Poster Abstracts

Liz Estefanía Ayala-Guzmán, "Soft Wheeled Mobile Robot with A Shape-Morphing Steering Mechanism"
Major: Aerospace Engineering
Faculty Advisor: Dr. Mahdi Haghshenas-Jaryani

Autonomous exploration of unstructured and extreme access environments of other planetaries poses a significant challenge for current robots. However, recent research indicates that soft robotics presents a more suitable solution due to its shape-morphing capabilities. This work aims to investigate the design and prototyping of soft-morphing mechanisms for generating adaptive locomotion that enables diverse terrain navigation. Our design consists of a series of soft-tube actuators affixed to a cylindrical structure, controlled by pressurized air. Sequentially inflated air tubes generate rotational motion about the cylinder's main axis, facilitating both forward and backward movements. Additionally, situated on each side of the cylinder is a radial expansion/contraction mechanism, which operates with four soft actuators. These actuators can be inflated or deflated to manipulate six strings attached to the circumference of the cylinder. By adjusting the air pressure, the radius of the wheel can be modified, consequently altering the angle of rotation.

Gabrielle Baca, "Detection of Trypanosoma cruzi in Triatomine Vectors in New Mexico"
Major: Microbiology
Faculty Advisor: Maria Castillo

Triatomines, commonly known as "kissing bugs", are blood-feeding insects that are vectors for the protozoan parasite Trypanosoma cruzi, the causative agent of Chagas disease. These insects feed on blood and deposit feces that can be contaminated with the metacyclic trypomastigote stage of the parasite. Later entering the mammalian host through the bite wound or mucosa. Triatome insects at the US-Mexico border pose a risk of Chagas disease transmission to the local population. In this study we aim to test for the presence of T. cruzi infection in triatomines collected in rural and urban areas in Las Cruces, New Mexico. To detect T. cruzi, the midgut insects were dissected and homogenized for DNA extraction, followed by amplification of parasite targets using PCR and gel electrophoresis analysis. The screening of T. cruzi in triatomines is an essential step in promoting public health."

Omar Bashammakh, "Enhancing Solar Power Generation through Machine Learning-Based Solutions"
Major: Electrical Engineering
Faculty Advisor: Dr. Di Shi

As power grids increasingly explore environmentally sustainable energy alternatives like solar power, there are many challenges in solar energy production, such as reliability, that need to be

addressed. This research tackles these challenges by utilizing machine learning models to predict solar power generation levels.

In the initial phase of our study, we constructed experimental models to determine the key factors influencing solar power generation. Our focus was on various neural network architectures, with an emphasis on Long Short-Term Memory (LSTM) networks. Our constant rebuilding of the model emphasized the best combination of model features, such as the number of layers.

Subsequent phases of our research will refine and improve our predictions utilizing transformer models. By doing so, we aspire to contribute to more reliable and efficient solar power generation through machine learning models, offering a step towards a future of sustainable energy production.

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

In Redrock New Mexico, located 28 miles South of Lordsburg is the Northern Burro Mountain formation in Ash Canyon. The area for my research has little published pieces regarding mapping or its 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 multi-faceted approach that combines fieldwork, drone mapping, geochronology, petrology and geochemistry analysis, and thin-section examination. Hand samples collected during fieldwork serve as primary data sources, while drone mapping enhances the understanding of the geological formations. Thin sections reviewed from hand samples indicate the presence of minerals consistent with gabbros, metasedimentary rocks, and metabasalts. Which provides valuable insights into the composition and origin of the rocks within the Red Rock NM region.

Maxwell Chapman and Haley Shaw, "Pitching Biomechanics Unveiled: Exploring the Interplay of Pitches and Arm Slots in Baseball
Majors: Maxwell Chapman (Kinesiology, Exercise Science), Haley Shaw (Kinesiology, Performance Psychology)
Faculty Advisors: Cabel McCandless, Dr. Alyssa Vanderlinden

Existing research looks at the kinematic disparities between sidearm and overhand pitching (Escamilla RF, et al., 2018), neglecting the correlation between performance and injury prevention. Professionals use both techniques in games, prompting insight into performance differences across various pitches and body types. This study aims to assess the performance of adolescent baseball pitchers employing overhand and sidearm techniques with diverse pitches. We think by identifying optimal pitches based on wingspan, height, range of motion, and arm lengths, we can optimize performance and prevent injuries. Twelve beginner male pitchers with no history of elbow or shoulder problems will participate, including left and right-handed throwers. Utilizing Baseball Rapsodo and IMU, we'll measure accuracy, velocity, limb orientation, angular velocity, and force on muscles and joints. Each participant will execute three

pitches, ten trials each, in a single-day data collection session. This research aims to unveil performance advantages and refine injury prevention strategies. "

Esai Cisneros, "Developing Applications for the Bruker Nanowizard XP Biological Atomic Force Microscope"
Major: Genetics and Biotechnology; NSF CMMI and MRI
Faculty Advisor: Dr. Elba Serrano, Biology

Biological Atomic Force Microscopy (BioAFM) is a powerful, high-resolution imaging technique that can be used to visualize cells and biomolecules, providing insights into their structure and mechanical properties such as stiffness and elasticity. This pilot study aimed to optimize protocols for visualizing plant and animal cells with NMSU's new BioAFM. Two-week post germination Kale leaves were imaged with Bio-AFM and Scanning Electron Microscopy (SEM), with a focus on the distribution and features of sensory guard cells (stomata). Results showed that high resolution analysis of a live or fixed sample's 3D structure and mechanical properties with Bio-AFM can benefit from complementary SEM characterization of larger areas of interest on the surface of fixed leaves. Taken together, results highlight the need for protocol optimization specific to the sample e.g. force settings, tip selection, imaging in air vs liquid. Efforts to optimize Bio-AFM imaging of a brain cancer (glioblastoma) cell line are ongoing.

