Ramaley Research Celebration

Program and Book of Abstracts

**Research and Creative Achievement Day
April 20, 2022
Kryzsko Ballroom**

Welcome!

Welcome to the 16th Annual Ramaley Research Celebration!

Named in honor of Dr. Judith Ramaley, the 14th President of Winona State University, the celebration showcases the achievements of students, both undergraduate and graduate, and faculty.

This year marks the 16th annual Celebration. It also mabates
rks the first year that classes have been cancelled to accommodate a full day event during the week-long celebration. In addition to the April 20th Research Celebration, many other events are scheduled around the Winona and Rochester campuses, including the Rochester campus' Community Creative Achievement Day on Thursday, April 21st. Please see page 47 of this document for a list of other events being held throughout the week.

This year, most events are in person, however, some recorded sessions will be available on Open River.

Please explore and experience the work of our student and faculty research teams and help us acknowledge and celebrate their accomplishments!

Special thanks to....

The Research Celebration Organizing Committee would like to thank Facilities Services for set-up and breakdown for the poster sessions. We also thank George Micalone and the Student Union staff for all their help in Kryzsko Commons.

The Celebration is made possible by funding provided by the WSU Office of Academic Affairs, and we also thank the WSU Administration for its continuing support of student/faculty research through Research and Creative Projects grants to our students.

We also want to thank the WSU Women in Science and Engineering (WISE) Club for their financial support and logistical assistance for the Celebration and for actively encouraging their members to participate. We thank them very much for their interest and support!

Finally, we want to thank the presenters and their mentors most of all. Do celebrate your accomplishments and be proud that you are living up to the WSU Mission of Improving Our World!

Sincerely,

The Celebration Organizing Committee:
Thomas Nalli, John Holden, Kendall Larson, Amanda Brouwer, Amanda Pruka, and James Schul

Abstracts

Student Presentations

By Academic Department

Art

Restaurant UX Service App
Recorded Oral Presentation on [Open River](#)

Abby Trask, Jordan Wuensch, and Ei Myatnoe Aung
Faculty Mentor: Chun Lok Mah

Restaurant UX Service App is a multidisciplinary project that focuses on increasing the quality of customer experiences for small restaurants with limited staff. The project client is the Miya Japanese Bistro, a family-owned business run by a wife, husband, and mother-in-law. The business faced a considerable challenge sustaining a quality customer experience while delivering quality food.

Employing the design thinking methodology, a design professor mentors a team of two I-Design majors and a Computer Science Major to develop a web app to ease the challenges.

The team collected a lot of live data by observing the business operation. We spent significant time analyzing the data and discovering many root problems that caused the inefficiency. At the same time, we also discovered many limitations. For example, the app needs to incorporate the existing billing system, online ordering app, and large menu selection.

Unlike other restaurant apps, the Restaurant UX Service app focuses on delivering a better physical dining experience with the following features.
- A web-based mobile app dining ordering system that avoids the user from downloading a new app.
- Allowing users to order with and without a member account. This will eliminate the worries that customers have when giving out personal information.
- An app that allows the owner to highlight certain items in the menu to increase consumer consumption.
- An app that allows users to request services. This increases contact efficiency and in return the server does not have to meet customers twice to deliver one service.
- An app that allows multiple people to order at the same time using their personal mobile device. At the same time it also allows the one user to order for their group using itemize ordering features. Confirmation feature is to allow the restaurant to retain the owner and customer relationship while reducing unnecessary contact time.
- Retaining old data for regular members to retrieve previous favorable selections.
- The app also contains a detailed picture of the food that the regular printed menu and online menu does not have. This will allow the consumer to view the type of ingredients in that particular item.
- The app also has detailed information about the ingredients and infographics depicting the ingredients.
- The app has a feature where the owner is able to talk to the customer by first name.
- This app has a filtering system that allows users to select items based on their personal preferences like dietary restriction or allergens one may have.

This mobile app will help create a seamless and convenient experience for their customers and the owner themselves. This means that the staff members can concentrate on providing utmost important

in-restaurant service, reducing error, while increasing the food delivery performance. Most importantly increase their ability to serve more customers at one time.

Stamp of Action

Recorded Oral Presentation on Open River

Kennedy Pierre-Toussaint
Faculty Mentor: Chun lok Mah

This stamp was created to represent the stamp of action mission; Where we motivate each other to fight injustice.

We currently live in a society that is unjust with the amount of inequality we are still facing today. Every instance of injustice that we see daily has organizations that emphasize the importance of their issue. I am creating a way to help identify and support those injustices but, in a way, that other organizations would want to join and be a part of them. Not taking away from the injustice itself but highlighting those who share equal importance in building a connection. The goal is to work alongside these other organizations never against them. To represent this in the best way, I took inspiration from the fist graphic commonly used as a symbol of resistance. I wanted to include the essence of change and growth in this logo, for this, I chose the butterfly. Then combined the two to create an abstract butterfly with the wings depicted as fists. This stamp is meant to create action and identify where the action is needed to be taken. Creating something that can be identified as a universal symbol for acknowledgment and change.

This project is meant to have an impact on the community in which it used to bring together all different types of individuals together. Two trial runs took place in the Spring of April 2021 in Winona, MN. I participated in two different protests one for Black Lives Matter and the other to prevent the building of a new juvenile detention center. During the first trial run, I distributed informational stickers that had a short description of the project along with a takeaway sticker of the stamp. These cards stated "This stamp represents the action being taken to counter any issue of injustice that we are constantly facing in society. Those who wear this stamp symbolize their allegiance to progressive change and to improving the world we live in for equality". For the second trial run buttons were handed out that depicted the stamp and slogan, "where we motivate each other to fight injustice. Making a positive impact in today's society is constantly something I aim to achieve.

Biology

An Analysis of Parasites in Ducks from the Upper Mississippi Flyway: Parasitology Spring 2022 Class Project
Session 1b #12

Annika Johnson, Ayomide Oloyede, Jaden Petri, Kevin McCann, Matthew Casmey, Sam Gilbertson, and Heather Zugschwert
Faculty Mentor: Kimberly Bates

The presence of increased parasitic load is associated with mortality in ducks. Ducks in the upper Mississippi Flyaway have not been sampled for a total parasites survey. Sixty-eight ducks were legally harvested from the Winona County, MN and Buffalo and Trempealeau County, WI and donated for research. Each duck was examined for ecto and endoparasites via necropsy. The parasites found in the ducks were then analyzed for species, specific location, sex, size, and type of parasite. The probability of a duck having a parasite was significant $p<0.0001$. It was observed that female ducks, larger ducks and wood ducks (*Aix sponsa)* had the greatest amount of endoparasites; note that statistical analysis has not yet been performed and this is an observation. Data will continue to be analyzed as more parasites are identified. This is one part of a class project for Spring 2022 Parasitology class looking at identifying parasites in local waterfowl.

Attenuated Sympathetic Baroreflex Sensitivity Evoked by Acute Mental Stress but not Prolonged Sleep Restriction in Healthy Adults
Session 1b #10

Spencer Majerus and Ashley Goodrie
Faculty Mentors: Ted Wilson and Sarah E. Baker

Sleep restriction and psychological stress have both been found to increase the risk of hypertension. To understand how these factors affect blood pressure, the sympathetic baroreflex sensitivity (sBRS) was measured throughout 1) 10 minutes of mental stress and 2) after a period of consecutive sleep restriction. A randomized cross-over study design was used to evaluate these effects in14 healthy, young adults. Continuous muscle sympathetic nerve activity was measured along with continuous real-time blood pressure and heart rate to evaluates RS. Mental stress included 5 minutes of a mental arithmetic task followed by a Stroop color-word test, while sleep restriction testing involved 4 hours of sleep per night for 14 or 19 days with a4-night acclimation period. Acute mental stress appeared to reduce baroreflex function compared to baseline, especially during the initial 5 minutes of mental stress testing. However, sBRS did not show any significant action between restricted sleep conditions and mental stress. This shows that sBRS is attenuated early during mental stress but returns to baseline quickly in young, healthy adults.

Bobcat Parasites of Wisconsin
Session 1b #40

Kati Stoltman, Monica De Leon-Sanchez, and Easton Maeder
Faculty Mentor: Kimberly Bates

Bobcats (*Felis rufus*) are an abundant species that can be found in all areas of the United States. The species has been growing in population since 1993 when Barnes v. DNR added bobcats to the protected species list. Studies have shown that different populations of bobcats are infected with different species of parasites. Our research focused on the bobcats of Wisconsin, and identification of parasites found within their intestines. Previous research groups collected tapeworms from 115 bobcat intestines that were donated by the WI DNR from legally harvested bobcats. These were labeled by location, gender, and age. Initial identification was attempted through morphological differences after staining and mounting. These revealed subtle differences but were not conclusive. Worms that were stained and mounted were then used for molecular identification. First, DNA was extracted using 10% Chelex. We have extracted DNA and quantified each sample. Of the 20 specimens extracted, we determined that 15

will be useful for DNA amplification and subsequent sequencing. We have begun DNA amplification and data will be available after sequencing has been completed.

Cestode Species Identification on Waterfowl: Parasitology Class Project 2020
Session 2a #5

Kaitlyn Curtis, Noah Dalsing, Megan Danielson, Kimberly Estabrooks, Naomi Fagerstrom, and Namjin Kim
Faculty Mentor: Kimberly Bates

Parasites can have a significant effect on an ecosystem if they become too abundant due to the multitude of animals that play a role in their life cycle. This research is a part of a larger class project for BIO 462 identifying parasites that are commonly found in or on waterfowl from around the Winona, Minnesota area. Ducks were donated from hunters and dissected to collect their endo and ectoparasites. Parasite specimens were stained and mounted to look for morphological characteristics that ultimately helped identify the parasites using light microscopy. DNA was extracted from the individual cestodes, and PCR was used to amplify select genes of the DNA. The DNA was then sequenced then compared to other DNA samples in GenBank which determined if the parasites was already classified or if a new species was found. More specimens will be processed to obtain additional results and obtain proper identification. These findings could help identify not only what parasites are common in certain species of ducks, but also provide additional information to the abundance of parasites within waterfowl in our local area.

Climbing Performance of Boas (*boa imperator*) Raised on Two Feeding Regimes
Session 2b #16

Leeandra T. Schultz
Faculty Mentor: Noah J. Anderson

Arboreality imposes significant challenges to an animal's morphology and physiology. Within snakes, a suite of characteristics including specialized locomotor strategies, reduced body mass to length ratio and laterally compressed shape are presumed to be evolutionary adaptations to an arboreal lifestyle. However, few studies have experimentally tested climbing performance of snakes that exhibit "arboreally adapted morphology" and "terrestrially adapted morphology." We studied the climbing performance of two groups of full-sibling boas that were reared on two different feeding regimes that resulted in divergent morphology. Half of the boas were frequently fed, and half were infrequently fed, all snakes received the same relative mass of prey. Using a vertically hung tensioned rope, we measured the following variables related to climbing performance: climbing speed, duration of resting that resulted from cessation of ascent, and slipping. Our results indicate that it is not only evolutionary forces that shape arboreal morphology and physiology, but also point to the significance of phenotypic plasticity.

Developing a Method for Rapid and Accurate Identification of *Bacillus* Species in Clinical Isolates Using Polymerase Chain Reaction
Session 2a #3

Jessica Anderson
Faculty Mentor: Casey Finnerty

Bacillus species have caused a variety of diseases in humans throughout history. These include foodborne illness, wound infections, and anthrax poisoning. With over 266 identified species within the *Bacillus* genus, isolates previously described as independent species (e.g. *B. anthracis*, *B. cereus*, *B. thuringiensis*) have been discovered to be so genetically and phenotypically similar that they are often very difficult to discriminate between. Therefore, there have been instances of misidentification reported in scientific literature. Therefore, the majority of clinical tests done may not be precise enough to distinguish between some species of *Bacillus*, as they are so genetically similar. A new software, called MALDI-TOF, has been very successful in species discrimination. However, this technology is relatively new and not widely available for all clinical settings. The misidentification of clinical *Bacillus* isolates from infected patients could have medical significance and negatively affect treatment. By finding improved approaches for correctly identifying and distinguishing between *Bacillus* species, the scientific community can increase its understanding of the pathogenic potential of certain *Bacillus* species and positively impact patient diagnosis and treatment.

This study was intended to develop a technique for better distinguishing between *Bacillus* species. Recent research has suggested that the pycA gene may be the key to separating *Bacillus* species. A series of specially designed primers will be used to target the pycA gene in *Bacillus thuringiensis* and *Bacillus cereus* strains grown from isolates obtained from the NRRL repository. With the use of these primers, PCR testing will be performed on the various *Bacillus* strains. This will allow for identification of the isolate strains based on the PCR products and comparison to the initial repository identification. If successful, this approach could prove to be a more rapid and precise way to distinguish between *Bacillus* species in clinical settings, possibly improving the speed of diagnosis and treatment. Data collection and analysis are currently being executed.

Development of a Quantitative PCR Assay to Determine Presence of *Borrelia burgdorferi* within *Ixodes scapularis*
Session 2b #20

Erin Turman and Heather Zugschwert
Faculty Mentor: Kimberly Bates

Borrelia burgdorferi is the bacterial causative agent of Lyme disease, which is transmitted through the bite of the black-legged tick (*Ixodes scapularis)*. *I. scapularis* transmits Lyme disease to a wide variety of hosts such as humans, canines, equines, and bovines. Lyme disease is the most prevalent arthropod-borne disease in the United States. The focus of this study was to develop a protocol for testing the presence of *B.burgdorferi* within ticks. DNA was extracted from approximately 6,000 ticks collected between 2005 and 2012 from both Minnesota and Wisconsin. A quantitative PCR (qPCR) was developed using iTaq Universal SYBR green supermix, and the primers of RecA for *Borrelia* DNA*,* and ITS2 for the *I. scapularis* DNA. The ITS2 amplifications served as a control for the viability of the DNA. The RecA amplifications showed if the ticks had *B. burgdorferi* and were compared to positive and negative controls. The findings to date have shown that the concentration of 1.5µL of RecA per sample, and 0.5µL ITS2 per sample had the best results. The next step will be to continue testing the tick DNA extractions to determine if unknown tick DNA will amplify consistently. Once the protocol is fully developed the prevalence of *B. burgdorferi* in ticks from 2005-2012 will be analyzed.

