz, Robert A. Nathenson, Brendan Saloner, Michael R. Richards, y Karin V. Rhodes.

“I need someone who speaks Spanish to talk to my patient...” This is one of the most common phrases that can be heard in a hospital in a region with a large Hispanic population. In this study, the primary objective was to investigate the need for Spanish medical interpreters in our region. Medical interpreters are needed to ensure proper medical care and accurate patient history collection for the Spanish-speaking members of our community. This paper argues that eliminating the language barrier is of extreme importance to the well-being of our region. This research is indebted to the studies of Tunay Oguz, Robert A. Nathenson, Brendan Saloner, Michael R. Richards, and Karin V. Rhodes.

Daniela Morales Hernandez is a senior Spanish major with a TESL minor. Her interest in the need of Spanish medical interpreters stems from her personal encounters of having to interpret for her family members. As a UAFS student, she has been active in various cultural organizations, such as Vietnamese Student Association, K-Pop Appreciation and Dance Club, and Gamma Phi Beta, organizations in which she has honed her leadership skills through various officer positions. She plans to pursue a career as an interpreter after graduating from UAFS and keep helping her Hispanic community the best she can.

Poster Presentations Boreham Library



Molecular Dynamics Study of Organochlorine Ligand Interaction with Human Serum Albumin

Presented by: Sully Sanford

Faculty Sponsor: Dr. Archana Mishra

Field of Research: Chemistry

Table 1

This study aimed to understand the binding properties between organochlorine pesticides and the most abundant serum albumin, human serum albumin (HSA). HSA is a carrier/reservoir for various endogenous biomolecules such as steroids, fatty acids, bilirubin, and vitamins. HSA can also readily bind to many small molecules circulating in the blood, affecting the pharmacokinetics/ADME of these molecules. HSA is a 66 kDa monomeric, multidomain (domains I, II, and III) protein characterized by two main ligand binding sites, Sudlow I and II.

Here, we have determined the molecular interaction of an organochlorine class of herbicide and insecticide, quinclorac (QUC) and 4,4 dichlorodiphenyldichloroethane (4,4-DDD), with HSA using molecular docking and simulation. These organochlorines have high toxicity (low LD50) and long half-life and can remain in soil, water, and organisms for an extended time. Here, we study the binding of these two pesticides with HAS at Sudlow I based on the experimental findings using fluorescence. These pesticides were also chosen because of their differing molecular properties.

Molecular docking was first performed to determine the pesticide's binding affinity for the ligand-binding site, Sudlow I, using induced fit docking in Schrodinger Maestro. Further, molecular dynamics simulations (MD) of HSA with and without pesticide in the binding pocket were performed using GROMACS and CHARMM force field. The results obtained from the docking and MD simulation study show the structural characteristics of two molecularly different pesticides that interact with the Sudlow-I binding site of HSA.

Sully Sanford is a sophomore pre-med chemistry major in computational chemistry research.

Investigating Galectin Glycoprotein Interaction with Sialoglycans and Nanoparticles

Presented by: Luke Jodoin (co-researcher Lyndsie Hicks)

Faculty Sponsors: Dr. Rahul Yadav and Dr. Archan Mishra

Field of Research: Biochemistry

Table 2

Mammalian cells carry various surface glycoproteins important for regulating cellular processes such as inter/intracellular signaling, cytoskeletal remodeling, cell-cell recognition, and adhesion. Galectins are one such class of lectin glycoproteins that bind to surface glycan, to which sialic acid is often the terminal glycan (sialoglycan). Lectins, including galectins, can recognize and bind various cis-/trans-sialoglycans to activate/inhibit signaling pathways. Studies have shown altered glycosylation in tumor cells compared to normal cells, which could be utilized to detect cancer-specific glycans and early detection of tumor progression. This study aims to determine (1) glycan recognition and selective binding to lectins (galectin and bacterial lectin) and (2) Make a lectin and nanoparticle probe for selective recognition of glycans.

In the first aim, we have utilized Schrodinger induced fit docking to study the selective binding of lectins with various sialic acid glycans (N-acetylneuraminic acid, N-glycolylneuraminic acid, N-acetylneuraminic acid- α (2,3)-galactose, N-acetylneuraminic- α (2,6)-galactose, N-acetylneuraminic acid- α (2,6)-N-acetylgalactosamine, and N-acetylneuraminic acid- α (2,8)-N-acetylneuraminic acid). In aim two, we have determined the absorption of human galectin-3 and bacterial lectin onto bare (20 nm) and serum-coated gold nanoparticles using the surface plasmon resonance phenomenon. Our results show a red shift in the SPR signal of gold nanoparticles, indicating protein adsorption to the bare and serum-coated nanoparticles. In conclusion, our initial results show that lectin-nanoparticles can be developed as a probe to detect specific sialoglycans.

Luke Jodoin is a junior chemistry major. He has been doing research for two years and has a goal of going to graduate school to continue research in polymers, batteries, solar cells, or organic solar cells. His ultimate goal is to expand his overall knowledge and make a worthwhile contribution to the scientific community. He also has an interest in teaching students who need chemistry so he can share his passion and help them navigate such an exciting subject. He is also involved on campus as the vice president of the Student Veterans Organization.

