

Kansas



Kansas Undergraduate Research Day

March 1, 202

Participating Kansas Board of Regents Institutions:

Emporia State University

Fort Hays State University

Kansas State University T (y)



KANSAS BOARD OF REGENTS

Kansas Undergraduate Research Day at the Capitol

The Kansas Board of Regents is pleased to support the outstanding students selected to present during the 2023 Kansas Undergraduate Research Days. University research is vital to the economic growth of our state. Students selected for this event are conducting research that makes a difference in Kansas communities, improves the quality of life for Kansans and supports businesses across our state.

Undergraduate students play an important role in the research enterprise of universities. These students learn skills that prepare them for the workforce while promoting engaged learning both inside and outside the classroom. Undergraduate student researchers complete projects that help them grow their personal skillsets, expand knowledge in a variety of fields, and contribute to the prosperity of our state. The talent of these students and their mentors is remarkable.

The Kansas Board of Regents invites you to explore the research selected for presentation from Emporia State University, Fort Hays State University, Kansas State University, Pittsburg State University, the University of Kansas, Washburn University, and Wichita State University.

We are confident you will leave the event with a renewed commitment to continue supporting research that benefits our students and our state and inspired by the outstanding work of these students.

Blake Flander

Emporia State University

Applying Operations Management to the Emporia Municipal Golf Course

Anna D'Ercole

This project placed us in the role of members of an operation management team at the Emporia Municipal Golf Course. Emporia Municipal Golf Course currently provides four types of annual pass fees: individual, couples/additional, seniors, and juniors membership. My project posits the benefits of adding a student membership plan to overall membership numbers and revenue. The final goal is to design a new membership pass for college students. To support this decision, the following five tools are used: 1. quantity decision, 2. customer identification,

And 2) how does each small molecule affect the binding free energy and the intermolecular interactions with STING in the holo state?

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50556>

Assessing and Improving Science Student #SciComm Skills

Kale Link, Kaiden O'Dell, Laura Wilson, Todd Moore

Introduction: As the population becomes increasingly connected online, there is a growing need for effective science communication on social media platforms (referred to here as #SciComm). Resources for students to get training or experience with online science communication are minimal, hindering science communication in this technological era.

Purpose: We are investigating what #SciComm-related skills students are already exposed to through coursework and then developing methods to train science majors on communicating scientific ideas to the public using popular social media platforms.

Methods: We deployed a survey to all FHSU undergraduate and graduate science students to gauge their experiences with #SciComm. Questions included what training students already receive on communicating science to non-scientists and which classes incorporate building these skills. We also collected data on what #SciComm content students consume on social media and what skills they want to develop.

Findings: Our survey found that a majority of students (78%) have not received any formal training in online science communication. However, many students (68%) reported that they wanted more hands-on #SciComm training. The final survey results also included useful findings on what social media platforms students are most interested in using and developing skills for science communication.

Relevance to Kansas: Results are being used to develop a hybrid workshop for FHSU students to provide a primer on #SciComm during the Spring 2023 semester. Ultimately, we hope to encourage more classroom- and workshop-based activities to better prepare the next generation of scientists for science communication in a digital world.

Relevance to Kansas: Multiple Kansas Colleges have been chosen in this study. The colleges in Kansas also showed a high participation rate. This study will help the instructors in Kansas to improve their overall understanding of stuttering and how to work with students who stutter.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50534>

Distance Exploration of Alpine Ecosystems in Elementary Classrooms Using 360 Videos

Brooklyn Whitcomb, Mary Kate Hale

In this study, the team explored using 360 video as a tool to create immersive environmental science experiences in classrooms. The study consisted of surveying teachers to identify perceived barriers in implementing this technology, field work in capturing videos to be used in classrooms, and preparation of lesson plan materials to be made available to teachers.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50527>

Kansas State University

BIOMETRIC PROPERTY OF MUZZLE IN DEEP NEURAL NETWORK-BASED CATTLE IDENTIFICATION

Hursen ADJOVI

Cattle identification is a crucial aspect of cattle management. Traditional approaches for cattle identification perform poorly in terms of scalability and cost efficiency. In recent years, computer vision-based biometrics has been successfully applied to cattle identification. Previous work has shown the efficacy of muzzle-based cattle

statistical significance of the intervention. Qualitative data, however, pointed to the importance of discussing politics and constructive ways of doing that. The topic was further examined with interviews and roundtables in a [separate investigative report](#) for Channel 8 News.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50575>

Do ecotypes of big bluestem grass perform better with their local microbes?