Genetic and Morphological Analyses of co-occurring Treehoppers (*Entlylia carinata* and *Publilia concava*)

Session 2a #23

Thea Riebel and Matthew Savage
Faculty Mentor: Amy Runck

Two treehoppers, *Entlylia carinata*(keeled treehopper) and *Publilia concava* (aster treehopper), co-occur in the Midwest. These insects, which are commonly accompanied by ants, reside on different species of asters. These treehoppers are identified by the shape of their pronotum, however, it has been hypothesized that they may be the same species, or may interbreed in regions where they co-occur. We believe that the pronotum could be a morphological feature that explains growth rather than speciation. Recent research shows that *Entylia carinata* make distinct mating calls depending on their natal plant which may result in assortative mating by plant type. In this study we aimed to a) determine if *Entylia carinata* and *Publilia concava* are the same species and b) determine if *Entylia carinata* are genetically differentiated based on their natal plant species.

For this study we collected treehoppers from four species of asters near Wonewoc, Wisconsin. We collected treehoppers nymphs from *Ratibida pinnata* (grayhead coneflower), *Echinacea purpurea* (purple coneflower), *Ambrosia trifida* (giant ragweed), and *Eutrochiun purpureum* (sweet Joe-Pye-weed). We stored the specimens in 70% EtOH. We then categorized each treehopper based on various morphological features that represent nymphal stages. We then utilized PCR to sequence the cytochrome oxidase subunit I gene. We examined each treehopper under a dissecting microscope to determine if we could find key features of morphological differences among the nymphal stages of the two species. The results of the morphological and genetic analyses were used to determine if *Entylia carinata* and *Publilia concava* are separate species and if Entyliacarinata are differentiated by host plant.

Identification of Trematodes in Waterfowl in the Upper Mississippi Flyaway. A Parasitology Class Project

Session 1b #30

Thea Riebel, Easton Maeder, Tasha Sosinsky, and Oliva McCarty
Faculty Mentor: Kimberly Bates

Ducks are hosts to numerous external and internal parasites, with one of the most prevalent being trematodes from the Class Trematoda within the phylum Platyhelminthes. The purpose of this study was to identify species of ecto and endoparasites of 68 ducks. This was performed to contribute to the overall understanding of parasitic prevalence in waterfowl populations in the Mississippi Flyaway in Winona County, MN, Buffalo County, and Trempealeau County, WI. This portion of the study focused on obtaining morphological and molecular data to identify trematode species found within the ducks. Ducks were legally harvested and donated by local hunters. We followed the protocol for parasite staining and slide mounting adapted from Dr. Vasyl Tkach, University of North Dakota to stain and mount trematode species found in the ducks. Furthermore, a Chelex DNA extraction was performed on unknown trematodes and stored in a freezer for future research. The quantification results via nanodrop indicated good DNA quantities with little to no contamination issues. The next step of our research is to utilize PCR and sequencing to further analyze and identify the trematode species found in local ducks.

Influence of Feeding Regime on Growth and Body Size in the Boa (*Boa Imperator)*
Session 1a #39

Carlynn Steele, Courtney Friberg, Ervin Pall, and Mara Doughty-Seals
Faculty Mentor: Noah Anderson

Because snakes are gape-limited predators, much emphasis has been placed on the role of prey size in inducing plastic changes to trophic morphology. In contrast, few studies have researched the effect of feeding frequency on growth and body size, even though many snakes experience long fasting periods between meals. We conducted an experimental, multiple year study of growth in Boas, (*Boa imperator*) that experienced different feeding regimes. Three liters of full siblings were randomly assigned into two groups. One group received a meal equal to 5% of their body mass every 7 days and the other group received a meal equal to 25% body mass in food every 35 days. Using x-ray radiographs, we measured body size and a several skeletal morphological variables before the feeding regimes began and annually thereafter. We observed that those boas fed frequently grew larger in body mass and exhibited greater robustness, whereas boas feed infrequently had lower body mass and were laterally compressed. Our results suggest that phenotypic plasticity resulting from feeding frequency may play a role in morphological diversity. Further, the changes we observed mirrored the evolutionary changes of mainland and island populations boas from Central America.

Molecular Studies to Evaluate Variegation of Philodendron *var. Birkin*
Session 2 a #21

Caitlin Normoyle, Shelby Orr, and Muira Arndt
Faculty Mentor: Kimberly Evenson

Plant tissue culture and molecular genetic techniques were used to analyze the instability of the genome in philodendron var. 'Birkin'. This plant has variegated, white, and greenish-red leaves (that have lost their variegation) on the same plant. Did genetic mutations occur in meristematic sectors of variegated leaves that have reverted to green coloration, or is it an epigenetic change? PCR and sets of plastid primers were used to determine if the presence or absence of a PCR product correlated with differences in leaf color and variegation (white, green-white variegated, reddish green or green leaves). A DNA isolation procedure was first optimized to extract PCR quality DNA. The Zymo Quick DNA Plant/Seed Miniprep Kit resulted in no DNA, but a modified DNA extraction procedure (BABEC) used to isolate insect genomic DNA also resulted in a high yield of PCR-quality DNA from Philondendron leaves - as measured by the Nanodrop system. PCR was performed with 3 different sets of plastid primer pairs (1F/724 R, 390F/1326 R and trnH/psbA) using 3 different thermocycling conditions. Differences in PCR products were observed for the three sets of primers. This indicated that genetic mutations resulted in differences in leaf color and variegation. We are, however, not excluding the possibility that epigenetic changes also play a role in variegation. While a number of factors can influence epigenetic variegation in a plant, the influence of varying hormone concentration has yet to have been studied. Plant tissue culture is being optimized as a way to vary environmental conditions and examine genetic and epigenetic changes. These results could provide useful information in terms of breeding for ornamental traits and introducing improvements to the genus *Philodendron*.

Parasite Identification in Waterfowl on the Upper Mississippi River

Session 1a #31

Brandon Lee, Carson Lovedale, and Ayomide Oloyede
Faculty Mentor: Kimberly Bates

Parasites are organisms that live within or on another organism, often called a host. They depend on the host(s) for survival, sometimes at a cost to the host. This research analyzed parasites of waterfowl on the western half of the Mississippi river flyway. Both endoparasites and ectoparasites of waterfowl were examined and identified, using morphological (anatomical structure), and molecular (DNA) techniques. First, parasites were obtained from waterfowl collected from hunters. They were then examined for condition, age, and sex, and measured for size. Ectoparasites were obtained after the feathers and body were ruffled. The waterfowl were the carefully dissected, and each body part examined for parasites. The body parts examined were, from top to bottom. Mouth and tongue, trachea, esophagus, lungs, heart, liver, gizzard (stomach), kidneys, intestines, ceca, and cloaca. The parasites were then separated by class and stored in ethanol to be preserved for identification. Specimens were stained using carmine and mounted in Canada balsam for identification using morphological keys. DNA was extracted using 10% Chelex and quantified. Specimens were amplified using PCR to determine species identification. The identified parasites will be compared to the parasites found in waterfowl located in the eastern half of the Mississippi river flyway in the future.

Respiratory Effects of Wearing an N95 Filtering Facepiece Respirator: A Review of Current Literature
Session 2b #6

Kellie Kozak
Faculty Mentor: Ted Wilson

During the COVID-19 pandemic, N95 filtering facepiece respirators (FFRs) have been commonly used to prevent the spread of infection. Concerns have been raised that N95 FFRs may have unintended detrimental consequences on respiratory health and function. This review examines current available data obtained from PubMed regarding the objective respiratory effects of wearing an N95. Fifteen publications studying N95 use in a total of 490 participants were reviewed; these included healthy subjects, healthy pregnant people, children, athletes, and individuals with pre-existing medical conditions. Studies examined N95 use under a variety of resting and exertional conditions. The reviewed data suggests that wearing an N95 may cause an increase in respiratory rate and end tidal CO_2 both at rest and during exertion. It remains unclear how different chronic medical conditions such as respiratory disease impact the degree of physiologic changes. Further studies must be performed to better understand the respiratory effects of wearing an N95 in the general public as well as special populations.

Species Identification of *Dictyocaulus* Found in Domesticated and Wild Ruminants
Session 2a #1

Madison Mack and Paige Adams
Faculty Mentor: Kimberly Bates

Dictyocaulus, or large lungworms, are a genus of parasitic nematodes that infect cattle (*Bos taurus*), horses (*Equus caballus*), deer and other ruminants. The lungworm has been found to cause disease, specifically parasitic pneumonia, and may be severe enough to kill the host. There is some confusion in the literature whether deer and cattle are infected with the same or different species of lungworm. This is important for ranchers as to how much effort they put into keeping deer away from cattle. Molecular differences of *Dictyocaulus* species found in cattle, red deer (*Cervus elaphus*) and white-tailed deer (*Odocoileus virginianus*) were determined by amplifying the major sperm protein 1 (MSP1) gene and the mitochondrial cyclooxygenase (COX-1) gene of ribosomal DNA and then using PCR sequencing. The first round of samples sent for sequencing came back with high percent identity matches. Our results to date give samples E6 and CN5, cattle originating from Mississippi, using the Cox-1 primer identified as *Dictyocaulus viviparus.* Also using Cox-1 primer, sample e10 (red deer) identified as *Dictyocaulus eckerti*. Using the MSP1 primer, sample W9 (white-tailed deer) identified as *Dictyocaulus eckerti*. E6 using MSP1, identified as *Dictyocaulus viviparus.* Sample T100 (white-tailed deer) using MSP1 identified as *Dictyocaulus eckerti*. Sample T (white-tailed deer) using MSP1 identified as *Dictyocaulus eckteri* for the forward strand, and *Dictyocaulus capreolus*on the reverse stand. All identifications were what was expected with the exception of *D. capreolus*. More samples will be tested with MSP1, Cox-1, and ITS2 primers to determine species identity and phylogenetic relationships.

Tiny Earth: Reverse Antibiosis Approach
Session 1b #14

Lucas Joseph
Faculty Mentor: Casey Finnerty

Of the estimated one billion species of bacteria out there, we've only named thirty thousand of them. Despite their reputation for getting us sick, bacteria, ironically, also help keep us healthy in many different ways. The Tiny Earth project enrolls the help of college students to expand our knowledge of antibiotics. Antibiotics were actually discovered by studying specific bacteria that have the capacity to repel other species of bacteria.

The growing threat of drug resistant bacteria is global, and the production of new antibiotics is limited. This study aims to explore the efficiency of a method for plating and testing for antibiotic producers used by high school students in MicroMundo Albacete 2020 as well as experienced UCLM researchers. Here, soil samples from eight different locals from within Minnesota are diluted, inoculated and incubated. After being treated with gram-negative antibiotics, the inoculated medium, Reasoner's 2A agar, is flipped over like a pancake in its dish. The now new top of the medium is treated with a gram-positive bacterial tester ESKAPE strain (either Bacillus subtilis, Staphylococcus epidermidis, or Escherichia coli) known to be pathogenic to humans. Cultured bacteria showing signs of antibacterial production will be extracted via transfer tube to be isolated on their own dish. Data is currently being collected for review.

Viral Fibroblast Growth Factors Tagged with Maltose Binding Protein can be Purified using Cationic Starch Derived from Corn
Recorded oral presentation on Open River

Korey Brist
Faculty Mentor: Casey Finnerty

Tagging proteins of interest with maltose binding protein (MBP) is a common method to produce recombinant proteins in *E. coli* that can be purified using amylose resin in affinity chromatography with a high degree of purity. The rising price of amylose resin over the years has made this purification method less desirable. Successful methods for purifying MBP-tagged proteins have previously been demonstrated using Catamyl-VS cationic starch derived from tapioca. While this method seems to offer an affordable route for protein purification, finding a cationic starch derived from tapioca starch that meets the specifications of Catamyl-VS has proven itself impossible due to its low demand in the paper making industry here in the United States. This study aims to find a cationic starch derived from corn that is cost effective, readily available in the market, and successful in purifying MBP tagged proteins with a high degree of purity.

Four cationic starches derived from corn (Charge +99, Charge +110, Charge +309, Charge +310) were kindly gifted to us by Cargill. Prior to this study, viral fibroblast growth factor (vFGF) genes from *Autographa californica* M nucleopolyhedrovirus (AcMNPV) and *Choristoneura fumiferana* M nucleopolyhedrovirus (CfMNPV) were cloned with a coding sequence for MBP to produce plasmids coding for the fusion proteins Ac6 and Cf6, respectively. Ac6 and Cf6 plasmids were transformed into *E. coli* ER2508 to express the recombinant proteins. Lysate from Ac6 and Cf6 were incubated with each cationic starch at concentrations of 0.2%, 0.3%, and 0.4% (w/v) cationic starch. Precipitation was done with 10% (w/v) PEG 3350 and 50mM $CaCl_2$. The bound MBP tagged protein was eluted off the cationic starch polymer by resuspension in 1M NaCl and separated by centrifugation. Current Bradford results show protein concentrations as high as 232μg/mL for Cf6 lysate with 0.4% (w/v) +309 cationic starch, and 311μg/mL for Cf6 lysate with 0.3% (w/v) +310 cationic starch. The Cf6 lysate with +99 and +110 cationic starches did not fall within the linear range of the BSA standard. A duplicate purification test with Ac6 lysate and cationic starches +309 and +310 is currently underway to compare protein concentrations from Cf6 lysate. Coomassie blue staining and western blotting will follow if protein concentrations fall within the minimum-maximum thresholds to verify that the vFGF protein of interest was indeed the protein purified, and to determine what level of purity was achieved with cationic starch when compared to purification by amylose affinity chromatography. If the cationic starch purification method is successful with high protein concentration and purification, I plan to continue researching purified vFGF from AcMNPV and CfMNPV for its mitogenic activity to induce cell proliferation in mammalian and insect cell lines.