Phylogenetic Analysis and Molecular Adaptation Events in Whales and Dolphins

Presented by: Armonii Dixon and Kiara Thomas

Faculty Sponsor: Dr. David McClellan

Field of Research: Evolutionary Biology

Table 3

This poster presentation showcases the comprehensive methodology employed to investigate the evolutionary dynamics within whales and dolphins through molecular analysis of the cytochrome oxidase subunit 1 (COI) and cytochrome b (cyt-b) full protein-coding mitochondrial gene sequences. The study involved assembling a robust dataset from the GenBank database (<https://www.ncbi.nlm.nih.gov/genbank/>), utilizing the Molecular Evolutionary Genetics Analysis (MEGA) software version 11 (Stecher, Tamura, and Kumar, 2020). Sequences were aligned using the Clustal W algorithm (Larkin et al., 2007) within MEGA to ensure accuracy, consistency, and homology. Phylogenetic reconstruction was performed using MEGA with the Maximum Likelihood optimality criterion, enabling the elucidation of evolutionary relationships among the diverse species of whales and dolphins. This approach provides insights into the genetic divergence and evolutionary history of the COI and cyt-b gene sequences. Furthermore, the resulting phylogenetic tree structure served as a foundation for estimating the timing of molecular adaptation events in COI and cyt-b since the divergence of cetaceans from the other Cetartiodactyla. The TreeSAAP software package (Woolley et al., 2003) facilitated this analysis, allowing for the identification and characterization of adaptive changes in the protein-coding regions of these genes. Through this interdisciplinary approach combining bioinformatics tools and evolutionary genetics principles, our study contributes to a deeper understanding of the evolutionary processes shaping the genetic diversity and adaptation in current marine mammal populations.

Armonii Dixon is a biology student studying pre-medical sciences at the University of Arkansas - Fort Smith. Her long-term goal is to pursue a career in pediatrics/ OBGYN, driven by her passion for working with children. Armonii was born and raised in South Carolina, but has spent most of her life in Rogers, Arkansas, where she graduated from Rogers New Technology High School.

Kiara Thomas is current a student at the University of Arkansas - Fort Smith majoring in biology with a concentration in biomedical professions. She has aspirations of pursuing a career in dentistry, particularly specializing in orthodontics. Kiara hails from Mansfield, Arkansas, where she has resided her entire life. She proudly graduated as the valedictorian of her class at Mansfield High School.

Molecular Evolutionary Analysis of Jellyfish: Insights from COI and cyt-b Gene Sequences

Presented by: Ciera Grijalva

Faculty Sponsor: Dr. David McClellan

Field of Research: Evolutionary Biology

Table 4

This poster presentation presents a methodical exploration of the evolutionary dynamics within jellyfish (Phylum Cnidaria), focusing on the molecular analysis of cytochrome oxidase subunit 1 (COI) and cytochrome b (cyt-b) full protein-coding mitochondrial gene sequences. The study involved the meticulous compilation of an appropriate dataset sourced from the GenBank database (<https://www.ncbi.nlm.nih.gov/genbank/>), facilitated by the utilization of Molecular Evolutionary Genetics Analysis (MEGA) software version 11 (Stecher, Tamura, and Kumar, 2020). Sequences were meticulously aligned using the Clustal W algorithm (Larkin et al., 2007) within MEGA to accurately ensure homology. Phylogenetic reconstruction was carried out employing the Maximum Likelihood optimality criterion within MEGA, thereby unveiling the intricate evolutionary relationships among selected jellyfish species. This approach offers valuable insights into the genetic differentiation and evolutionary trajectories within this enigmatic marine taxon. Furthermore, the resulting phylogenetic framework served as a cornerstone for estimating the temporal occurrence of molecular adaptation events in COI and cyt-b. Leveraging the capabilities of the TreeSAAP software package (Woolley et al., 2003), our analysis unveiled significant adaptive changes within the protein-coding regions of these genes. Through combining advanced bioinformatics tools with fundamental principles of evolutionary genetics, this interdisciplinary investigation sheds light on the evolutionary mechanisms governing genetic diversity and adaptation in extant jellyfish populations.

Ciera Grijalva is a sophomore at the University of Arkansas - Fort Smith pursuing a degree in biological science. She is from Magazine, Arkansas, and graduated high school there in 2022 at the top of her class. When not studying or working, Ciera enjoys the arts, cooking, and spending quality time with friends and family. As the oldest of four children, she strives to set a good example for her younger siblings. After graduating she plans on working in Arkansas for a few years before looking for opportunities outside of the state.

Exploring Evolutionary Dynamics in Old-World Mice and Rats: A Molecular Analysis of COI and cyt-b Gene Sequences

Presented by: Laney Wagner

Faculty Sponsor: Dr. David McClellan

Field of Research: Evolutionary Biology

Table 5

This poster presentation offers an in-depth exploration of the evolutionary dynamics within Old World mice and rats of the Family Muridae, focusing on the molecular analysis of cytochrome oxidase subunit 1 (COI) and cytochrome b (cyt-b) protein-coding mitochondrial gene sequences. The study meticulously assembled a robust dataset from the GenBank database (<https://www.ncbi.nlm.nih.gov/genbank/>), leveraging the capabilities of Molecular Evolutionary Genetics Analysis (MEGA) software version 11 (Stecher, Tamura, and Kumar, 2020). The alignment of sequences was conducted using the Clustal W algorithm (Larkin et al., 2007) within MEGA, ensuring the accuracy and homology of the dataset. Phylogenetic reconstruction, employing the Maximum Likelihood optimality criterion within MEGA, revealed intricate evolutionary relationships among the diverse species within Muridae. This phylogenetic framework offers valuable insights into the genetic divergence and evolutionary history of Old World mice and rats. The resulting phylogenetic structure served as the foundation for estimating the timing of molecular adaptation events in COI and cyt-b. Utilizing the TreeSAAP software package (Woolley et al., 2003), our analysis unveiled significant adaptive changes within the protein-coding regions of these genes, shedding light on the evolutionary pressures shaping the genomes of Old World murine rodents. By integrating advanced bioinformatics tools with fundamental principles of evolutionary genetics, this interdisciplinary investigation provides a nuanced understanding of the evolutionary processes driving genetic diversity and adaptation in Old World mice and rats.

Laney Wagner is a senior at the University of Arkansas - Fort Smith majoring in biology. She plans to continue her education and pursue a medical degree after graduation. Laney has always had a passion for sciences, and she feels incredibly grateful to be able to practice her passion at UAFS. When she is not occupied by schoolwork, Laney enjoys hiking and engaging in various outdoor activities.

