Panel Talk Abstracts

Cristian Acosta, “Parvovirus Contraction in Dona Ana in Relation to Average Household Income, Population Density and Stray Dog Population”
Major: Animal Science; Minor: Chemistry and Human Animal Interaction
Faculty Mentor: Dr. Gaylene Franseko
Young Agri-scientist Program

Canine parvovirus type 2 (CPV-2) is a highly contagious virus causing acute hemorrhagic enteritis and myocarditis in dogs. Despite available vaccines, CPV-2 remains widespread in Doña Ana County, New Mexico—especially among stray and outdoor dogs. This study examines whether CPV-2 contraction rates prior to intake at the Animal Service Center of the Mesilla Valley (ASCMV) correlate with ZIP code-level income and population density. Data from August 2021 to August 2024 were analyzed, with intake records used to estimate contraction location based on the virus’s 2-to-14-day incubation period. Dogs testing positive within 2 days of intake were linked to their pickup ZIP code; cases with unclear exposure timing were excluded. Remaining cases were compared to U.S. Census data. Multiple linear regression found no statistically significant correlation between contraction rates and income ($r = -0.468$, $p = 0.56$) or population density ($r = -0.442$, $p = 0.149$). Findings highlight the need for targeted CPV-2 prevention beyond socioeconomic indicators.

Gabriel Agnew, Uzias Gutierrez-Hougardy, and Jackson West, “Modal Logic of Closeness in Euclidean Spaces”
Major: Mathematics (all members)
Faculty Advisor: Dr. Ilya Shapirovsky

The notion of distance in Euclidean spaces is fundamental in various areas of mathematics and physics. We examine Euclidean spaces equipped with a binary relation that indicates whether two points are closer than a given distance from each other, comparing the geometric properties across different dimensions of these spaces. We are interested in properties definable in the language of modal logic, an efficient formalism for working with relational structures. We found that there are modal formulas which hold in lower dimensions of Euclidean space but do not hold in higher dimensions. Then, we demonstrate that any modal formula which holds in the rational numbers with the closeness relation also holds in the real numbers; however, there are modal formulas that are valid in the real number space but not in the rational number space.

Gabrielle Baca, “Molecular Analysis of Triatomine Insects for *Trypanosoma cruzi* Infection and Bloodmeal Sources in Las Cruces, New Mexico”
Major: Microbiology
Faculty Mentor: Dr. Maria Castillo
U-RISE

Triatomine insects are vectors for transmitting *Trypanosoma cruzi*, the causative parasite of Chagas disease. Triatomines are found in the Southwest U.S. including New Mexico. Triatomines are hematophagous insects that transmit *T. cruzi* by depositing contaminated feces on hosts, which enter through skin lacerations or mucous membranes. Triatomines feed on

various mammals, including humans. In this study, we collected triatomines from various sites in Las Cruces, NM and tested them for *T. cruzi* infection, and performed a bloodmeal analysis. DNA was extracted from the insects' hindguts and amplified with PCR using *T. cruzi* and mammalian-specific primers. Positive samples were identified on agarose gels and sequenced. Results showed that 56% of samples are infected with T. cruzi. Currently, bloodmeal source(s) are being tested. The detection of *T. cruzi* in triatomines and the identification of their preferred bloodmeal sources are essential steps in preventing Chagas disease in New Mexico.

Jessica Barrio, "Frigid Mornings and Other Stories"
Major: English-Creative Writing
Faculty Advisor: Phillip Hurst
Honors Capstone Project

I want to present a collection of my short stories at URCAS to share with others the writing journey I have been on for the last few years. These stories are realistic fiction, and they grapple with real human emotions. I plan to do a reading from my short story "Frigid Mornings," which deals with themes of motherhood, bodily autonomy, love, and lust as two people make their commute to work on a particularly cold morning. I have been workshopping these stories in writing workshop classes for years and I hope I can reach and inspire people with some of my work.

Jessica Barrio, Emiliano Iniguez Salgado, Mason Kokovay, Esai Cisneros, and Chantay Herrera, "*The Agora* 2025 Edition"
Major: Jessica Barrio (English-Creative Writing); Emiliano Iniguez Salgado (Journalism and Mass Communication), Mason Kokovay (Mathematics); Esai Cisneros (Genetics & Biotechnology); and Chantay Herrera (Studio Arts)
Faculty Mentor: Dr. Tracey Miller-Tomlinson
The Agora, HNRS 421

We are eager to show off the 2025 edition of *The Agora*, an undergraduate interdisciplinary journal of research and creativity. We plan to discuss the experiences the editors had working on this edition of the journal and what they have learned. We will also be discussing how we went further to get this edition not only published but also printed physically for URCAS. We will show off some of the articles we will be publishing.

Jordan Bell, "Geochemistry of Proterozoic Rocks in the Burro Mountains: Helping to Understand the Proterozoic History of the Mazatzal Province"
Major: Geology
Faculty Mentor: Dr. Jeffrey Amato

In Redrock, New Mexico, located 28 miles north of Lordsburg, is the northern Burro Mountain. Proterozoic rocks are exposed in Ash Canyon, but few studies exist on its mapping or lithology. It can be rather difficult to map because of its geologic structure and the formations of this area being highly altered and weathered. This research incorporates a multifaceted approach that combines fieldwork, geochronology, petrology and geochemistry analysis, and thin-section examination. Hand samples collected during fieldwork serve as primary data sources, enhancing the understanding of geological formations. Thin sections reviewed from hand

samples indicate the presence of minerals consistent with gabbros, metabasalts, metasedimentary rocks, anorthosites, ricolite, and volcanic rocks. Additionally, after zircon dating it was found the age of the rhyolite aligns with the Caster Marble Tuff in Texas, bringing greater significance to this site. This study provides critical insights into the geological complexity of the Redrock New Mexico area.