Chemistry

Effect of Polymerization Temperature on Polymethylmethacrylate Stereochemistry and Molecular Weight: A Polymer Chemistry Laboratory Procedure
Session 2a #7

Summer Gruber
Faculty Mentor: Robert Kopitzke

Polymethylmethacrylate (PMMA) is a popular commercial polymer commonly referred to as acrylic, plexiglass, or Perspex. PMMA's applicative versatility can be sourced back to its bulk structure, which

refers to the ratio of crystalline to amorphous regions within a sample and is directly related to physical and mechanical properties. Chain tacticity is a determining factor of crystalline and amorphous proportions, as it influences ordered stacking and entanglement, therefore effecting bulk structure. Tacticity can be described as having isotactic, syndiotactic, or atactic patterns that can typically be observed by1H NMR. The relationship between polymerization temperature and tacticity in PMMA has already been observed and reported, so the purpose of this project was to reproduce the trend and construct a laboratory procedure for an upper-level polymer chemistry course. This relationship entails as polymerization temperature decreases, syndiotactic patterns dominate. To begin the experiment, PMMA samples were synthesized at various temperatures ranging from 60°F-100°F (15.55℃-37.77℃). These samples were then analyzed by viscometry to determine the average molecular weight per chain and construct a pattern with respect to change in polymerization temperature (supplemental information). The resulting pattern demonstrated a slight inverse relationship between temperature and average molecular weight. Regarding the1H NMR analysis, peaks within the region of 0.5-1.5 ppm were integrated, followed by taking the ratio of these values that corresponded to the 3 tacticity patterns. The consensus regarding H1 NMR data is still being discussed and analyzed by both advisor and experimenter (as of 3/18/2022).

Creating an Exploratory Protocol of Protein Thermodynamics for Chemistry Undergraduates
Session 2b #18

Justin Sells
Faculty Mentors: Emily Ruff and Hannah Leverentz-Culp

The objective of this research is to create a protocol that explores the protein unfolding process and its thermodynamic properties using circular dichroism (CD) spectroscopy and differential scanning fluorimetry (DSF) for chemistry undergraduates. The thermodynamic properties of interest for the unfolding process are the standard enthalpy change ($\Delta H°$), the standard entropy changes ($\Delta S°$), the equilibrium constant (K) and melting temperature (Tm). The CD instrument explores these thermodynamic properties by utilizing the thermal denaturation scan (TD scan). Alongside the TD scan, the CD instrument can also explore the makeup of the protein using the wavelength scan (WL scan). The WL scan is able to provide information on the secondary structure of the protein. These results can provide an understanding when exploring the thermodynamic properties of a protein. With the creation of this protocol, it was decided that the students are required design an overall research question with a testable hypothesis. The protocol provided underwent a test run with chemistry students and feedback was obtained. The results of this research found that the protocol for undergraduate chemistry majors provided a well developed understanding of protein thermodynamics and structure.

A Methodology for the Synthesis of Bioactive Butenolides
Session 1b #2

Mekhi Besseck
Faculty Mentor: Sara Hein

Butenolides are a class of lactones with a four-carbon heterocyclic ring structure that can be synthesized and derivatized with different R groups. The compounds show important biological activities such as antibacterial and antimicrobial. *Candida* infections, which are the most common types of yeast, show a

potential response to the butenolides chemical. The complications with using the butenolide chemicals is that many are not stable. The objective of this research is to be able to find a way to use and synthesize a compound of butenolides that is a potentially useful yeast infections treatment. Past research done by other students at Winona State University on butenolides suggested that ring-closing metathesis (RCM) could be employed in the future. This was bypassed by purchasing an α-angelica lactone and starting from this compound to continue the synthesis scheme. From the α-angelica lactone starting material five schemes were implemented to synthesize the butenolide to create a final testable product of C9H12O2. TLC and1H NMR spectroscopy was used to monitor the reaction. The final C9H12O2 product will then be tested for bio activity.

A New Synthetic Strategy for Ebselen Enabling the First ever Isolation of Ebtellur
Session 2b #4

Summer J. Gruber, Elijah J. Kellner, Benjamin A. Carvell, Creed D. Poppler, and William H. Josul
Faculty Mentor: Joseph West

Ebselen, is currently being assessed for a multitude of pharmaceutical uses ranging from treating bipolar disorder, acting as a preventative for heart disease/failure, as well as being a potent antiviral and antibacterial. Ebselen has also been a FDA-approved candidate during the SARS-CoV-2 pandemic by inhibiting the protease responsible for viral spread. While ebselen has captured pharmaceutical interest, its tellurium analogue, ebtellur, has remained out of reach by any equivalent synthetic routes. As such, there are no reports of the successful synthesis and isolation of ebtellur. We have explored a new synthetic approach for ebtellur, utilizing TeCl4, that has enabled its first ever successful identification and isolation. The targeted compound has been identified by125Te NMR spectroscopy and mass spectrometry methods. Side products and considerations of this new route are discussed as is application of this new route towards the synthesis of ebselen.

Chloride Contamination in Natural Water Sources
Session 1b #8

Isabella Dusbabek
Faculty Mentor: Jeanne Franz

Chloride contamination in natural water sources is a significant problem throughout the United States. In Midwestern and Northeastern regions of the country, the most snowfall is experienced along with the highest rates of chloride contamination. With increasing infrastructure development there is an increasing need to use de-icing road salts during cold or snowy months. Run off due to increasing temperatures transfers salt into nearby bodies of water where it dissolves and breaks up into free sodium and chloride ions. A consumable level of chloride in water is 250 ppm, any specimen that tests about this value is considered to be impaired. Weekly samples were taken from 12 drainage and flow sites along the large and small sections of Lake Winona over the course of February and March. An ISAB was then added to all specimens and chloride concentration was obtained using a chloride ion selective electrode. Examination of these samples showed there is a concerning chloride contamination issue in Lake Winona due to spring snow melts.

Degradation of Ovulation Inhibitor Estrogens Using HPLC Chromatography
Session 2a #9

Jenna Holst
Faculty Mentor: Jeanne Franz

In recent years, there has been a rise in observed intersex aquatic species along with a rise of reproductive issues in humans. This has been linked to the endocrine disrupting properties of over 200 chemicals that have estrogenic activity and persist in aquatic environments. The focus of this research is the estrogens that are used in hormonal birth control as ovulation inhibitors. Between 2015-2017, 14% of US women aged 15-49 used hormonal birth control. According to a study published in 2002, three estrogens that are used in hormonal birth controls as ovulation inhibitors, 17α-ethynyl estradiol, mestranol, and 19-norethisterone, occur in an average of 12.8% frequency in US streams. This high prevalence is caused by the inability of wastewater treatment plants to fully remove pharmaceuticals before they reach surface water. With an increasing abundance of the population utilizing ovulation inhibitors, preventing persistence in the environment is crucial. To ensure full removal of pharmaceutical compounds from wastewater, High-Performance Liquid Chromatography with Ultraviolet Visible Spectroscopy was utilized. HPLC-UVVis methodology utilized acetonitrile and water as solvents in an 80:20 ratio within the pumps to obtain desirable peak separation with each estrogen at wavelengths of 239 and 280nm for maximum absorbance. Ongoing work will look at the effects of sodium hypochlorite on the degradation of ovulation inhibitors. The utilization of household bleach (sodium hypochlorite) mimics what is used in wastewater treatment plants but at a much higher concentration that the population that uses ovulation inhibitors can utilize to prevent the persistence of the estrogens they consume in the aquatic environment.

Determination of the Rate Constant for H Atom Abstraction by Phenyl Radicals for THF

Session 2b #14

Cameron Scheithauer
Faculty Mentor: Thomas Nalli

Phenyl radicals are known to rapidly abstract hydrogens and add to double bonds and H-abstraction, particularly from the deoxyribose rings of DNA, is known to have biological significance. However, rate constants for H-abstraction (k_H) by phenyl radicals from biomolecules are largely unknown. This research used *p*-fluorophenyl radicals generated by the photolysis of 4-fluorophenylazoisobutyronitrile (FPAIN), to allow for product yields to be measured using F-19 NMR. Specifically, the rate constant for phenyl radical iodine abstraction from 3-iodobenzotrifluoride ($k_I = 2.2 \times 10^8$ M^{-1} s^{-1}) measured previously in our lab was used as a kinetic reference point for determining k_H for hydrogen abstraction from tetrahydrofuran as a model for the deoxyribose rings of DNA. Thus, when FPAIN was photolyzed in the presence of THF and 3-iodobenzotrifluoride (ArI) at 23 °C the product yield ratio of p-hydro- to p-iodofluorobenzene ([FPhH]/[FPhI]) gave an excellent linear correlation ($R^2 = 0.9985$) with the reactant concentration ratio ([THF]/[ArI]). The slope of the trendline (slope = 0.048) gives the relative rate constant k_H/k_I, which in conjunction with the determined $k_I = 2.2 \times 10^8$ M^{-1} s^{-1} gives k_H. The result $k_H = 1.1 \times 10^7$ M^{-1} s^{-1} at 23 °C compares favorably to the literature value $k_H = 4.8 \times 10^6$ M^{-1} s^{-1}.
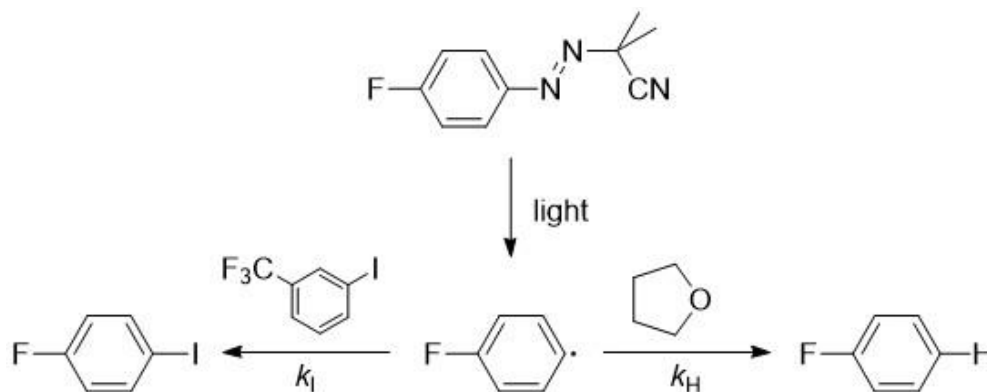
Elucidation of Solution State Structures of CoCl₂ in Assorted Lewis Basic Solvents
Session 2a #31

Olivia B. Zill, Krista L. Osteraas, Christiana L. Hoyt, and Kaitlin I. Johnson
Faculty Mentor: Joseph West

CoCl₂ is readily solubilized in a variety of Lewis basic solvents. While the aqueous structure is commonly known, [Co(H₂O)₆]Cl₂, identification of exact coordination sphere geometry and species has not been fully elucidated for any other solvents. Spectrophotometric data has been combined with an extensive computational analysis to deduce most probable solution state structures in acetone, acetonitrile, ethanol, dimethylsulfoxide, glyme, methanol, and pyridine for both cationic and anionic species. Crystallographic approaches have also been utilized anion exchange to attempt isolation of cationic complexes as tetraphenylborate salts.

Gravimetric and Spectrophotometric Determinations of Curcuminoid Solubilities in Ethanol
Session 2b #33

Sylvia P. Chase, Elisa M. Quevedo, Emily A. Jacob, and Grace E. Wronski
Faculty Mentors: Valeria Stepanova (UW-La Crosse) and Joseph West

Curcumin, a natural extract of turmeric, has many purported health benefits, but a part of its limited broader applicability is frequently attributed its poor solubility in water. This lack of solubility is one of the primary drives for the exploration and synthesis of new analogues, seeking more greater aqueous solubility. Bioactivity assays frequently make use of ethanol solutions of these curcuminoids, followed by subsequent dilution in water. We have explored the solubility of an array of curcuminoids in ethanol to ascertain substituent effects on this property. Additionally, a few curcuminoids containing a saturated ring in their backbone have tested to determine its impact on solubility. Both gravimetric and spectrophotometric means have been utilized to measure solubility. Beer's Law plots of all local maxima in the UV-vis spectra of each curcuminoid have been produced to track linearity of the Absorbance-concentration relationship at each wavelength and correlation of each with gravimetrically determined solubilities.

Identification of Drug Metabolites of Tricyclic Antidepressant Medications in Rat Liver Microsome Using Compact Mass Spectrometry

Session 1a #37

Kathryn M. Senchea, Maya R. Fernando, Blessing I. Ojo, and Dani K. Schmaus
Faculty Mentor: Myoung Lee

Prescription antidepressants are commonly used drugs to treat depression and many other disorders. It is known that enzymes metabolize most prescription drugs within the liver by altering them to become more polar to allow for easy excretion through the urine or bile. This study was done to determine the outcome of metabolism of six different tricyclic antidepressants (TCA's): clomipramine, duloxetine, escitalopram, imipramine, nortriptyline, and venlafaxine. These six drugs were mixed with rat liver microsomes and an NADPH-generating system in a phosphate buffer at pH 7.4. All samples were incubated for two hours at 37°C.Each sample was subjected to the compact mass spectrometer fitted with a C18 reverse phase column. Duloxetine, escitalopram, and venlafaxine all underwent N-demethylation but not aromatic hydroxylation during metabolism. On the other hand, clomipramine, imipramine, and nortriptyline failed to show N-demethylation nor aromatic hydroxylation. Several controls were incubated and analyzed, such as the mixture without the drug, the mixture without the NADPH-generating system, the mixture without the rat liver microsome, and a mixture of just the drug and buffer. The future goal is to repeat these experiments using HPLC/CMS to separate the metabolites further.