Jay Choate, "United States Policy on Small Modular Reactors"
Major: Government; Minor; Public Administration; Course: Environmental Policy
Faculty Advisor: Dr. Ani Ter-Mkrtchyan

The debate on U.S. energy policy is increasingly centered on balancing energy security, environmental sustainability, and economic growth. This research delves into Small Modular Reactors (SMRs) and their potential to address these concerns, highlighting their safety, lower emissions, and deployment flexibility. However, challenges like public skepticism, regulatory hurdles, and economic viability loom large. This study explores how SMRs could be woven into the national energy strategy through detailed analysis, underlining the need for development, regulatory adaptability, and public engagement. As we aim for a sustainable energy future, this study emphasizes the importance of SMRs in achieving a secure, environmentally friendly, and competitive energy market. It advocates for a comprehensive approach that combines technical innovation, policy support, and societal acceptance to overcome obstacles and maximize the benefits of SMRs in the energy landscape.

Emerald Davis, Abygail Flores, Mario Ochoa Dominguez, Mack Pokorny, Chrystin Rodriguez, Ashton Sanchez, "Study of the Sun Activity with the ELSOL NSF grant using Data Science and AI for engagement"
SMET102
Faculty Advisor: Dr. Ilhuiyolitzin V. Pedraza

ELSOL is a pilot project funded by the National Science Foundation (NSF), The objective is to engage STEM students with one astrobiology class that includes the use of a citizen science project, data science and artificial intelligence. In this work we will explain the results for the second year of the project with a NASA radiotelescope.

Jeff Dominguez, "Gram negative bacteria release of lipopolysaccharide (LPS) negatively affects female reproduction"
Major: Animal Science; USDA National Institute of Food and Agriculture Hispanic- Serving Institutions Education Grants Program
Faculty Advisor: Dr. Jennifer Hernandez Gifford

Haptoglobin (HP) is an acute phase protein used to access immune response to bacterial infections. This study examined HP concentrations in ewes exposed to varying LPS doses during ovarian follicular development. Thirty-six multiparous Rambouillet ewes received 0 (control), 1.5 ug/kg, or 3 ug/kg LPS treatments. Plasma samples were collected over 12 hours on days 5 and 15 of their synchronized estrous cycle. HP concentrations were evaluated using ELISA kits at 0, 3, 6, 9, and 12 hours. Results showed higher HP concentrations at 12 hours for LPS-treated ewes compared to controls on day 5 ($P < 0.003$). On day 15, HP levels increased rapidly, with significant elevation at 9 and 12 hours post-LPS challenge compared to controls ($P < 0.0025$). Monitoring immune system and inflammation markers like HP may offer insights into how disease states impact reproductive physiology.

Teresa Galvan, "Uranium Adsorption Using Biochar"
Major: Chemical and Materials Engineering
Faculty Advisor: Dr. Catherine Brewer

Heavy metal water pollution such as natural uranium is a problem found in New Mexico. Common causes of pollution is when groundwater breaks down the minerals in the soil, dissolving the metals into the water. Adsorption based methods like biochar can be used in water treatment. Biochar is a black carbon made from biomass such as wood, plants, or agricultural waste products, that was heated up to 400 C in slow batch pyrolyzers under nitrogen gas flow. Synthesized water samples will be made using dilute concentrations of uranium and added salts to mimic local water. Adsorption will be tested using batch experiments at different isotherms for different kinetics. Uranium and heavy metal concentrations will be measured before and after adsorption using inductively coupled plasma optical emission spectroscopy (ICP-OES). The goal of this project is to characterize biochar made from locally available biomass and find the best option for uranium absorption."

Adrian Gonzalez, "The Ethical Dilemma of Online Ad Tracking"
Major: Information and Communication Technology, Engineering; S-Stem
Faculty Advisors: Adan Delval, Dr. Mark Lawrence

How often do you agree to "Accept Cookies" without realizing what you are agreeing to? Cookies play an essential role in enhancing user experience. Cookies are used for remembering our logins (including passwords), tracking our online activities, and personalizing user experience. This study seeks to show how online behavior is monitored for advertising purposes. This raises the ethical question about consent, clarity, and questions the balance between business needs and our privacy. There has been an increase in companies utilizing cookies to collect non-essential user data. Users feel companies lack transparency in their data collection. Users, often without knowing, consent to third-party ad tracking when "Accepting Cookies." Accepting Cookies shares users' location, shopping habits, and personal data. This research aims to shed light on these business practices and question their fairness, all while trying to create awareness and push towards more ethical and transparent digital advertising and privacy standards.