Kayla Blundell, “Illuminating the Cosmos: Bridging STEM and Art in Astronomy and Solar Physics”
Major: Studio Art
Faculty Mentor: Dr. Juie Shetye, Assistant Professor, Dept. of Astronomy
NSF FDSS, NSF SHINE, Nationwide Eclipse Ballooning Project (NEBP)

My research explores the fusion of art and science through two sculptural projects created in collaboration with the NMSU Astronomy Department. Supported by the NSF FDSS grant, these works translate astronomical phenomena into engaging visual and interactive experiences.

The first project I created was a sculpture of my interpretation of the total solar eclipse through my studies in the Nationwide Eclipse Ballooning Project and a site visit to Sunspot Solar Observatory. The second project is an interactive ferrofluid display demonstrating Earth's magnetic field and solar wind interactions. Viewers manipulate magnets to observe fluid movements, mimicking auroral forces.

Public outreach and audience surveys have provided valuable feedback, confirming that these works enhance viewer engagement and comprehension of scientific concepts. The findings suggest that integrating art with science fosters curiosity, accessibility, and a deeper understanding, demonstrating art’s role in bridging scientific exploration and public engagement.

Cade Borner, “Portrayals of Masculinity in Metal Lyrics”
Major: Sociology
Faculty Mentor: Dr. Marshall Taylor
Discovery Scholars Program

This is a pilot study that aims to answer to what extent do metal lyrics reflect toxic masculine attitudes and beliefs. Metal is a very polarizing genre of music that engages in social deviance as a statement and reflects partially the fringe of social acceptability. Drawing from a computational text analysis of a clean corpus of metal lyrics from bands of a diversity of popularity, I argue that metal lyrics portray two prominent themes of toxic masculine attitudes: promotion of war/violence and masculine queerphobia. These themes and attitudes deserve attention and qualitative content analysis.

Lizbeth Karely Silva Chavez and Liliana Holguin, “Design and Development of a Low-Cost 3DOF Hover Platform for UAV Control System Testing”
Majors: Lizbeth Karely Silva Chavez (Mechanical and Aerospace Engineering), Liliana Holguin (Information Technology)
Faculty Mentors: Dr. Hilda Cecilia Contreras Aguirre, Dr. Luis Rodolfo Garcia Carrillo
ROLE (Research Oriented Learning Experience)

Unmanned aerial vehicles (UAVs) are increasingly required to carry variable payloads and support diverse gripping attachments for transportation and delivery services. In response to this demand, this work presents the design and development of a cost-effective three degrees of freedom (3DOF) hover platform, intended as a versatile testing ground for various control system algorithms. The platform simulates aerial motion in pitch, roll, and yaw using integrated sensors, actuators, and a custom-built frame, ensuring smooth and responsive maneuverability. Key challenges addressed include design optimization, system integration, and real-time data processing, which collectively facilitate thorough evaluation and tuning of autonomous control strategies. This project demonstrates how low-cost components and open-source tools can be harnessed to create an accessible and educational platform, advancing research in UAV flight dynamics and control systems.

Jason Christopherson, "The Importance of Being Beautiful: The Aesthetics of Games"
Major: English-Creative Writing
Faculty Mentor: Dr. Fabrizio Ciccone
Honors Capstone

Humanity has long since loved games, and the history of games has often gone hand in hand with human history as a whole. However, throughout this illustrious history, games have had a noticeable inclination towards being aesthetically attractive. This presentation discusses three modern modes of games: physical games, video games, and roleplaying games such as Dungeons and Dragons, and discusses the way that aesthetics plays a role in their consumption. From the rise of artistically brilliant board games, to a consumerist obsession with graphics in video games, to the aesthetics of imaginary play in Dungeons and Dragons. Some case studies will include Nemesis, Lenormand Cards, Alan Wake 2, Smile For Me, Ten Candles, and the show Dimension 20.

Elliot Cisneros, "Open-Source Inverted Pendulum for Affordable Control Systems Research"
Major: Electrical Engineering
Faculty Mentor: Diego Chávez
Research Oriented Learning Experience (ROLE)

The inverted pendulum is a fundamental problem in control theory, often used to test algorithms for balance, stabilization, and other nonlinear control problems. However, commercially available systems can cost upwards of $10,000, limiting accessibility for students and researchers with budget constraints. In this project, we designed and built a low-cost, open-source alternative using 3D-printed components and readily available hardware. Our model incorporates AI-driven control algorithms to improve stability and responsiveness. By making this system accessible, we aim to provide an affordable, customizable platform for educators and researchers studying control systems. This project involved extensive mechanical design, electronics integration, and programming, demonstrating the challenges of real-world control applications. Our goal is to contribute an open-source solution that allows more institutions to explore control theory without financial barriers.

Jade Collins, "Evolutionary history of mimosine production in agriculturally significant legumes"
Major: Computer Science and Biology; Minor: Genetics and Biotechnology
Faculty Advisor: Dr. Donovan Bailey

Mimosine is an amino acid-like substance produced by plants in the mimosoid clade of the legume plant family for defense. Mimosoid legumes are important plants in the wild and to humans due to their geographic range, agricultural significance, and scientific contributions. The evolution of mimosine production in legumes remains unclear. The objective of this project is to explore the evolutionary history of the genes involved in mimosine production. This will be done through the collection of relevant genomes, determining orthologous groups, and characterizing the evolutionary history of mimosine genes to show the origin of mimosine. The progress to date includes the collection of 15 mimosoid genomes, 1 outgroup, and 8 sequences of genes related to mimosine production, and preliminary data on the presence of mimosine-related genes in mimosoid genomes/plants. Future directions include building a phylogenetic tree and finding the possible reason for mimosine evolution from cystathionine β-lyase (CBL).