Investigation of Nanoparticle Ligand Systems for Solar Cell Applications

Session 1b #16

William Josul
Faculty Mentor: Jennifer Zemke

Over the past several years, interest in nanoparticle-derived solar cells has increased. This is due to their low material cost, high-potential efficiency, and desirable and tunable optical properties. Using biphasic ligand exchanges, sodium 3-mercapto-1-propanesulfonate (MPS) and sodium 2-mercaptoethane-sulfonate (MES) were successfully exchanged as ligands with oleic acid to create particles that have a higher propensity to move charge in a solar cell. MES and MPS were chosen as ligands due to being shorter and less insulating than oleic acid. The initial as-synthesized CdSe-OLA, and the nanoparticle products of the two ligand exchanges were confirmed by ^{1}H NMR, UV-Vis, and FTIR spectroscopy. These three nanoparticle products were used to synthesize thin-film solar cells characterized by a potentiostat under a halogen lamp.

Ni(salen): Development of a two-week Introduction to Synthesis and Characterization in General Chemistry

Session 2a #11

Nicholas D. Immel, Mekhi F. Besseck, Kevin Flanaghan, Alyssa Priebe, and Anna M. Schneider
Faculty Mentor: Joseph West

As introductions to organic and inorganic synthesis, safe and expedient preparations of salen (N,N'-ethylenebis(salicylimine)) and its nickel complex have been developed for execution in the General

Chemistry II laboratory. Preparation and isolation can be completed in no more than 45 minutes. Prepared compounds are then analyzed by an assortment of characterization methods: melting point determination, mass spectrometry, IR spectroscopy, UV-vis spectrophotometry and ^{13}C NMR spectroscopy. These lab exercises are meant to serve as "soft" introductions for methods and instrumentation that will be utilized more heavily in the subsequent chemistry courses. Students are given basic training in analyzing data for each method to begin learning their utility for identifying product presence and purity. Simulated and modeled spectra are also used as accompaniment to experimental data to aid in analysis and interpretation training.

TDDFT Predictions of UV-vis Spectra in Ethanol for an Array of Curcumin Analogues
Session 2b #10

Elisa M. Quevedo and Sylvia P. Chase
Faculty Mentors: Valeria Stepanova (UW-La Crosse) and Joseph West

The time-dependent density functional theory (TDDFT) approach has been utilized to predict UV-visible absorption spectra for an assortment of curcuminoids - analogues of the turmeric extract, curcumin. Curcumin's UV-vis spectrum was modeled using the B3LYP, CAM=B3LYP, PBE0 and LC-BLYP density functionals. All methods utilized the 6–311++G** basis set for all atoms. Experimentally obtained UV-vis spectra were collected for all curcuminoids in ethanol, thus all spectra were modeled with implicit solvent effects using the conductor-like polarizable continuum model (C-PCM). The quality of spectral matching for the various density functionals are presented as are the predictive strengths of TDDFT in general for UV-vis spectra for this class of compounds.

The Degradation of Acetaminophen in Water using Bleach
Session 2a #13

Anna Martin
Faculty Mentor: Jeanne Franz

Acetaminophen is a very common antipyretic, mainly found in Tylenol. Because of climate change, there will be a time when climate change related weather events such as heavy rainfall, will cause the destruction of water supply infrastructure, lower the water resource availability, and reduce the quality of consumable water. As of 2020, only 30% of rural populations in the poorest countries have water that is clean of fecal and priority chemical contaminants, showing how important the removal of acetaminophen from water is. The main way acetaminophen gets into ground water is though excretion after consumption, and when flushing unwanted medication that contains acetaminophen. Up to 9% of initial acetaminophen is excreted after being metabolized through the body. The use of a bleach tablet in the toilet bowl will degrade the acetaminophen before being flushed. Even small concentrations of acetaminophen influence fish populations including disturbing normal development of the embryos. Solutions of 5 and 10 ppm acetaminophen were made to convey the concentration of acetaminophen that may be found in the environment. Both were inserted into a UV-Vis spectrophotometer. The λ_{max} was found to be 242.5 nm for both solutions which was needed for the UV detector on the HPLC. The 10 ppm acetaminophen and water solution was run in the HPLC. A good mobile phase is important for the resolution and separation of peaks of the chromatogram. The solvent composition was 94.5:5.5 water:acetonitrile solution, which produced a sharp peak at 3.5 minutes. All trials had a flow rate of 1.5

mL/min and ran for 10 minutes. After seeing inconsistency in retention times, the solvent was improved to take 0.4% of the HPLC grade water, to make room for 0.2% triethylamine and 0.2% acetic acid. All solvents (water, acetonitrile, triethylamine and acetic acid) were combined into the same container to improve the difference in viscosity between water and acetonitrile, which was adding pulses in the chromatograms at a consistent time (every 0.5 minutes). A rerun of all samples (1, 2, 3, 4. 5 and 10 ppm) with all siphons in the one solvent, were done to find a peak at about 6.5 minutes. From this data, a calibration curve was made based on concentration of acetaminophen. The line of best fit equation is y=495327x+570950 with an R^2 value of 0.8732. Preliminary kinetic experiments measuring the effect of bleach an acetaminophen degradation are ongoing.

Computer Science

Approaches of Data Security by Businesses
Session 1a #35

Peter Schurhammer
Faculty Mentors: Sudharsan Iyengar and Ming Ma

Based on this study, there is a wide range of techniques that people can use to breach data maliciously. Results from this study indicates that every individual surveyed was worried about potential security risks in their company, independent of the size and scope of the business. Involved in the survey the is the use of techniques and tips to help prevent such breaches from even happening. A significant response from the survey was "keeping up with infosec and maintaining up-to-date versions of tools and platforms." Results indicate that there was at least one layer of security used; with only one response without any security. There were three responses with two layers, and seven responses with two or more layers of security.

Comparing MD5 and SHA-2 in Password Hashing
Session 1b #28

Reynold Obuyekha
Faculty Mentors: Sudharsan Iyengar and Ming Ma

Cryptographic applications are essential in tight security and super speed security applications. They ensure that they are encrypted by the sender when sending messages to either ensure authenticity or confirm invulnerability. Senders can achieve this by using a private key that verifies the sender's authenticity or a public key that the receiver would use to verify the security of the message. As a result, the hashing technique conceals the data from unauthorized individuals and outsiders. This hashing technique is vital as it ensures and confirms the user's authentication on both sides of the message. I analyzed and compared Message-digest algorithm 5 (MD5) and Secure Hash Algorithm 2 (SHA-2) algorithms to find the better cryptographic hash function in factoring in various key performance indexes such as speed, security, and performance. MD5 and SHA-2 are among the most used cryptographic hash functions globally. These hash functions are measured to be one-way operations for security purposes, meaning they should ideally make it impossible for outsiders to retrieve data using the hashes. Additionally, they are meant to be collision resistant. There should be no scenarios where the same hash should be produced from two different messages. Moreover, they are intended to check

and verify data integrity and identify files as these hash functions are faster and easier to identify, than the data itself. After extensive research and use of open-source materials. It is safe to conclude, SHA-2 is a more modern and better cryptographic hash function compared to MD5, which is older and lacks some standard cryptographic hash function criteria. Although MD5 is 20% faster than SHA-2, this performance boost does not outweigh the security risks MD5 has as an algorithm. Therefore, MD5 is only suitable for low-security applications, such as being a checksum algorithm for file verification. On the other hand, SHA-2 should be the default algorithm of the two when prioritizing security over speed.

CT Image Segmentation for Prostate Cancer Diagnosis Based on 3D U-net Deep Learning Model

Session 1b #38

Ellen Siro
Faculty Mentor: Ming Ma

The vast advancement in deep learning techniques over the past years has consequently led to the creation of state-of-the-art models applied in the medical imaging field for cancer diagnosis. The basic 3D U-net model has shown success in delimiting various organs on medical images such as CT scans, MRIs, and X-Rays. However, it is desirable to develop a more accurate segmentation model. In this work, we study the basic 3D U-net model applied to CT image segmentation of the male prostate organs for prostate cancer diagnosis and compare its performance with that of an improved 3D U-net model. Experiments are carried out on a dataset of CT images with prostate organs and the performance is evaluated using the Intersection over Union (IoU) metric.

Detecting Dangerous Scenarios from Body Language and Emotion Using a 2D CNN

Session 1b #18

Alexander Kruschek
Faculty Mentors: Sudharsan Iyengar and Ming Ma

Using computer technology and deep learning methods, it is possible to analyze data more quickly and accurately than ever before through training convolutional neural networks (CNNs) to detect certain characteristics from a range of media including videos and images. These machine learning technologies and methods can be applied in real-world scenarios to detect, and possibly even help deter, dangerous situations or events. This work proposes using a 2D CNN to classify images including people based on the emotion that is being presented in the image. The emotions that will be primarily focused on in this study will be pain, anger, fear, and suffering. The dataset used for the training and testing for this work will come from the EMOTIC database which contains approximately 24,000 images. Success in this endeavor may result in a CNN model that could be installed into security cameras, allowing them to monitor and alert whenever a possible dangerous situation is about to occur, or is already in the process of happening. The time that could be gained from detecting these situations early may save people from injuries or possibly even save lives. This approach will attempt to improve upon existing emotional detection research by focusing less on just faces and more on the person's body and environment as well.

Evaluation of a Modified Trémaux's Maze Solving Algorithm
Session 1b #42

Alissa Teigland
Faculty Mentor: Sudharsan Iyengar

A maze-solving algorithm is a series of steps a computer can follow to find a path through a maze. Some of these algorithms require knowledge of the maze's entire layout. Others, such as Trémaux's algorithm, do not use any prior knowledge of the maze. Maze algorithms which are designed to use only partial knowledge of the maze's layout are not well-researched. I compared the performance of Trémaux's algorithm to a modified version that uses the maze's exit location. Compared to Trémaux's algorithm, the modified algorithm found the maze's exit in 53.1% fewer total steps on average when the maze connectivity was 100, 57.9% fewer total steps on average when the maze connectivity was 60, 81.8% fewer total steps on average when the maze connectivity was 30, and 95.2% fewer total steps on average when the maze connectivity was 0. This shows that an algorithm which uses partial maze information can perform better than Trémaux's algorithm, especially on mazes whose walls are less connected.

Investigating Password Reuse for Security at Winona State Computer Science
Session 1a #33

Renae Ramsden
Faculty Mentor: Sudharsan Iyengar

Password security has been improving over the past few decades, but people's knowledge and practice have not. Passwords are being used more and more every day for a variety of things, which may make the user feel more protected, but that isn't always true. 65% of individuals reuse their passwords for multiple accounts according to a study Google did in 2020. Reusing passwords can be extremely dangerous and doing so could cause someone's accounts to be hacked and loose sensitive data. Two-factor authentication (2FA) is where the user needs two or more pieces of authentication before being allowed to login. This is a popular concept in addition to passwords that a majority of people use occasionally or whenever it is available.

Password reuse can be difficult to calculate due to each individual having a different number of accounts. Winona State Computer Science staff and students took a survey to determine the security of password reuse within a technology-based background. 48% of the participants had 50 or more accounts that required a password and 35% of them only use 1 to 5 passwords total.

Tennis Action Recognition Based on a Deep Learning Model
Session 2a #17

Sawyer Nelson
Faculty Mentor: Ma Ming

Action recognition in various sports is becoming increasingly more popular mostly due to its uses for analysis and training by coaches. Using action recognition specifically for tennis can be a very helpful tool to put together a collection of different precise strokes and actions that can be analyzed by coaches for training. However, it is a challenging task to design an accurate action recognition model which can

provide feedback for a stroke or action preformed in a tennis match. Some existing method uses a deep learning model pretrained on ImageNet and trains it on a single LSTM (Long Short-Term Memory) layer. In this work, we propose to use two or more LSTM layers to help improve the model. Experiments are conducted on a dataset of 1980 RGB videos. The results in the evaluation experiments show that the improved model achieves an increase in the f1-score.

Using YOLOv5 Object Detection and a Raspberry Pi to Improve the Safety of Drivers

Session 1b #36

Ben Schmalz and Connor Sanvik
Faculty Mentor: Ma Ming

This research proposes using YOLOv5 object detection in vehicles to detect possible obstructions to the driver using a Raspberry Pi. Because the detections are made in real time, the YOLOv5 nano model is used, which is a smaller model that sacrifices some accuracy for higher speed. The obstructions accounted for are vehicles, emergency vehicles, pedestrians, bicyclists, animals, motorcycles, and traffic lights. A dataset of images mainly taken from dashcam footage were used in this study, as it closely simulates the environment the model will be used in. Overall, we found that this did improve the safety of drivers in terms of the evaluation metric using mean average precision.

Engineering

Carbon Climber

Session 1b #4

Rashed Alyami, Carson Boots, Honggun Cho, Josh Oberg, and Wes Wilson
Faculty Mentor: Keith Dennehy

The Carbon Climber is an ultra-lightweight carbon fiber ladder. The goal of the design was to remove any inconvenience factors of ordinary ladders, which originate from their heavy bulky design. The Carbon Climber is meant to be a fast and safe alternative to promote safety in high reaching situations when users may otherwise be inclined to stand on a chair, shelf, or countertop.