Alan Gonzalez, Sebastian Rubio-Olivas, and Samuel Sepulveda, "Planning Disaster Response"
Research Oriented Learning Experiences (ROLE)
Faculty Advisors: Dr. Luis Rodolfo Garcia Carrillo, Nicholas Grijalva, Edward Rivota

The objective of this project is to streamline the assessment and mapping processes in disaster-affected regions through the utilization of an Unmanned Aerial Systems (UAS). The overarching societal benefit of this initiative is to contribute to humanitarian aid efforts in natural disaster areas. Our approach entails waypoint navigation to chart an optimal course for the drone. We will employ cutting-edge techniques such as Simultaneous Localization and Mapping (SLAM) You Only Look Once (YOLO) to ensure obstacle avoidance in route to the affected zone. Additionally, we will utilize You Only Look Once (YOLO) to survey the environment and devise a method for effectively distinguishing victims from surrounding objects. This project underscores the critical role of drones in mitigating risks to first responders. The deployment of drones in hazardous environments can significantly reduce the potential dangers faced by human responders, thereby enhancing the overall safety and efficiency of the disaster response efforts.

Jade Gonzalez, "New Mexican Nopalitos Salad - Could it prevent cancer?"
Major: Jade Gonzalez (Horticulture)
Faculty Advisor: Dr. Ivette Guzmán

Plant-based foods have health-promoting phytonutrients. Cooking methods and ingredients affect bioavailability of these phytonutrients. As diets have westernized, they have become less plant-based which has increased our risk of cancer. The effects of westernization on phytonutrient bioavailability was tested. They hypothesis was that the traditional preparation of a "nopalitos" salad recipe was expected to have higher phytonutrient bioavailability. In collaboration with La Semilla Food Center three versions were identified. The recipes were prepared at the Fred Hutchinson Cancer Center. The three "nopalitos" salad versions underwent an in vitro simulated human digestion protocol. High-performance liquid chromatography was used to analyze samples pre- and post-digestions. Results showed that the traditional version had the most bioavailable carotenoids. The westernized had the most bioavailable chlorophylls. The traditional

preparation did not prove to have higher bioavailability of all phytonutrients tested. In conclusion, the preparation of plant-based foods impact bioavailability of cancer preventative compounds.

Valerie Guha, "Polyphenolic Content in Navajo Sumac Berries – Are they a superfood?"
Major: Biochemistry
Faculty Advisor: Dr. Ivette Guzmán

Sumac berries are a well-known spice that grows naturally all over the world. The berries come with many health benefits ranging from anti-cancer to anti-inflammatory effects, and they are especially high in antioxidants and pro-vitamin A. These phytonutrients may vary from region to region. Navajo Nation sumac berries have not yet been profiled and thus the hypothesis is that these sumac berries have a higher polyphenolics content than a known super food, wild blueberries. Phenolic extracts of wild blueberries and the sumac berries were prepared using acetified methanol and a bioassay was performed using gallic acid standards as a comparison. The results showed that the blueberries were a lot higher in polyphenolic content compared to the sumac berries (21.8190 mg/g and 10.2898mg/g, respectively) However, it should be taken into consideration that wild blueberries were used due to their rich phenolic content which makes them a superfood."

Galilea Gutierrez, "Concurrent validity and test-retest reliability of SqueggTM - smart dynamometer and handgrip trainer in healthy individuals"
Major: Kinesiology
Faculty Advisor: Zarmina Amin & Dr. Larissa True

Handgrip strength (HGS) assessment is essential for overall health and is measured using hand dynamometers. This study compared the Jamar® Hydraulic Hand Dynamometer with the SqueggTM Smart Dynamometer and Handgrip Trainer, a Bluetooth-enabled device. The purpose of this study was to establish concurrent validity and test-retest reliability between Jamar and Squegg. Participants aged 18 years and above, without hand diseases or dysfunctions, underwent bimanual HGS measurement in two sessions using both devices. Spearman's rank correlations evaluated concurrent validity, while intraclass correlation coefficients (ICC) assessed test-retest reliability. Results from 594 participants showed good concurrent validity between Jamar and Squegg for both right-hand ($\rho = 0.670$) and left-hand ($\rho = 0.730$) measurements. Squegg demonstrated good to excellent test-retest reliability (RH, ICC = 0.911; LH, ICC = 0.928). This study suggests Squegg as a reliable alternative to Jamar, offering consistent HGS testing with Bluetooth technology at a reasonable cost.

Galilea Gutierrez and Brooke Smith, "Baseline Assessment of Upper Extremity Hand Function in Collegiate Esports Players"
Major: Kinesiology
Faculty Advisors: Zarmina Amin, Dr. Larissa True, Dr. Peter Smoak

The study conducted establish normative data on upper extremity hand function of collegiate Esports players in the Southwest United States Methods: Collegiate Esports players' physical performance in hand and finger strength, dexterity, wrist and finger range of motion, and reaction time were evaluated, with their scores compared to established norms. Esports keyboard and mouse players, aged 18-29, generally had lower handgrip and pinch grip strength than the norms, with exceptions. Hand dexterity was slower for both genders compared to the norm. Thumb range of motion (ROM) demonstrated higher ROM in the dominant hand and mixed ROM in the non-dominant hand. Wrist ROM was mixed, with some measures higher and others lower than the norms. reaction times for players aged 18-25 showed slower choice reaction time but faster simple reaction time compared to norms. Conclusion: The study delved into Esports players' physical attributes and their link to gaming performance, highlighting the importance of physical health.