Laisha Corona and Liduvina Tolentino, "Translanguaging in STEM: Understanding Bilingual Student Experiences in Introductory Chemistry"
Major: Laisha Corona (Biology), Liduvina Tolentino (Communication Disorders)
Faculty Mentor: Dr. Paulette Vincent-Ruz
McNair Scholars Program

This research contributes to the field of STEM education by examining how bilingual Latine students navigate an introductory chemistry course at a Hispanic-Serving Institution (HSI). The study investigates how students use translanguaging—the practice of alternating between Spanish and English—in both academic and everyday contexts. Using a QuantCrit methodological framework, we analyzed quantitative and qualitative data collected in Fall 2024 and Spring 2025. Preliminary findings show that although 38% of participants grew up in Spanish-speaking households, the use of translanguaging significantly declined in academic spaces. Many students perceived English as the only valid language in STEM settings, which discouraged them from engaging their full linguistic repertoire. This study highlights the need for more inclusive classroom practices that support bilingual students' linguistic strengths to promote equity, engagement, and deeper learning in STEM fields.

Jonathan Davis, "'It was the best of times, it was the worst of times' : Ballet as Literature"
Major: Undeclared
Faculty Mentor: Dr. Glenn Fetzer

Paris, 1870. Napoleon, the man who killed "liberté, fraternité, égalité", is dead. The Second French Empire is now allied with Queen Victoria. All the world is now their oyster, and a hunchback's medieval Paris has become the City of Lights. Here, Giuseppina, a sixteen-year-old, appears in her first starring role as Swanhilda; Napoléon III is in the audience.

London, 1870. Charles Dickens dies two weeks after the premier of *Coppélia* in Paris. Dickens would have been a great choice to write the tale of how Napoléon III's hubris caused a seventeen-year-old's rising star to crash and bur. However, there is little evidence that anyone has looked behind the scenes, or between the lines; telling the real-life tragedy behind the comedy falls to me. We will briefly explore this fairy tale ballerina's first performance…to learn how it become her swan song.

Nicole Dozier, "Developing an eDNA Assay for Critically Endangered Butterfly *Euphydryas anicia cloudcrofti*"
Major: Genetics and Biotechnology
Faculty Mentors: Dr. Brook Milligan and Dr. Ashley Rohde

The Sacramento checkerspot butterfly (*Euphydryas anicia cloudcrofti*) is federally endangered and endemic to the Sacramento Mountains near Cloudcroft, New Mexico. Population densities have declined steeply over the last three decades, and no wild specimens have been detected since 2022. We are currently developing an eDNA assay specific to the Sacramento Mountains checkerspot to improve detection of specimens by collecting environmental DNA (eDNA) from their host flowers visited in the same active season. We have gathered 114 published DNA sequences of *E. anicia* and are gathering sequences for the 38 species of *Nymphalidae* known to co-occur with *E.a. cloudcrofti*. These sequences will be aligned to identify promising genomic regions for species-specific primer development. When completed and verified, we will use these primers to detect *E.a. cloudcrofti* from fragments of eDNA within the native geographic range. This method will be used to supplement visual surveys that will provide baseline data for recovery efforts.

Frida Estrada, "Teaching *Macbeth* for 10th Grade"
Major: Secondary Education Language Arts
Faculty Mentor: Dr. Tracey Miller-Tomlinson
ENGL 409. Shakespeare II

This project proposes a two-week curricular unit on Shakespeare's *Macbeth* that is designed to engage students in critical literary analysis while making personal and real-world connections. Through themes of power, fate, and ambition, students will explore the play's relevance to environment, food, and self-identity. This unit allows for creative and meaningful engagement with the text and serves as an opportunity to refine my instructional design skills. Inspired by interdisciplinary research, assignments will move beyond traditional essays to include projects such as visualizing Macbeth's environmental impact or analyzing disease metaphors. By incorporating diverse perspectives on gender, witchcraft, and medicine, the unit cultivates deeper inquiry while maintaining student interest. Ultimately, this project aims to balance English Language Arts standards with innovative, student-centered learning.

James Flesner, "Design and Analysis of a Robotic Vacuum Arm for the Collection of Submerged Golf Balls"
Major: Mechanical Engineering
Faculty Advisor: Dr. Mahdi Haghshenas-Jaryani
Tim Thompson Graduate Scholarship
NM Graduate Stem Scholarship
Chevron Phillips Scholars Scholarship

Golf balls often become lost in bodies of water due to the nature of the sport while they can be quite valuable, this leads to water pollution which pose a threat to the environment. We aim to design and develop an underwater remotely operated vehicle with an integrated robotic vacuum arm to detect, localize, and collect golf balls. Our current robotic arm consists of three hollow 3D-printed links which are driven by servo motors. Homogeneous transformation matrices were derived and used to plot the workspace of the robotic arm. These matrices were utilized to create the Jacobian matrices which were used in torque calculations. These analyses showed

that the maximum torque experienced by the base link is about 1.3 Nm which is compatible with the selected servo motors in the design. Additionally, the inverse kinematics was developed and tested in simulation for moving the arm between two points.

Shabhan George, Zachary Carmichael, Michael Gremse, "Byte Bungalow: Webscraping for Rapid Data Visualization and Aggregation"
Majors: Computer Science
Faculty Mentor: Dr. Ayman Alzaid
NMSU Alamogordo: Introduction to Data Structures

ByteBungalow is a web-scraping application designed to gather and organize rental property information from various prominent listing websites. Tailored to assist young adults relocating to new cities or towns on short notice, the program extracts key attributes of rental listings and stores them in an easily sortable SQL database. User-defined input parameters allow data to be dynamically sorted through specialized algorithms, yielding personalized housing options. Additionally, ByteBungalow integrates visual aids, providing statistical summaries such as median, mean, and mode of rental data. By simplifying the housing search process, this tool offers a streamlined solution for users to make informed decisions in minimal time.