Carbon fiber composite was the material of choice due to its high strength to weight ratio as well as its high stiffness, which is a primary factor for ladder rail buckling and step stiffness. The rails of the Carbon Climber are solid carbon composite laminate, while the steps are a sandwich panel using lightweight foam as well as glass fiber rods incorporated into the layup to create anti-slip ridges onto the top of the step. The steps and rails are then joined using a high strength epoxy adhesive.

CARGO X: The Fully Collapsible and Storage Friendly Rooftop Cargo-carrier

Session 2b #12

Michael Bennick, Trevor Fabian, Andrzej Popieluch, Julian Rodriguez, and Parker Schurhammer
Faculty Mentor: Keith Dennehy

CARGO X is a completely collapsible carbon fiber composite frame cargo carrier for an automobile. Most cargo carriers on the market are either hard-shell designs that are space limited and expensive or soft-shell designs that are fabric dominated and have little structural integrity. CARGO X is designed in a way that maximizes internal volume and ease of storage, while providing the structural integrity of typical hard-shell designs. The lightweight nature of the carbon fiber frame allows for ergonomic loading and mounting of the carrier. The composite carbon fiber frame is made completely of hand lay-up panels and a polyester vinyl fabric bag placed over the frame to enclose the carrier.

Composite Clay Pigeon Thrower
Session 1a #19

Zachary Folstad, Colton Haney, Cullen Patterson, Brandon Schadt, and Wilfred Schmitz
Faculty Mentor: Keith Dennehy

The clay pigeon trap throwing market has grown tremendously in recent years all around the globe. The current market of both electrical and mechanical trap throwers available today are made of some combination of aluminum and steel. No evidence has been found of a composite trap thrower on the market today. The Clay Pigeon Pitcher is a complete redesign of your traditional swing-arm mechanical clay pigeon throwing motion. Instead, the Clay Pigeon Pitcher uses a crossbow mechanism. It also consists of detachable and foldable components for ease of storage. The product is made of solid carbon fiber/epoxy construction, with the exception of the arms of the crossbow mechanism. They are made from fiberglass/epoxy. Given its portability and ease of storage, the Clay Pigeon Pitcher will revolutionize the clay pigeon trap throwing industry.

Design of Experiments for Drop Tower Impact and Tensile Welding of 3D printed Structures
Session 1a #25

Tasha Kemna, Regan Harvey, Alex Hilo, and Kellie Hardecopf
Faculty Mentor: Eric Kerr-Anderson

Two studies were conducted during this EYRCM program project; Drop Tower Impact of 3D printed structures and welding studies of 3D printed structures. Most recommendations for fused deposition method (FDM) 3D printer settings revolve around the final aesthetic of the part and do not focus on the strength of the part created. FDM 3D printed parts are typically quite weak in the vertical direction and can be prone to significant damage from impacts. A design of experiments (DOE) was used to determine which settings used to print the part have the greatest effect on the final appearance and impact strength of the part. Flat panels were printed and a drop tower impact test was conducted on the specimens. JMP was then used to statistically analyze the effects of the DOE. Additionally, several methods were explored to weld together 3D printed parts. Tensile testing was conducted to compare the weld joints, and it was determined that strong, effective welds can be attained with simple methodology. These studies open doors for new 3D printed designs to be used as final parts and/or allows for the splicing of several 3D printed parts into larger structures like a jigsaw puzzle.

Furniture Build Project

Session 1b #24

Zoharel Anthony Quinn, Hongun Cho, Lydia Velishek, Hannah Matuszak
Faculty Mentor: Eric Kerr-Anderson

A multi-disciplinary team was assembled to design and build composite furniture for customers across campus. The intent was to create lasting, useful items that would showcase interdepartmental work and the flexibility of composites as a design material. Students were required to discuss what image wants to be evoked by the department/entity, pitch customer with 3D printed renderings, design for aesthetics and mechanical performance, and create the furniture. Additional requirements were to incorporate 2 different manufacturing technologies and at least 3 different materials. The result of this work was the design of two items and the creation of one item.

Impact Properties of Continuous Fiber Reinforced Thermoplastic Composites
Session 2a #29

Weston Wilson; Honggun Cho, and Anders Nielsen
Faculty Mentor: Beckry Abdel-Magid

In the last decade, continuous fiber reinforced thermoplastic composites (CFRTP), including thermoplastic prepregs, unidirectional tapes, and organo-sheets, have taken a major role as viable structural materials rivaling pre-impregnated and pultruded thermoset composites. The major advantage of continuous fiber reinforced thermoplastic (CFRTP) composites is their ability to deliver high mechanical properties at a lighter weight, enhanced chemical resistance, inexpensive transportation and storage rates, and high-speed processing. In addition, they can be readily incorporated as selective reinforcement in commonly used short fiber and long fiber thermoplastic processes.

The goal of this project is to study the pendulum and drop weight impact properties of various CFRTP composites. These properties are of interest in automotive and aerospace applications. Materials to be investigated include CF/PPS, GF/PPS, and GF/PET, CF/PA66, CF/PA12 from Celanese and GF/PP from Avient. Samples have been fabricated and conditioned in two common application environments including exposure to moisture and ultraviolet light. The effect of these environments on the Izod impact properties of the CFRTP materials will be presented and discussed in this poster.

Scooter Solutions: Side Car Companion for 50cc Motor Scooter
Session 1a #23

Melissa Greco, Ashton Miloszewicz, Anthony Quinn, Schumacher, and Christian Taylor
Faculty Mentor: Keith Dennehy

Scooter Solutions is a composite structured chassis designed to be connected to a two-wheeled small engine vehicle for the purpose of transporting cargo and passengers. Manufactured using woven carbon fiber/epoxy panels with an XPS foam core and Aluminum 6063-T5 framing, the structure must be light for user practicality and reducing engine wear while maintaining adequate strength for the passenger load and debris deflection while exposed to the natural environment.

This product is unique due to its carbon fiber reinforced foam sandwich panels with a two-part epoxy matrix allowing for a lighter, more durable side car than its contemporaries. The light weighting is achieved via novel carbon composite construction in substitution of the steel and thick fiberglass used by competitors in this market.

English

Gender and Social Identity in SLA
Session 1b #22

Autumn Lemieux
Faculty Mentor: Ethan Krase

In recent years, society has held a strong spotlight on gender and social identity. Fourth-wave feminism has pushed for intersectionality, the empowerment of women, and the expulsion of gender norms and conformity. These changes in topics of discourse and ideals have rippled out into fields that may initially seem unexpected, such as into theories of second language acquisition. However, social identity, including gender, is undoubtedly a huge set of factors involved in second language acquisition and the successes (or failures) of L2 learners. Choosing to ignore these factors in research and considerations leaves us drawing conclusions which aren't based on the whole picture. Thankfully, there has been a shift to this aspect of research within the past 30 years, and we are continuing to develop it today. It is of the utmost importance to remove learners from an abstract environment in research and consider real factors that are a part of their everyday lives. Afterall, it seems highly unlikely that any learner is placing themselves into an isolation chamber to learn a language. Language learners weave their learning into their complex, unique daily lives. Gender and social identity are major key factors to consider when discussing the acquisition of a second language.

Satori 2022: WSU's Literary Journal
Session 2a #27

Emily Venne, Jasmyne Taylor, and Matthew Pearson
Faculty Mentor: James Armstrong

The editors of WSU's literary journal, *SATORI,* will present a poster session on some of the highlights of this year's issue. They will highlight important moments of the editing and design process, show some of the works featured in the magazine, and answer questions about the creative process.

Geoscience

Faunal Analysis of a Fossil Microsite from the Late Cretaceous Hell Creek Formation, North Dakota
Session 1a #29

Elizabeth Lindow

Faculty Mentor: William Beatty

Over the past few decades, vertebrate microsites have been acknowledged for their usefulness in taphonomic studies. Starting in June of 2019, a group of researchers surveyed a plot of land near Marmarth, North Dakota to document the vertebrate microfossil accumulation in the Hell Creek Formation. This project will allow for us to gain a better understanding of the local fauna and paleoenvironment, provide context to nearby dinosaur excavations, and build a collection for use in future microsite research.

The plot we had surveyed was split into six roughly equal sections, or lanes. As a group of six, each of us took up our own lane, combing our individual areas for microfossils. Once we had each finished combing through our individual lanes, the collection of fossils was then transported back to Winona State University for analysis, where the fossils were sorted and taxonomically identified. Individual fossils of each identified taxon were then tallied to determine the relative abundance of the various taxa discovered at the site. This tally resulted in a collection of 2,863 skeletal fragments from the site, including unidentifiable bone fragments. The site produced fossils of turtles, crocodilians, fish, rays, mammals, Triceratops, Edmontosaurus, and theropod dinosaurs.

This project is the first of an ongoing series of studies at this site. Future studies could repeat the site sampling in order to give a better representation of the original diversity and abundance.

Geologic Walking Tour of Downtown Winona, MN
Session 1a #21

Matthew D. Gonzalez and Jessica M. Morschhauser
Faculty Mentor: Jennifer Anderson

Winona is an historic town located on the Mississippi River in the driftless region of southeastern Minnesota. Many of its older downtown buildings are on the National Register of Historic Places and were constructed using local quarried rocks and other interesting stone imported from around the globe. We are utilizing these building stones to create a Geologic Walking Tour of Downtown Winona highlighting geology for the citizens and visitors of the Winona area. From our local Oneota Dolostone in the bluffs surrounding our city to Carrera marble statues imported from Italy and 36-foot tall columns of Black Mountain Granite quarried in Dummerston, Vermont, we will make downtown Winona into an accessible geological field trip. We have worked with the Winona County Historical Society to research our historic downtown buildings, from the geology of where the rocks were quarried to their formation and other geologically interesting features that can be included in the walking tour.

To increase the accessibility of this Geologic Walking Tour, we are creating a Spanish language version of the tour. The population of Spanish speakers in Winona County has risen in recent years, with our population of Hispanic or Latino residents doubling from 1.6% in 2009, to 3.1% in 2019 making it the largest minority group in the county. This field trip will also be utilized in our introductory geology courses at Winona State University. After exploring mineral and rock samples in lab, undergraduate students will follow the Geologic Walking Tour, make observations about the various building stones, and then place these rocks into their geologic context within the rock cycle as well as use them to explore the geologic time scale. Students will consider the economic rationale behind which rock types are used for certain buildings; for example, the trade-offs between a rock's resistance to erosion, strength as a building material, ease of access in terms of distance to the quarry, and overall cost of the

material. Our Geologic Walking Tour of Downtown Winona will combine history and geology to highlight our community's dependence on the geosciences and provide another way for our citizens and visitors to experience the geology of Winona in our everyday life.

Health, Exercise & Rehabilitative Sciences

Biomarkers, Physiological Parameters, & Prevention Strategies of Overtraining Syndrome in Male Aerobic Athletes
Session 1a #13

Katherine C. Curtis
Faculty Mentor: Erin White

Background. Overtraining syndrome (OTS) is defined as an imbalance of exercise and rest that results in maladaptive adaptations. Symptoms of OTS are multisystemic and variable among individual athletes. Biomarkers such as adrenocorticotrophic hormone (ATCH) and cortisol have been investigated as a reflection of the Hypothalamic-Pituitary-Adrenal (HPA) axis' integrity. OTS affects athletes' health and performance; therefore, it is important to develop monitoring and prevention strategies.

Purpose. The purpose of this literature review is twofold, first, to summarize the responses of biomarkers (ACTH & cortisol) and physiological parameters in overtrained male aerobic athletes; second, to provide suggestions for monitoring and preventing OTS.

Results. Hormonal response to exercise is an indicator of the HPA-axis' integrity and the body's ability to respond to stress. The HPA-axis' integrity is altered in athletes with OTS. ACTH and cortisol levels are blunted during exercise in athletes with OTS when compared to healthy athletes. Biomarker cut-points are not standardized, therefore physiological parameters like heart rate (HR) are used when monitoring OTS. Specifically, HR is significantly increased in athletes with OTS at rest and significantly decreased during submaximal and maximal exercise compared to healthy athletes. Evidence-based prevention strategies for OTS are lacking; however, monitoring training duration and ratings of perceived exertion (RPE), athletic performance, and mood disturbances are promising strategies that could be used for preventing the development of OTS. To prevent excess duration and exertion on athletes, periodized training is suggested. Unexplained decrease in sport performance is another sign of OTS. To measure decrements in performance, it is recommended to use time-to-fatigue sport-specific testing because it will show the greatest changes in exercise capacity. Lastly, mood questionnaires, such as the Profile of Mood State (POMS), can be used to measure changes in mood disturbances. The POMS questionnaire can be utilized to predict the impact of training intensity on an athlete's mood. As intensity increases without adequate rest, an athlete's mood will decrease significantly. Mood disturbance scores should influence programing with the goal of reducing the risk of developing OTS.

Conclusion. In male aerobic athletes with OTS, the integrity of HPA-axis is altered leaving them unable to respond appropriately to exercise stress. Due to the blunted cortisol response and rapidly declining ACTH levels, they fatigue faster, recover slower, and have a decrease in performance. Monitoring training duration and RPE, athletic performance, and mood disturbances throughout training are possible strategies to prevent OTS.

The Effects of Physical Activity on the Signs and Symptoms of Inflammatory Bowel Disease
Session 2b #2

Max Carlson, Mason Lentz, Lily Scallon, Sarah Abeln, and Mariah Lund
Faculty Mentors: Kent Hansen and Gary Kastello.

Introduction: Inflammatory Bowel Disease (IBD) generally describes several autoimmune disorders that involve inflammation of the gastrointestinal tract including Ulcerative Colitis (UC) and Crohn's disease (CD). An estimated 3.1 million Americans are affected by IBD. Although the inflammation caused by IBD mainly affects the gastrointestinal tract, when IBD is exacerbated, the inflammation can become systemic. Consistent exercise is theorized to reduce chronic inflammation and reduce signs and symptoms of IBD.