Gloria Hernandez, "Evaluation of Pyrolysis Systems and Biomass feedstock"
Major: Chemical and Materials Engineering; NM AMP
Faculty Advisor: Dr. Catherine E. Brewer

Pyrolysis systems are crucial for converting biomass into valuable biochars, bio-oils, and combustible gases. This project aims to evaluate and compare commercial mobile pyrolysis systems suitable for small-to-medium biomass processors, particularly those using woody feedstocks in New Mexico. The systems will be assessed based on technology complexity, scale, biomass compatibility, cost, and community needs. Selected systems will undergo techno-economic analysis using vendor information and quotes. Special attention will be given to labor costs, automation levels, and revenue generation. Initial research will leverage data from the U.S. Biochar Initiative (USBI) and the International Biochar Initiative (IBI), which will be complemented with biomass quantification, quality analysis, and application testing for the produced biochar. The study will also explore the potential integration of the use of heat recovery for an organic Rankine cycle.

Tania Ibarra, "Optimizing Patient Care: The Importance of Correct Dosing for Over-the-counter (OTC) Medications"
Major: Microbiology; Honors Capstone
Honors Advisor: Kristen Chavez, PharmD
Instructor: Shawn Werner

Over-the-counter (OTC) medications are widely used for self-treatment of common ailments, yet determining the correct dosage can be challenging due to factors such as age, weight, and medical history. This research aims to synthesize current knowledge on optimal dosing practices for commonly purchased OTC medications, emphasizing OTC medications most likely to be purchased on a college campus. This study further highlights the importance of accurate dosing to ensure safety and efficacy. Factors influencing dosing recommendations, such as formulation differences, potential interactions, and patient variability, are analyzed to provide insights into individualized dosing strategies. Furthermore, this study aims to shed light on the role of

pharmacists in educating patients about appropriate dosing guidelines and their contribution to enhancing the effectiveness and safety of OTC medication use. "

Domonic Jimenez, "Diet Habits of The American Kestrel (Falco sparverius) in Arid Agricultural-Desert Scrubland Within Southern New Mexico"
Major: Fisheries and Wildlife Management, Ecology; McNair Scholars Program, USDA LEADING Hispanics, and USDA ENHANCEMENT Project
Faculty Advisor: Dr. Martha Desmond

The American Kestrel (Falco sparverius), North America's most common and widespread falcon, is experiencing substantial population declines. Since 1960, this raptor has declined 1.4% on average each year. The exact causes of decline remain speculation, and several factors are thought to contribute. Researchers suggest region-based analysis can provide more accurate descriptions of population change throughout the kestrels' range. Utilizing an ongoing Nest Box Program at New Mexico State University, camera compartments and game cameras will be placed into nest boxes utilized in previous years. Expected results will show a difference in diet composition as agriculture increases, correlating with a change in nestling condition The results of this study can provide managers with information on how the kestrel is impacted by agriculture in the arid desert scrubland of Southern New Mexico. This study also serves as a pilot study, paving the way for future research by NMSU graduate or undergraduate students.

Rabiya Khadijah Kamran, "Basal body docking in spermatogenesis in *Drosophila melanogaster*"
Major: Biology and Psychology; BIOL 398 Research Programs
Faculty Advisor: Dr. Jennifer Curtiss, Biology

Non-canonical polyA polymerases are important for post-transcriptional regulation of stored mRNAs. The TENT5 family of polyA polymerases is important in human male fertility, but the mechanisms remain unclear. A mutation in the D. melanogaster TENT5 ortholog results in male sterility with a failure in spermatid individualization. We hypothesize that a failure of basal body docking to the nucleus in later stages underlies male spermatid individualization defects in mutant flies. To test this, we will generate TENT5 mutant flies containing Asl-GFP, which is a basal body marker, and confirm genotypes via PCR. We will dissect testes from these flies and co-stain with phalloidin to mark the actin cones, and Hoechst to mark spermatid nuclei, and examine whether the nuclei are separated from the basal bodies in the mutants. This research aims to shed light on the role of TENT5 in spermatogenesis and its orthologs, with implications for future studies.

Karime Luna, "Efficacy of chute-side pregnancy test on early pregnancy determination in mature Rambouillet ewes"
Major: Animal Science; ACES UG Research Program
Faculty Advisor: Dr. Jennifer A. Hernandez Gifford

Distinguishing pregnant and non-pregnant females allows for improved flock management. Established early pregnancy detection techniques like ultrasonography require specialized training and equipment not readily accessible to producers. The objective of this study was to evaluate a commercial pregnancy test for early pregnancy detection in sheep. Estrous synchronized ewes were exposed to a ram and blood constituents were collected via jugular venipuncture before synchronization (d 0) and on days 20, 35, and 70 of gestation. IDEXX Alertys™ OnFarm bovine pregnancy test was used to assess blood samples for pregnancy. Pregnancy validation, using progesterone analysis, and ultrasound examinations were also evaluated. On day 20 of gestation, pregnancy was diagnosed at 32%, 61%, and 61% in whole blood, serum, and plasma, respectively. Detection accuracy increased at d 35, and by d 70 was comparable to ultrasound and progesterone analysis suggesting the IDEXX test is accurate to detect pregnancy by d 70 of gestation.