Student Research Symposium

Probiotics: Capsules, Gummies, and Liquids and the Impact of Delivery Methods on Growth Rates

Presented by: Nayda Barbry, Lana Putman, and Samantha Gates

Faculty Sponsor: James Brandli

Field of Research: Biology

Table 6

Probiotics are widely used across the United States and are classified as microorganisms that are alive and have benefits on health. The National Center for Complementary and Integrative Health describes what Probiotics might do to help our bodies. Probiotics might help our bodies maintain a healthy community of microorganisms, produce substances that have desirable effects, influence our body's immune response, along with an array of many other impacts. There are two types of bacteria that are common among probiotics: Lactobacillus and Bifidobacterium. The probiotics in this experiment contain one or both bacteria. Since the 1900's, the idea of probiotics has changed, and we now have a better understanding of them. Since the original idea arose, manufacturers have developed several delivery methods to disperse probiotics to people interested in taking supplements to benefit their gut biome. The delivery methods we are discussing include capsules, liquids, and gummies. There seems to be a significant knowledge gap on the testing of probiotics, especially for different delivery methods. We are experimentally determining the impact of delivery methods on growth rates of bacteria in the probiotic supplements. It is important to the health of our communities to determine which delivery method of probiotics works the best. We predict that the most common delivery method of bacteria, which is capsules, will grow the best when referring to the number of bacteria because it is the least invasive way to deliver probiotics and it is cheaper for companies to produce.

Nayda Barbry graduated from Sheridan (Arkansas) High School in 2019 and attended Henderson State University for two years before transferring to UAFS. She is majoring in biology and minoring in business administration, graduating this May. She is currently employed as a vet tech, and her goal is to attend veterinary school. Her favorite activities are hiking and spending time with family and friends.

Lana Putman is from Whitesboro, Oklahoma, and has an associate degree in allied health at Carl Albert State College. She is a senior at UAFS, earning her bachelor's degree in biomedical professions. Upon graduation in May 2024, she will start her next academic journey by attending physician assistant school at Northeastern State University in Muskogee, Oklahoma. Lana desires to work for the Choctaw Nation in Talihina, Oklahoma, as a physician assistant.

Samantha Gates is a senior at UAFS. She has been a physical therapist assistant for almost 10 years and returned to school for a bachelor's degree. After graduating in May, she plans to take a gap year while applying to online physician assistant programs and focus on her family. She has three children and has been married for 12 years.

Student Research Symposium

Land-use and Diffuse Pollution: A Look at Jack Nolan Lake in Greenwood, Arkansas

Presented by: Analise Black, Anna Carden, and Noah Tawney

Faculty Sponsor: James Brandli

Field of Research: Biology

Table 7

With increased population comes increased infrastructure such as industry, agriculture, and residential dwellings. Each of these land-use activities have the potential to make pollution worse, including pollution caused by land-use due to runoff. It is understood that land-use directly impacts water quality in some way. This study aims to understand the impacts of land-use on Jack Nolan Lake in Greenwood, Arkansas and to improve the decision-making associated with land-use change. During this project, water samples will be taken and analyzed for Phosphate, Nitrate, COD, Turbidity, herbicide, E. Coil, coliforms, and PH levels at deferent depths. The information gained through this study will be used to help develop in the future a forecasting AI to predict land-use up-stream from bodies of water.

Analise Black is a senior at the University of Arkansas - Fort Smith. She is completing her biology degree on her way to becoming a marine biologist working in conservation. Analise has a love for science and lab work. In her free time she likes to relax and watch shows that she likes.

Anna Carden is a sophomore biology student at UAFS. Her concentration is in biomedical professions. She was born and raised in Little Rock, Arkansas. Anna enjoys hiking, swimming, and volunteering in her free time.

Noah Tawney is a sophomore pursuing a biology pre-medical degree at the University of Arkansas - Fort Smith. He recently decided to switch majors and pursue the medical school route. Since the change Noah has had the pleasure of being able to shadow an outstanding vascular surgeon, Dr. Chris Stout. He has also been able to join a research team to further develop his skills. At UAFS he is currently the president of Kappa Alpha Order fraternity. His goal for his career is to be a surgeon. The dream really started when he was a kid. Almost all of his family on his maternal side is in the health care industry. While he has an idea of what kind of surgeon he would like to be, he's not going to limit his decisions this early on in his career. Overall, his goal is to be the best doctor and human he can be.

Exploring Genetic and Environmental Factors that Control Differentiation of Pseudoplasmodium in Dictyostelium discoideum

Presented by: Evan Wittig

Faculty Sponsor: Dr. Sandhya Baviskar

Field of Research: Cell and Developmental Biology

Table 8

One of the multicellular stages during Dictyostelium development life cycle is the pseudoplasmodium stage, also known as the slug stage, which is formed at 14 to 16 hours of development. A slug is a 1-2 mm long tubular structure consisting of differentiated cells. A slug looks relatively undifferentiated but contains several cell types such as anterior pre-stalk cells, posterior pre-spore cells, and in the posterior region, anterior-like cells. We conducted experiments to explore if slug cells can undergo dedifferentiation and found that differentiated cells of slug in the presence of food source, either bacteria or nutrient medium, undergo dedifferentiation but not in presence of non-nutrient medium like phosphate development buffer. These findings have prompted us to explore the expression of developmentally regulated genes and role of environment factors in dedifferentiation of slug cells. Using RT-PCR technique, the expression of two developmentally regulated genes: *ecmA* and *pspA* will be studied in dedifferentiated cells because their expressions are required to form a slug. We will explore if there is any relation between expression of developmentally regulated genes and environmental factors such as light, temperature, and humidity.

Evan Wittig is a fourth-year student at the University of Arkansas - Fort Smith. He is an Arkansas native working towards a career in health care. After Evan graduates with his bachelor's in biology and a minor in chemistry this spring, he plans to pursue a master's degree in counseling before continuing his education at medical school. Should the future permit, he also has an interest in pursuing research related to radiotrophic fungi and their possible role in Martian colonization. Evan enjoys spending his time making meaningful connections with the people around him and experiencing nature through the lens of his biological knowledge via hiking and camping.

