49th Annual

Student Research and Creativity Conference

April 6, 2023

EASTERN NEW MEXICO UNIVERSITY

Eastern New Mexico University

Student Research and Creativity Conference

2023

Conference Proceedings

Portales, New Mexico

April 2023

About the Student Research and Creativity Conference

Eastern New Mexico University's annual Student Research and Creativity Conference is designed to showcase research and creative projects being done by undergraduate and graduate students. Students present their work in professional poster/creative work display and paper/performance sessions and are judged and critiqued by an inter-disciplinary group of faculty members. Through this process, students can see how their work compares with that of other students, get feedback on their work and presentations, and practice their professional presentation skills. Students, faculty, staff, and community members are invited to attend the presentations. Cash awards are presented at the evening banquet.

The Eastern New Mexico University Student Research Conference began in 1974 with a grant from the ENMU chapter of Sigma Xi, the Scientific Research Society. The first director of the conference was Dr. Ram Sharma, who held the position for 25 years. While the conference was originally for students in the sciences, later students from all academic disciplines were eligible and encouraged to participate. A poster session was added to the conference in 2011. Creative work display and fine arts performance sessions were added for the first time in 2018, broadening the scope of the conference to include students in all majors. For the 2019 conference, 199 students made 251 presentations representing 21 different academic disciplines. 81 faculty and staff members served as judges and 48 students received cash awards.

For More Information

www.enmu.edu/srcc
www.facebook.com/ENMUSRCC

Student Research and Creativity Conference Committee
2022-2023

Dr. David Hemley, Co-Chair
Dr. Chelsea Starr, Co-Chair
Dr. Mary Ayala
Dr. Matthew Haney
Dr. John Montgomery
Dr. Darron Smith
Dr. Juchao Yan

with administrative assistance from
Ms. Esthela Bañuelos
Ms. Sara Krafft

Special Thanks

Office of the President
Eastern New Mexico University

Office of the Vice President for Academic Affairs
Eastern New Mexico University

Office of Campus Life
Eastern New Mexico University

Sodexo Dining Services
Eastern New Mexico University

Office of Communication Services
Eastern New Mexico University

Physical Plant
Eastern New Mexico University

Inventory Control
Eastern New Mexico University

2023 Conference Judges and Room Moderators

Dr. Sieun An
Dr. William Anderson
Dr. Regina Aragon
Dr. Suzanne Balch-Lindsay
Dr. John Barr
Dr. Gary Bond
Dr. Steven Brust
Dr. Eduardo Ceh-Varela
Dr. Ken Cradock
Dr. Rebecca Dewbre
Dr. Donald Elder
Dr. Jeff Gentry
Dr. Corey Green
Dr. Cristina Haney
Dr. Scott Hendershot
Dr. Ali Hussein
Dr. Alaba Gabriel Idowu
Dr. Essa Imhmed
Dr. Steven Karpowicz
Dr. Kris Kuhlmann
Dr. Zhiming Liu
Dr. Leonard Madrid
Dr. Henna Messina
Dr. Larry Nelson
Dr. Brian Pasko
Dr. Darren Pollock
Dr. Kim Potters
Dr. MD Mhahabubur Rhaman
Dr. Claudia Rocha
Dr. Michelle Schmidt
Dr. Sarbagya Shakya
Dr. Rick Shepardson
Dr. Lassiter Speller
Dr. Erik Stanley
Dr. Chelsea Starr
Dr. Cristina Tica
Dr. Varum Uthappa
Dr. Matthew Vetterly
Dr. Kathleen Wagner
Dr. Kristin Waldo
Dr. Jennifer Welsh

2023 Conference Schedule
Thursday, April 6th

9:00 - 11:00 a.m.	Poster session in the Campus Union Building Ballroom
9:00 - 11:00 a.m.	Creative work display session in the Campus Union Building
1:00 - 3:00 p.m.	Paper and performance sessions in rooms across campus
6:30 - 8:30 p.m.	Awards Banquet

2023 Conference Award Winners

Alyissa Aragon
Advisor: Dr. Gary Bond

Jessica Barron
Advisor: Dr. Britta Urness

Sierra Beverly
Advisor: Dr. David Sweeney

Christine Capehart
Advisor: Dr. Steven Karpowicz

Santiago Chacon
Advisor: Dr. Ann Beck

Jacqueline Chavez
Advisor: Dr. Edgar Eduardo Ceh-Varela

Brianna Fryman
Advisor: Dr. Kalynn Baldock

Sarah Glastetter
Advisor: Dr. Hamid Allamehzadeh

Joshua Gonzalez
Advisor: Dr. Drew Davis

Chelsea Hatfield
Advisor: Dr. Sieun An

Kayla Hein
Advisor: Dr. Gary Bond

Nadya Kakaras
Advisor: Dr. Gary Bond

Cheyenne Kissee-Dowdell
Advisor: Dr. Michelle Schmidt

Matthew Kube
Advisor: Dr. Hamid Allamehzadeh

Yitzen Lizama
Advisor: Dr. Tala Karkar Esperat

Enrique Martinez
Advisor: Dr. Md Mhahabubur Rhaman

Richard Sandoval
Advisor: Dr. Hamid Allamehzadeh

Cecilia Torres
Advisor: Dr. Kenwyn Cradock

Stephen Villanueva
Advisor: Dr. Edgar Eduardo Ceh Varela

Haley Warren
Advisor: Dr. Kalynn Baldock

Stephen Washington
Advisor: Dr. Stephen Miller

Nichole Webb
Advisor: Dr. Zachary Mitchell

Jai Whitteker
Advisor: Dr. Ann Beck

Poster and Creative Work Display Presentation Abstracts

Creative Work Display Group 1

Green Valley
Presenter: Nahida Akter
Project Advisor: Scott Golem

The artwork is a logo design Idea. It is a combination mark logo. In my work I presented a logo that could be used for a farming drone company. So, I used light green color for making the healthy leaf and a shoot which portray the letter G(Green) and V (Valley). I used black circle to hold the green so that it easily be noticeable.

Wise Woman
Presenter: Jessica Barron
Project Advisor: Britta Urness

This oil painting is done on canvas with the dimensions of 24in X 18in. The work began with gathering bits and pieces of art and photographs to create a collage. The idea was to take things that were already in existence and arrange them into something new. I created many small collages that were 4x6 inches to figure out which composition would look the best on the canvas, then began the process of painting. My main goal was to portray the expression on the woman's face. I wanted her to convey to the viewer her compassion and contentedness. Her expressions and the way she is holding the moon makes one want to know what this wise woman has to say. The round forms of the cactuses suggest this painting takes place somewhere between our world and the next life. My overall goal was to create something pleasing to the eyes and lead one to wonder about who the woman is.

Abide
Presenter: Lauren Mazuranich
Project Advisor: Britta Urness

Set against a floral inspired background, the image of a creature both human and inhuman stand. Above are two objects that seem somewhere between moons or other planets. Before the beast sits a morose woman in fancy garb.

Group 2 - Mixed Posters

Interviewing Rural Residents Concerning their Environmental Quality of Life
Presenter: Alyissa Aragon
Project Advisor: Gary Bond

The concept of quality of life (QoL) has been used as a measure of life satisfaction, happiness and health since approximately the 1960s. However, there have been several issues related to a lack of a clear definition for QoL in the scientific literature. Marcel (2014) argues that it is more practical for researchers to explicitly define which aspects of QoL they are trying to measure and the context in which they are trying to measure them. Few studies have attempted to investigate QoL as it relates to the environment in rural communities. There are two aims to the current research plan: 1) to interview rural residents in order to extract themes that relate to overall quality of life in a rural setting and the environmental components specific to their quality of life (the current study); and 2) to create a scale based on those extracted themes (currently in-progress). The snowball sampling method was used in order to obtain a stratified random sample of 28 participants, 15 men and 13 women, whose ages ranged from 18-73 years. The most frequently reported themes and attributes included: Community, natural environmental conditions, infrastructure, and water and air quality. These convey the most important features of the issues and values related to EQoL for rural residents living in Southeastern NM.

Synthesis & Purification of Carbonyl-functionalized oligo(p-phenylene(s)
Presenter: Christine Capehart
Project Advisor: Juchao Yan

In recent years, organic solar cells (OSCs) based on p-conjugated polymers and small molecules have received increasing interest, due to favorable electronic properties, component versatility, and low production and installation costs. Despite the progress, many improvements are still needed prior to widespread commercialization, involving device efficiency, lifetime, and cost. Of these, increasing device efficiency, particularly power conversion efficiency (PCE), is the most challenging task. To control electron delocalization and thus improve the PCE, we synthesize and purify of functionalized oligo(p-phenylene)s, and will use radiation chemistry facility to characterize electron delocalization. Such compounds are expressed to explore cheaper and adaptable avenues in enhancing the PCE of OSCs

Poster Group 3 - Biology

Effects of Catastrophic Wildfire on Stream Macroinvertebrate Communities in Northern NM
Presenter: Jodie Montgomery
Project Advisor: Zachary Mitchell

In the western United States, catastrophic wildfires are expected to occur more frequently and intensely. Alterations to forest and watershed habitats from severe fires can significantly impact stream ecosystems, negatively affecting aquatic communities by reducing total abundance and species richness and altering community structures for wildlife and fish in downstream systems. Because few studies have assessed the impacts of extreme wildfire events on macroinvertebrate community structure, further research is needed to understand how wildfire influences stream ecosystems. Our study aims to evaluate the effects of the Hermits Peak and Calf Canyon wildfires of 2022 on stream macroinvertebrate community structure in the Pecos Wilderness. Macroinvertebrate community and water quality assessments will be conducted in several streams within the Pecos River basin. Sites were chosen based on soil burn severity (unburned, low-burn, moderate-burn, and high severity). Preliminary samples have been collected from three sites to provide baseline community structure data. Macroinvertebrates were sampled from riffle mesohabitats using D-frame kick nets. Samples will then be counted and identified to the lowest reasonable taxonomic to evaluate relationships between community structure and environmental and spatial variables. Generalized linear mixed models will be used to test for differences in the number of species within and among sites over time. Catastrophic wildfires are increasing in intensity, frequency, and duration. The Hermits Peak and Calf Canyon fires remain the most catastrophic in New Mexico's recorded history. Our study will contribute toward a greater understanding of how wildfires structure macroinvertebrate communities in montane streams.

Trait-Environment Relationships in Stream Fish Assemblages in the Pecos River Basin
Presenter: Ryan Sheppard-Peery
Project Advisor: Zachary Mitchell

Metacommunity theory provides a useful framework to evaluate the relative importance of neutral and niche-based processes (environmental selection, dispersal, drift) in structuring ecological communities. However, a majority of metacommunity studies analyzing only taxonomic (species level) data result in a high percentage of

unexplained community variation, which can make it challenging to disentangle specific metacommunity assembly processes for riverine organisms. Incorporating a trait-based (functional) approach can increase our understanding of processes structuring metacommunities, especially when species traits can provide insights into the underlying mechanisms of factors driving the distribution pattern. The goal of this study is to describe trait-environment relationships of fish assemblages in the Pecos River basin, NM. RLQ and fourth-corner analyses will be used to examine the relationships between fish traits and environmental variables using existing datasets from state and federal agencies and academic institutions. Additionally, asymmetric eigenvector map (AEM) analysis will be used to model the spatial structure of fish communities within the Pecos River basin. Variation partitioning based on redundancy analysis will be used to determine the relative importance of environmental (identified using the RLQ-fourth corner analysis) and spatial (AEM) variables in explaining variation in community composition of fish with different functional traits. This study will provide additional insights into the efficacy and generalizability of using functional traits to understand how and why fluvial fish respond to specific environmental conditions.