Objective: The aim of this meta-analysis is to examine the effects of physical activity on the signs and symptoms of IBD.

Methods: A literary search was conducted using Cochrane library, PubMed, and Cinahl databases. Of the 1031 records identified, twelve articles met the inclusion criteria, with seven articles presenting data that could be meta-analyzed. The reported data from the seven included articles were standardized in order to compare dependent variables using Stata17 statistical package.   Pooled effect sizes and 95% confidence intervals were obtained through the random effects model. The results were used to examine the effects of exercise on C-reactive protein (CRP), fecal calprotectin (FC), and IBD signs and symptoms related questionnaires.

Results: Signs and symptoms questionnaires were standardized and compared which resulted in a low risk of heterogeneity of 0.00% (I2) and an effect size of 0.02 and 95% confidence interval of –0.66 to 0.70 (p=0.96). Biomarkers were pooled, standardized, and compared, resulting in heterogeneity of 37.82% (I2) and an effect size of 0.01 with 95% confidence interval of –1.39 to 1.42 (p=0.98).

Conclusions: These results suggest that exercise does not decrease the signs and symptoms in IBD patients.

Mathematics & Statistics

Comparing Geospatial Interpolation Methods for Modeling Snow Depths
Session 2b #8

David Larson
Faculty Mentor: Silas Bergen

Predicting values of unknown points at geographic locations using known points at other locations seems simple, but many methods offer different solutions to try to predict such points. The goal of this research was to investigate how different geospatial interpolation methods work by comparing their accuracy of predicting snow depths in western Colorado. This data is publicly available and was collected

by the Remote Sensing Center at the University of Alabama, who used an FMCW radar system to measure the snow depths. The interpolation methods explored in this project included ordinary kriging, inverse distance weighting, k nearest neighbor, thin plate splines, and universal kriging. Out of all these methods, inverse distance weighting performed the best on this subset of snow depths data.

Music

Liberation by Joel Love and Black by Marc Mellits
1:15pm Oak Rooms E&F

Jake Schumacher, Tyler Upham; Performed by Jake Schumacher and Tyler Upham.
Faculty Mentors: Melanie Brooks and Christopher Dickhaus.

This is a performance of two unaccompanied pieces for saxophone. The first is Liberation for alto saxophone, written by Joel Love. The second is Black by Marc Mellits which is a duet for two baritone saxophones. These two pieces were part of the program for my senior recital which acts as the capstone project for music performance majors.

Psychology

Behavior of Undergraduates: Substance Use and Mental Health Concerns
Session 1a #27

Andrea L. Hinitt, Megan E. Reis, and Katelyn M. McDonald
Faculty Mentor: Trisha Karr

College is a period of time in which young people are often on a journey of self-discovery. Discovering oneself at this age may lead to new social relationships, experimenting with substance use, and experiencing mental health difficulties. The primary goal of this study was to assess the connection between undergraduate college student's levels of substance use and their mental health concerns. The hypothesis of this study was that college students who had higher levels of mental health concerns would also have higher levels of substance use. This was proven to be nonsignificant but there was a significant finding between increased levels of substance use and more social support. A sample of (n=103) students at a Midwestern university completed an online survey. This survey asked students about marijuana use, alcohol use, mental health concerns, and perceived social support. In order to examine differences between substance users and non-users, an independent sample t-test was used. The analysis confirmed the hypothesis that students who used substances reported higher levels of social support.

Effects of Bupropion on Sign-Tracking
Session 1a #3

Megan Arth, Cassidy Bos, Kiya Azure, and Amanda Barbaro

Faculty Mentor: John Holden

Sign-tracking is defined as the tendency of an organism to engage with a conditioned stimulus that has been paired with a rewarding unconditioned stimulus. Sign-tracking behavior may be comparable to the behavior drug addicts demonstrate when going through a period of relapse after being exposed to a stimulus they associate with drug use. A medication that reduces sign-tracking could be used to aid in drug addiction treatment. In this study, we investigate the effect of bupropion on sign tracking behavior, hoping to explore if this drug can aid in drug addiction treatment. Subjects were 48 male Sprague Dawley rats. In order to measure sign tracking, operant chambers were used. Subjects were conditioned over the course of 5 days to associate the presence of a lever with food delivery. Then subjects were tested under the influence of 0, 20,40, or 60 Mg/kg of Bupropion. In the present study, Significant differences were found and Bupropion was found to reduce sign tracking.

Effects of Escitalopram on Sign-Tracking
Session 1a #5

Kiya Azure, Megan Arth, Amanda Barbaro, and Cassidy Bos
Faculty Mentor: John Holden

Sign tracking is a phenomenon in organisms in which they are likely to approach a cue for appetitive stimuli. This behavior is important in drug addiction and likelihood of relapse. The aim of the current study is to examine the sign tracking and goal tracking behaviors of rats when different doses of Escitalopram are administered to them. We hypothesize that sign tracking behaviors will decrease when Escitalopram is administered. Subjects are 31 male Sprague Dawley rats. Sign and goal tracking behaviors are measured using operant chambers. Upon analyzing the data with a repeated measures ANOVA, we found that among the strongest sign trackers, administration of escitalopram reduced their sign tracking as hypothesized. Implications of these findings can be applied to drug addiction rehabilitation and relapse in humans. Further research needs to be done, but SSRIs may be an effective adjunctive treatment for drug addiction.

Effects of Memantine on Sign-Tracking
Session 1a #7

Amanda Barbaro, Megan Arth, Kiya Azure, and Cassidy Bos
Faculty Mentor: John Holden

Sign tracking is an organism approaching a signal for an appetitive stimulus. An example of this in humans is an addict interacting with drug paraphernalia when coming across it without consciously understanding why or knowingly intending to get high. This contributes to relapse and finding a pharmaceutical that reduces sign tracking could help addicts in recovery. We replicated this kind of sign-tracking in rats and administered three different doses of Memantine to test how this affects their sign-tracking. We first got the rats to associate a lever popping out with a treat pellet being given. We tracked how often the rats interreacted with the lever and food receptacle to determine if they are sign-trackers (interact a lot with the lever) goal-trackers (interact a lot with the food receptacle) or Intermediate (Interacted with both).A mixed model ANOVA showed a significant interaction between dose and behavioral phenotype, but post hoc test showed no significant differences between pairs. These results are unusual but promising and more research is needed.

Effects of Venlafaxine on Sign and Goal Tracking
Session 1a #9

Cassidy Bos, Megan Arth, Kiya Azure, and Amanda Barbaro
Faculty Mentor: John Holden

Sign tracking is when an organism interacts with a conditioned stimulus that signal something desired. This is comparable to when a drug addict is engaging in drug seeking behaviors after interacting with something which could be associated with drug use. Reducing this type of behavior in addicts who are trying to get off of drugs would be beneficial for the future of drug rehabilitation. One medication we think may work is Venlafaxine, a selective serotonin and norepinephrine reuptake inhibitor (SNRI). This medication effects behavior by increasing the amounts of serotonin and norepinephrine, naturally occurring substances in the brain. For the procedure, the 17 male Sprague Dawley rats were exposed to the banana pellets (which is used in the operant chambers) over a few days. Next, the rats were individually kept in the chambers, one day without the pellets and the second day with the pellets. Subjects were conditioned over the course of 5 days to associate the presence of a lever with food delivery. Subjects were tested under the influence of 0mg/kg or saline, 30mg/kg, or 60mg/kg of Venlafaxine. Significant differences were found between intermediate and sign trackers. There was a significant difference in goal tracking as well, however it is unsure what translates to goal tracking in humans. To be more conclusive about the results, we would need to have human trials done.

Emotional Experiences among College Students Returning to Campus Amid the COVID-19 Pandemic.
Session 1b #6

Jenna Dale, Megan Reis, and Skylar Fedoravicius
Faculty Mentor: Amanda Brouwer

Introduction: Since the beginning of the COVID-19 pandemic, there have been over two million confirmed cases. Of those cases, the majority (57.4%) occurred among young adults aged 18–24 years old (CDC, 2021).Although existing research demonstrates that following recommended health behaviors (e.g., vaccinations, hand washing, social distancing) reduces the risk of contracting COVID-19,less research has explored the emotional experiences of young adults returning to campusduringtheCOVID-19 pandemic. The experiences of young adults during this time frame are important to study as they are going through natural shifts in their lives. Changes due to COVID in their routines, education, employment have had significant effects on the emotional well-being of young adults. The long-term effects of these changes are unknown, but opinions and experiences of COVID-19 in the eyes of young adults can help us understand their willingness to engage in preventative health behaviors. Therefore, the purpose of the current study was to qualitatively explore the emotional experiences of college students as they returned back to campus in the Fall of 2020.

Methods: Participants were college students (N=24) who participated in focus groups held in July and August 2020. Questions about COVID-19 experiences and returning to campus during a pandemic were discussed. Data were qualitatively analyzed for themes.

Results: Participants expressed a variety of emotional experiences ranging from concern about themselves and others, to anxiety and uncertainty about COVID-related changes. A commonly expressed emotion was one of loss; loss of academic, social, and community experiences. Participants also

expressed loss of control over their environments and fear regarding others' behaviors. Stress and the challenge of coping with COVID-related demands was also frequently described. Despite many negative emotions, participants also expressed some degree of understanding and acceptance about needed changes and that they felt safe returning to campus.

Discussion: Overall, results demonstrate that emotional experiences varied, and at times, was subjective. Loss was an underlying, common experience, especially for college students who have many diverse opportunities. Loss seemed to play a strong role in affecting others lives and other emotional experiences. Coping skills also varied, especially under conditions where participants felt stressed by the ongoing need to manage new skills and behaviors related to COVID-19. Overall, participants concern surrounding COVID-19 was for others and not themselves. Despite the myriad of emotions, students indicated that they felt safe returning to campus.

Gender Norms and Anxiety
Session 1a #11

Kirstin Cole
Faculty Mentor: Amanda Brouwer

The objective of this study was to examine how attitudes about gender roles affect anxiety and how those attitudes might differ for men and women. Previous research demonstrates that women are more likely to experience and report anxiety than are men. Additionally, a relationship between conformity to masculine norms and mental health issues such as anxiety exists, but less work has explored how the relationship between masculine social roles and anxiety might differ depending on gender. Therefore, the effect of masculine social norms on anxiety and whether it depends on gender. Participants (N = 303; Mage= 21.44, SD= 5.85) completed an online survey with questions about anxiety, masculine gender roles and attitudes, and gender identity. A moderation analysis was conducted to test whether gender was a significant moderator in the relationship between attitudes about masculine gender roles and anxiety. Masculine self-concept significantly predicted anxiety, b = -1.55, t(261) = -2.03, p = .04. As masculine self-concept increased, reports of anxiety decreased. Contrary to the hypotheses, gender was not a significant predictor of anxiety (b = 2.81, t(261) = 1.38, p = .17), nor was there a significant interaction (b = .47, t(261) = 1.15, p = .25). Findings indicate that masculine self-concept (and not gender) is associated with lower levels of anxiety reporting and that this holds true for men and women alike. These results have important implications for clinicians. Individuals' self-concepts and views of their own masculine traits might be important to factor in with the treatment of anxiety.

Individual Facets of Emotional Dysregulation as Predictors of Aggression
Session 2a #15

Sean McCoy
Faculty Mentor: Robert Casselman

Studies have found significant relationships between emotional dysregulation and aggression (Casselman & McKenzie, 2015; Contardi et al., 2016). When developing the Difficulties in Emotion Regulation Scale (DERS), Graetz and Roemer (2004) identified six facets that underly the construct of emotional dysregulation: nonacceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotional

regulation strategies, and lack of emotional clarity. Buss and Perry's (1992) Aggression Questionnaire (AQ) conceptualized four dimensions of generalized aggression: physical aggression, verbal aggression, anger, and hostility. Previous studies have largely utilized the total scores of these scales when identifying relationships between them (e.g., McKenzie & Casselman, 2015). This study sought to examine predictive relationships between the subscales of these measures in a sample of college students. Based on evidence from the literature, we predicted that the DERS subscales would have positive correlations with the AQ subscales. In addition, it was hypothesized that impulsivity would be the strongest predictor of anger, physical, and verbal aggression, while nonacceptance of emotions would be the strongest predictor of hostility compared to the other DERS subscales. As expected, results show significant positive correlations between all DERS and AQ subscales. In support of our hypothesis, further analysis found impulsivity to be the most substantial predictor of anger, physical, and verbal aggression. However, four facets of emotional dysregulation were significant predictors of hostility. Implications and direction of future research are examined.

Parental attachment and Emotional Dysregulation

Session 2a #19

Saralynn Ness
Faculty Mentor: Robert Casselman

There has been extensive research to show a relationship between parent attachment and emotional dysregulation (Yaghoubipoor, Seyed &Khoshab, 2021; Mota, Goncalves, Carvalho & Costa,2021; Kullik &Petermann,2013). Parental and peer attachment is a construct that describes the emotional bond between self and others (Armsden & Greenberg, 2009). Generally, insecurely attached individuals have greater difficulty with emotional functioning (Casselman & McKenzie, 2014). Gratz and Roemer (2004) conceptualized emotional dysregulation (ED) in their Difficulties in Emotion Regulation Scale (DERS) as having six dimensions: nonacceptance, lack of goals, impulsivity, low awareness, lack of strategies, and lack of clarity. Yaghoubipoor et al. (2021) found that adolescents in correctional facilities had greater difficulty regulating emotions when they felt their parental attachments were unstable. Kullik and Petermann (2013) showed that secure parental attachments were associated with emotional regulation and decreased depressive symptoms in adolescence. Although there is limited research examining the specific facets of ED and parental attachments, Stevens (2014) found strong positive correlations between anxious attachment and the impulsivity and strategies factors, and the goals factor had a nonsignificant relationship with avoidant attachment (Stevens, 2014). There is also limited research on whether mothers or fathers have a stronger impact on specific ED aspects. This current exploratory study sought to expand our understanding of these relationships. Based on the research, we hypothesized the following based on the research literature:

1) DERS subscales will be significantly and negatively correlated with parental attachment.
2) Insecure parental attachment will not significantly predict the goals factor.
3) Insecure parental attachment will strongly predict the impulsivity and strategies factors.