Kian Fogarty

INTRODUCTION AND PURPOSE: Big bluestem (*Andropogon gerardii*) is a dominant forage grass of prairies and is distributed across a steep rainfall gradient in the Great Plains. This gradient has given rise to locally adapted wet and dry ecotypes. Because soil microbes likely vary along this gradient, we investigated how soil microbes affect Big Bluestem growth and whether plant ecotypes are matched to their local soil microbes. We predicted each ecotype would grow better when grown with its native microbes. **METHODS:** We collected seed and soils from six native Big Bluestem populations from western KS and IL. Plants were grown in greenhouse in garden soil and microbes were reciprocally injected into the garden soils weekly and measurements were taken weekly. **FINDINGS:** Ecotype differences affected many results like leaf area, height, and leaf width. Interestingly, ecotypes produced more biomass when grown with their local microbes. Furthermore, chlorophyll absorbance (proxy for photosynthesis) was also enhanced when ecotypes grew with their local microbes, suggesting effects of microbe-mediated nutrient availability. We concluded that local microbes have a large impact on plant growth. **RELEVANCE:** Big Bluestem accounts for roughly 70% of the biomass of prairie ecosystems. Big bluestem has been used to restore millions of acres of land back to prairie and it plays large role in the multi-billion dollar cattle industry of Kansas as it is the major forage for cattle. Understanding how big bluestem interacts with their local soil microbes likely will support increased future growth and productivity of these major Kansas industries.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50511>

Understanding skeletal muscle metabolism as a means to improve livestock feed efficiency

Chanae Parker

Parker C. A¹, L. A. Rimmer¹, E. R. Geisbrecht², M. D. Chao¹, J. C. Woodworth¹, T. G. O'Quinn¹, and M. D. Zumbaugh¹

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Mounting pressures to increase meat animal production with fewer agricultural resources call for innovative strategies to improve feed efficiency. Skeletal muscle is responsible for up to 90% of all glucose use in meat producing animals, and therefore has become a target to improve nutrient utilization efficiency. For example, an

Defendant Counterclaim Importance in the Perceptions of Judges' IPV Rulings

Susan Wilkinson

Problem: With the visibility of court proceedings and rulings today, we explored how the type of counterclaim made by a defendant being accused of IPV and the visual perceptions of the judge presiding over the case (i.e., age and

showed a success rate of 10% (18/180 trials), which is significantly lower than the performance of the bluestreak cleaner wrasse—who engage in complex cleaning interactions with other coral reef species—in a similar paradigm (two-tailed Fisher’s exact test, p

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50602>

University of Kansas, Lawrence Campus

Optimization of Enhanced Oil Recovery in Kansas: a Time Continuous Study

Alexander Erwin

This paper presents an expanded economic framework of Carbon Dioxide-Enhanced Oil Recovery (EOR). EOR is a technique in which pressurized CO_2 is injected into oil wells which increases production by driving oil out of the well at higher rates. Additionally, this technique allows for the long-term storage of CO_2 underground. Oil producers earn a tax credit for each unit of CO_2 sequestered. This paper expands upon the existing theoretical framework of EOR. The existing framework involves a producer choosing an amount of CO_2 to inject into an oil well, thereby resulting in changes to oil production and CO_2 sequestration. This study also uses numeric modeling of oil fields over time to

This presentation will focus on a Mixed Matrix Membrane (MMM) method used to address the challenge of separating HFC blends. A MMM combines an ionic liquid (IL), a compound with unique physical properties that make it ideal for working with refrigerants, with a polymer to create a membrane. A highly selective IL will trap one component of the HFC blend while the other portion will continue to flow through the highly permeable membrane to separate the mixture. This poster will discuss the process of creating MMMs and testing them for their potential to separate refrigerant mixtures.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50528>