Julianna Hernandez, "Educational Anthropology in the Borderlands"
Major: Anthropology, Culture and Language
Faculty Mentor: Dr. Judith Flores Carmona
McNair Scholars Program

My McNair research thesis is on the hegemonic effects on pedagogy in El Paso, Texas. Currently, there's been a major shift in the last 10 years from public education to private education within the city. State policies related to education have adversely affected access to free public education to poor communities, shifting desperately needed money and resources to more privileged schools. I'll be researching the reason for this change and what the consequences could be in limiting equal access to education. I hypothesize that it may be ideologically driven in an effort for El Paso to separate itself from Juarez as much as possible, and that wealthy interests have pushed that divide at the expense of children's education for monetary gain.

Hannah Himelright and Andrew Melendrez Zerwekh, "On Computing Quotients of Finite Kripke Frames"
Major: Mathematics
Faculty Mentor: Dr. Ilya Shapirovskiy
Department of Mathematics Research Training Group in Logic and Its Application

A Kripke frame is a set of points connected by a binary relation. Two frames are said to be m-equivalent if they are indistinguishable by modal formulae containing at most m propositional variables, for a natural number m. We consider the following decision problem: given m and two finite Kripke frames, determine whether they are m-equivalent. Directly determining m-equivalence is unfeasible since there are infinitely many formulas in m variables. To decide the

m-equivalence problem, we developed an algorithm relying on special quotient frame constructions. Our algorithm is implemented in Python.

Sara Hipps and Lacey Yates, "STEM Student Identity and Career Motivations at Hispanic Serving Institutions"
Majors: Sara Hipps (Social Work), Lacey Yates (Human Development and Family Sciences)
Faculty Mentor: Dr. Paulette Vincent-Ruz
Discovery Scholars and McNair Scholar Program

This study examines the relationship between identity, career motivations, and science culture among undergraduate STEM students at a Hispanic Serving Institution (HSI). The focus is on understanding how organizational culture and culturally relevant curricula can foster a strong sense of belonging and science identity for these students. Using reflexive thematic analysis of qualitative surveys from students enrolled in a General Chemistry 1 course, the study finds that participants commonly tie their identity to family and choose careers driven by a desire to help their communities. The findings suggest that further research is needed to explore how HSIs can adapt chemistry curricula to better support the development of science identity in STEM students.

Sevren Jackson, "Multi-axis Investigation of the Box Assembly and Removable Component"
Major: Mechanical and Aerospace Engineering
Faculty Mentor: Dr. Abdessattar Abdelkefi
Program: Environmental Testing of Structures Laboratory Undergraduate Research Program

Current methods of modal and environmental testing often combine several separate single-excitation tests of a test article to predict the multi-axis response by utilizing the superposition principle. However, this can fail to account for the change in nonlinear behavior(s) of the system depending on the excitation configuration, especially when excited directly via stinger instead of base excitation. This investigation aims to clarify the nonlinear behavior(s) of the Box Assembly and Removable Component when subjected single- versus multi-excitation testing, the influence of forced versus base excitation on the change in dynamical response, and the degree to which the superposition principle can accurately predict the multi-axis response.

Zenaida Mendoza Levario, "Mental Health and Agriculture: Investigating Agricultural Programming and Tools Supporting Veteran Mental Health"
Major: Agricultural Communications
Faculty Mentor: Dr. Shannon Norris-Parish
LEADING Program, NIFA NextGen Program

Supporting veteran mental health is a critical priority in the United States, as many veterans experience high rates of physical, mental, and behavioral health challenges but there is a gap. To help bridge this gap, agricultural and horticultural programs for veterans have been developed. Guided by Bandura's (1977) theory of self-efficacy, we investigated the impact of these agricultural programs on veteran mental health by conducting a systematic literature review. We used the keywords "mental health," "agriculture," and "veteran," in the Web of Science database and initially yielded 45 articles and retained nine (n = 9) for analysis. After inductively coding each article we identified an overarching phenomena and two supporting

themes. Our findings indicate that agricultural programs can be therapeutic for veterans. In summary, agricultural programming offers substantial benefits for veteran mental health, including improved mood, reduced symptoms of anxiety and PTSD, an increased social connectivity and sense of belonging.

Guinivere Mayse, "Yoga Through the Ages: Integrating Art History and Mindfulness"
Major: Art History and History
Faculty Mentor: Dr. Anne Hubbell
Honors Capstone Project

This project explores the intersection of yoga, mindfulness, and art history by developing a unique yoga curriculum inspired by artistic movements from prehistory to contemporary art. Each session integrates guided meditation, movement, and thematic elements derived from specific artistic periods, allowing participants to physically and emotionally engage with art beyond traditional visual analysis. The curriculum will be implemented through the Honors Yoga Club at NMSU and an online platform featuring written meditations, art analyses, and instructional videos. By merging historical artistic expressions with mindfulness practices, this project fosters an interdisciplinary appreciation of art and wellness. The significance of this work lies in its innovative approach to art education, encouraging participants to embody historical artistic philosophies while promoting mental well-being. This research contributes to discussions on holistic learning, experiential art history, and the therapeutic potential of creative movement connected to meditation. The presentation will include a live demonstration that attendees can participate in, along with a talk highlighting the intersection of art history and mindful yoga.