Nico Mendoza, "EyeUI: Combining Eye Gaze and Face Gestures for Accessible Human-Computer Interaction"
Major: Industrial Engineering
Minors: Mathematics, Supply Chain and Operations Research Analytics; NM AMP
Faculty Advisor: Dr. Justin MacDonald

Current human-computer interaction methods primarily rely on physical input devices, such as keyboards and mice, which causes computer usage to be inaccessible to individuals with upper body impairments. These individuals often depend on costly assistive technology to interact with computers. The objective of this research is to create a system that requires only a webcam to control a user's computer. This research uses two JavaScript-based programs, WebGazer and face-api.js, to conduct eye tracking and recognize face gestures. The system successfully detects users' smiles and "O-shaped" open mouths. A local browser-based server is used to interact with a simple test scenario. The conducted test assesses the user's ability to press on-screen buttons and scroll through text using these facial inputs. While this work has yet to implement both programs simultaneously, the initial results demonstrate potential for implementing this system online allowing for multiple individuals to contribute to at-home studies using EyeUI."

Elida Miller, "Breakeven Manure Transport"
Major: Agricultural Economics and Agricultural Business
Faculty Advisor: Dr. Frannie Miller

The specialization of modern agriculture has made once unfathomable leaps in yield and farm efficiency possible. However, it has also broken the nutrient cycle between livestock feed and livestock manure. This project looks specifically at the breakeven point on manure hauling, given different diesel and fertilizer costs. Using the Michigan State University Cooperative Extension Service Manure Hauling Calculator, input values were adjusted based on the assumptions below, to find the data in the tables to the right. This was overlaid onto a map featuring a representative dairy in Chaves County, New Mexico to gain an understanding of how the two input costs affect the ability to use manure as a fertilizer substitute. Clearly, a change in

fertilizer cost causes much more variation between farm-specific manureshed size than diesel prices.

Liam Mitchell, "Epidemiology, Bioinformatics, and Government Responses: An analysis of the COVID-19 Pandemic"
Major: Biology; Honors Capstone, National Center for Genome Resources, NIH NISE Bioinformatics
Faculty Mentor: Dr. Joann Mudge and Adam Gomez

Governmental public health responses were analyzed in Japan, Singapore, and the United Arab Emirates based on public perception and stringency of response, and compared to disease severity metrics including testing, vaccination rates, and excess mortality, accounting for cultural differences. Variant evolution was analyzed to determine any correlations to public health responses and disease severity. Findings demonstrate the impacts of governmental response on public opinion, including that disease severity does not necessarily correlate to public perception of effective public health responses, so much as the extent of stringency and agreeance with cultural beliefs. Lack of testing in Japan may have contributed to significant jumps in phylogenetic branches, which may be concerning for variant surveillance. Despite differences in public health responses and demographics, disease severity in all countries remained relatively mild throughout the pandemic. "

Lilian G. Montoya, "How University Practices and Policies Challenge Student Demographics Targeted by Elitist Scholarship Programs with the Official Aim of Diversifying the Professoriate"
Majors: Gender and Sexuality Studies/Borderlands and Ethnic Studies; McNair Scholars Program
Faculty Advisor: Dr. Manal Hamzeh Al Smadi

I am a Latina woman of transgender experience who is a first-generation college student and of low-income status and currently a member of an elitist scholarship program within an HSI university. This program officially aims to "diversify" the professoriate by guiding low income, first generation, and underrepresented student demographics into graduate programs. The purpose of my proposed research project is to understand participants' encountered challenges with several practices and policies of this elitist scholarship program within an HSI university on the borders of the U.S and Mexico. I have chosen to use platica~testimonio as a methodology to guide this proposed study. Plática~testimonio is a data gathering method and methodology which builds trust between researcher and participants through informal conversations where the process of reflexión reveals testimonios. These testimonios can illuminate encountered challenges by prioritizing everyday-lived experiences which can be used to create/guide systemic change for those affected. In the first stage, I will write my testimonio on my own experience from registration to attending conferences, and other experiences within this scholarship program. In the second stage, I will share my testimonio with my peers in the program then then invite 2-3 of them who are willing to participate in the study to share their testimonios. We will start with 4-6 group pláticas for 2 hours each. I will audio record every group plática. The

recorded pláticas may potentially reveal testimonios. After IRB approval, I plan to start this study this summer and work on it for at least 6 months.

Athena Neeld, "Chemical and Electrochemical Syntheses of IBA-Cl"
Major: Biochemistry
Faculty Advisors: Dr. Scott Folkman and Camilo Muñoz-Pena

The synthesis of IBA-Cl has been completed both chemically and electrochemically, proving that the protocol to synthesize it is reproduceable. This has been repeated with increased amounts. It has been found that increasing the yield of IBA-Cl produces less pure results. This has been proven through thin-layer chromatography and NMR techniques. This information is to be proven useful in further experiments, such as the synthesis of IBA-SO2R. This information will also be used to obtain more knowledge regarding click chemistry.

Serina Padgett, "The Relationship Between Employment, Counseling, and Recidivism"
Major: Counseling & Community Psychology; McNair Scholars Program
Faculty Advisor: Dr. Michael Marks

Recidivism is an extensive and on-going issue throughout the United States, especially in New Mexico. Research on recidivism may lead the way when revising rehabilitation programs and/or the corrections systems for the betterment and well-being of reoffenders, and ultimately our society. What are the risk and protective factors of recidivism? The two predictors this study entails are educational opportunities and counseling services. How do employment opportunities and counseling services interact and are associated with criminal recidivism? Prior research has been conducted concerning various types of counseling services, rehabilitation treatment, employment, and reentry programs. Data will be collected through administered surveys, and will be analyzed with the SPSS Factorial ANOVA Test. I hypothesize that participants that received both counseling and employment opportunities would not reoffend. Secondly, participants that received only one (either employment or counseling) or neither, reoffended at least once more.