Digitizing and Georeferencing the Herpetological Collection of the Gennaro Natural History Museum at ENMU
Presenter: Zoe Hutcherson
Project Advisor: Drew Davis

Natural history collections are an important resource that help us understand the biological diversity of the state. Without a proper digital catalog, the utility and use of a natural history collection remains limited. The Gennaro Natural History Museum at Eastern New Mexico University is a public resource for biologists and land managers to gain information on their specific research projects. As the importance of natural history museums increases due to declines in modern collecting, steps to increase the accessibility of data should be taken. Accessibility to and evaluation of historic data is critically important, especially with regard to understanding modern-day species declines. Here, we are working to digitize and georeference the herpetological collection of the Gennaro Natural History Museum. We are in the process of digitizing collection data into a simple flat file (Microsoft Excel), performing QA/QC checks, confirming species identifications, and georeferencing specimen locality data. Georeferencing specimens allows a GPS coordinate to be assigned to each specimen so that their distributions can be visualized, which is done in batches following MaNIS/HerpNet/ORNIS Georeferencing Guidelines. Future steps include updating specimen tags where needed, lids, and fluid preservative. This work will serve as the foundation for continued improvements to the Gennaro Natural History Museum and

eventual migration of the specimen database to an online, searchable database of museum holdings, allowing the data to be freely available to interested individuals.

Distribution of the Smooth Softshell (Apalone mutica) in the Canadian River through Traditional and Novel Survey Methods
Presenter: Joshua Gonzalez
Project Advisor: Drew Davis

The Smooth Softshell (Apalone mutica) is a cryptic aquatic turtle species that inhabits rivers and streams throughout central North America. In New Mexico, the Canadian River provides important habitat for this species, but little is known about its distribution and abundance in this area. To gain a better understanding of this species in New Mexico, we aim to combine traditional and novel methods to survey for the Smooth Softshell in the Canadian River drainage in New Mexico. Surveys will be conducted during the spring and summer months when turtles are most active and detection rates are higher. The study will utilize both traditional and novel survey methods. Traditional methods include visual surveys, which will be conducted by walking along the riverbank and scanning for the presence of individuals through binoculars, and hoop-net trapping, which will allow for additional information on individual health, sex, and body condition to be collected; novel survey methods for Smooth Softshell consist of environmental DNA (eDNA) sampling. eDNA surveys are based off the collection of DNA shed by organisms into the water, which can then be captured (filtered) and returned to the lab for DNA amplification and sequencing. The surveys will be conducted at predetermined sites along the river; sites are being selected based on factors such as accessibility, habitat suitability, and previous reports and observations of Smooth Softshell. We hope the combination of traditional and novel surveys methods improve the detection of Smooth Softshell and that information generated helps to inform management decisions.

Influence of Hoop-Net Trap Opening on Capture Rates of the Grande Cooter
Presenter: Sierra Shoemaker
Project Advisor: Ivana Mali

The Rio Grande Cooter (Pseudemys gorzugi) is a medium to large riverine turtle whose range is limited to the lower Rio Grande watershed. This species is relatively abundant in the Black River, a tributary of the Pecos River, and the Devils River, a tributary of the Rio Grande. However, the Black River is the only system where juveniles are readily observed and captured via hoop net traps. Mark-recapture study carried out on the Black River from 2016 to 2021 revealed a decrease in capture rates of juvenile turtles, especially the smallest size classes, possibly due to an increase in trap mouth size

opening over the years. During 2022 field season, we sought to assess whether making the mouth of the traps smaller would increase juvenile capture rates. Using two trap types (i.e., small mouth and large mouth), we tested whether turtle sex and size influenced the type of trap they were captured in. Generalized linear mixed effect models revealed that that sex was not a significant factor but that indeed larger turtle sizes were positively correlated with large mouth traps. However, capture rates of juvenile P. gorzugi were still low, alluding to the potential decrease in recruitment. We recommend that future studies use traps of various sizes of mouth opening to capture turtles of different size classes. More research is needed in the area of Rio Grande cooter nesting success and hatchling survivorship to further understand species population dynamics in the Black River

Evaluating the Upper Thermal Tolerance of the Rio Grande Chub (Gila pandora)
Presenter: Nichole Webb
Project Advisor: Zachary Mitchell

New Mexico (NM) is a naturally arid state which puts it at risk for major drought events due to prolonged warming associated with climate change. In NM, the Rio Grande Chub (Gila pandora) is considered a species of greatest conservation need. Decreased stream flows and increased temperature associated with drought threaten G. pandora. The objective of this study is to 1) implement lab experiments to quantify the upper thermal tolerances of G. pandora and 2) utilize extensive field surveys to evaluate the relationship between G. pandora distribution and stream thermal regime. Fish communities will be sampled in 20 sites in the Jemez River basin to evaluate the relationship between the thermal regime and fish community structure. A subset of G. pandora will be used in lab experiments, and upper thermal tolerances will be quantified using acclimated chronic exposure (ACE) and critical thermal maximum (CTM) methods. This study will result in a better understanding of the upper thermal tolerances of G. pandora since this information is currently unknown. These data will identify the geographical areas within G. pandora's current range where their upper thermal limits are being reached and for how long those temperatures persist. This study could model future changes to G. pandora distribution in response to changing climate conditions. This study could also lead to establishing water quality standards that may benefit other fluvial fishes of the southwest.

Toxicity of Fire Retardant in Pulsed Exposures to Rio Grande Cutthroat Trout Under Varying Temperatures
Presenter: Ashlyn Reynolds
Project Advisor: Zachary Mitchell

Wildfires are increasingly affecting aquatic habitats and biota. One often overlooked indirect effect is the usage of wildfire retardants. Although there are regulations preventing retardant deployment within certain ranges of water bodies, accidental and special permission intrusions do occur. Much of the research evaluating the toxicity of wildfire retardants on fish focuses on evaluating the impacts of long-term static exposure, which is unlikely to occur in the field. Therefore, the goal of this study is to evaluate the toxicity of the commonly used fire-retardant chemical (Phos Chek LC-95) in pulsed exposures to juvenile Rio Grande Cutthroat Trout (RGCT) under different temperatures. Fish will be randomly exposed to varying concentrations of fire retardants chemicals (1,000, 2,000, or 4,000 mg/l) in static tanks (10 RGCT/tank) at either 12, 15, or 18°C. There will be three replicate tanks per chemical concentration at each temperature treatment in addition to control tanks. After thirty minutes of acclimation, the RGCT will be exposed for 30 min and then subsequently placed into tanks with control test water at the same temperature for the remainder of the experiment (96h). Immobile and unresponsive fish will be removed every 12 h. Generalized linear mixed models will be used to examine differences in RGCT mortality among chemical concentration and temperature treatments. Although the level of mortality that occurs in an environment is dependent on numerous factors, using RGCT as a model species will provide further knowledge on the effects of fire retardants on salmonids, an economically and ecologically impactful taxa.

Influence of Seasonality on the Relative Importance of Abiotic and Biotic Factors in Determining Fish Survival in Isolated Pools in NM Rivers
Presenter: Brittany Pulcini
Project Advisor: Zachary Mitchell

Over the past two decades New Mexico, has experienced record-breaking drought conditions. Droughts decrease water quantity within rivers, often resulting in the loss of connectivity between aquatic habitats, leaving isolated pools in the streambed. Organisms within these isolated pools can be subjected to an increase in abiotic (e.g., water temperatures) and biotic stressors (e.g., predators). However, it is not always clear whether abiotic or biotic stressors are more important in determining fish survival in isolated pools, particularly across seasons. The goal of this study better understand the relative importance of abiotic- and- biotic factors in determining fish survival in isolated pools during different seasons. Mesocosm experiments will quantify the

relationship between selective forces and survival rates of a common fish species (Hybognathus placitus) in the Pecos River, New Mexico. Twenty artificial pools, containing H. placitus, will be buried adjacent to the river channel. To assess whether environmental filtering or predation is more important in determining fish survival in isolated pools, half of the pools will be covered with wire mesh to prevent predators from reaching the fish. Game cameras will be mounted on rebar in front of each pool to determine predator presence. Within each pool, temperature will be continuously measured while dissolved oxygen and ammonia will be measured once a day during each trial. Biologists in New Mexico and other regions will benefit from better ecological understanding on the structuring forces of fish communities in isolated pool during periods of reduced stream flows.

Posters Group 4- Science & Engineering

Evaluation of the Performance Impact of SPM Data Allocation Scheme on a Novel Scratchpad Memory
Presenters: Caleb Parten
Project Advisor: Essa Imhmed

Local Memory Store (LMStore) is a novel hardware-controlled, compiler-managed Scratchpad memory (SPM) design, with previous research evaluation that shows its capability for improving program performance by an average of 19.8%, compared to a conventional cache-only architecture. However, the performance of LMStore significantly depends on the memory layout decided by a programmer or a compiler. In this study, we designed two heuristic-based SPM allocation algorithms to evaluate the performance impact of data allocation on LMStore. Our experimental results show that the Stack Distance-based algorithm significantly improved LMStore performance compared to the Frequency-Based algorithm.

Optimizing Document Clustering in NLP with Embedding & Cluster Methods
Presenter: Stephen Villanueva
Project Advisor: Eduardo Ceh-Varela

Clustering is an unsupervised machine learning technique that groups similar data points based on their features. In order to effectively perform clustering of documents, the selection of an appropriate embedding technique and the number of clusters are critical factors. Our research project focuses on exploring the optimal combination of embedding techniques, including Bag-of-Words, Term Frequency-Inverse Document Frequency, and Doc2Vec, and methods for finding the best number of clusters, including Elbow and Silhouette methods for Natural Language Processing (NLP) tasks. Our experiment was conducted using a large corpus of approximately 55,000 articles collected online, covering various topics such as education, programming, and data science. We evaluated the performance of clustering algorithms using different evaluation metrics such as Jaccard Index and Normalized Mutual Information. Our results showed that the performance of clustering algorithms heavily depends on the choice of embedding technique and the number of clusters. The implications of our findings are significant for researchers and practitioners working in the field of unsupervised machine learning and NLP. An appropriate combination of embedding techniques and clustering methods can enhance the accuracy and efficiency of clustering algorithms, which can be utilized in various fields such as marketing and social media analysis.

Exploratory Data Analysis on Breast Cancer Datasets
Presenter: Jacqueline Chavez
Project Advisor: Eduardo Ceh-Varela

During this project, we used exploratory Data Analysis on a dataset of breast cancer from patients and analyzed the relationship between certain features and the likelihood of breast cancer diagnosis. To achieve this, we used data cleaning and pre-processing, data visualization, data summarization, correlation analysis and highlighted feature importance achieved using a Machine Learning algorithm.

AI and Machine Learning Prediction of Antenna Parameters
Presenter: North Star Horsechief
Project Advisor: Shakya Sarbagya

The focus of my research project is to understand how we can utilize machine learning to maximize time efficiency in prediction of antenna bandwidth.
Compared to alternative approaches, AI and Deep learning methods are proven to be most accurate when predicting antenna bandwidth.

Digital Locking Mechanism that uses Frequency Modulation
Presenter: Richard Sandoval
Project Advisor: Hamid Allamehzadeh

If you're anything like me, then you value your personal privacy with not only yourself but also with your belongings. It is through this idea that I have decided to design and build a digital lock that uses a Radio Frequency Identification (RFID) sensor that allows the user access. There is also a Liquid Crystal Display (LCD) that will tell the user if they have used the correct card or not. If the correct card is used, the program will accept this, the LCD will tell the user "Access Granted" and then it will send a signal to the solenoid motor, that I am using as the lock, and it will unlock it. If the wrong card is used, the LCD will tell the user "Access Denied" and no signal will be sent to the solenoid. All of this is done through the Arduino microcontroller. The Arduino is a microcontroller that can "control" electronically powered devices such as, motors, sensors, LEDs, etc. through the programming software Arduino IDE that it provides. The language itself is a derivation of C and C++. The software allows me to add certain actions to the circuit, allowing me to control how it works. For example, when the correct card is used, voltage is sent to the solenoid for 5 seconds. After these 5 seconds, it will relock and the user will have to unlock to relock. This forces the user to have more responsibility on their card, thus adding more security for the user.