Dolores Melchor, "A Recipe for Change: Transforming Traditional Foodways in Mesilla, New Mexico"
Major: Anthropology
Faculty Mentor: Dr. Lois Stanford
McNair Scholars Program

Over the years traditional ways of cooking and recipes have been subjected to influence. The changes in Southern New Mexico's cuisine reflect the socioeconomic changes of these small border communities, such as Mesilla, New Mexico. Exploring the changes in recipes and cooking explains the process of this transformation and modernization. These components of change represent a more modern dietary preference, availability of different foods, generational changes, and nutritional needs. Drawing on the narrative analysis of audio recorded interviews with Mesilla cooks, this research project examines the main markers of changes in foodways. Understanding these components of change helps us understand the challenges facing community residents and provide an insights into why traditional foodways are changing.

Katie Mena, "'Upon a True Contract': The Shifting Landscape of Marriage Vows in Early Modern England"
Major: English-Literature, Language, and Culture
Faculty Advisor: Dr. Tracey Miller-Tomlinson
ENGL 409. Shakespeare II

Shakespeare's play *Measure for Measure* presents three differing marriage scenarios reflecting a changing and tumultuous historic moment in the early modern period in England in which church, civil, and societal views on marriage vows differed. Grounded in historical research, this presentation will offer a reading of *Measure for Measure* as a glimpse into early modern marriage laws in England, leading up to and following the Canon Law Revisions of 1604. Notably, *Measure for Measure* was first performed at court on the 26th of December 1604 and presumably composed the same year, signaling a link between the marriage vow scenarios staged in the play and the recent changes to marriage vow requirements or validity according to canon law.

Angelina R. Mora, "A Comparison of the Ambitious Efforts of Lady Macbeth and Goneril"
Major: English
Faculty Mentor: Dr. Tracey Miller-Tomlinson
ENGL 409. Shakespeare II

The women in Shakespeare's tragedies are complex and typically the catalyst in the advancement of tragedy in their plays. These women are often subversive characters that explore the dynamics of gender and power. In Shakespeare's tragedies women are often intelligent and ambitious. However, instead of being rewarded for these characteristics like their male counterparts, they are subjected to bouts of mental anguish and ultimately pay with their lives. The objective of this presentation is to examine the doomed outcomes of ambitious women in Shakespeare's plays by making comparison between Lady Macbeth and Goneril's eventual descent into madness and ultimately taking their own lives. This presentation will reveal the double standard between ambitious female and male characters. This presentation highlights the importance of the general inclusion of gender studies and feminist theory in Shakespearean literary criticism.

Alexis Munoz, Christopher Le-Dozal, Lorena Escandon, Zion Lopez, and Noctis Maciel,
"URCAS Logo Design Presentation"
Major: Art
Faculty Mentor: Professor Brita d'Agostino

Each student from ARTS 455 Advanced Graphic Design was asked to come up with unique design for the 2025 URCAS logo. This presentation will cover each of the designs that were submitted, with each designer talking about their concept and how they went about this project. There are five presenters for this presentation in total, each with a completely unique and individualized logo and concept.

Ian Nelson, "Field-deployed passive trap methodology determines quality of insect molecular data"
Major: Biology and Chemistry
Mentor: Dr. Brook Milligan and Scarlet Sellers

Passive trapping is an efficient and practical method for studying insect communities. Blue vane traps (BVTs), traps consisting of water filled containers and a vane-shaped funnel, may be set for extensive periods, resulting in lethal capture. Additives such as surfactants or preservatives are also used in BVTs to improve capture rates. Researchers often disregard specimens

captured in BVTs for molecular ecology purposes, assuming DNA is too degraded after long-term exposure. However, the rate of DNA degradation in the field, including the influence of additives, is not well known. We tested the tradeoff between time and DNA quality of trapped specimens, and the influence of different additives. We exposed honey bees to trap conditions for varying periods and assessed the DNA from those post-treatments. This will improve understanding of passive trap conditions on DNA quality and allow for greater use of BVT captured specimens in molecular ecology studies.

Fin Pelowitz and Astrid Montanez, "Supporting the development of a STEM identity in LGBTQ+ Students"
Majors: Fin Pelowitz (Biochemistry), Astrid Montanez (Psychology)
Faculty Mentor: Dr. Paulette Vincent-Ruz
Vincent-Ruz Lab and McNair Scholars Program

Queer individuals are currently experiencing a dramatic uptick in negative sentiments, due in part by growing political divides. Queer individuals have always been a minority, however, with little research addressing their role and position in STEM education. As such, it is important to perform research directly focused around how queer identities fit or contrast with STEM field majors and classes. We have historically seen a large percentage of queer students leaving STEM fields. This research aims to explore the intersectionality of queer students with their STEM identities and determine what is unique about STEM that causes this behavior.

This study takes place in two separate parts. First, photo-elicitation is performed to capture individual attitudes and perceptions of STEM environments for current and former queer STEM majors. Second, focus groups are created where students are asked a series of questions regarding their experiences in STEM as queer students.

Eliza Phillips, "The Bard & the Gothic"
Major: Theatre Arts
Faculty Mentor: Dr. Tracey Miller-Tomlinson
ENGL 409. Shakespeare II

The goal of my paper is to research elements of the gothic in Shakespeare's plays, with specific look into both *Hamlet* and *Macbeth*. I attempt to argue that Shakespeare should be considered one of the early pioneers in what eventually became the gothic genre.