Distribution of Detrital Sediment Captured in McKay Bay Member Knoll Reef, Upper Peninsula, Michigan

Presented by: Kaleb McLaughlin

Faculty Sponsor: Dr. Maurice Testa

Field of Research: Geoscience

Table 9

The reef systems of the Michigan Basin have been investigated since the 1930's. However, little research has been conducted on its knoll reefs that exist in outcrop. Knoll reefs are carbonate mounds that form in shallow waters, which hamper the reef's ability to grow vertically, forcing the reef to grow horizontally instead. The knoll reefs in this study are stratigraphically located in the McKay Bay Member, in the Bush Bay Formation, of the early- Silurian Engadine Group. The knoll reefs are found in the Hiawatha National Forest at the south-eastern end of Michigan's Upper Peninsula.

This project is a preliminary investigation into the origin and distribution of detrital sediment captured in of the largest knoll reef in the study area. Over 100 hand samples and cores were collected at 1-meter intervals across the reef. The samples were collected in a transected grid pattern every 22.5 degrees and are being analyzed through petrographic analysis. Detrital sediment for each thin section is point counted to create rose diagrams. This will show the direction of detrital sediment influx for the reef.

From the 100 hand samples that we have, we chose 12 samples for chemical analysis. Six of the samples were chosen at the 22.5 degrees direction because the area of the reef faced the basin inlet. Six other samples were chosen randomly throughout the reef to determine if there was geochemical heterogeneity.

Kaleb McLaughlin is a geoscience major. He is interested in sedimentary rocks and field research. Kaleb plans to attend graduate school and earn his Ph.D. in geoscience.

Testing the Accuracy of Polycam® 3D Scanning Software on LiDAR and Optical Photogrammetry Devices in Field Research

Presented by: Abigale Kelly, Perla Romero, and Matt Van Hook

Faculty Sponsors: Dr. Maurice Testa and Lisa Cady

Field of Research: Geoscience

Table 10

Polycam® is a mobile application that uses high resolution photogrammetry and Light Detection and Ranging (LiDAR) to scan and render 3D models. To scan, Polycam® uses the best available camera on a device to conduct its scans. The software is able to scan and render images using a LiDAR camera or strictly photogrammetry using the device's optical camera. This project investigates the accuracy between photogrammetry only and LiDAR supported devices in different field environments. Testing was conducted on measured geologic sections in the upper peninsula of Michigan at various outcrops in Hiawatha National Forest and The Quarry in Fort Smith, Arkansas. A photogrammetry and LiDAR scan was taken at each meter in distance from the outcrop up to 5 meters. The internal measuring system of Polycam® was used to measure the geologic sections at each scan. The measurements were compared to the physical measured sections to test the accuracy of the rendered images at varying scanning distances.

LiDAR camera scans were conducted with an Apple® iPad Pro 5th generation 12.9. An iPhone 12 was used for the optical camera photogrammetry scans. In field testing it was noted that the LiDAR equipped device was quicker to capture large, scaled areas or areas with large scanning distances. Optical cameras were more successful and quicker in capturing detail for micro-scale analysis. At the 1-meter distance, accuracy was within 2.5cm for LiDAR camera at a 1-meter distance, similar to higher-end LiDAR cameras. However, the accuracy rapidly diminished with an increase distance from the outcrop.

Abby Kelly is a geoscience major with plans to work in geoscience education after graduation.

Perla Romero is a geoscience major. She will work with the National Forest Service this summer in the Upper Peninsula of Michigan in GIS and groundwater flow.

Matt Van Hook is a geoscience and history major. He plans on attending graduate school for geoarchaeology after graduating from UAFS.

X-Ray Diffraction and Petrographic Analysis of Magent Cove Carbonatite Core, Arkansas

Presented by: Emily Mero

Faculty Sponsors: Dr. Maurice Testa and Dr. Dave Mayo

Field of Research: Geoscience

Table 11

Geothermal activity such as hot springs are known to precipitate calcium carbonate (CaCO_3) minerals, producing rocks such as tufa, travertine and sometimes associated with carbonatite. The precipitation of CaCO_3 is caused by the reduction of CO_2 , which is less soluble in warmer waters. Geothermal heating of water in natural springs drives this precipitation of CaCO_3 in areas of Arkansas including Magnet Cove. Magnet Cove, Arkansas is an alkalic igneous rock complex that is composed of a series of ring dikes post-Mississippian in age. These dikes have intruded into faulted and folded Paleozoic sedimentary rocks. One of these igneous dikes is carbonatite, a rare carbonate-rich igneous rock. The formation of carbonatite remains unclear to this day. It may form from magmatic solutions, hydrothermal metasomatism, or a combination of both. If carbonatite is formed through hydrothermal metasomatism, then its likely forms through repeated events of redeposition and recrystallization. On the other hand, if carbonatite is formed through magmatic means, then its parental magma must be some type of alkalic composition.

In this study, a carbonate-rich core sample was taken from Magnet Cove at the depth range of 10 feet to 55 feet below ground. Five samples were processed for analysis at every 10 feet. Petrographic and X-Ray Diffraction (XRD) analysis was conducted on each sample to investigate the mineralogy and better understand the chemical alterations the area experienced.

Emily Mero is a geoscience major. After graduation this semester, she plans to move to Huntsville, Alabama, and work in the environmental and geoenvironmental sector.