Poster Group 5 : Chemistry

Predicting Drug Binding through Changes in Molecular Motion
Presenter: Christine Capehart
Project Advisor: Steven Karpowicz

Computational calculations can be used to find the effectiveness of a drug's binding to an active site of an enzyme. Here, we use only changes in molecular motion, not electrical charge, to predict binding. The equilibrium constant for the association of an enzyme and small molecule is calculated using a new Statistical Mechanics model. Using computer software, the volume of various drugs and the binding pocket of the enzyme Carbonic Anhydrase are measured. These volumes and other data are used to predict molecular association constants. If the predicted values are near the known equilibrium association constants, then a mathematical model considering molecular motion can be used to accurately determine drug binding.

Colorimetric Detection of Cyanide in Water
Presenter: Enrique Martinez
Project Advisor: Md Mhahabubur Rahman

Cyanide is well known as fast-acting and potentially deadly chemical to humans, posing a threat to public health, the environment, and homeland security. It can affect many functions in the human body, including the vascular, visual, central nervous, cardiac, endocrine, and metabolic systems. It is known that 0.5-3.5 mg of cyanide per Kg of body weight is fatal for humans. Nevertheless, cyanide is widely used in many chemical processes, such as electroplating, plastics manufacturing, gold and silver extraction, tanning, resins, herbicides, and metallurgy. In addition, many plants contain endogenous cyanides, a potential source of cyanide poisoning to living systems. Unfortunately, cyanide does not decompose in the environment. The World Health Organization has set the maximum contaminant level of 1.9 μM for cyanide in drinking water. Therefore, sensitive, selective, simple, reliable, efficient, and affordable sensors for cyanide ions are in great demand for various applications. Colorimetric and fluorescence sensing of specific anion's is an attractive research area to solve cyanide detection problems at low level and on the spot because of its low cost, simplicity, and visual detection of anions without expensive spectroscopic instrumentation and skilled technician. In our research, a dinuclear nickel complex of 2,6-pyridinedicarbaldehyde based polyamine macrocycle will be synthesized and used to detect cyanide visually following indicator displacement assay using commercially available dyes such as Eosin Y, Fluorescein, Pyrogallol Red, and Pyrocatechol Violet. Selectivity of detection of

cyanide will be compared with commons anions. A calibration scale will be prepared to detect cyanide quantitatively.

Rational Design, Synthesis, & Application of Functionalized Oligo(p-Phenylene(s) for Organic Solar Cells
Presenter: Janessa Price
Project Advisor: Juchao Yan

The world revolves around energy. Whether it is used to generate electricity to light up our homes, fuel our vehicles, or power our cell phones, energy greatly affects our daily lives. However, there may be a day when fossil fuels are no longer able to fulfill these seemingly simple, yet significant parts of our lifestyle. Everything and everybody is made up of molecules. These molecules possess energetic activity, due to chemical bonding and the presence of electrons. Funded by Department of Energy, we are currently synthesizing a series of carbonyl-terminated oligo(p-phenylene)s. The molecules have p-conjugated chains and an infrared reporter group of carbonyl, enabling real-time measurement electron delocalization by time-resolved infrared spectroscopy combined with pulse radiolysis. The molecules will be used as the active layer in organic solar cells to further advance the collection and conversion of solar energy. This research will be a major contribution toward renewable, clean energy in the future. Through this presentation, I will discuss the knowledge and data that we have collected, what the current project entails, and finally what the projected results will be and why they are significant.

Synthesis of a Carbonyl-Functionalized Tetra(p-phenylene) for Probing Electron Mobility
Presenter: Chantel Nelson
Additional Collaborators: Natalie Gallegos, Gwen Buchanan, Christine Capehart, Chimezie Onukwuli
Project Advisor: Juchao Yan

Organic solar cells have still not been commercialized, due to their low power conversion efficiency and short performance lifetime. The key is to understand and thus control the electron mobility in conjugated molecules. For this, we synthesize and purify a carbonyl-functionalized tetra(p-phenylene) and will use it as a model compound to probe electron mobility using time-resolved infrared spectroscopy coupled with pulse radiolysis. We use a Suzuki cross-coupling reaction to form carbon-carbon bonds between aromatic rings and use chromatography to purify the compounds. Preliminary results will be reported in a poster presentation.

Synthesis of Carbonyl-Functionalized Tetra(p-Phenylene) for Organic Solar Cells
Presenter: Gwen Buchanan
Additional collaborators: Chimezie Onukwuli, Chantel Nelson, Christine Capehart, Natalie Gallegos, Janessa Price
Project Advisor: Juchao Yan

The aim of this research is to synthesize a carbonyl-functionalized tetra(p-phenylene). This product is yielded by a reaction mechanism known as Suzuki cross-coupling, which utilizes an alkaline-based medium with a palladium catalyst in order to prompt the formation of carbon-carbon bonds between aromatic rings. This reaction is highly selective and will produce a stable product.

Synthesis & Purification of Carbonyl-functionalized oligo(p-phenylene(s)
Presenter: Natalie Gallegos
Project Advisor: Juchao Yan

Pi-conjugated oligo(p-phenylene)s are being synthesized through the formation of a carbon-carbon bond between aromatic rings. The carbonyl functional group is further introduced by carbonylation, allowing for real-time detection of electron delocalization by time-resolved infrared spectroscopy coupled with pulse radiolysis. We use column chromatography to purify the compounds. The results could help improve the power conversion efficiency of organic solar cells.

Taurocyamine Synthesis through Substitution of Taurine for Glycine Using GATM
Presenter: Emma Hafenbrak & Bailey Goodson
Additional Collaborators: Adalee Alvarez, Christine Capehart, Dennasia Cordova, Natalie Gallegos, Grace Mesarchik, Chantel Nelson, Kassadie Tindle
Project Advisor: Steven Karpowicz

A known metabolic pathway uses GATM (glycine amidinotransferase) to catalyze the production of L-ornithine (an amino-acid) and guanidinoacetate from glycine and L-arginine. Guanidinoacetate is a precursor of creatine, a molecule used for energy storage. We hypothesize that the substitution of taurine for glycine in this reaction produces taurocyamine. We will use PCR and molecular cloning to express the GATM protein. Enzyme kinetics will be determined through a coupled indirect assay. If taurine reacts with L-arginine using GATM, then taurocyamine may be a precursor for creatine production.

Synthesis & Purification of a Carbonyl-Terminated Indenofluorene

Presenter: Adalee Alvarez
Project Advisor: Juchao Yan

Carbonyl-terminated indenofluorene is a p-conjugated molecule with an infrared reporter group of carbonyl. It allows for time-resolved infrared spectroscopy followed by pulse radiolysis to detect electron delocalization along the conjugated chain. The synthetic paths include Suzuki cross-coupling, cyclization, bromination, alkylation, and carbonylation. Column chromatography is used to purify the compounds.

Poster Group 6: Agriculture

Determining the Agriculture Literacy in ENMU Undergraduates
Presenter: Makenzie Drake
Project Advisor: Kalynn Baldock

Agriculture serves as the basis for everyday living: food, clothing, and shelter. Currently agricultural producers are struggling with marketing products due to consumer misinformation. Often consumers are unaware the agricultural practices involved in getting everyday common use items onto the store shelf. Improving Agricultural literacy across the United States has been the mission of agriculturalist for many years now. One initiative is the Ag in the Classroom which is increasing the agricultural literacy of elementary teachers and students. The purpose of this study is to determine the Ag Literacy of undergraduate students attending Eastern New Mexico University. Undergraduate students enrolled in Eastern New Mexico University will be emailed a link to the Judd-Murray Agricultural Literacy Instrument, Ag Smarts Instrument 1 questionnaire hosted by Qualtrics. Dillman's five contact email strategy will be utilized. This instrument was developed to determine the Ag Literacy of high school students. Gaining a better understanding of the agricultural literacy of ENMU undergraduate students will provide important data for development of courses and curriculum at ENMU. Finding ways to improve the agricultural literacy of undergraduate students will aid in current issue agricultural producers are facing with uninformed consumers. Data is currently being collected.

Effect of Corpus Luteum on Quality of Oocytes Collected from Abattoir Ovaries
Presenter: Makenzie Drake
Project Advisor: Kalynn Baldock

Understanding the ovaries and the potential implications of a corpus luteum (CL) is important for animal reproduction. As embryo transfer becomes a more common practice producers will continue to look for effective ways to collect oocytes for in vitro fertilization and embryo transfer. One of these methods is to utilize abattoir ovaries for oocyte collection. The purpose of this study is to determine the effects the Corpus Luteum has on the number of viable oocytes collected from abattoir ovaries. Determining if visual inspection of CL on abattoir ovaries to determines oocyte quantity might lead to a more effect method for collection. For this study follicles from 121 abattoir ovaries were divided into four groups based on the CL stage. Corpus luteum stage was based on visual identification of CL structure, color, and size. Forty ovaries did not have a visible corpus luteum. The remaining 81 were separated into Secretion

(16),Regression (27), and Proliferation (38). All antral follicles were aspirated. Images of all oocytes aspirated were taken using Swift Imaging 3.0. Twenty-nine oocytes were collected from ovaries without a CL. The proliferation group had 42 oocytes, regression group 12 oocytes, and the secretion group total of 29 oocytes. Data is currently being analyzed. Images are still being analyzed for oocyte quality. Data will be analyzed using SPSS software.

Effect of Beta-agonists on Grazing Behavior of Calves
Presenter: Isaac Ramirez
Project Advisor: Ali Hussein

Beta-agonists are feed additives added to livestock diets to increase muscling and decrease fattening of the carcass. Previous research has shown that beta-agonists can significantly increase lean body weight gain and feed efficiency in cattle. Despite these benefits, anecdotal evidence from cattle managers has suggested that beta-agonist use is related to an increased prevalence of Cattle Fatigue Syndrome (CFS). Symptoms of CFS include difficulty breathing and inability to walk or stand. The animal welfare concerns associated with CFS led to decreased use of beta-agonists in the beef industry and threatened future improvements in beef production. To determine if CFS has a relationship with beta-agonist use, ten growing Holstein steers will be used in a controlled study at a local cattle operation. All steers will graze Blue Grama grass pasture and be offered a feed supplement containing canola, corn, vitamins, and minerals. The amount of supplement provided to each steer will be 1% of their body weight each day. Steers will be randomly assigned to 1 of 2 treatment groups. Treatments include control (no beta-agonist) and 4 mg/day of the beta-agonist Optaflexx®. After 21 days of treatment, a camera drone (DJI Air 2S) will be flown over the pasture twice daily to monitor standing and walking behavior of the steers. The DJI Air 2S is the best drone for this task because it combines a high-end camera with the latest autonomous technology for less than $1,000. We hypothesize that symptoms of CFS will not be observed in steers receiving Optaflexx®

Effect of Rooster on Quality and Quantity of Eggs
Presenter: Haley Warren & Makenzie Drake
Project Advisor: Kalynn Baldock

Backyard flocks are becoming popular for urban residents. Rhode Island Red hens are a popular breed for backyard flocks as they are a great dual-purpose breed. Rhode Island Reds lay on average six to seven brown eggs per week. This production remains constant during summer and winter months, making them efficient producers for backyard flocks. Often backyard flocks consist solely of hens, as roosters can pose

various issues that can affect both the hen and producer. The presence of a rooster does allow for producers to have fertilized eggs for increasing their flocks. The purpose of this study is to determine the effect the presence of a rooster has on the quality and quantity of eggs produced by Rhode Island Red Hens. Ten Rhode Island Red Hens were randomly separated into two groups, one group having a rooster. Daily eggs were collected, counted, weighed, and graded utilizing USDA guidelines over a four-week period. Egg quality was based on the USDA grading system air pocket sizes. Eggs were graded as AA (1/8 depth), A (3/16 inch), to B (no limit), AA being the highest quality and B being the lowest. Weights were taking using an egg grading scale. Data will be analyzed utilizing SPSS software. Data collection is currently in process.