We also had one research question: Will mother or father attachment have a stronger relationship in predicting facets of ED? Data will be analyzed in early April and impressions and future research will be discussed.

The Effects of the Environment on Positive and Negative Emotions

Session 1a #15

Jenna Dale
Faculty Mentor: Amanda Brouwer

Introduction: Houseplants have been recently trending, specifically in the young adult population. This increase in plant buying began close to when the lockdown from COVID-19 began. Some suggest plants became a way to bring the outdoors inside while others explain plants have healing properties in regard to physical and mental health. There are minimal studies involving the benefits to mental health from plants. Therefore, the aim of this study was to focus on the mental healing properties houseplants may have among young adults. Specifically, it was hypothesized that plants will reduce stress and negative emotions as well as increase positive emotions.

Methods: Young adults (estimated N=50) are randomized to one of two groups, a room with plants placed on the table and floor, or a room with no plants. Participants then complete a stress task and are asked to report on their positive and negative emotions. Data will be analyzed using repeated measures t-tests and independent t-tests to determine differences in positive emotion, negative emotion, and stress.

Results: Data collection is ongoing, but it is expected that those around plants will have more positive emotions and fewer negative emotions than the control group. Furthermore, the stress ratings will be lower in the plant group when compared to the control.

Discussion: Anticipated results may indicate that houseplants reduce negative emotions and stress while also increasing positive emotions. Furthermore, if the hypotheses are supported, those working with young adults could consider implementing houseplants as a possible mental health treatment to help with overall happiness and reducing stress.

The Role of Ethnicity and Mental Health in Coping, Stress, and Self-Compassion
Session 2a #25

Madison Rios
Faculty Mentor: Amanda Brouwer

The relationship between one's ethnic identity and mental health status plays a major role towards an individuals' level of perceived stress, coping mechanisms, and self-compassion. For some individuals this could be explained by different race-related stressors, racism, discrimination, and lower mental health status. This specific race-related stress that is associated with ethnic identity has numerous physiological, emotional, and mental outcomes. The present study sought to examine the relationship that ethnicity and mental health status have among perceived stress, coping mechanisms, and self-compassion. Although data collection is ongoing, preliminary analyses indicates that participants (*N*=146) are 79% women and 19% are men. Additionally, 84% of participants are in the majority ethnic group (i.e., white) and 14% are in the minority ethnic group. Participants took an anonymous online survey with questions about coping, perceived stress, self-compassion, anxiety, and depression. Independent t-tests were calculated to determine if there was a difference in the given variables, between minority and majority ethnic statuses. Currently, results indicate that there are no significant differences between those in the minority ethnic group in comparison to those in the majority ethnic group for levels of self-compassion, coping mechanisms, perceived stress, anxiety, and depression.

Means do trend in a direction that suggest those in the minority ethnic group might have higher anxiety and depression. Given the current non-significant results, it can be concluded that there are no differences between minority and majority ethnic groups and mental health status, stress, coping mechanisms, and self-compassion. It is important to note that these variables are experienced differently between the specific ethnic groups in the overall minority group, as shown in past research. Although it didn't hold in the current study, future research should explore how ethnicity is connected to stress, coping, mental health status, and self-compassion. The current study was limited as there a limited number of participants in the minority group. Future research should conduct selective sampling for those that are in the ethnic minority group.

Recreation, Tourism, and Therapeutic Recreation

An Analysis of Children's Play in Resort Childcare Programs: A Prominent Element for the Hospitality and Tourism Industry
Session 1a #17

Abigail Fell
Faculty Mentor: Philesha Dombroski

In the tourism and leisure industry children are an essential component to consider as they are consumers and active decision-makers not unlike their parents. While a significant amount of studies exists regarding children in community recreation programs, individual and team sports, summer camps, and outdoor activities, there is a definite gap in the literature regarding children's programming in resorts. For families, many summer vacation decisions involve the provision of childcare. Thus, many resorts and some hotels offer not only a place and program but also a set of staff devoted to creating a safe and pleasurable experience for the youngest resort guests while they are away from their parents. What is more, not all lodging establishments at vacation destinations have embraced this market opportunity and the determinants of childcare provision in hotels and resorts remain poorly understood. With this in mind, a preliminary inquiry of Mini Club programs at a select number of U.S. resorts was conducted to establish criteria for future research in the provision of resort childcare programs.

Social Work

Sex Trafficking Awareness and Prevention: A Survey of Lodging Facilities in Winona, MN
Session 1a #1

Brianna Albertson
Faculty Mentor: Ruth Charles

Sex trafficking, which falls under the umbrella of human trafficking, is an illegal activity in which victims are sexually exploited. There is a lack of awareness on this issue stemming from many misconceptions and little support for victims and survivors. One common misconception is that sex trafficking only

occurs in urban and metropolitan areas, however, this is inaccurate as it can take place anywhere regardless of size. Sex traffickers use many different settings for this type of exploitation, with hotels and motels being among the most common. Lodging facilities like hotels and motels are common sites as they allow for anonymity and easy access.

On account of this information, the town of Winona, MN is striving to increase awareness of and the prevention of sex trafficking in the area, and more specifically, in local lodging facilities. In an effort to achieve this, a survey will be distributed to hotels, motels, and bed and breakfasts in Winona and will be analyzed to inform any additional training needed by lodging staff. This survey will ask about the number of rooms offered, types of services available- including pay-per-view pornography, and if staff would want free additional training on sex trafficking. Once analyzed, the Winona Community Primary Prevention Project (WCPPP) will create training resources on this issue and provide this to facilities that expressed interest. The goal of this survey and its results is to inform the WCPPP on creating customized trainings on sex trafficking awareness and interventions for local lodging facilities as to prevent this crime.

Sociology

Gender Wage Gaps: A Multivariate Analysis
Session 1b #20

Madelyn Kuck
Faculty Mentor: Rafael Narvaez

Outline: A wage gap between the males and females has been documented by US census data: Females earn $0.78 per dollar earned by males. My research focuses on the intermediate variables contributing to the wage gap, beyond the variable of gender itself.

Methods: This study involves a comprehensive literature review as well as multivariate meta-analysis of published secondary data, and univariate analysis of US census data.

Results: The results are at present incomplete as I am still conducting multivariate analysis. So far I can report that intermediate variables that contribute to the wage gap between males and females include race, ethnicity, maternity and paternity leave policies, and the sexual identity of individuals.

Discussion: Many intermediate variables have a role producing the wage gaps between males and females in the US. These analyses can help us understand the various reasons, beyond gender itself, for these gaps in our society. Before conducting this study, I did not think that other variables could explain the wage gap between males and females, but researching these intermediate variables helps me explain why in society a wage gap still persist. These analyses can also help other students understand the multiple reasons for the economic differences between males and females in the US.

Legalization of Marijuana and Economic Growth in U.S. States
Session 1b #26

Jacob Mutch

Faculty Mentor: Rafael Narvaez

Hypothesis: Legalizing marijuana has been linked to economic growth in states that have legalized it.

Research Design/Methods: I will be looking at the GDP (growth domestic product) of 3 random states that have legalized marijuana and 3 random states that do not have any form of it legalized. I will start with the GDP a year before marijuana was legal in any of the six states to show where each state's economy was at beforehand. Then, I will show the GDP each year after to show how the economy has been affected in each of the six random states. I have not obtained my results yet but will continue my research to find out.

Discussion: If my results show there is more growth from the three states that have legalized marijuana, then this study could be used as an argument to legalize marijuana due to its economic advantages. If my hypothesis is null, then this study could be used to show there are not economic advantages to the legalization of marijuana.

Psychological Effects of Using Facial Masks in Classrooms
Session 1b #32

Emma Rognlie
Faculty Mentor: Rafael Narvaez

Outline: Since 2020, when the global pandemic started, people all around the world have had to adapt to new ways of life. One of the most obvious changes that has come from the pandemic is the use of face masks. This experimental study examines the ways in which face masks help or hinder communication and relationship building in a classroom setting.

Path of Research: Previous research done by Emily Lee, Kayla Cormier and Anu Sharma in a hospital setting showed that masked communication requires more intense listening which leads to a disinterest in interpersonal communication. In a study conducted by Danial Campagne it is suggested that health care workers adopt the use of transparent masks because face covering negatively impact communication.

Study Aims: The goal of this study is to examine the differences between masked communication and non-masked communication and to fill a research gap on the impacts of wearing masks in an educational setting.

Study Design: This experimental research study will involve a blinded, speaker. All the speaker knows is that he or she will present a short reading to one sociology class with a mask on, and to another similar class without a mask on. The reading will be the same for both classes. Upon completion of the reading, a survey containing Likert-type scales and questions pertaining to emotional reaction of the students to the two conditions (mask vs. no-mask) will be collected from the students attending the sessions in each class. The questions will aim to measure the effectiveness of the speaker (i.e., the degree to which students understood the speech) as well as the degree of emotional connection between students and speaker, as reported by the students. At present, data have not been collected but they will be fully collected and analyzed a week before the commencement of this conference.

The Effect of the Covid-19 Pandemic on Psychological Well-Being
Session 1b #41

Jordan Tapp
Faculty Mentor: Rafael Narvaez

Outline: According to the World Health Organization (WHO), there have been 485,243,022 reported cases of Covid-19 and 6,137,553 deaths from the beginning of the epidemic to March 2022. Covid-19 has impacted individuals' psychological well-being in many ways. Mapping these effects can create awareness of the impact that Covid-19 has had on the psychological well-being of individuals and populations and can allow us to palliate these negative mental health effects.

Research Design: Literature review was conducted to understand the effects of the Covid-19 pandemic on stress, isolation, and coping mechanisms among college students, British South Asian gay men, healthcare workers, and Black and Latinx people. In this study I analyze secondary data to map these mental health effects among these groups.

Aims of the Study: In this presentation I map the ways in which Covid-19 has impacted individuals' mental health, how they are coping with and dealing with stress, and experienced loneliness due to the pandemic. Based on these results, I argue that funding may be needed to prevent and help these mental health issues. I also argue that raising more awareness of the mental health sequels of the pandemic is needed. In terms of interventions, I note that students and employees could benefit from more time off for mental health and or having knowledge of available mental health resources.

The Investment in College Education: Is it Worth it?
Session 1b #34

Amanda Schabacker
Faculty Mentor: Rafael Narvaez

Hypotheses: This study tested two hypotheses: that an educational degree (independent variable) is positively correlated to wages (dependent variable), making college a good financial investment; and that education (Independent) contributes to differential income (dependent) across ethno-racial groups in the US; such that the income gap across these groups is driven not only by race but above all by education as the causal variable of economic disparity.

Methods: I used US Census data (2010 to 2020) to test these hypotheses. Data are analyzed by means of univariate and multivariate analyses to determine the benefit of education in general and the extent to which education contributes to ethno-racial disparities related to income.

Results: The first hypothesis seems correct according to univariate analysis of US Census data: The higher the educational degree, the higher the median wage income. The data shows a continuous climb in wages that is proportional to education degree level. For example, the most significant jump in wage from "less than high school education" level to "graduate or professional degree" involves a 77% difference in media of earnings. Analyses for the second hypothesis are still being conducted.

Discussion: Investment in college is money well spent. As the median wage shows in the census data, the investment pays for itself. Colleges can use these types of analyses as part of their recruitment

efforts; and students considering college should be aware of these data as well. Multivariate analyses pertaining to education and median income among ethno-racial groups are still being conducted, but analysis of the first hypothesis suggests that access to education may close income gaps among ethno-racial groups.

Faculty Presentations

Social Media, COVID-19, Misinformation, and Ethics: A Descriptive Study of American Adults' Perceptions
11:00am Oak Rooms E&F

Professor Tammy Swenson-Lepper, Department of Communication Studies
Student Co-Author: Heidi J. Hanson

Social media users' perceptions of the ethics of social media posting about the COVID-19 virus, vaccines, and masking has received little attention in the scholarly literature. This descriptive study examined US residents' perceptions of misinformation and ethics in social media related to the COVID-19 pandemic. Participants (N=161) responded to an online survey that asked them to describe their perspective on the ethics of postings about the COVID-19 pandemic and their views of misinformation and fake news surrounding COVID-19, the vaccines, and masking. The study found, consistent with the Third Person Effect, that most people believe their friends and family are more likely to share misinformation than they are. The most important ethical issues they discussed related to social media postings about the pandemic were misinformation, freedom of speech and other civil rights, lack of tolerance, politicizing COVID-19, and the rights of the individual versus the needs of the community.

Fighting Plague and Heresy in Early Modern Bavaria
11:20am Oak Rooms E&F

Professor Erik Heinrichs, Department of History & Legal Studies

I would like to speak about my recent research project dedicated to understanding the links between efforts to fight the plague and fight heresy within one early modern state, ducal Bavaria. I will present work from a forthcoming article on the topic. It examines how physicians, clerics, and political leaders worked together between 1520 and 1650 to devise the first public health policies for plague in Bavaria, as well as tackle the other perceived threat to health, the heresies of the Protestant Reformation. This study reveals much about the nature of early modern politics and how the first public plague mandates were colored by concerns about the soul amid an atmosphere of religious tension.