Student Research Symposium

A Darcy Column for Demonstration and Research in Hydrogeology

Presented by: Abigail Carico

Faculty Sponsors: Dr. Dave Mayo

Field of Research: Hydrogeology

Table 12

Darcy's Law is an empirically derived expression describing the flow of water through porous media such as soil or sand, and was discovered by Henry Darcy (1803-1858). Darcy experimented with sand-filled pipes ("Darcy columns") as water filters and ultimately designed a sophisticated, gravity-driven water distribution system in Dijon, France. We fabricated a Darcy column using sand-filled transparent PVC pipe, flexible tubing and a water pump to study the impact of variations in sediment grain size and hydraulic head on the flow rate of water. Our Darcy column will be used to demonstrate Darcy's Law for students in introductory geology courses and for hands-on experiments for geology majors in courses such as hydrogeology.

Abbie Carico is a junior studying geoscience with a concentration in environmental geology. She is planning to work in hydrogeologic consulting upon graduation.

A Benchtop Model of Piezometers Used to Determine the Vertical Flow of Groundwater

Presented by: Juan Lopez and Kendal Dixon

Faculty Sponsors: Dr. Dave Mayo

Field of Research: Hydrogeology

Table 13

Piezometers are small tubes that are driven like water wells into water-saturated sediment. The vertical component (i.e. up or down) of groundwater flow is assessed with a piezometer “nest” - two or more piezometers driven to different depths side-by-side at the same location. The height to which water rises in each piezometer tube indicates the relative pressure at the bottom of the tube. Thus, for a two-piezometer nest, a higher water level in the deeper piezometer indicates upward flow, while a higher water level in the shallower piezometer indicates downward flow, and equal water levels indicates no net vertical flow. We used PVC pipe, flexible tubing and a water pump to fabricate a benchtop apparatus to model the application of a nested piezometers. Our benchtop piezometer nest allows us to experimentally control variables such as sediment grain size and hydraulic head and determine their impact on the flow rate. Our benchtop apparatus will be used to demonstrate the application of piezometers for students in introductory geology courses as well as geology majors in courses such as hydrogeology.

Juan Lopez is a senior geoscience major with a minor in GIS. He is planning on studying contaminant hydrology in graduate school.

Kendal Dixon is a sophomore geoscience major. After graduation, he is planning to work as a stratigrapher.

Pediatric Suicide Risk Associated with Social Media Use: A Literature Review

Presented by: Gracie Larru and Polly Hoang

Faculty Sponsors: Michele Elmore

Field of Research: Nursing

Table 14

Suicide is the second leading cause of death in children worldwide. The purpose of this study is to analyze previous studies on social media's effects over suicide. In addition, suggestions for preventing and combating this issue are mentioned throughout this paper. There was no specific method used to aid in the search for previous research within this paper. Eleven studies were gathered, but only ten were used for the analysis and suggestions. Studies were selected from various countries to gain an international perspective on social media and suicide. Social media mainly had an effect on the mental health of children, specifically on their risk for depression and anxiety which increases their risk for suicidal ideations. There were several commonly found themes such as dependency, desensitization, addiction, etc. Additionally, increased time on social media was found to increase the chances of suicide in the pediatric population. A major contributor to suicide is cyberbullying including various challenges associated with cyberbullying such as peer pressure and constant exposure. With that being said, there are several benefits to limited social media use such as a sense of community and belonging. Some suggestions from previous research concluded that education over social media use in family and healthcare providers is beneficial. Another suggestion that is not recommended in this paper is to screen social media posts through artificial intelligence (AI). This paper's recommendations based on previous research includes education, implementation of stricter laws, and user control over social media content. Further research could be done to examine the cause and effect on the relationship of social media on suicide and early digital footprint. Longitudinal studies can be done on more relevant issues such as family vlogging.

Gracie Larru is a Senior I nursing student and is also involved in the university's Myles Friedman Honors Program. She enjoys reading and baking in her free time. She is expected to graduate in December 2024

Polly Hoang is a Senior I nursing student and is also involved in the university's Myles Friedman Honors Program. During her free time, she likes to crochet and sew. She is expected to graduate in December 2024.

Male-Oriented Recruiting, Job Satisfaction, and Retention Practices in Nursing

Presented by: Gerbert Floreschavez

Faculty Sponsors: Brooke Gray

Field of Research: Nursing

Table 15

Nurse staffing levels are a significant issue, worsened by COVID-19. Insufficient staffing means nurses face heavier workloads, less time with patients, and worse outcomes. High nurse-to-patient ratios can cause mental health challenges and burnout, leading to higher turnover rates. Solutions include revising recruitment strategies to improve nursing job satisfaction and retention rates, offering professional development and attractive incentives to make nursing jobs more appealing, providing training options to acquire new skills and learn from experts in various nursing fields, and attracting male nurses by challenging negative stereotypes through social media marketing. By acknowledging gender stereotypes in caregiving, we can encourage men to develop empathy and emotional intelligence through training opportunities, making them valuable members of the nursing profession. Evidence shows the United States is struggling with a nursing shortage, made worse by the need for more nursing faculty. In 2019 over 1,600 faculty positions were vacant, and only 7 percent were male. Hiring more male nursing faculty would promote workplace diversity and inspire male nursing students to pursue a nursing career. In conclusion, increasing male nurses' recruitment, job satisfaction, and retention practices can reduce workplace burnout, turnover rates, and medical errors while improving patient outcomes.

Gerbert Floreschavez was born in San Miguel, El Salvador, and discovered his passion for caring for others at 14 when volunteering at the Red Cross. After finishing high school, he moved to the United States to pursue his dream of caring for patients. Gerbert joined the U.S. Army as a medical laboratory technician in 2000 and was awarded a nursing scholarship in 2004, graduating in 2006. As a critical care nurse, he deployed to Afghanistan in 2010. In 2012 Gerbert became a U.S. Army Practical Nursing Program instructor. He retired as a major after 20 years of service and moved to Fort Smith in 2020. Gerbert is pursuing a graduate degree as a nurse educator and aims to become a clinical instructor at the Carolyn McKelvey Moore School of Nursing. Gerbert's nursing philosophy is based on integrity, compassion, competence, and caring. Gerbert is bilingual and married to Sara.