Effects of Red Heat Lamps on Growth & Development of Cornish Cross Chicks
Presenter: Brianna Fryman & Haley Warren
Project Advisor: Kalynn Baldock

Cornish cross chickens reach meat production weights within four to six weeks of hatching. Therefore, it is important for poultry producers to evaluate production practices for efficiency. Raising meat chickens requires the use of heat lamps during the first few weeks of life during feather development. Various colors and types of lights can be utilized during this brooding process. The purpose of this study is to determine the effects red heat lamps on the growth and development of Cornish Cross chicks. Fifty day old Cornish Cross chicks were randomly placed into groups upon arrival. One group is raised under two BR 40 infrared reflector 250W clear light bulbs, while the second group has two BR 40 infrared reflector 250W red light lamps over a four-week period. Both groups will receive ad libitum commercial meat bird feed. Twice weekly all chicks will be weighed, and pictures will be taken to document feather development. Preliminary data suggests Cornish Cross chickens raised under the R40 infrared 250W red-light have a lower average daily gain than those under the clear light.

Team-based Learning
Presenter: Jessiann Dusenbery
Project Advisor: Kalynn Baldock

Agricultural educators are continually trying to find new teaching strategies to engage students. One strategy is team-based learning (TBL). With TBL, students work in groups to solve real-world scenarios. The purpose of this study was to determine if TBL with designated roles was an effective way to teach post-secondary students upper division AG 350Advanced Dairy Science. Students were randomly divided into groups of four and assigned the role of owner, manager, veterinarian, or nutritionist. Throughout the course students were given dairy scenarios, as a group they would

solve the problem based on their various roles. At the end of the semester, students participated in semi-structured interviews on their opinions of this Team-Based Learning approach. Further a Qualtrics survey with eight Likert-type questions about their learning experience sent via Qualtrics. A better understanding was found on how students felt about working with a team throughout the whole class through this data. Students thought it was an effective way to learn and liked being able to communicate with other students. . As seen with team-based approaches, some groups were able to work better together than others. Students liked the new approach to learning how to work a dairy. Further analysis of the data will be used to determine if this team-based learning approach is a viable teaching strategy for agricultural production management classes. Findings from this study will guide further implementation of this team-based learning approach in other Agricultural production classes.

END OF POSTERS

Paper Presentations

Group PSYCH 1- Psychology

Signal Detection Theory: Real News or Fake News
Presenter: Brittany Valenzuela
Project Advisor: Gary Bond

Signal Detection Theory is used to determine why people make decisions based on the analysis of data collected in an experiment. (Abdi, 2007). SDT uses responses of hits, misses, false alarms, and correct rejections to determine discriminability and bias. Discriminability (d prime) is the separation or time between the noise and signal (Heeger, Landy, 1997). The bias (β) is the uses of one's judgement. The researcher's prediction is that discriminability will be poor in the study because individuals are swayed by media and other outside influences. It is also predicted that participants will be biased liberally in saying that the real news is fake news because of the outrageous context of the news headlines. Participants will be of the age range 17-60, male and females. Materials used were a PowerPoint of real and fake news headlines. The PowerPoint was sent to the participants after they had given consent, and they emailed or texted their responses back to the researcher. After the results were back the study found that the average d prime was .31 (SD = 1.12), and the average c was 1.88 (SD = 5.96). These results proves that the study was true for H1 but found that H2 was not as it was predicted.

Animal vs. Human Skin: Signal Detection Theory
Presenter: Mikaela Moore
Project Advisor: Gary Bond

In Signal Detection Theory, there are hits, misses, false alarms, and correct rejections. A hit represents a detection when a signal is present, whereas a miss signifies a "no detection," when a signal is not present. This experiment tests whether age affects the perception of an image. Specifically in this experiment, whether subjects over the age of 20 are more likely to instinctively recognize the difference between animal and human skin, when shown microscope images.

How Good is Camouflage: A Signal Detection Theory Study
Presenter: Chelsea Hatfield
Project Advisor: Sieun An

Signal Detection Theory uses the presence and absence of stimuli in order to test the discriminability of participants based on 'yes' or 'no' responses. This study looks at the ability of participants to distinguish between camouflaged animals and their environments. It is predicted that humans' ability to distinguish between the two will be fairly good due to humans' ability to recognize patterns. There were 10 volunteers (7 women and 3 men) who participated in the study. The use of 24 images shows either an environment with no animal or an environment with a camouflaged animal was shown. The participants were given three seconds per image to determine if there was an animal present. The hit proportion was 81.67 while the false alarm proportion was 18.33. There was poor discriminability (M=1.403) meaning participants were poor at distinguishing between the presence and absence of the animal. The average c was -0.201 meaning the decision-making bias was liberal. Therefore, participants were more likely to respond with a 'yes' than a 'no'.

Human Whistle or Machinery Whistle? A Signal Detection Theory Experiment
Presenter: Jordan Klein
Project Advisor: Gary Bond

Signal Detection Theory (SDT) is the ability to detect sounds presented to individuals each day and the use of discriminability to find the source of the sound. Participants were presented with a PowerPoint with different sources of sound. The participants were then asked to use their criterion and indifferent human whistles and machinery whistles. Focusing on car machinery and individuals who mimic the same whistles made the participants question their answers. After listening to each slide twice, participants were asked whether the whistles were machine or human made. The goal was to further understand SDT and humans' ability to understand their surroundings, focusing on sound. Their discriminability was rated when the PowerPoint was presented and then calculated in the Excel sheet. Then they would email their answers to the email given. Once calculated by the researcher, the average was calculated. Normality was not related to the ability to understand sound. Participants with availability to machinery sound regularly showed more significant criterion. This research study is crucial to understand and further education for the safety of those who are around and/or use machinery. The ability to understand what the sound is coming from and what it means can be beneficial to all.

Can we Detect a Firework over a Gunshot?
Presenter: Nadya Kakaras
Project Advisor: Gary Bond

Signal Detection Theory is defined as how we, as humans, respond to different stimuli presented. The uncertainty in life is unavoidable, however there are ways to test the outcomes that are predicted. The world is a dangerous place, however, can humans tell the difference between fireworks and gunshots? 12 stimuli were presented to 10 participants with various backgrounds, including law enforcement. These 10 participants consented to being part of a research study to test the hypothesis. 6 of the 12 stimuli were signal present, and 6 were signal absent. It was predicted, more participants would "hear" fireworks over gunshots. Participants listened to various audios of either guns being fired, or fireworks being lit. The hits, misses, correct rejections and false alarms were calculated after participants completed the study. The results showed more participants had "heard" fireworks, over gunshots. The main reason for this study was to test how accurately participants responded to the stimuli presented. With many participants having a law enforcement background, the results show how desensitized people are to gunshots. Since participants responded with a biased towards fireworks, the results showed how telling the difference between the two sounds is getting harder. The results prompt the question as to how many gunshots Americans accurately hear on a yearly, or even daily, basis.

Serial Killer or Not?: Signal Detection Theory
Presenter: Gabrielle Cardenas
Project Advisor: Gary Bond

Signal Detection theory is a technique that can be used to evaluate sensitivity in decision-making (Anderson, 2015). Signal Detection Theory or (SDT) for short, can be applied to many day-to-day tasks we do. Many experiments have been done by using (SDT) such as one's behavior grading papers and observing fear from an individual by looking at their eyes or mouth are just a few. This research focuses on how we as humans discriminate between a person who looks like a serial killer and one who does not. It is predicted that discriminability will be fair in the study because through social media and documentaries the serial killers chosen to have been highlighted broadly. There were 10 participants (7 women, and 3 men) who participated in the study. Ages ranged from 7-64 (M=32.3, SD=7.56). The method chosen was a PowerPoint as it is easy to understand and gather the information needed. The link was then shared to Facebook and through text as well as a consent was posted before they took the survey. Twenty-four stimuli were presented to participants in a PowerPoint slideshow. Twelve of the stimuli were signal present trials, and 12 were signal-absent trials.

Discriminability was fair in this study that distinguished between 24 photos of serial killers and random men, as a serial killer or not. Decision making bias was liberal, which means that the group of observers are relatively unbiased as they favored yes as their answer.

Hearing Whistle Noise or Not?
Presenter: Tianna Boone
Project Advisor: Gary Bond

This experiment studies if humans can hear a whistle being blown in a loud environment. A control group of 10 participants were presented with a PowerPoint of 24 slides. Each slide had loud rave music playing, and some had a faint whistle noise in the background and some did not, and participants were asked to determine if they heard the whistle or not. This was to examine Signal detection theory. Signal detection theory (SDT) is a concept that was developed to explain how humans detect stimuli in a noisy environment. This experiment also examined the d' and criterion of the data. The average d' was -0.0487 and the average c was 0.25. This experiment suggests that humans can separate a single, constant frequency from other loud noises. The results of this experiment can be used to better understand how the human brain is able to process sound in a noisy environment.

Pink Eye or High?
Presenter: Jacqueline Perez
Project Advisor: Gary Bond

Signal Detection Theory assists individuals in differentiating between stimuli that bears important information regarding given situations (signals) from random patterns within one's background (noise). In this research, it is observed how much humans can discriminate between individuals who are afflicted with conjunctivitis (pink eye) and individuals who are under the influence of cannabis. There were 10 participants within this study (4 women, 6 men) who's ages ranged from 21 to 52 (M=36.7, SD= 9.86), made up of family and friends of the researcher. Twenty-four stimuli were presented to the participants, 7 of which were signal-present trails(pink eye) and 16 of which were signal-absent trials(cannabis induced). The hit rate was 0.49, and the false alarm rate was 0.35, indicating that overall discriminability was low, and that the participants for the most part were conservatively bias. It can be assumed that these results reflect the individual's personal experiences involving both conjunctivitis as well as cannabis usage.

Group PSYCH -2: Psychology

Signal Detection Theory
Presenter: Alondra Orozco
Project Advisor: Gary Bond

Signal detection is a human-nature stimulus because it is a constant detection of the human body used every moment and each induvial acts for every signal detection. Signal detection theory provides analyzing choices and evaluating how effective they are made. Therefore, research was created in which it focuses on how individuals can recognize an everyday object as a real object or a drawing. There were 10 participants (4 women and 6 men) who participated in the study. Ages ranged from 20-80, and the individuals that were analyzed were Friends, family members, co-workers, and college students. The research consisted of Twenty-four stimuli that were presented to the participants through a PowerPoint presentation. Twelve of the stimuli were actual objects and twelve of the stimuli were drawings by a professional. The outcome was as expected; Discriminatory was poor in this study because the skill level of the artist used in this research was outstanding. The experiment can be improved for the future by focusing on a specific demographic to generate a more accurate result.

Serial Killers or Not? Signal Detection Theory Experiment
Presenter: Nikola Benedum
Project Advisor: Gary Bond

In my study, participants made yes/no decisions in order to complete their signal detection task. The decision-making process is part of signal detection theory (SDT) because a person needs to decide if he/she recognizes a signal or not. Participants were presented with photos of serial killers and non-serial killers, and they decided, based on facial expression, who was a killer and who was not. SDT allows people to discriminate between individuals' ability to detect a given affective expressions, such as anger or happiness. There were 6 participants (2 men and 4 women) who participated in the study. Ages ranged from 16-65 (M=36.6, SD=20.8). They had 10 seconds on each photo from 10 photographs to make a decision. Discriminability was poor (d' 0.37), and bias was liberal. The sample size was small in this work, and people had limited time to make decisions.