Vanessa V. Pando, "The health condition of Mexican free-tailed bats (*Tadarida brasiliensis*) from Southern New Mexico and Southern Arizona"
Major: Biology
Faculty Advisors: Dr. Maria G. Castillo, Dr. Teri J. Orr

Bats are unique disease reservoirs compared to other organisms given their abilities to travel long distances, their seemingly robust immune systems, and their varied social structures ranging from solitary roosting bats to aggregates of over a million individuals. This study sought to understand how overall body condition ('health') including immunological profiles differ between the sexes and age in the Mexican free-tailed bat (Tadarida brasiliensis). Further, we asked if there are geographical differences between animals in New Mexico and Arizona in immune profiles. We captured bats at two sites in the summer of 2022 and 2023. Once captured,

blood samples were collected for blood smears, body mass, relative skeletal sizes, sex and approximate age were all noted. Blood remaining was spun to measure hematocrit a proxy for hydration status. Blood smears were stained using Hematoxylin and Eosin (H&E), and imaged light microscope. Using the resulting photomicrographs, we were able to identify cells and estimate differential white blood cell counts. Precedently, we have observed key types of immune cells, including the relative prevalence of neutrophils and leukocytes. We present data from a total of 72 blood smears corresponding to 20 males, 20 females from New Mexico, 24 males 8 females from Arizona. We noted that Hematocrit varied by sex (females: $0.63 +\_0.001$ males: $0.61 +\_0.001$). However, body condition relative to the neutrophil (N) to lymphocyte (L) ratio is highly conserved (0.1-0.6 N:L) across the individuals we have examined thus far suggesting bats maintain a consistent immune profile despite location, age, and sex."

Kennedi Pyper, "The Impact of Synthetic Cannabidiol Derivatives (+)-abnCBDP and (+)-abnCBD on Trophoblast Proliferation and Viability"
Major: Genetics and Biotechnology
Faculty Advisors: Dr. Ryan Ashley and Dr. Amanda Ashley

Cannabidiol (CBD) is the major non-psychoactive component of cannabis and is commonly reported to be used during pregnancy for treatment of related discomforts. Cannabinoid receptors are expressed throughout the placenta and may play a role at critical steps in early development, including during placentation and implantation which depend on properly regulated trophoblast cell proliferation, migration, and invasion. A significant knowledge gap exists describing how disrupted endocannabinoid system homeostasis can influence reproduction, especially trophoblast functions. Our objective is to elucidate how exogenous cannabinoids may perturb normal processes and affect pregnancy outcomes. To investigate this, we synthesized a novel cannabinoid, derived from the (+)-abnormalcannabidiol (abnCBD) scaffold, a compound noted for its potent vasodilatory and anti-inflammatory properties. This derivative, (+)-abnormalcannabidiphorol (abnCBDP), was evaluated alongside abnCBD and CBD for changes induced to cellular functions. Results from our studies will provide valuable insights into the roles cannabinoids and the endocannabinoid system play during placental development.

Hubert H. Quintana III, "Automated Continuum Estimation Analysis for SDSS5 Quasar Spectra"
Major: Engineering Physics, Physics
Faculty Advisor: Dr. Joseph Burchett

Spectral absorption lines have long served as crucial tools for studying distant clouds of gas that otherwise would be invisible. Intergalactic gas clouds found in the universe are extremely diffuse and emit little to no light themselves. Distant luminous objects such as quasars can be used as background light sources to illuminate the gas cloud and create an absorption spectrum. When analyzed, an absorption spectrum can show valuable information about an object's composition and its velocity structure. The ion MgII has two key spectral features and may be readily identified in quasar spectra. The Sloan Digital Sky Survey (SDSS) have been collecting 100,000's - 1,000,000 of new quasar spectra that need to be searched for MgII absorption. One

method to address this new data is Non-Negative Matrix Factorization (NMF), a mathematical technique that factorizes a given matrix into the product of two lower dimensional matrices. When applied to quasar spectra we can estimate continua, making the identifying of MgII, and other common absorbers, much faster and easier.

Julienne Rirsimaah, "Thought Processes Across a Prospective Memory Task and Ongoing Task"
Major: Psychology; Honors Capstone
Faculty Advisor: Dr. Melissa Guynn, Psychology

Prospective memory is memory for actions intended to be done in the future. In this between-subjects design experiment, participants undergo a prospective memory (PM) task whilst completing an ongoing task. A PM task is often presented alongside an ongoing memory task to simulate naturalistic remembering. For the ongoing task, participants identify whether words are valid English words or not (i.e. lexical decision task). For the PM task, they must say aloud a string of either three or one syllables (intended action, IA), if they see either one or three syllables (target event, TE). Participants are given TE support in the 3 TEs and 1 IA syllable condition and given IA support in the 1 TE and 3 IAs syllable condition. We are interested in whether ongoing task performance slows down less when they receive support. This would indicate that they are actively thinking of the PM task components as they perform the ongoing task.