Student Research Symposium

The Evolution of Dental Radiology Safety

Presented by: Samantha Baughman, Jenny Kindle, and Parker Lemley

Faculty Sponsors: Roxy Reed

Field of Research: Dental Hygiene

Table 16

Since the discovery of the X-ray made by Wilhelm Roentgen in 1895 dental radiographs have undergone significant advancements. Dental radiographs are crucial in helping to diagnose and treat various dental conditions. Dental radiology safety has been a major topic of concern. The evolution of radiology safety has shown many different stages. During the beginning many did not understand the effects of radiation and did not use protection. With the help of updated technology, the amount of radiation a patient is exposed to can be reduced and safety measures have been placed to the patient as well as the clinician. Now the emission of radiation that is produced is said to be so low that certain protection such as a lead apron are no longer needed. This research paper will provide a comprehensive review of how dental radiographs came to be and their progression over time. As well as how safety measures have evolved with radiology practices.

Samantha Baughman is a senior dental hygiene major at UAFS. She was born and raised in Checotah, Oklahoma. She was awarded the Helping Hands Transfer Scholarship when she transferred from a local community college to UAFS. She is passionate about being able to care for patients and providing them the best care possible. She loves seeing patients show improvement in their oral hygiene and who are just as passionate about it as she is. After graduation she hopes to work in the Oklahoma City area to practice as a registered dental hygienist. She enjoys spending her free time with family and friends.

Jenny Kindle, from Stilwell, Oklahoma, is a senior dental hygiene major at UAFS. An active member of the Gamma Phi Beta sorority, she has held many leadership roles including membership vice president, administrative vice president, and new member educator. Jenny is a part of the First-Generation Students Association and received the Cherokee Nation Undergraduate Scholarship. After graduation she hopes to work for the Cherokee Nation Health Services in Tahlequah, Oklahoma, capital of the Cherokee Nation. Proud of her Cherokee heritage, Jenny is passionate about sharing dental health knowledge to the Native American community. She will marry her fiancé this year, and in her free time, she enjoys concerts and exploring national parks.

Parker Lemley is a senior dental hygiene student at UAFS. She was born and raised in from Fort Smith. She was a member of Delta Gamma, holding many leadership positions including vice president roles for communications, programming, and social standards. She is also a part of First-Generation Students Association and To the Smalls. She was awarded the Arkansas Scholar, Academic Excellence, Arkansas Academic Challenge, and ArcBest Corporation scholarships. After graduation she plans to move to Northwest Arkansas, where she is building a house with her fiance, and begin working at a pediatric office.

Student Research Symposium

Look Out Flouride, There's a New Amino Acid in Town!

Presented by: Dulce Guterrez, Leslie Guerra, Amy Le, and Abigail Mussett

Faculty Sponsors: Roxy Reed

Field of Research: Dental Hygiene

Table 17

This paper aims to evaluate the efficacy of oral care products containing arginine, either alone or in combination with fluoride, in comparison to fluoride-only formulations with a focus on their ability to reduce the risk of dental caries. A comprehensive search was conducted across several databases for studies, trials, and reviews published in the last five years regarding the use of arginine. Studies investigating the impact of arginine-containing oral care products on caries prevention, either alone or in conjunction with fluoride, were included. This paper identified a range of studies assessing the effectiveness of arginine-containing products and fluoride-only formulations in reducing caries risk. While fluoride has long been established as a cornerstone in caries prevention, recent attention has turned to arginine and its potential role in fostering a neutral pH environment. The comparative effectiveness of products containing arginine and fluoride versus fluoride alone remains a subject of ongoing investigation. Preliminary findings suggest a potential synergy between arginine and fluoride in mitigating caries risk, with arginine contributing to an environment less conducive to acid-induced enamel demineralization. However, further well-designed clinical trials and long-term studies are needed to establish the comparative efficacy of these formulations. Dental professionals should consider individual variations, adherence to oral care practices, and the presence of other risk factors in providing personalized recommendations. This paper highlights the importance of ongoing research to inform evidence-based approaches in optimizing oral care regimens for caries prevention.

Dulce (Candy) Gutierrez is a senior in the dental hygiene program at UAFS. She moved to Fort Smith upon her acceptance to the dental hygiene program, but is originally from Russellville, Arkansas. Prior to being accepted into dental hygiene, she worked for two years as a registered dental assistant in general dentistry while completing pre-requirement courses at Arkansas Tech University. Candy is secretary for the Student American Dental Hygienists' Association (SADHA) at UAFS. She is a first-generation college student and is beyond excited about starting her career as a dental hygienist. After graduation she plans on working full time as a dental hygienist either in Fort Smith or Russellville. She is passionate about helping those in need and hopes to use her skills to help underserved populations.

Leslie Guerra is a senior dental hygiene student at UAFS. She is a first-generation college student and obtained her Bachelor of Science in biology from UAFS in December 2019. Prior to dental hygiene school, she was a registered dental assistant for nearly 10 years. She has been on two

Student Research Symposium

dental mission trips to Guatemala, which is where her parents are from. After the mission trips, she knew she could continue her education and provide more services for those in need. She is bilingual and uses that skill to enhance care and communication with Spanish-speaking patients. Leslie enjoys dental hygiene because she plays a role in preventing oral health issues. During her free time, she loves to spend time with her family. After graduation she plans to work in dental offices in the River Valley area.

Amy Le is a senior dental hygiene student at UAFS. She is from Fort Smith and is treasurer for the Student American Dental Hygienists' Association (SADHA) at UAFS. Amy has been involved in her youth group, the Vietnamese Eucharistic Youth Movement of America, as the vice president. She had the opportunity to attend a mission trip to Vietnam through the youth group. Amy is passionate about educating her patients and the community about oral health and hygiene. She wants to foster strong relationships with her patients to deliver the best care. Upon graduating, she plans to practice in Fort Smith.