Signal Detection Theory: Is This a V-8 Engine or Not?
Presenter: Yamile Uribe Ortiz
Project Advisor: Gary Bond

Signal detection theory is an association between the internal representations of a cue and an outcome is thought to be formed when a subject is exposed to a flow of stimuli, allowing the representation of the cue to activate the representation of the outcome. It includes yes/no decisions under certain associations (Jozefowiez, 2021). These associations include signal, noises, or sight cues. In the signal detection theory framework there are hits, false alarms, misses, and correct rejections. The students, friends, or coworkers (N=12; ages 18-32) examined different vehicles and had to answer yes or no to the question, Is this a v8 engine?, on a power point that was created. The researcher hypotheses explained that the discriminability would be fair, and the bias would be liberal. In reality participants showed poor discriminability in the study and were more liberal meaning they used yes more than no. This study had several limitations including the type of participants chosen. In future studies they should be randomized instead to get more accurate results.

To Eat or Not to Eat? A Signal Detection Theory Experiment
Presenter: Barbara Nabors
Project Advisor: Gary Bond

Signal Detection Theory (SDT) is where people can detect a signal, whether from hearing, seeing, or feeling, and the ability to convey whether the signal was received or detected with or without the presence of the signal with “Yes” and “No” answers. A PowerPoint presentation of edible and non-edible flowers was presented to observers to detect if the observer was able to correctly identify which flowers were edible. The observer was asked to provide “Yes” or “No” answers to twenty-four presented slides containing an image of a flower in grayscale. The experiment will also detect if the observers are liberally or conservatively biased with their answers based on the frequency of “Yes” and “No” answers given. A study of eight observers, including men (3) and women (5) between the ages of 18 and 60, was completed. Findings showed that people have difficulty correctly identifying edible flowers from non-edible ones and are more conservatively biased when answering, meaning there were more “No” answers given.

Sex Offender or Not? A Signal Detection Experiment

Presenter: Kayla Hein
Project Advisor: Gary Bond

Signal detection theory is a way to tell whether there is discrimination is being used or not. It can be a way that people naturally discriminate in order to protect themselves. If they make a correct choice it is called a hit, and in cases where danger is around this can be very beneficial. The maximum hit rate gives the highest probability that a person will choose the stimulus that is both correct and chosen. This means that they are able to choose the correct stimulus that will provide protection from a possible dangerous situation. Fourteen people were chosen to test the hit rate of a signal detection test that tested whether the participants could tell the difference between a sexual offender and a regular person. Twenty-four stimuli were presented to the participants. 201 of the 360 responses were yes responses. This shows that the participants were liberally biased. That is to say, they said yes a lot more often than they said no. The discriminability of this study was poor. The information that was gathered in this study is useful because it shows that people are generally not able to tell the difference between a sex offender and a non-sex offender. This is important because it shows that we are not able to accurately sense danger in the form of a sex offender who might re-offend.

Group PSYCH-3 Psychology

Donkey or Something Else? Signal Detection Theory
Presenter: Sophia Escareno
Project Advisor: Gary Bond

Signal detection theory (SDT) is a loose family of models that produces discriminability (d′) and bias (c) measures. This study hypothesized that discriminability would be poor and that the bias would be liberal. Six participants (five women and one man) from ages 20-60 (M=26.67, SD= 16.33) participated in the experiment by viewing a PowerPoint with 24 pictures. The pictures are of 12 donkeys and 12 mules. The participants were told to write down a 'Y' if they think the picture they see is a donkey and to put down a 'N' when they think the picture is a mule instead. Results were calculated by using a signal detection theory calculator online in order to calculate the discriminability and the bias. You use the calculator by placing the hits, misses, false alarms, and correct rejections each participant had. The total results from the calculator showed that the discriminability was poor and the bias was near neutral. The average d' was 0.90 (SD = 0.77) and the average c was 0.09 (SD = 0.26). The hit proportion was 64.17 and the false alarm proportion was 31.67. In real life, donkeys are more dangerous than mules, so being around a donkey and thinking it's a mule could put you in more danger than with a mule. Having a bigger sample size and better pictures have been suggested to make the experiment better.

Poisonous Flowers and Non-Poisonous Flowers SDT
Presenter: Emily Barton
Project Advisor: Gary Bond

Signal Detection Theory (SDT) is a structure or framework that allows researchers to model decision-making accuracy and bias where observers make binary yes/no decisions of an observer under certain or ambiguous conditions (MacMilan, 2002). Those conditions include both noise with signal or noise with no signal. In the signal detection theory framework, there are hits, misses, false alarm and correct rejections (Wikens, 2001). This research focuses on the observers' ability to discriminate between poisonous plants and non-poisonous plants. It was predicted that discriminability would be fair because many plants look similar (color, shape and size) and decision bias would be liberal. There were 10 participants (5 men and 5 women) who participated in the study. Their ages ranged from 17-55 (M=26.8, SD= 9.75). Average c was 0.05 (SD=0.24). Discriminability was poor in the study that assessed how humans distinguished poisonous flowers to non-poisonous flowers. Decision making bias was

slightly liberal, although near zero which means that the group of observers said yes slightly more frequently than no in this study.

Celebrity or Not? Signal Detection Theory
Presenter: Janesa Garcia
Project Advisor: Gary Bond

Signal detection theory is a means to analyze how humans make binary decisions under uncertain conditions. A signal detection theory experiment was conducted that presented 12 signal present and 12 signal absent stimuli to participants. The stimuli were of American celebrities (signal) and non-celebrities (non-signal). There were eight participants in the study (age ranged from 29-75; M = 33.12, SD = 6.45). Research sessions lasted approximately 5 min. Volunteers participated via computer in their homes. Participants took photos of their answer sheets and were emailed or sent via text attachment to the researcher. Average d prime was 1.052, and average c was -0.107. Discriminability was fair in this study that looked at decisions about whether certain humans look like celebrities. Decision making bias was slightly liberal, indicating that observers said "yes, that is a celebrity" more frequently in the study. The results might indicate that in real life, people may mistake others as people who have celebrity status even if they do not have that status.

Spotting Fake Consumer Logos: A Signal Detection Theory Experiment
Presenter: Austin Rodriguez
Project Advisor: Gary Bond

Signal Detection Theory (SDT) is a structure or framework that allows researchers to model decision-making accuracy and bias where observers make binary yes/no decisions of an observer under uncertain or ambiguous conditions. It measures the ability to discriminate a signal among varying outside interferences. A sample of friends, family members, and co-workers ranging in age from 24-35 (M = 27.6, SD = 4.2) were presented with a slideshow of twenty-four stimuli. An equal number of signal-present trials, the unaltered and the truest form of a consumer brand logo, and signal-absent trials, the altered form of the consumer brand logo. Because humans interact with brand logos every moment of their lives, it is predicted that discriminability will be excellent and participants will have little to no bias in recognizing the brand's actual logo. The actual results of the study indicated that discriminability was good and decision-making bias was actually liberal. In the case of consumer marketing strategies, humans greatly familiarize themselves with logos of everyday branding.

Blue Eyes or Not: A Signal Detection Theory Experiment
Presenter: Riannah Wiker
Project Advisor: Gary Bond

The signal detection theory is used "to separate the ability of the subject to differentiate between classes of events from motivational effects or response biases" (Pastore & Scheirer, 2005). Friends, family, and students (ages 18-19) signal detection results were recorded. Participants were instructed to determine if an image of eyes under a black-and-white filter was blue or not. The pictures of the eyes were the stimulus, and twenty-four were presented. They were randomized with blue, green, amber, and brown eyes. It was not timed however, the time they took was recorded, as well as their age, gender, and consent to volunteer. The results were the participant's hits, misses, false alarms, and correct rejections. The findings were that the discriminability was very poor and relatively unbiased. There were several limitations and improvements to this study. Overall, detecting blue eyes under a black-and-white filter may show supported signal detection results, if a range of ages and volunteers are used for more accurate results.

Dry-Eye or Not? A Signal Detection Theory Experiment
Presenter: Issiah Preciado
Project Advisor: Gary Bond

This study on signal detection theory was performed to test the ability of individuals to detect signal-present and signal-absent stimuli. In general, the signal detection theory allows us to model decision-making in "yes" or "no" situations. We can measure discriminability and biases using the signal detection theory by using the calculation of hits, misses, false alarms, and correct rejections. This study used twenty participants aged between 18-73 (N= 20; ages 18-73) who attempted to correctly identify if the image of an eye shown was, or iwas not, dry. There will be twenty-four total stimuli shown twelve of which were signal-present stimuli and the other twelve were signal-absent stimuli. According to the statistics found in this study, participants were more likely to say yes, an eye was dry even if it was not dry, than they were to say no. Though there are limitations, they are small problems, which can be easily corrected with just a few simple changes.

How Does Signal Detection Theory Apply to Colors?

Presenter: Isabella Robertson
Project Advisor: Gary Bond

Signal detection theory can be defined as a method of testing someone's senses to determine whether or not a stimulus is present in a given situation. One example of this would be hearing tests. The purpose of this study is to determine who can distinguish the color dark blue from other dark colors, such as black. It is predicted that participants will be biased in saying "no" that the color is not dark blue. Hits, misses, false alarms, correct rejections, discriminability, and bias (c) all have to be calculated with the results of the experiment. The study group consisted of 10 individuals, two females and eight males, all ages 18-21 who attend ENMU. Discriminability showed that participants were more biased in saying no that the color shown to them was not dark blue. Bias (c) was conservative in this experiment. This means that the naked human eye can not distinguish between dark shades of blue and the color black, but they were able to tell which colors were entirely not blue.

Group MATH-1: Math & Computer Science

Cyberspace Security: Changing the Culture
Presenter: Stephen Washington
Project Advisor: Stephen Miller

We live in a time where we are surrounded by technology, and with its growth comes a level of responsibility for our personal security. Many people view the subject of cybersecurity as foreign and it's time for a change in culture. While we have cybersecurity professionals defending us every day, people are still very vulnerable to cyber-attacks. In my research, I am going to identify roles in cybersecurity, hacking culture, changing the culture, and the effects of hacking on a global scale to the small town. I will emphasize small-town challenges and identify real-world issues found on the internet by doing the first step in ethical hacking, footprinting and reconnaissance. It is my hope that my research aids people to think of their personal cybersecurity like a door, and like any door it requires the appropriate lock to protect its contents.

Cable-Driven Parallel Robot with Microcontroller-Based Control System
Presenter: Ty Bergman
Project Advisor: Brian Pasko

This project presents the design and implementation of a cable-driven parallel robot (CDPR) controlled by microcontrollers. The CDPR consists of four stepper motors, each with a spool of fishing line, and each motor's line is connected in the center of the motors. Two microcontrollers make up the control system for the robot. The Arduino Uno is used to control the motion of each stepper motor to achieve motion control of the point where the lines of each motor are bound. Additionally, an ESP8266 microcontroller is utilized to enable wireless communication for controlling the robot with the aid of a user interface (UI) that runs on the ESP8266. The project aims to explore potential use cases for this type of robot. The CDPR's unique cable-driven design allows it to achieve acceptable levels of precision and flexibility in movement, making it a promising platform for a range of applications. The wireless control system allows for remote operation and flexibility in controlling the robot, while the UI provides an intuitive and user-friendly means of controlling the robot's motion. Through this project, we hope to showcase the capabilities of the CDPR and demonstrate its potential as a tool for a variety of industries, including manufacturing, healthcare, and entertainment. By providing a flexible and precise means of controlling motion, the CDPR could enable new applications and innovations in a range of fields.