Ethan Rodriguez, "Handgrip and Pinch Grip Strength, Screen Time, and Smartphone Addiction in College-Age and Older Adults"
Major: Kinesiology
Faculty Advisors: Dr. Larissa True and Zarmina Amin

Smartphones, while crucial for communication and entertainment, pose risks of addiction-like behaviors and musculoskeletal issues, varying by age.
Purpose: This study aimed to achieve two objectives: first, investigate handgrip strength (HGS), pinch grip strength (PGS) disparities, and total screen time (TST) between college-age individuals (18-to-25 years old; n = 50) and older adults (50+ years old; n = 50); second, explore correlations between HGS, PGS, and total screen time within both age groups. Screen time data was directly retrieved from participants' smartphones, while HGS and tip, key, and palmar PGS were measured using dynamometers. Participants completed three consecutive maximum-effort trials of HGS and PGS with dominant (D) and non-dominant (ND) hands. Independent samples t-tests revealed significant differences favoring college-aged individuals in D and ND HGS, tip, key, and palmar PGS for both hands. Additionally, the college-age group exhibited significantly higher TST compared to older adults. Pearson's bivariate correlations unveiled weak positive relationships between TST and ND HGS in young adults ($r = 0.296$; $p < 0.01$), and strong to moderate relationships between TST and HGS (D and ND) and all PGS in older adults, respectively ($r = 0.643$ to 0.828; $p < 0.05$). Younger individuals demonstrate greater HGS/PGS and increased TST, with a weak correlation between HGS and TST. Older adults exhibit strong correlations between HGS, PGS, and TST. These findings underscore the complex relationship

between physical health and smartphone use, suggesting directions for future research and interventions in our digitalized world.

Isabella Rodriguez, "Exploring Solar Dynamics: Insights from the Total Solar Eclipse of April 8, 2024"
Major: Microbiology; Honors Capstone
Faculty Advisor: Dr. Juie Shetye

As a passionate student intrigued by the origins of life in the universe, I've explored the intricate relationship between solar processes and Earth's atmosphere. Understanding the significance of our host star, the Sun, positioned 93 million miles away, has been a focal point of my studies. However, my coursework also highlighted the Sun's role in generating disruptive space weather events like solar storms, prompting me to delve deeper into predicting its behavior. My project for Spring 2024 focuses on analyzing data from radiosondes to unravel atmospheric wave generation, especially during the total solar eclipse. By exploring questions such as the types of waves in Earth's atmosphere and their response to solar light, I aim to contribute valuable insights into the dynamic interplay between solar activity and atmospheric processes.

Katherine Ropp, "Disrupting the CXCL12-CXCR4 chemokine axis at the fetal-maternal interface during implantation in sheep results in less placental VEGFA at midgestation"
Major: Animal Science; ACES UG Research Program
Faculty Advisor: Dr. Ryan Ashley

Dysregulation of placental angiogenesis is a primary contributor to placental insufficiency, a cause of most pregnancy complications. Placental vascularization is predominately stimulated by VEGFA, but questions remain as to upstream regulators of VEGFA. We hypothesized activation of the CXCL12- CXCR4 axis stimulates VEGFA synthesis and placental vascularization. To test, increasing amounts of CXCR4-inhibitor, AMD3100 (1X, 1.5X, 3X) or saline were delivered into the uterus of sheep during implantation. Placentomes were collected mid-gestation and analyzed via immunofluorescence to quantify VEGFA. In the control group, placentomes from female fetuses displayed more ($P<0.05$) VEGFA compared to male placentomes. Ewes exposed to 3X AMD3100 exhibited less ($P=0.008$) VEGFA compared to control with tendencies for decreased VEGFA in 1X and 1.5X AMD3100 treated ewes compared to control. Our data underscores the importance of CXCL12-CXCR4 signaling in placentation and our sheep model may prove useful for further investigation of pregnancy complications stemming from disrupted placental vascularization."

Yulianna Salas, "Evaluation of Immune Gene Expression in Response to Endotoxin Challenge in Ewes"
Major: Animal Science; Honors Capstone
Faculty Advisor: Dr. Jennifer Hernandez Gifford

In females, fertility is dependent on proper ovarian follicle development which can be compromised in disease states. Gram-negative bacteria release the endotoxin lipopolysaccharide (LPS) capable of disrupting normal folliculogenesis and ovarian steroid hormone production. The objective of this study was to evaluate immune gene expression of PPARG and SOD2 via real-time quantitative PCR in response to repeated low dose endotoxin challenge. Thirty-six ewes were administered 0, 1.5 or 3.0 µg/kg LPS during distinct stages of follicle maturation. Blood samples were collected at regular intervals for 12 h after LPS challenge on d 5 and 15 of a synchronized follicular wave. Anti-inflammatory gene expression was evaluated by real-time PCR. Regulation of immune genes may serve as mediators to the immune system that can impact ovarian signaling pathways important for female fertility.

Gloria Esthefania Sepulveda, "The impact of synthetically derived exogenous cannabinoids, (+)-CBDO and (+)-CBDV on trophoblast proliferation"
Major: Chemical Engineering
Honors Advisors: Dr. Ryan Ashley, Dr. Amanda Ashley

The endocannabinoid system (ECS) is implicated in multiple physiological processes regulating immune-reproductive interactions vital for successful pregnancy. Recent decriminalization and legalization of cannabis potentially increases use during pregnancy, rendering an urgent need to understand the effects of exogenous cannabinoids on embryo implantation and placental formation. We investigated the effect of synthetically derived exogenous cannabinoids on trophoblasts. Cells were exposed to varying doses of (+)-abnormal cannabidivarin (abnCBDV), (+)-abnormal cannabidiol-oct (abnCBDO), cannabidiol (CBD), or vehicle and live-cell imaging was used to monitor cell proliferation. Compared to control, ovine trophoblast cells exhibited decreased proliferation following exposure to 30 or 10 µM CBD 30, 10 or 3 µM, abnCBDV, or 30 or 10 µM. Trophoblast cell migration and invasion are under investigation using scratch wound assay. This research delineates synthetic cannabinoids' roles in trophoblast cell proliferation. Elucidating these roles may provide insight into the increased risk of adverse pregnancy outcomes associated with cannabis consumption.