Abigail (Abby) Musset is a senior dental hygiene student at UAFS. She has been a member of the dental community since August 2020, beginning with her career as a registered dental assistant in Russellville, Arkansas. Abby currently serves as president of the UAFS Chapter of the Student American Dental Hygienists' Association (SADHA) and is also a current member of the Arkansas Dental Hygiene Association (ADHA). Building and maintaining patient relationships and providing a safe space for patients to receive care is what excites Abby the most. After graduation she looks forward to traveling and being involved in providing dental cleanings and education to children and underserved communities. She firmly believes that everyone deserves the opportunity to love their smile and feel confident, and with her new role as a dental hygienist, she aims to help others do just that.

Student Research Symposium

Periodontal Tissue Regeneration

Presented by: Samantha Drain, Aracely Najera-Hernandez, Rudy Vasquez, and Gabriel Woody

Faculty Sponsors: Roxy Reed

Field of Research: Dental Hygiene

Table 18

Periodontal disease is a chronic condition that commonly affects the general population. This disease is life-long and results in hard and soft tissue degradation over time if left uncontrolled. Among other things like oral jewelry, tissue trauma, and anatomical abnormalities, the loss of periodontal hard and soft tissues is a major dental concern that dental professionals moderate regarding overall health and aesthetic concerns for patients. This research analyzes and reviews different treatment options, concurrent and emerging, that aid the dental world in regenerating lost periodontal tissues.

Samantha Drain is a senior in the dental hygiene program at UAFS. She is from Lincoln, Arkansas, and is a first-generation college student. She is the youngest of five and has three beautiful nieces. She was awarded the Laurie Mason, Northwest Dental Society, and Arkansas Student Dental Hygiene Association scholarships. Samantha puts a great deal of emphasis on her patients, making sure they feel understood and comfortable while receiving care. In her free time, she enjoys baking, sewing, and playing with her dog Lennox. After college she plans to work in Northwest Arkansas to be close to her family and implement all she's learned to be the best hygienist she can be for her patients.

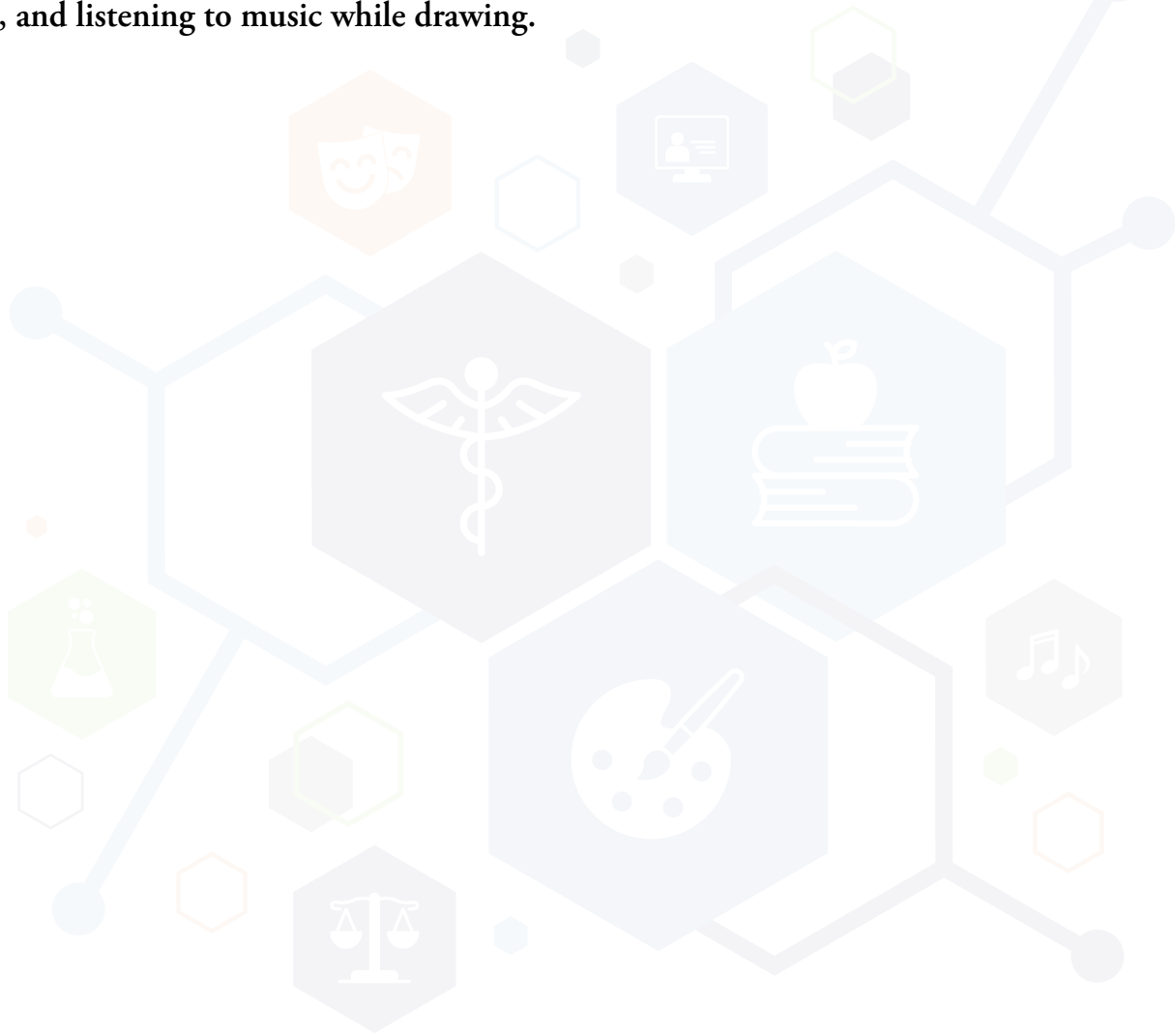
Aracely Najera-Hernandez is a senior dental hygiene student at UAFS. Aracely is from Springdale, Arkansas and is vice president of the Student American Dental Hygienist's Association (SADHA) at UAFS. She is a member of the Chemistry Club, First-Generation Students Association, and Phi Theta Kappa Society. She was awarded three UAFS Foundation scholarships: Laurie Mason, Phi Theta Kappa, and E.H. Patterson. In addition, she was awarded the Arkansas Challenge scholarship. Aracely is a first-generation college student and the oldest of three siblings. She enjoys helping others by educating patients on oral hygiene instructions and the importance of dental care. She likes to spend her free time with her friends, family, and dogs. After graduation she plans to work in Northwest Arkansas and be a dental hygienist traveler in the future.