Probabilistic Individual Thresholds in Jury Verdicts (online poster)
Presenter: Chantel Pine
Project Advisor: Brian Pasko

Understanding how a jury reaches a verdict is critical for trials in the justice system. Many things happen in the deliberation room that determines a verdict. In this project, we want to model the deliberation process of juries by utilizing a threshold behavioral paradigm. Our model tries to capture the effects of behavioral group thresholds, time thresholds, and critical situations on juries. We want to understand what this could mean in the real world and interpret our results.

Six Year Completion Rates Predicting Student Loan Repayment Seven Years From Graduation (online poster)
Presenter: Nick Anderson
Project Advisor: Prabha Shrestha

This paper studies whether students who have completed their college degree programs after six years of enrollment is able to predict whether students who have taken out federal student loans will still be in repayment status seven years after graduation. It utilizes a multivariable regression analysis to predict the repayment rate seven years after graduation, with variables such as the completion rate six years after enrollment, the income of students who completed six years after enrollment, gender, Pell or no Pell grant recipients percentages, percentage of students who have taken out federal student loans, and the type of university that the students graduated from, i.e., private or public. The initial hypothesis is that students who take six years to complete their degree programs will generally have a lower repayment rate after seven years from graduation than those who completed in faster time frame, given that the students who take that long might have changed their majors, had life-circumstances that impacted their ability to complete their studies faster, or they might not have been as invested in school as would be expected, which can have significant financial consequences and hence impact a person's ability to service a federal student loan. Machine learning techniques will also be utilized to see if this cohort of students who take out federal student loans is consistent regardless of the year in which a student graduates.

Group SOC-1: Social Science/Media

Are Female Characters in Popular Sitcoms Written Differently Depending on the Gender of the Writer?
Presenter: Samantha Wilkening
Project Advisor: Erik Stanley

For my project, I will be doing content analysis on how women in TV are written for sitcoms and looking at if the writing changes with the gender of the writer. I will be looking at one to two episodes of popular sitcoms from the 1950's, 60's, 70's, 80's, 90's, 2000's, 2010's and 2020's, depending on the diversity of writers. The focus will be on the behavior and actions of women in TV shows and seeing how those change with the gender of the writer, if it does at all. Some things that I will be looking for are common stereotypes, such as The Dumb Blonde trope and the Nagging Wife trope, if the woman is working outside of the home, what a female character says or does and if it is played for laughs, and looking at how the writing style and characters in TV shows changes as the years go on. My hypothesis is that since old TV shows were written by men, ergo the characters were written by men, women are typically portrayed as how men saw them rather than how they are, and that the narrative changes when women start writing female characters. If my hypothesis is correct, I could compare and contrast women written by men and women written by women and will be able to see the differences in the writing, actions, and dialogue of the character.

Diversity in Video Games: Can a Triple-A Game Score an A in Diversity?
Presenter: Cheyenne Kissee-Dowdell
Project Advisor: Michelle Schmidt

In Dr. Schmidt's Sociology of Media course, I conducted a small-scale content analysis of video games, focusing on the Assassin's Creed series, to investigate the extent to which the franchise had become more diverse and inclusive over time. My research question was "Have video games become more diverse over the years?" and my hypothesis was "Yes, but with room for improvement." This presentation provides an overview of my methodology, including my coding scheme and the theoretical frameworks that informed my analysis. I also present the findings of my research and why it matters.

Our Childhood Movies & Environmentalism
Presenter: Grace Mesarchik
Project Advisor: Michelle Schmidt

This presentation explores how the presentation of environmentalism in children's movies interfaces with real-world environmental movements and trends. Individuals, communities, and society are affected by aspects of environmentalism every day. Children are an impressionable audience, so the environmental depictions to which they are exposed could have a lasting impact on their environmental perspectives. The data was compiled from external source lists of pro-environmental movies and stated why the authors thought the movies were good representations or starting points for introducing environmentalism. The data was analyzed for the issues presented, lessons taught, and entertainment elements. Media hegemony and the gratification theory provided a theoretical framework to understand the relationship between environmental media messaging, consumption, and activism.

The Popularity of Nepali Food on Facebook as Nonverbal Communication
Presenter: Leonard Bailey
Project Advisor: Patricia Dobson

This study explores gastronomic interaction as a form of non-verbal communication, specifically by the means of Facebook postings focusing on Nepali foods. Sharing food can transcend language and make culture inclusive. This research examines how gastronomic culture through social media can be a form of non-verbal communication and how it connects people from around the world. Using constructive design theory, this research looked at non-verbal communication surrounding Nepali cultural food postings. It poses questions regarding how social media platforms could break cultural misconceptions, creating greater inclusion. It reviews the types of reactions to posting, and the use of emojis on Facebook posts as forms of communication. By evaluating 805,020 Facebook views around Nepal's food culture, the research found that 43.6% were around positive, non-verbal emotional reactions compared to 0.11% of non-verbal communication demonstrating negative emotional reactions. Nepal is facing newly proposed legislation surrounding social media that could restrict freedoms. Social media platforms like Facebook, form normative structures that are especially useful when translating the data of emotional behaviors of content. Through constructive design theory, this research explores user's reactions to cultural gastronomic content on social media and how it can enable future research regarding sharing foods as a means of non-verbal communication.

Conflict Resolution Through the Karate Kid Movie to the Cobra Kai TV Show
Presenter: Leonard Bailey
Project Advisor: Darrell Roe

The present study investigated conflict resolution through the television series Cobra Kai, exploring both conflict and associated resolution. The research hypothesizes that viewers perceived realism in relationships with aggression and conflicts could change in the media through resolution. This study implemented quantitative, observational approach to study the effects of conflict resolution theory by counting the number of conflicts over four episodes of the Cobra Kai series and comparing the number of resolutions. It was found that in eighteen conflicts, only eight were made resolute; this accounts for only 1.44%. It proposes the question that if media implements positive resolutions to conflicts would it lead to modeling constructive outcomes.

The Portrayal of Latin Men in Hollywood and the Study of Machismo
Presenter: Jose Ruiz Rivero
Project Advisor: Erik Stanley

Erotic, suave with women, and effortless control of any situation. This description is used to presents the Latin lover or machismo troupe, which has and is still being used to depict Latin males throughout various media. The depiction of male Latino's in media have always followed stereotypical themes such as violent, controlling, sexual, etc. This portrayal has given Latin culture's a poor reputation, as well as Latin males . This depiction does not just affect the Latin culture but has a negative impact on the new generation of males. Young Latin males can view these actions as correct and harm individuals. Machismo in media is shown as a positive theme and the actions shown are also viewed as positive. These themes are the opposite of positive and are based on the mental and physical abusive of individuals in their life.

Gender Norms & Media: A Content Analysis of Generational Sitcoms
Presenter: Meghan Ensign
Project Advisor: Erik Stanley

The issue explored in this paper is how media and gender norms evolve with politics. Building on previous work of theorists from the 1950s to the 2020s, media has held a strong foothold over populations worldwide, developing their realities and shaping how they understand or portray stereotypes. With this previous understanding that media establishes realities, the following content analysis focuses on how political events cause a change in what is pictured. Due to time constraints, this analysis was limited to only one episode from each decade. The codebook examined three themes:

work, household, and overall relationships. Work was broken into role conflict of the female in the workplace, clothing adaptations (following social trends), and mannerisms - the formality between males and females. The household code looked at role conflict of the female in the household, clothing trends, and mannerisms of the female to others. The relationship code was a broad theme that looked at the role conflict of both genders in any social occasion (attempting to fit in or defy norms), the interactions between the same gender, and interactions with the opposite gender. All episodes were analyzed using timestamps to note the frequency of codes. The results concluded that the hypothesis was valid. As the years passed and women fought for their rights, pushing politics, they increased their screen time, fought against the patriarchy, and defied gender norms. Media has shifted from being a mode of political gain to destigmatizing stereotypes in society.

Group HUM-1: Social Sciences & Humanities

The Illusion of Borders in "Uprooted"
Presenter: Sierra Beverly
Project Advisor: David Sweeten

With the issues of borders growing exponentially within the modern world, we as a society can look to our art for answers. Within fantasy, the exploration of ideas that have yet to be mainstreamed within reality can be identified, which goes for Naomi Novik's novel "Uprooted", where the issues permeating from the two political bodies of the Wood and the country of Polyna can be seen as synonymous with numerous issues seen within reality. The solution at the end of the novel is also realistic, with the main character choosing to learn and help than fear and destroy.

Women Empowerment Represented in the Portales Women's Club
Presenter: Andrea Velazquez
Project Advisor: Henna Messina

While doing research in the Special Collections at the GSSC I came across various sources containing information around the Portales Woman's Club. There were primary sources which included club scrapbooks, photographs, documents, and more that outlined the astounding work of the women who had a role in this club. On top of such, I read on secondary sources that presented similar ideas as the Portales Woman's Club. I learned the Portales Woman's Club is a women's organization who have been dedicated to putting forth "mutual helpfulness in all the affairs of life, in united effort toward the highest development of humanity." From a Flower Show to a community Clean-Up, the women that have been a part of this club were able to build the community up to be better and bring the community together. In this paper, I also wanted to introduce a "trend" which I noticed while doing my research. This "trend" is the display of women empowerment through not only this club's efforts, but New Mexican women's efforts as one. A driven goal showcasing there are no limits to what women are capable of, especially when we all band together.

The Impact of National Federation of Independent Business v. Sebelius on the Interstate Commerce Clause
Presenter: Cameron Axelrod
Project Advisor: Steven Brust

This paper will discuss the current state of the Interstate Commerce Clause as found in the National Federation of Independent Business v. Sebelius, one of the most recent Supreme court cases that deals with this issue. First, I will briefly summarize the National Federation of Independent Business v. Sebelius, including the facts and the case's holding. Then I will discuss the Justices' reasoning in their opinions through the cases they cite and their interpretation of the Interstate Commerce Clause and the Constitution. Finally, I will talk about the implications of the ruling on inter commerce, including my thought on the critical distinction that the court made between activity and inactivity in the market and the substantial effects doctrine.

SDT: Serial Killers or Not
Presenter: Jerika Morales
Project Advisor: Gary Bond

Distinguishing certain parts of facial features differ from person to person as our eyes are shaped differently. During this study participants will observe sets of eyes to determine which are serial killers and which are not. This was done using the signal detection theory. In this study participants were presented with 24 pictures. These pictures consisted of eyes of serial killers (12 pictures) compared to other random individuals' eyes (12 pictures). Twenty participants (12 female, 8 male) took part in this study where a slideshow of randomly placed pictures was presented to participants. The task was to indicate whether participants were observing the eyes of a serial killer or the eyes of other random individuals. Participants reported their answers to the researcher who then calculated the responses. The results of the study found that participants used a conservative unbiased criterion for detecting the eyes. Participants had a conservative unbiased criterion setting in neither saying "yes" or "no" extensively. The results also indicated the discriminability was poor with a d prime of 0.41. These findings indicate individuals will find it difficult to distinguish serial killers from everyday people.

Group ED-1: Education

"Yes, Miss Teacher": The Role of a More Experienced Other in a Young Girl's Literacy Acquisition
Presenter: Chazlin Lesueur
Project Advisor: Olga Gould

This qualitative case study was designed, IRB-approved, and conducted with one preschool-age research participant in the rural southwestern U.S. This research was grounded in Vygotsky's (1978) socio-cultural constructivism and Bronfenbrenner's (1995) ecological systems model theories. Our participant was the only child of a wealthy family. The purpose of our study was to investigate whether or not it is possible to motivate a low-motivated child in learning how to read while being raised in a no-academic-pressure environment. Over the period of three consecutive months, we provided weekly literacy sessions to the child who was not willing to learn academic skills from the previously hired by this family staff. We collected the data in the form of observational notes and memos. Upon conducting the data analysis, we found that dramatization, readers' theatre, and, most importantly, positive role-modeling strategies have a great potential to motivate a reluctant early childhood student in learning.