Tristian Ramirez and Annette Sciortino, "Sustainable Home-Growing Recommendations"
Majors: Horticulture
Faculty Mentor: Dr. Kulbushan Grover
AGRO/HORT/ENVS/SOILS 447

Home-growing and gardening is a rising trend, with more than half of the American population having the desire to produce their own food. This increasing interest has led to an influx of self-sustaining practices that anyone can follow at home. Despite this interest, many struggle to determine how to begin their journey—both successfully and sustainably. The myriad of plants and the varieties to choose from can be daunting to the novice gardener; the techniques that are suggested, and possibly required at times, may stump newcomers and be an interesting

reminder to those with experience. There are some fundamentals required for growing plants and progressive levels of knowledge that come with the work. The objective of this case study will be to examine and relay the essence of home-growing essentials. This will aim to detail the groundwork and suggestions that a home-gardener should heed as they work towards achieving their goals.

Ariana Rael, "Neurodivergence, Mental Health, and Music"
Majors: Psychology and Music
Faculty Mentors: Dr. Michael Marks, Dr. Madelyn Moore, and Dr. Sarah Daughtrey
Honors Capstone

The DSM-5 writes that individuals with Autism and ADHD are more prone to mental health concerns than neurotypical individuals. With more and more people receiving adult diagnoses, we aim to see if poorer mental health is more associated with a late diagnosis rather than one in childhood. This correlational study uses a survey asking about the possible neurodivergent or mental health symptoms one may experience. The survey also asks what ways music has been therapeutic to the respondents. The findings show that there is correlation between ASD/ADHD and mental health issues but there were no significant correlations in age of diagnosis. The researcher uses these results to discuss possible music therapy implications to cope with mental health issues and skills for neurodivergent individuals.

Edward Rivota, "Neuromorphic Compatible Autopilot"
Major: Computer Science
Faculty Mentors: Dr. Luis Rodolfo Garcia Carrillo and Dr. Eduardo Espinoza Quesada
Latinidad

Neuromorphic computing emulates the brain's architecture using spiking neural networks (SNNs), which process information through discrete spikes. This allows for real-time decision-making with reduced power consumption compared to traditional systems designed with a von Neumann architecture. While conventional autopilots often face power inefficiencies and limited adaptability, a neuromorphic-friendly autopilot leverages the parallel, event-driven nature of SNNs and specialized hardware. This approach enhances autonomy and responsiveness, especially for edge-deployed and power-constrained robotic platforms, promising advancements in the field.

At the unmanned systems laboratory in the Department of Electrical and Computer Engineering, we focus on integrating neuromorphic computing technology into robotic applications. My research involves designing an autopilot system compatible with drone applications. An autopilot acts as an embedded control system, enabling autonomous navigation and stabilization of robotic platforms by processing sensor data and issuing commands without human intervention.

Chloe Roman and Maxine Burford, "Benefits of Using Nature and Landscape Design to Enhance the Health of Urban Populations"
Major: Horticulture
Faculty Mentor: Dr. Kulbhushan Grover
HORT 447

Creating landscapes in urban settings has become more popular as urbanization has increased in the United States, furthermore the world. The presence of greenery has an immediate effect on an environment's biodiversity, together with the overall health of humans residing in the environment. This case study addresses the importance of utilizing and appreciating landscape design as a way to improve a sustainable quality of life for both humans and an ecosystem enhancing climate regulation and air circulation. Literature research in this study provides practical ways that populations can embrace landscape design and maintain ecosystems amongst urban environments. Research also supported the idea that landscaping projects are a tool in building community and can foster positive social interactions between people. This study will showcase examples of how green spaces have shown to improve natural areas and surrounding community(s) by increasing mental and physical health, air quality, community involvement, and biodiversity.

Matthew Ross, "The Effect of Game Format on Intramural Officials' Physical Activity Levels"
Major: Kinesiology
Faculty Mentor: Dr. Larissa True
SPMD 4998 Internship

Intramural sports officials play a critical role in maintaining fair play and game integrity, and the physical demand for officiating varies between sports. This research aims to identify the effect of game format on intramural officials' physical activity levels based on the data collected from basketball, pickleball, and softball games. The study will identify which format of sport places the greatest physical demand on officials and the effects of factors such as game tempo and size of the officiating crew on activity levels. Intramural officials will be recruited to officiate games while wearing an ActiGraph Link Accelerometer to measure steps taken, distance covered, and average heart rate. T-tests and analysis of variance will be used to determine differences in physical activity variables among the three sports formats. Findings have the potential to optimize game-day officiating rosters, training programs, and workload planning to enhance officials' health, performance, and well-being.

Remi Salinas Schmeis, "A Structural Difference in The Orthogonality Spaces of R^3 and C^3"
Major: Mathematics
Faculty Mentor: Dr. John Harding
Research Training Group in Logic and Its Application

Given a quantum system represented by H=R^3 or H=C^3, we can study the pure states of the system via the orthogonality space of H. The orthogonality space of H is a symmetric, irreflexive graph whose vertices are the pure states of the system, given by the 1-dimensional subspaces of H, and in which two vertices are adjacent if they are orthogonal as subspaces. The goal of this research was to find an explicit structural difference in the orthogonality spaces of R^3 and C^3 and thus a difference in the pure states of quantum systems represented by the two spaces. By considering unbiased bases, I constructed a finite graph that can be found as a subgraph of the orthogonality space of C^3 but not as a subgraph of the orthogonality space of R^3. In this talk I will show how such a finite graph can be constructed.