Alejandra Soliz, "Rehabilitation strategies for Benign Paroxysmal Vertigo (BPPV) associated with Traumatic Brain injury (TBI)"
Major: Biology
Faculty Advisor: Dr. Elba Serrano

Vestibular disorders affect a significant portion of the population (~35% of those 40 years and older). Typical symptoms such as vertigo, dizziness, imbalance, nausea, and hearing loss, can impair a person's ability to perform daily activities and participate in social interactions. Benign Paroxysmal Positional Vertigo (BPPV) is a common vestibular disorder characterized by brief episodes of vertigo triggered by certain head movements or changes in position. This study examined the vestibular system's functionality, its nexus with BPPV and traumatic brain injuries (TBIs), and the evidence for mechanisms that underlie rehabilitation strategies. The state of current knowledge and statistical insights were assessed with open access resources, e.g. PubMed; CDC; HealthyPeople2030. Analysis unveiled the vestibular system's complexity and

the scarcity of physiological studies connecting BPPV with TBI. While studies acknowledge manual maneuvers' efficacy in BPPV treatment post-TBI, gaps persist in understanding the mechanisms and the effects of TBI on BPPV and vertigo.

Daniela Tarango, "Measuring DNA damage following melanin diminishment in melanoma"
Major: Genetics and Biotechnology; NMSU ENHANCEMENT
Faculty Advisor: Dr. Amanda Ashley

Melanoma is a rare, severe type of skin cancer arising from cells that produce melanin for pigmentation: melanocytes. High levels of melanin are associated with resistance to DNA damaging treatments. We expect that upon melanin diminishment, we will observe higher levels of DNA damage in melanoma cells. Our overall goal is to investigate diminishing melanin followed by treatment with DNA-damaging agents to further increase melanoma cell death. We are assessing drugs that differentially impact DNA damage. Cisplatin causes platinum-DNA adducts, and doxorubicin, an inhibitor of topoisomerase II; each induce apoptotic cell death. We are measuring DNA damage using γH2AX signal with and without melanin diminishment with arbutin and kojic acid. Using immunofluorescence, we can quantify levels of γH2AX within the cells, and determine differences in DNA damage response. Our goal is to provide novel strategies for combatting melanoma.

Haylee Viramontes, "Cybersecurity for Water Systems in New Mexico"
Major: Information Engineering Technology; McNair Scholars Program
Faculty Advisor: Renita Lovell

In a world of ever-changing technology, we are met with concerns about privacy and security for personal information. There have been many recorded incidents of cyber-attacks on critical national infrastructure in the country, including water and electrical systems. With New Mexico being a desert environment, water is crucial to our farmland and communities. What security measures are effective for water facilities in the state? Creating a model to demonstrate efficient network topologies can give us a better understanding of these measures. By contacting water facilities directly, we are able to learn more. The Albuquerque Water Authority, for example, has modernized their network to best suit their large clientele by investing in Cisco's Cyber Vision, upgrading current SCADA systems, and segmenting distinct groups on the network with firewalls and demilitarized zones. Lastly, the disconnect between OT and IT systems and personnel was repaired with effective training methods, allowing efficient team collaboration."

Shayla Whitaker, Invisible Disabilities (Mental Health) and College Students
Major: Anthropology; Honors Capstone
Faculty Advisor: Dr. Anne P. Hubbell

The Invisible Disabilities Association (2019) defines invisible disabilities (ID) as "…a physical, mental or neurological condition that is not visible from the outside, yet can limit or challenge a person's movements, senses, or activities" (para 1). Although many are challenged by ID, for

individuals to be considered "disabled" by the Americans with Disabilities Act and be able to gain access to accommodations for their disability, their impairments have to be such that the condition or experience may impact at least one major life activity (U.S. Department of Justice, 2013). Invisible disabilities such as mental illness and other debilitating conditions are prevalent throughout society, including among college-age students. These students often require classroom accommodations in order to be successful, yet they frequently encounter resistance because the disability is invisible. Here we present how the self-disclosure of invisible disabilities by students is managed at multiple levels within higher education.

Yosif Yosif, "Q-learning for low-density parity-check (LDPC) decoders"
Major: Electrical Engineering
Faculty Advisors: Dr. David Mitchell, Dr. Salman Habib

This poster addresses the multi-armed bandit (MAB) problem, where a gambler must choose which arm of a slot machine to pull for maximum rewards. We focus on Q-Learning, a reinforcement learning method, applied to modeling an LDPC decoder as a slot machine. Each arm represents a check node in the code's Tanner graph. By selecting nodes strategically, we aim to maximize rewards with minimal messages propagated. Implementing Q-learning yields superior scheduling policies compared to traditional methods, enhancing LDPC decoding performance.