The Role of Extra-Curricular Literacy Support to an Elementary School-Age Motherless Child
Presenter: Kinnley Davis
Project Advisor: Olga Gould

We designed and conducted this IRB-approved qualitative case study grounded in Vygotsky's (1987) socio-cultural constructivism theory with one seven year-old elementary school student in a rural Southwestern American district. Our research participant belonged to a low-income single-father household. At the start of this project, this child was a very low-motivated, reluctant reader with an extremely low self-esteem. The purpose of our research was to understand whether or not an elementary school-age motherless child might benefit from the in-home literacy/reading support provided by a female non-family member educator. During three consecutive months, we collected the data in the form of observations and informal interviews with the participant and her parent. We used the Cartesian Plane to analyze our data. Our research found that, though utopic at a first glance, the educational goal was achieved: our participant started demonstrating a greater willingness to read and discuss the books under the researcher's guidance. Earlier this year, we presented our research

findings at the 18th International Congress of Qualitative Inquiry headed by Dr. Norman Denzin.

"We Will Run Our Own Private School for Free!": Developing Intrinsic Motivation in a Homeschooled Kindergarten Student in a Low Income Family
Presenter: Chelsey White
Project Advisor: Olga Gould

We conducted our qualitative case study grounded in Bronfenbrenner's (1995) ecological systems model theory in one of the rural districts in the southwestern U.S. In the focus of this research, there was one low socioeconomic status (SES) single-parent family with one Kindergarten-age child. The purpose of this study was to investigate whether or not a low SES might negatively affect the parent - child teaching and learning interactions, motivation, and academic progress of the participant. In our professor-student research tandem of co-investigators, the professor designed and directed the study, and the second co-investigator collected the observational data and the public-school records while homeschooling her own child, an emergent reader. Upon Miles and Huberman (1984) memoing data analysis, this study found that, after three months of the transformative strategic instruction within this project, the child showed growth of self-esteem, intrinsic motivation, and progressed academically, regardless of the adverse circumstances.

The Challenges of Teaching Online: Instructor's Perceptions of Online English as a Second Language Courses at a Mexican University
Presenter: Yitzen Lizama
Project Advisor: Tala Karkar Esperat

The proliferation of online courses has facilitated students' access to educational opportunities and allowed schools worldwide to offer courses and programs. Even when the advantages of educational technologies can be several, teaching online requires specific skills, abilities, and competencies that educators need to develop. Additionally, online instructors' roles, practices, and challenges differ drastically from face-to-face teaching. This qualitative study collected data from 14 online English as a Foreign Language (EFL) instructors at a Mexican University. The study aimed to identify the online instructors' perceptions, attitudes, and experiences regarding online teaching and its effectiveness in developing English communicative skills.

Dungeons and Dragons: Creating a Chemist Class for Educational Purposes

Presenter: Thallan Schwartz
Project Advisor: Sarah Lonelodge

Have you ever wanted to help others learn about new chemicals or special concoctions? What about teaching through games? Well, in the game Dungeons & Dragons (D&D) you can do so. In the game D&D, a tabletop role-playing game where people act as characters within a fantasy world, people can bring scientific ideas and creative processes into it to try to learn while having fun. Results are typically determined by a 20-sided die - the higher the better most of the time. There are other systems in place and abilities that people can use to affect a role or even completely change it. One such feature includes classes, which determine what abilities you, as a character, receive. In the base game of D&D, there are 13 classes. However, I have personally created additional classes. One I am working on is the "chemist" class. The general concept of the "chemist" class implies one who has mastered or has a deep understanding of all periodic table elements. The chemist may use all 118 known elements in creative manners to concoct new and useful - but possibly deadly - recipes. In my presentation, I will discuss how the class works and ways that players can use it, such as creating a medicine that uses zinc to heal people, developing a metal compound that allows people to levitate, and more.

Group BIO-1: Biology & Forensic Science

The Effects of Insect Repellent on Initial Insect Colonization of Decomposing Pig Remains
Presenter: Cecilia Torres
Project Director: Ken Cradock

Forensic entomology is the branch of forensic science that uses insects as evidence in criminal and civil investigations, including investigations of suspicious deaths. Most commonly, insects are used to estimate a postmortem interval/post colonization interval, or time since death. Postmortem interval/post colonization interval is estimated by determining the age of the immature insects present on the remains and by analyzing the overall insect fauna on the remains, as different insects colonize remains at distinct points in time. Numerous factors can influence insect colonization and development including temperature, habitat, and the presence of drugs or toxins. My research aimed to determine whether insect repellent influences insect colonization, as it is manufactured specifically to repel insects. This study utilized pig feet as analogs for decomposing human remains. The feet were divided into four groups: one without repellent, one sprayed with repellent containing 40% DEET, one sprayed with repellent containing 98% DEET, and one sprayed with repellent containing lemon eucalyptus extracts. We observed initial insect colonization and analyzed insects collected from the samples and determined that insect repellent did not significantly delay colonization, but 98% DEET insect repellent reduced the number of insects collected from the remains.

The Ecology of Ants (Hymenoptera: Formicidae): Urban vs. Rural Assemblages of Eastern New Mexico
Presenter: Dennis Tinucci
Project Advisor: Ken Cradock

With over 55% of the world's population residing in urban centers the encroachment of humanity upon undeveloped areas is accelerating. Meanwhile, the study of urban ecology has grown apace, and investigation of ants in urban settings has become an increasingly important component of ant ecology research. The ecology of ants in urban areas is in part about exposing how they adapt to disturbance and fragmentation, and the tangled structure of urban settings provides a prime example of modern habitat trends. More myrmecologists, however, have chosen to broaden their study to encompass ant assemblages in the immediate countryside, and this project takes a similar approach. In the placement of pitfall traps not only within the city, but in

undisturbed plots in the countryside, this study adopts a comparative approach serving to measure ant assemblages between disturbed and undisturbed areas. Over the course of two summers three treatments covering plots within backyards and fields in the city proper and a country native patch were employed in mid-June and mid-August. Research to date has revealed the distribution of ant genera representing four subfamilies, namely Myrmicinae (5) with 58% of total species, Formicinae (3), with 21%, Dolichoderinae (2) with 16% and Dorylinae (1) with 5%. Genera included Crematogaster, Dorymyrmex, Forelius, Monomorium, Paratrechina, Pheidole, Pogonomyrmex, and Solenopsis. In the final analysis there was little difference in established genera between city and country. However, species count, namely for small ants, was higher in the city.

Shifting Butterfly Diversity Due to Climate Change and Habitat Alteration in Nepal
Presenter: Anisha Sapkota
Project Advisor: Ken Cradock

Documentation of diversity of butterflies in Nepal started since 1820s however, it was Smith (2010) who, through his near five-decade study, concluded species richness of butterflies in Nepal to be 660 in 263 genera. However, the diversity of butterflies keeps fluctuating hence, to update the list a survey was conducted from early 2017 to late 2021 where distribution record of close to 200 species of butterflies in terms of regional distribution, seasonality, and elevation were accessed. In the process, 17 new butterflies to the known butterfly fauna of Nepal were added: Celaenorrhinus nigricans nigricans (deNicéville, 1885), Pantoporia sandaka davidsoni Eliot, 1969, Prosotas bhutea (deNicéville,1884), Zenonoida discreta discrete (Elwes & Edwards 1897), Halpe aucma Swinhoe, 1893, Celaenorrhinus pyrrha deNicéville, 1889, Coladenia agni (deNicéville, [1884]), Erionota thrax (Linnaeus, 1767), Hasora taminatus (Hübner, 1818), Hasora vitta (Butler, 1870), Seseria sambara (Moore, [1866]), and Tarucus balkanicus (Freyer, 1844), Caltoris bromus (Leech) ssp. bromus, Nacaduba berenice (Herrich-Schäffer) ssp. plumbeomicans (Wood-Mason & deNiceville), Pseudocoladenia dan fabia (Evans, 1949) and Pseudocoladenia fatua (Evans, 1949), along with one new subspecies: Pelopidas conjuncta narooa (Moore, 1878). This study highlights the common pattern of range extension of butterflies to west Nepal from east and/or northward, upward and downward elevational shifts, and new seasonal records, consistent with the impact of climate change records on invertebrates around the world. Driving factors include human-inflicted climate change, habitat destruction, loss of host plants, and accidental/intentional introduction of butterfly species/their host plant(s) that may influence gene flow, leading to vulnerability, thus, conservation efforts are needed.

Residue Quality Affects Litter Decomposition Dynamics & Carbon & Nitrogen Mineralization in a Semi-Arid Agroecosystem
Presenter: Amrit Adhikari
Project Advisor: Zhiming Liu

Although cover cropping is promoted to improve soil health in arid and semi-arid environments, information on its residue decomposition and soil carbon (C) and nitrogen (N) dynamics need to be improved. This study evaluated decomposition dynamics and nutrient release from different winter cover crops in a semi-arid agroecosystem. Approximately 20-g of triticale (×Triticale hexaploid Lart), turnip (Brassica rapa subsp.rapa L), and pea (Pisum sativum subsp. arvense L) cover crops residues were kept in litter bags and deployed in the field. Litter bags were removed every other week (12 destructive samplings) to evaluate the remaining dry matter and C and N contents. Among the two models (first-order kinetics and exponential model), exponential model fitted well to describe the decomposition rate of three cover crop residues. After 98 days, the residue decomposition in litter bags was higher with pea (47 %) followed by turnip and triticale. The residue analysis showed that legumes' lower C: N ratio favored faster decomposition. Residue quality affected the decomposition rates. Also, a 10-week long incubation was set in laboratory conditions to understand the decomposition of triticale, turnip, pea, wheat, sorghum, and native grass residues by estimating potential mineralizable carbon (PMC) each week. Among three models used double exponential decay model was the best fitted model for experimental data to describe carbon mineralization. Cover crop termination and cash crop planting times should be managed based on the quality of crop or cover crop residue for effective soil nutrient cycling and their uptake by subsequent crops.

Effect of Cover Crops on Thrips Population Dynamics in Seedling Cotton
Presenter: Raju Sapkota
Project Advisor: Ken Cradock

Cotton (Gossypium hirsutum) requires a long growing period for fruit and fiber maturation, making it vulnerable to insect pests, thus affecting the seed cotton yield. Cotton thrips (Thysanoptera: Thripidae) are one of the major insects impacting cotton yield, specifically in Texas High Plains. Study conducted at Texas A & M Agrilife showed that densities of thrips, feeding injury from thrips, cotton growth, and yield varied according to the type of cover crops used as a treatment at different irrigation levels. The densities of thrips decreased in the later growth stage compared to the earlier growth stage of cotton but no significant difference was observed. When taking cover crops: rye, wheat, and fallow into account, thrips' densities were found in decreasing patterns from fallow, wheat, and rye, respectively, in both sampling dates

but was insignificant. The number of nymphs per five plants was found decreasing unlike the number of adults which was increasing in second sampling Cotton planted in no cover plot had the highest yield potential regardless of the irrigation level but no significant difference with rye and wheat cover crop. Results of the study indicated that using cover crops did increase the number of flowers and plant height but no fiber yield and micronaire value compared to fallow plot.