Mario Esteban Saenz Trejo, Valerie Guzman, and Arturo Rivera, "3D Reconstruction of Static Indoor Spaces Using an Intel® RealSense™ LiDAR and RGBD sensor"
Major: Mario Saenz (Electrical Engineering and Computer Science), Valerie Guzman (Industrial Engineering), and Arturo Rivera (Electrical Engineering)
Faculty Mentor: Dr. Cecilia Contreras and Dr. Luis Rodolfo Garcia Carrillo
Research Oriented Learning Experience (ROLE)

This research contributes to the computer vision field and smart environment modeling by reconstructing complex indoor spaces using an Intel® RealSense™ L515 LiDAR and RGBD sensor. The central research question asks how accurately a depth sensor is able to map a static complex indoor space in real time. To investigate this, we integrated the Intel® RealSense™ L515 using the Intel® RealSense™ Software Development Kit with Python for processing and Simultaneous Localization and Mapping techniques to build a 3D reconstruction of indoor spaces. To visualize results, the OpenCV and NumPy Python libraries along with the Intel® RealSense™ SDK point cloud resources were used to generate, project, and analyze the resulting 3D reconstruction. Preliminary findings show that the high density point clouds generated depict a reasonably accurate reconstruction of the space dimensions. This work demonstrates the possibility of accessible and relatively affordable depth-sensing technology for applications ranging from indoor mapping, robotics, and facility management.

Lizzett Solis and Natalie Nguyen, "Quality Improvement Teaching Strategies in Family Medicine Residency"
Major: Lizzett Solis (Biology & Anthropology), Natalie Nguyen (Biology)
Faculty Mentor: Dr. Mary Alice Scott
McNair Scholars Program

Residents in family medicine residency programs must engage in quality improvement (QI) projects as a requirement of accreditation through the Accreditation Council for Graduate Medical Education. Although there is a growing recognition of the need for more effective QI educational strategies, the landscape of teaching strategies employed and evaluated remains unclear. To address this gap, we are conducting a scoping review to identify, map, and characterize the range of quality improvement teaching strategies utilized in family medicine residency programs that have been evaluated, published in medical education, and related journals. This scoping review will provide an overview of the existing evidence including strategies, evaluating methods employed, and reported outcomes. Using the JBI scoping review methodology, we seek to identify the current scope of evaluated QI teaching methods and areas for future research and innovation that enhance QI education in family medicine residencies. This presentation describes our preliminary findings.

Estevan Soto and Alfonso Hernandez-Barraza, "Natural Disasters: Long Term Effects"
Major: Estevan Soto (Horticulture), Alfonso Hernandez-Barraza (Environmental Science)
Faculty Mentor: Dr. Kenneth Carroll and Dr. Ryan Goss
AGRO/HORT/ENVS/SOILS 447

There are many types of natural disasters such as tornadoes and wildfires. We usually only see the damage right after the disaster: what we don't see is the long term effects on the community affected, such as contamination in water, soil, or air and the time it takes to rebuild. The physical effects of these natural disasters are felt heavily by the farmers and other agriculturists, who must repair or recoup their equipment, infrastructure, crops, livestock or a plethora of other

problems that occur due to these disasters. The objective of this presentation is to understand the long-term effects from natural disasters, which can help us prepare for them.

Molly Streich, "Development of High Sensitivity Quantitative Methods for Short Oligonucleotides in Biological Samples"
Major: Biochemistry and Biology
Faculty Mentor: Dr. Christopher Baker

Short oligonucleotides of fewer than 100 bases, such as microRNA (miRNA) and cell-free DNA (cfDNA), play important roles in normal and disease-state biology. Polymerase chain reaction (PCR), particularly quantitative PCR (qPCR), has been the foundation of DNA and RNA research for decades. However conventional PCR amplification is not possible at the short length scales of miRNA and many cfDNAs of interest. To address this challenge, various approaches have been developed towards oligonucleotide amplification at short length scales, with rolling circle amplification (RCA) standing out for its simplicity and the quantitative benefits of linear amplification profiles. Much of the focus in RCA development has been on accelerating reaction times to match the exponential nature of PCR. Relatively fewer developments have concentrated on harnessing the linear amplification of RCA to deliver reliable quantitative performance. In this work we discuss the development of two distinct yet complimentary approaches to quantitative RCA. In the first, we utilize machine-learning algorithms, such a principal component regression and uniform manifold approximation and projection (UMAP), to build calibration models that predict the starting concentration of short oligonucleotides based on the observation of real time RCA amplification with SYBR-Gold RCA amplification to a digital droplet format. The fundamental principles of both approaches will be described, and proof-of-principle experimental results will be presented.

Fabian J. Talavera, "Structural Design and Prototyping of an Omnidirectional Unmanned Aerial Vehicle"
Major: Aerospace Engineering
Faculty Mentor: Dr. Eduardo S. Espinoza and Omar Garcia
Latinidad

Unmanned Aerial Vehicles (UAVs) have become a widely utilized tool for various applications, including search and rescue and mapping. However, commonly used platforms like quadrotors lack the ability to independently control their thrust in a three-dimensional environment, whereas this new multirotor technology offers that capability.

At the Unmanned Systems Laboratory in the Department of Electrical and Computer Engineering, we specialize in developing advanced technologies for aerial robotics applications. My research focuses on the structural design and prototyping of an omnidirectional UAV to overcome the limitations of traditional multirotor vehicles. By optimizing thrust vectoring, this UAV achieves full six-degree-of-freedom motion (both translational and rotational) using an eight-rotor system, with potential applications in aerial manipulation.

Geraldine Romero Tenorio and Itzel Cordova, "Auto ethnography: Our Perceptions of Errors in the Math Classroom"

Major: Geraldine Romero Tenorio (Actuarial Science and Insurance), Itzel Cordova (Elementary Education)
Faculty Mentor: Dr. Mariana Alvidrez
Latinidad

Despite growing recognition of the benefits of mistakes in the learning process, they are still often frowned upon in classroom settings, particularly in mathematics classrooms. This study is part of a larger ethnographic project that examines elementary mathematics teachers' attitudes toward mistakes and supports them in reframing errors as valuable learning tools. Within this context, we conducted a mini-study using autoethnography to describe and critically analyze our personal experiences and cultural understandings of the role of mistakes in mathematics learning. Our data consists of reflective memos in which we examine our participation in a series of six professional development workshops. Our findings reveal how these experiences influenced our efforts to (re)frame errors as valuable tools for developing problem-solving strategies and deepening conceptual understanding. They also highlight how our evolving perspectives as students, tutors, and future teachers can shape our perceptions of what it means to be "good at math" and our identities as mathematical thinkers.