Rudy Vasquez is a senior in the dental hygiene program at UAFS. He is from Fort Smith, where he has spent his whole life. Rudy is a first-generation college student and the youngest of three siblings. He has been awarded John McFarland, Baldor Endowed, and Northside Legacy, Arkansas Academic Challenge Traditional, and the GAP scholarships. Rudy joined the dental

Student Research Symposium

hygiene program with a desire to help others through education of oral health and building a positive experience for his patients. He enjoys exercising and being with family and friends.

Gabriel (Gus) Woody is a first-generation college student at UAFS. She moved to Arkansas in 2010 and has lived in the Fort Smith region since then. Gabriel has been awarded the Arkansas Challenge, Excellence, and Laurie Mason scholarships. She enjoys discussions on dental hygiene topics and educating patients. In her free time, she enjoys researching dental hygiene and mycological topics, reading, and listening to music while drawing.



Student Research Symposium

A Comprehensive Evaluation of Fluoride

Presented by: Skye Haagenson, Mackenzie McBride, and Alissa Owens

Faculty Sponsors: Roxy Reed

Field of Research: Dental Hygiene

Table 19

Fluoride, the abundant element found in nature that is best known for its dental benefits, has been a subject of controversy for many decades due to its potential for toxicity. Known as one of the best public health achievements of the twentieth century, fluoridated water has been a major dietary source for many populations in developed countries since the mid-1900s. Many studies support the notion that fluoride aids in the prevention of dental caries and has drastically improved oral health throughout history. However, significant health concerns have been brought to light through the years about prolonged fluoride ingestion and the risk of associated toxicity. Due to these differing and opposing effects, certain dialogues over its use have more recently been a topic of discussion. The following research paper will evaluate the proposed benefits of fluoride and its potential for toxicity. In addition, it will explore the history, introduction, regulation, and current use of fluoride alongside the ongoing debate.

Skye Haagenson is a senior in the dental hygiene program at UAFS. She previously worked in a factory as a machinist building oil pumps, but quit her job to pursue her dream of becoming a dental hygienist. Skye has two young children, and she is looking forward to a career that makes it possible for her to attend any important activities that they might have. After graduation her family will move to Northwest Arkansas. She looks forward to volunteering at events to help underserved populations. In her free time, she enjoys reading, oil painting, and baking.

Mackenzie McBride is a senior in the dental hygiene program at UAFS. She is from Bentonville, Arkansas, and hopes to stay local to this area after graduation. She is historian for the Student American Dental Hygienists' Association (SADHA) and has made the Dean's List the last three semesters of her student dental hygiene career. Mackenzie enjoys working with her local community and has volunteered at the Arkansas Mission of Mercy as well as providing education to students at the Boys and Girls Club in Fort Smith and Special Olympics athletes. She hopes to be able to provide care for underserved populations in the future. She is one of the youngest in her family of seven and enjoys spending time with them when she isn't focusing on her studies or providing patient care.

Alissa Owens is a senior dental hygiene student at UAFS. She is from Poteau, Oklahoma, and was awarded the Myles Friedman Honors Program, Laurie Pendergraft Mason Endowed, and Sisters of Mercy scholarships. She served as historian for the Student American Dental Hygienist Association and enjoys working with patients to improve their health and confidence in their smiles. In her free time, she enjoys spending quality time with her people, traveling, reading, and doing nothing. After graduation, Alissa plans to pursue a job, enjoy a less stressful life, and see what happens next.

Student Research Symposium

Instrumental Music and You

Presented by: James Estrada

Faculty Sponsor: Dr. Alexandra Zacharella

Field of Research: Music Education, Music Outreach, Community Music

Table 20

All too often, individuals that are not classically trained in music will view the world of instrumental music at an angle of what “should have” and “could have been” rather than at an angle of what could become. There are emphases that are placed on learning instruments at a young age; there are many terms in music that originate from several different languages; there are different systems of musical notation that each come with their own challenges for a new learner; there are high costs from owning and maintaining many of the single traditional classical instruments; there is a large amount of time and dedication required to acquire technical mastery in many traditional classical instruments; there is a misalignment in interests that appears between the genres of music associated with traditional classical instruments and the genres that appear in modern pop-culture. Many challenges come in the way of people that want to become classically trained musicians or want to engage with the world of instrumental music beginning in adult life. Unfortunately, these individuals sometimes never experience the pleasures of composing and performing with traditional classical instruments. This presentation will delve into the psychology and circumstances that cause the separation between non-classically trained adults and classical instrumental music. It also will aim to provide potential solutions for non-classically trained adults to enter the world of instrumental music as composers and musicians.

James Estrada is a senior instrumental music education major at the University of Arkansas – Fort Smith. At UAFS Estrada studies clarinet and composition and serves with several university organizations. After serving as its vice president, Estrada currently serves as UAFS NAFME’s Collegiate president and is an active member of Kappa Kappa Psi – Lambda Kappa Chapter, the band service and leadership fraternity. While in high school, Estrada performed in the Arkansas School Band and Orchestra Association All-Region and All-State bands and obtained several formal recognitions of excellence in the Van Buren Band Program. Estrada volunteers as a sound technician, media specialist, and musician for his churches, and he is presently interning at Darby Middle School as a music educator.

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