Hemipeplinae (Coleoptera: Myteridae) of the Austro-Oriental Region with Descriptions of Six New Species from the Philippines
Presenter: Sajan KC
Project Advisor: Darren Pollock

Specimens of Hemipeplinae from different museums around the world were borrowed. The external morphology and the male genitalia of the specimens were examined. All three known species of Hemipeplinae from the Austro-Oriental regions were found viz. Hemipeplus australicus Arrow, 1930, H. nuciferae Arrow, 1930, and H. klematanicus (Gestro, 1873). In addition, H. miyamotoi Kamiya, 1961, which was previously known only from Japan (Palearctic region) was found from Taiwan. Six species new to science were found from Philippines viz. H. cuspidatus sp. nov., H. harkonensis sp. nov., H. luzonensis sp. nov., H. mindanaos sp. nov., H. palawanensis sp. nov., and H. surigaos sp. nov. Among the newly described species, H. harkonensis, H. mindanaos, H. palawanensis, and H. surigaos are described based on their unique external as well as male genital morphology, while H. cuspidatus and H. luzonensis, both lack male specimens but are unique based on their external morphology. The dichotomous keys, biogeography as well as morphological details of the new as well as previously known species are provided along with the necessary images/illustrations.

The Relationship Between Predator and Prey in Robber Flies (Diptera: Aslidae) with Differing Feeding Location Behaviors
Presenter: Stephen Murphy
Project Advisor: Darren Pollock

Robber flies (Asilidae) have three different locations where they feed on prey. Some species perch on the ground while feeding, some perch on the ends of dead twigs while feeding, and some hang from vegetation while feeding. This study examines three species of robber flies that each exhibit one of these feeding strategies: Efferia helenae Coquillett, Heteropogon patruelis Loew, and Diogmites bilobatus Loew respectively. The flies will be captured along with their prey while feeding, then the size of both predator and prey will be measured. The size ratio of predator to prey will then be

calculated for each species to determine if the predator-to-prey size ratio differs between these feeding strategies.

Group EET: Electronics and Physical Sciences

Inverter
Presenter: Donald Adams
Project Advisor: Hamid Allamehzadeh

There are various ways to implement an inverter. The one tested here has been using the 555 timer with the transistors at the output to amplify the voltage for use at the transformer. The secondary, smaller experiment uses the multivibrator with the transistor as the amplifier for the transformer. The purpose is to convert direct current to alternating current. The solar panel can provide the right current for the transformer to produce the desired output. Under test conditions the inverter produces 105VAC out of 120VAC for use in residential applications.

Ardiuno Controlled Distance Sensor
Presenter: Sarah Glastetter
Project Advisor: Hamid Allamehzadeh

This research project presents the development of an Arduino-controlled distance sensor that implements the components HC-SR04 Ultrasonic Distance Sensor, a Piezo-Buzzer to give audio cues in proportion to distance, LED visual indicators, and an LCD for distance measurement in both inches and centimeters. This project aims to design a cost-effective and accurate distance sensor that can be used in various applications, such as obstacle avoidance systems and reversing vehicle monitors. The project's methodology includes using an Arduino Mega microcontroller board to interface with the HC-SR04 sensor, which sends ultrasonic waves to detect the distance between the sensor and an object. The system was tested using various obstacles at different distances, and the results show that the system accurately measures distances within a 1-inch to 50 inches range. Moreover, the system provides reliable and user-friendly feedback through audio and visual indicators, making it suitable for various applications. Overall, this project successfully implements an Arduino-controlled distance sensor with an HC-SR04 Ultrasonic Distance Sensor and a Piezo Buzzer for audio distance verification, LED visual indicators, and an LCD display for distance measurement in inches and centimeters. This system provides a low-cost, accurate, and user-friendly solution for obstacle detection and distance measurement, which can be utilized in various applications, including robotics, automation, and security systems. A laptop will be used to display the coding implemented in this project. This system can be powered on with a normal wall outlet and a 12V adapter cable.

Clovis Fire Dept.: Enhancing Emergency Dispatch Audio Quality with Lowpass Filter
Presenter: Matthew Kube
Program Advisor: Hamid Allamehzadeh

The City of Clovis Fire Department (CFD) heavily relies on 2-way radio communications to dispatch resources to emergency situations. Without a reliable system the speed and efficiency of dispatching resources is hindered. At all 6 of the Clovis fire stations the method for receiving calls consists of a Motorola CDM 1250, the audio output from this 2-way radio is pushed through an amplifier. The resulting audio is very loud and distorted with high frequency crackles, that bounce around the echoey truck bays making the audio almost incomprehensible. To remedy this situation the CFD has tried many different solutions, which include soundproofing materials, and speakers that are spherical in shape. This has resulted in little improvement to the audio quality. My solution is to place a lowpass filter between the radio and the amplifier. A lowpass filter will only allow signals that are below the cut off frequency to pass through and reject the signals that are above the cutoff frequency. By implementing a lowpass filter we will be able to remove the high frequency audio peaks before the amplification stage, which will result in cleaner and clearer audio in the truck bays. The result of this filter will improve the overall ability for dispatch to communicate with Fire/EMS resources, decrease the amount of miscommunications, and ultimately save lives.

Synthesis of Carbonyl-Functionalized Idenoflourene for Probing Delocalization
Presenter: John Owunebe Ehoche
Project Advisor: Juchao Yan

Indenofluorene with terminated carbonyl functional group has recently gained attention due to its potential applications in optoelectronics. It is synthesized via Suzuki cross-coupling and carbonylation, resulting in the formation of a carbonyl group at the terminus of the molecule. The inefficiencies of the existing materials for the purpose of conducting electrons in organic solar cells has made this particular path of research an interesting one. To improve the efficiencies of organic solar cells, it is required that electrons are well delocalized. The nitrile-terminated indenofluorene has been synthesized and characterized via time-resolved infrared spectroscopy followed by pulse radiolysis. The introduction of a carbonyl group onto the indenofluorene molecule provides an additional handle for chemical modification and further functionalization. The resulting indenofluorene with terminated carbonyl functional group exhibit enhanced solubility in common organic solvents, which is an important property for solution processing techniques used in the fabrication of optoelectronic devices. Indenofluorene with terminated carbonyl group has been found to exhibit

good thermal stability and high electron mobility, making it suitable for use in organic light emitting diodes and organic solar cells. The carbonyl functional group also allows for improved charge transport and facilitates the formation of stable and efficient charge complexes in these devices.

Synthesis and Characteristics of Carbonyl-Functionalized Oligo{p-phenylene}s for Probing Electron Delocalization
Presenter: Chimezie Onukwuli
Project Advisor: Juchao Yan

The optoelectronic applications of π conjugated p-phenylenes in organic solar cells (OSCs), wearable organic photovoltaics (OPVs), light-emitting diodes, and organic lasers have attracted much research interest. To improve the performance and durability of OSCs, it is required that electrons be well delocalized. Nitrile terminated, rigid, and coplanar ladder-type oligo p-phenylenes (LTOPPs) have been synthesized to study electron delocalization via pulse radiolysis and time-resolved infrared spectroscopy. LTOPPs functionalized with a nitrile group is not common used in OSCs. Here, we suggest adding a carbonyl infrared reporter to LTOPPs chain to further investigate electron delocalization. Using a cheap and non-toxic N-formyl as a carbonyl source, we synthesize the target compound via palladium reductive carbonylation.

Effects of Electroculture on Plant Production
Presenter: Isaac Ramirez
Project Advisor: Ali Hussein

Electroculture involves the use of electrical currents to stimulate plant growth and enhance soil quality. It may provide innovative solutions to issues such as climate change and global food scarcity. Several case studies will be examined and a controlled research experiment will be conducted over garden beds to explore how electroculture can contribute to sustainable agriculture. Electrical currents generated by the elements of nature can improve soil health, reducing the need for synthetic fertilizers and pesticides that harm the environment. To harvest electricity, an apparatus will be attached to a 15’ galvanized pole facing direct magnetic north and south. Two plot’s labeled Block 1 and Block 2 will be placed 15’ away from each other. Each garden bed will be composed of the same medium that includes fungal compost provided by the Johnson Su bioreactor and garden soil. Key identifiers will include soil electrical conductivity (EC), soil pH, nutrient uptake, moisture levels, plant growth, and yield production for the duration of the study. In essence, using this strategy could benefit farmers that have high labor costs and use fertilizers. Despite the positives, the limitations of electroculture will need to be investigated when implementing this

strategy on a large-scale farm. Furthermore, research in electroculture is preliminary, thus requiring large sample sizes and further analysis to understand the mechanisms behind it. The hypothesis of the experiment is that application of electrical currents will significantly increase soil nutrient update, plant growth, and crop yield.

Wireless Power Transfer
Presenter: Matthew Kube & Sarah Glastetter
Project Advisor: Hamid Allamehzadeh

With the ever-growing demand for wireless electronics increasing, it is necessary for us to increase the efficiency of transferring power wirelessly. Our research aims to identify the optimal size of the coil in proportion to the efficiency of the transferred power. To accomplish our goal, we designed coils that range from 2 inches to 18 inches in diameter. The quality factor of the coil is directly proportional to the distance that can be achieved by the transmitter and receiver coil. The Q of the coil is equal to the energy stored, divided by the energy consumed. The higher the Q, the less you have to amplify. To test the Q of the coils, we utilized a function generator and a digital oscilloscope to determine the Quality factor of the coil. A higher Q factor indicates that the coil efficiently transfers energy and presents lower losses in the form of heat generated. This is desirable for wireless power transfer, as it allows a greater distance between the transmitter and receiver. To test the efficiency, we utilized a Royer oscillator, eliminating the need for a complex control system. The Royer oscillator can automatically track and adjust the resonance frequency based on the amount of mutual inductance between the coils. The result of this study shows that adjusting for the Q of the coil will have significant impacts on the future of wireless power transfer technology.

Group FA-1: Fine Arts Performances

Elephant in the Room
Presenter: Israel Stacy & Santiago Chacon
Additional Collaborators: Liam Hurley & Jacen Jimenez
Project Advisor: Anne Beck

Elephant in the Room is a play by Santiago Chacon and was performed as a part of the New Mexico New Works Festival. Israel Stacy is the director of the piece and it stars Liam Hurley as Michael, Jacen Jimenez as Oscar, and Santiago Chacon as Sergio. This is the story of a father and his two sons after the loss of his wife. Through a toy elephant given to the sons by their mother, the trio accept what it means to continue living in the face of death. Being that Santiago Chacon worked as both writer and actor, it provides a perspective from multiple standpoints in regards to this piece and makes for an intriguing discussion in the process of this stories creation. Meanwhile, Israel Stacy can share his thoughts in direction and how he developed the piece with added commentary from Jacen Jimenez and Liam Hurley who can provide their own input on their characters and the process as a whole. We are excited to share this piece and all the work on this project as well as our dive into the process of how this work came to be from start to end.

Monster
Presenter: Alysha Guss
Project Advisor: Erik Stanley

What my video is a stop motions video done in an application called Gacha club its an online mod for creating charters and being able to create video through stop motion.

Let Us Pray
Presenter: Jai Whitteker
Additional Collaborators: Sara Kinard – Writer, Chloe Earp – Actor, Theresa Rohe – Actor, Bee Cotton - Actor
Project Advisor: Anne Beck

I will show a 10-minute play that I have directed, the play has been directed by a student, written by a student and will be acted out by students. This is a new work that hasn't been shown before. The stage will be minimal with two chairs needed for the set.

Dolor(es)
Presenter: Santiago Chacon & Jai Whitteker
Project Advisor: Anne Beck

A performance of the play 'Dolor(es)' by Samantha Fields about three sisters going through the process of deciding what their mother should wear for her funeral, along the way making observations about the process.

In the Blink of an Eye
Presenter: Zach Chadwick
Project Advisor: Darrell Roe

For my creative project I have built a website together on how I have personally helped the homeless over the years. I have met many individuals over the years and have been told many tear dripping stories. Homelessness is everywhere and all around the world. It does not matter where you are from or what age you are it can happen to anyone at any given time. There are many different ways one can become homeless and realizing the effects of homelessness can be brought onto you and even other people. I have had the honor to help and talk to many homeless people and listen to what they have to say.

END OF SESSIONS