Grafton Urbatsch, "Innate Value: Philosophy Talk"
Major: Computer Science
Faculty Mentor: Instructor Celsia Arockiadass
COMM-1115G

This is a persuasive speech written for a Communications class on the detriment posed by hard work to the human life. Sentiment has been growing online and in popular culture among the youth that absolute hard work and self-improvement is the key to a life well lived. Various authors and public speakers who have devoted their lives to self-improvement, such as David Goggins, are idolized by youth today, and that is a problem. A life well lived is not one of hard work, self-improvement, or striving for perfection.

Ayla Valles, "Multi-Objective Co-Design Optimization of Pneumatic Artificial Muscle (PAM)-Driven Snake-Like Robots"
Major: Aerospace Engineering
Faculty Mentor: Dr. Mahdi Haghshenas-Jaryani

This study presents a multi-objective co-design optimization framework aimed at enhancing the locomotion of muscle-driven snake-like robots, with a primary focus on optimizing both morphology and joint-space controller for improved agility and power consumption efficiency. The framework incorporates a parametric dynamic model of the robot, and a computed muscle-force controller designed to track desired joint motions. Control testing and MATLAB simulations were conducted on a 2-link module and expanded to larger 6-link robot, where varying motion parameters and friction conditions were explored. The optimization process examined the impact of morphological parameters and control gains on balancing velocity and power efficiency. Optimization methods such as Nonlinear Programming, Patternsearch, and the global Genetic Algorithm were explored in this process. The results indicated that shorter muscles placed closer to the joints, smaller morphology, and using the critical damped control scheme, provided optimal forward velocity with minimal power consumption.

Amanda Velazco and Zachary Guyule, “Highs and Lows of Cannabis”
Major: Horticulture
Faculty Mentor: Dr. Kulbhushan Grove and Dr. Omar Holguin
SOIL/HORT/AGRO/ENVS447

Cannabis, a plant with a long history of use, presents a complex profile of both potential benefits and risks. This project aims to synthesize current scientific literature to provide a balanced overview of these effects. By examining the therapeutic potential of cannabinoids, such as Delta-9-tetrahydrocannabinol or THC, in treating conditions like chronic pain, epilepsy, and nausea, while also addressing the potential adverse effects associated with cannabis use, including cognitive impairment, respiratory issues, and the risk of developing cannabis addiction. Furthermore, assessing the economic implications of cannabis legalization and the ongoing debate surrounding its long-term impact on the public. By evaluating existing research, this project seeks to contribute to a deeper understanding of cannabis and inform evidence-based discussions regarding its use and regulation.

Camryn Wharff, “Adolescent Social Media: More Harm Than It’s Worth?”
Major: Psychology
Faculty Mentor: Dr. Lisa Peterson

In our modern world, social media usage is widespread across adolescents, which has led many policy makers to question if it is safe for young adults. This literature review analyzes the current research in the field, identifying both the harms and benefits of social media in seven key areas: social comparison, cyberbullying, addiction, exposure to negative content, support, belonging, and relationship maintenance. The research shows that social media has the power to be both harmful and beneficial to adolescent mental health depending on the ways in which it is used. Future research in the field needs to work to establish causal claims in regards to mental illness and social media and begin to create interventions to minimize the harm caused by social media.

Joshua Wood, “Developing Future Leaders: The Impact of the ASNMSU Roadrunner Internship Program”
Major: Government and Criminal Justice
Faculty Mentor: Dr. Samuel Worley
Honors Capstone Project

This capstone project contributes to leadership development and professional growth programs at the university level, specifically focusing on underclassman programs within student government. The research question guiding this project is: How do the ASNMSU Roadrunner Internship Program foster leadership skills and professional development for students, and how does it compare to other university programs? I will analyze the structure and outcomes of the ASNMSU Roadrunner Internship alongside three comparable programs from universities nationwide. The primary method involves qualitative research, including interviews and surveys with past interns, alongside a comparative study of program frameworks. Initial findings suggest that the Roadrunner Internship program effectively develops leadership skills, strengthens professional capabilities, and enhances understanding of student government operations. The significance of these findings lies in demonstrating how professional development programs can

serve as powerful tools for leadership training and long-term career success, offering a model for other institutions to adopt.

Brooke Yehle and Mario Rodriguez, “Comparing Traditional Agave Production and Farming Practices with Modern Practices and its Effects on the Tequila Industry”
Majors: Brooke Yehle, Genetics and Biotechnology, with minor in Biochemistry; Mario Rodriguez, Soil Science
Faulty Mentor: Dr. Kulbhushan Grover and Dr. Omar Holguin
SOIL/HORT/AGRO/ENVS447

The cultivation of *Agave tequilana* holds economic significance in the tequila industry. Traditional farming practices utilizes semi-arid domestication strategies; however, this system has low genetic diversity given it is a monoculture and will experience the negative effects brought on by climate change. Current literature shows that unchanged methods of subsistence farming have been used for hundreds of years. With the basic understanding of plant development, farmers have been consistently able to produce agave for the tequila industry. This project has identified the need for improvements in agricultural technologies like new irrigation systems, remote sensing technology, or new knowledge in plant breeding. This comparative analysis found that the use of these new advancements, agave producers and the tequila industry can see large improvements in cost, time, and overall yield.