Analysis of OSCP Deregulation in Alzheimer's Disease

Albert Park

Alzheimer's disease (AD) is a chronic and irreversible neurodegenerative disease that affects more than 44 million people worldwide. There are currently no effective therapies for this devastating neurological disorder and the detailed molecular mechanisms of AD etiopathogenesis remain unelucidated. Mitochondrial dysfunction is emerging as a vital contributor to the development of AD. The molecular pathways that lead to disease-associated mitochondrial abnormalities including impaired ATP production via oxidative phosphorylation (OXPHOS) are under intensive investigation. Previous studies have implicated loss of oligomycin sensitivity conferring protein (OSCP), a key protein of the F₁F₀ ATP synthase, in AD pathology; however, the precise mechanism for OSCP degradation in AD conditions remains unknown. Our study aims to establish an age-dependent deregulation of ubiquitinated-OSCP in a mouse model of AD. We have discovered increased ubiquitinated OSCP in a mouse model of AD as compared to their wildtype age-matched counterparts. In contrast, the treatment of amyloid-cortical neurons revealed increased expression of OSCP. This may be a result of cellular compensation for the increased ubiquitinated OSCP seen in vivo. Further studies will be performed to add clarity to OSCP degradation in an AD context and will be a key to understanding the precise mechanism behind OSCP loss in AD and integrating it as a potential therapeutic target in AD.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50738>

Synthesis of a Hyaluronic Acid-Deferoxamine Conjugate for Local Treatment of Bone Regeneration

Navya Singh

Medically based efforts and alternative treatment strategies to prevent or remediate the corrosive effects of radiotherapy on pathologic fracture healing have failed to produce cheip-3 ()11.1 3a(ea)2t

Elderspeak within Family Caregiving: The Impact of Relationship and Gender on Elderspeak Use with Dementia Care Recipients

Camille Henderson, SN

Introduction: Elderspeak is a communication style used by younger adults interacting with older persons, especially those with dementia. Elderspeak has been studied primarily in nursing home settings where it has been linked to negative responses from dementia care recipients. There is limited information about the use of elderspeak by family caregivers.

Purpose: This study will describe elderspeak (speech resembling baby talk) by family caregivers caring for a person with dementia and will evaluate whether elderspeak use varies based on relationship and gender.

Methodology: Secondary analysis of transcripts of 144 videos collected by 36 family caregivers-care recipient dyads at home will be used to identify elderspeak (diminutives, collective pronoun substitutions, tag questions, and reflective speech). We will compare whether frequency of each type of elderspeak varies based on relationship and gender.

Findings: Systematic Analysis of Language Transcripts (SALT) software will be used to count the frequency of elderspeak use. We will compare the frequency of elderspeak in dyads of different caregiver relationships (spouse or child) and for different genders of caregivers using descriptive statistics.

Discussion: Knowledge about the frequency of elderspeak use by family caregivers can inform care in relation to how the care recipient responds to the caregiver's use of elderspeak. This information can be used for training family caregivers

The Long-term Transferability of Learning Via In-class Simulations to Nursing Practice: a Qualitative Descriptive Study

Mallory Renea Peterman, SN

Purpose & Background: Data indicated only 14% of new graduate registered nurses (NGRNs) demonstrate entry-level competencies as they transition to practice. To close this gap, the use of in-class simulation-based experiences (SBEs) in pre-licensure nursing programs provide increased cognitive knowledge and clinical judgment. This study's purpose was to fill the evidence gap on the long-term transferability of in-class SBE outcomes to practice 3 years post-intervention via interviews.

Theoretical Framework: The interviews used narrative inquiry methodology to prompt storytelling and were semi-structured guided by the integrative framework—Transfer Appropriate Processing (TAP) Theory. It states memory is best when the processes engaged in during encoding (learning) match those during retrieval. Therefore, the assumption was that learners that observed in-class simulations would have better memory because the process engaged in during encoding matched retrieval activities in practice.

Methodology: This qualitative descriptive study utilized recorded semi-structured interviews to answer the research question: To what extent are NGRNs able to transfer learning that occurred via observation of in-class SBEs in their traditional pre-

Indigenous Peoples' Relative Risk of Homicide in the USA: A Systematic and Meta-Analytic Review

Grace Hawks