Accelerated Tensile-Tensile Fatigue Testing of Long Fiber Thermoplastic Materials
12:00pm Oak Rooms E&F

Professor Eric Kerr-Anderson, Department of Composite Materials Engineering
Student Co-Author: Sara E. Johnson

Fatigue characterization is one of the most time consuming and expensive tests that a material must undergo prior to adoption into critical industries and/or uses. Most fatigue testing is conducted by alternating between a low tensile load and a high tensile load until the material fails, which yields a cycle count to failure for a given loading scenario. Compiling a graph with multiple loading scenarios generates a failure threshold that is used to design a part for the number of loading cycles expected to witness during its service life. The studies presented attempted to determine testing methodology to reduce the required testing time from 3 weeks to 1 week by taking advantage of Cumulative Damage Theory. Several methods were examined, and it was concluded that there may be a path that could be used to generate such time savings.

Determination of Rate Constants for Hydrogen Abstraction by Phenyl Radicals from Fatty Acid Esters

11:40am Oak Rooms E&F

Professor Thomas Nalli, Department of Chemistry
Student Co-Authors: Breanna M. Murray, Kevin Plaisance, Emily Barthel, Cameron Scheithauer, Travis Vatland, Rick W. Dorn

Radicals are molecules that contain an unpaired electron in place of a bond. As such they are generally very reactive and only exist as short-lived intermediates in chemical reactions. Phenyl radicals ($C_6H_5\bullet$) are well known reactive intermediates that rapidly undergo typical radical reactions such as hydrogen abstraction and double bond addition. Their H-abstraction reactions with lipids and other biomolecules are of particular interest, yet rate constants (k_H) for these have not been previously reported. We used the visible photolysis of *p*-fluorophenylazoisobutyronitrile (FPAIN) to generate *p*-fluorophenyl radicals, which were allowed to react with a fatty acid ester (FAE) in competition with abstraction of iodine from an iodoarene (*m*-iodobenzotrifluoride, ArI). The relative yields of the competitively formed products, fluorobenzene and p-fluoroiodobenzene were measured by integration of the fluorine-19 nuclear magnetic resonance (^{19}F NMR) spectrum allowing the relative rate constants (k_H/k_I) to be determined. A literature derived value for k_I ($k_I = 2.2 \times 10^8\,M^{-1}\,s^{-1}$) then serves as a kinetic reference point for determining k_H. We also report the results of high-level density functional theory (DFT) calculations that support the supposition that the reactivities of *p*-fluorophenyl and unsubstituted phenyl radicals are very similar.
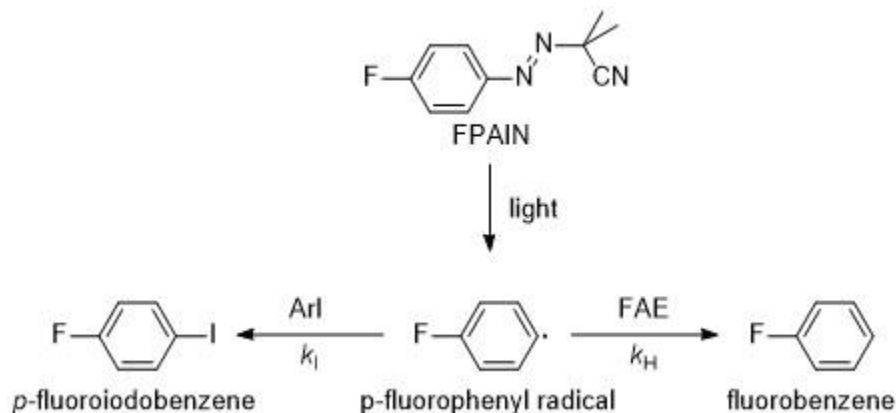
Schedules

Poster Sessions

Kryzsko Ballroom
Session 1: 9:00-11:00 AM   (1a presenting at 9:00-10:00, 1b presenting at 10:00-11:00)
Session 2: 1:00-3:00 PM   (2a presenting at 1:00-2:00, 2b presenting at 2:00-3:00)

Posters should be on display for the entire two hours of each session!

Presenters	Sess	#	Dept.	Title
Adams, Paige M; Mack, Madison G	2a	1	BIOL	Species Identification of *Dictyocaulus* Found in Domesticated and Wild Ruminants
Albertson, Brianna M	1a	1	SOC	Sex Trafficking Awareness and Prevention: A Survey of Lodging Facilities in Winona, MN
Anderson, Jessica L	2a	3	BIOL	Developing a Method for Rapid and Accurate Identification of Bacillus Species in Clinical Isolates Using Polymerase Chain Reaction
Arth, Megan J	1a	3	PSY	Effects of Bupropion on Sign-tracking
Azure, Kiya M	1a	5	PSY	Effects of Escitalopram on Sign-Tracking
Barbaro, Amanda M	1a	7	PSY	Effects of Memantine on Sign-Tracking
Besseck, Mekhi F	1b	2	CHEM	A Methodology for the Synthesis of Bioactive Butenolides
Boots, Carson L; Cho, Honggun; Oberg, Joshua H; Wilson, Weston C; Alyami, Rashed A	1b	4	CME	Carbon Climber
Bos, Cassidy J	1a	9	PSY	Effects of Venlafaxine in Sign and Goal Tracking
Carlson, Max J; Lentz, Mason T; Scallon, Lily C; Abeln, Sarah E; Lund, Mariah R	2b	2	HERS	The Effects of Physical Activity on the Signs and Symptoms of Inflammatory Bowel Disease
Chase, Sylvia P	2b	33	CHEM	Gravimetric and spectrophotometric determinations of curcuminoid solubilities in ethanol
Cole, Kirstin D	1a	11	PSY	Gender Norms and Anxiety
Curtis, Kaitlyn N; Dalsing, Noah J; Danielson, Megan J; Estabrooks, Kimberly A; Fagerstrom, Naomi L; Kim, Namjin	2a	5	BIOL	Cestode species identification on waterfowl: Parasitology class project 2022
Curtis, Katherine C	1a	13	HERS	Biomarkers, Physiological Parameters, & Prevention Strategies of Overtraining Syndrome in Male Aerobic Athletes
Dale, Jenna M	1a	15	PSY	The Effects of the Environment on Positive and Negative Emotions

Presenters	Sess	#	Dept.	Title
Dale, Jenna M; Reis, Megan E; Fedoravicius, Skylar M	1b	6	PSY	Emotional Experiences Among College Students Returning to Campus Amid the COVID-19 Pandemic.
Dusbabek, Isabella J	1b	8	CHEM	Chloride Contamination in Natural Water Sources
Fell, Abigail C	1a	17	RTTR	An analysis of children's play in resort childcare programs: A prominent element for the hospitality and tourism industry
Folstad, Zachary M; Haney, Colton C; Schadt, Brandon M; Schmitz, Wilfred J; Patterson, Cullen L	1a	19	CME	Composite Clay Pigeon Thrower
Gonzalez, Matthew D; Morschhauser, Jessica M	1a	21	GEOS	Geologic Walking Tour of Downtown Winona, MN
Goodrie, Ashley R; Majerus, Spencer R	1b	10	BIOL	Attenuated Sympathetic Baroreflex Sensitivity Evoked by Acute Mental Stress but not Prolonged Sleep Restriction in Healthy Adults
Greco, Melissa R; Miloszewicz, Ashton J; Schumacher, John C; Quinn, Zoharel Anthony T; Taylor, Christian A	1a	23	CME	Scooter Solutions: Side Car Companion for 50cc Motor Scooter
Gruber, Summer J	2a	7	CHEM	Effect of Polymerization Temperature on Polymethylmethacrylate Stereochemistry and Molecular Weight: A Polymer Chemistry Laboratory Procedure
Gruber, Summer J; Kellner, Elijah J; Carvell, Benjamin A; Poppler, Creed D; Josul, William H	2b	4	CHEM	A new synthetic strategy for ebselen enabling the first ever isolation of ebtellur
Hardecopf, Kellie L; Hilo, Alex; Harvey, Regan G; Kemna, Tasha V	1a	25	CME	Design of Experiments for drop tower impact and tensile welding of 3D printed structures
Hinitt, Andie	1a	27	PSY	Behavior of Undergraduates: Substance Use and Mental Health Concerns
Holst, Jenna L	2a	9	CHEM	Degradation of Ovulation Inhibitor Estrogens Using HPLC Chromatography
Immel, Nicholas D; Besseck, Mekhi F; Flanaghan, Kevin	2a	11	CHEM	Ni(salen): Development of a two-week introduction to synthesis and characterization in general chemistry

Presenters	Sess	#	Dept.	Title
Johnson, Annika K; Oloyede, Ayomide O; Petri, Jaden M; McCann, Kevin L; Casmey, Matthew R; Gilbertson, Samuel E; Zugschwert, Heather L	1b	12	BIOL	Analysis of Parasites in Ducks from the Upper Mississippi Flyway: Parasitology Spring 2022 Class Project
Joseph, Lucas E	1b	14	BIOL	Tiny Earth: Reverse Antibiosis Approach
Josul, William H	1b	16	CHEM	Investigation of Nanoparticle Ligand Systems for Solar Cell Applications
Kozak, Kellie N	2b	6	BIOL	Respiratory Effects of Wearing an N95 Filtering Facepiece Respirator: A Review of Current Literature
Kruschek, Alexander V	1b	18	CS	Detecting Dangerous Scenarios from Body Language and Emotion Using a 2D CNN
Kuck, Madelyn A	1b	20	SOC	Gender Wage Gaps
Larson, David K	2b	8	MATH	Comparing Geospatial Interpolation Methods for Modeling Snow Depths
Lemieux, Autumn	1b	22	ENGL	Gender and Social Identity in SLA
Lindow, Elizabeth L	1a	29	GEOS	Fauna Analysis of a Fossil Microsite from the Late Cretaceous Hell Creek Formation, North Dakota
Lovedale, Carson P; Lee, Hwmkong B; Oloyede, Ayomide O	1a	31	BIOL	Parasite Identification in Waterfowl on the Upper Mississippi River
Martin, Anna C	2a	13	CHEM	The Degradation of Acetaminophen in Water using Bleach
Matuszak, Hannah; Velishek, Lydia J; Cho, Honggun; Quinn, Zoharel Anthony T	1b	24	CME	Furniture Build Project
McCoy, Sean M	2a	15	PSY	Individual Facets of Emotional Dysregulation as Predictors of Aggression
Mutch, Jacob P	1b	26	SOC	Legalization of Marijuana and Economic Growth in U.S. States
Nelson, Sawyer J	2a	17	CS	Tennis Action Recognition Based on a Deep Learning Model.
Ness, Saralynn E	2a	19	PSY	Parental Attachment and Emotional Dysregulation
Normoyle, Caitlin E; Orr, Shelby	2a	21	BIOL	Molecular Studies to Evaluate Variegation of Philodendron var. Birkin
Obuyekha, Reynold W	1b	28	CS	Comparing MD5 and SHA-2 in password hashing
Quevedo, Elisa M; Chase Sylvia P	2b	10	CHEM	TDDFT predictions of UV-vis spectra in ethanol for an array of curcumin analogues
Ramsden, Renae A	1a	33	CS	Investigating Password Reuse for Security at Winona State Computer Science

Presenters	Sess	#	Dept.	Title
Riebel, Thea E; Maeder, Easton B; Sosinsky, Tasha L; McCarty, Oliva G	1b	30	BIOL	Identification of Trematodes in Waterfowl in the Upper Mississippi Flyaway. A Parasitology Class Project
Riebel, Thea E; Savage, Matthew	2a	23	BIOL	Genetic and Morphological Analyses of co-occurring Treehoppers (*Entlylia carinata* and *Publilia concava*)
Rios, Madison L	2a	25	PSY	The Role of Ethnicity and Mental Health in Coping, Stress, and Self-Compassion
Rodriguez, Julian; Schurhammer, Parker M; Popieluch, Andrzej W; Fabian, Trevor S; Bennick, Michael J	2b	12	CME	CARGO X: The fully collapsible and storage friendly rooftop cargo-carrier
Rognlie, Emma L	1b	32	SOC	Psychological Effects of Using Facial Masks in Classrooms
Schabacker, Amanda J	1b	34	SOC	The Investment in College Education: Is it Worth it?
Scheithauer, Cameron J	2b	14	CHEM	Determination of the Rate Constant for H Atom Abstraction by Phenyl Radicals for THF
Schmalz, Ben J; Sanvik, Connor J	1b	36	CS	Using YOLOv5 Object Detection and a Raspberry Pi to Improve the Safety of Drivers
Schultz, Leeandra T	2b	16	BIOL	Climbing Performance of Boas (boa imperator) Raised on Two Feeding Regimes
Schurhammer, Peter C	1a	35	CS	Approaches of Data Security by Businesses
Sells, Justin L	2b	18	CHEM	Creating an Exploratory Protocol of Protein Thermodynamics for Chemistry Undergraduates
Senchea, Kathryn; Ojo, Blessing I; Fernando, Maya R	1a	37	CHEM	Identification of Drug Metabolites of Tricyclic Antidepressant Medications in Rat Liver Microsome Using Compact Mass Spectrometry
Siro, Ellen	1b	38	CS	CT Image Segmentation for Prostate Cancer Diagnosis Based on 3D U-net Deep Learning Model
Steele, Carlynn J	1a	39	BIOL	Influence of Feeding Regime on Growth and Body Size in the Boa (Boa Imperator)
Stoltman, Kathleen E; De Leon-Sanchez, Monica S; Maeder, Easton B	1b	40	BIOL	Bobcat Parasites of Wisconsin
BobaTapp, Jordan L	1b	41	SOC	The Effect of the Covid-19 Pandemic on Psychological Well-Being
Teigland, Alissa K	1b	42	CS	Evaluation of a Modified Trémaux's Maze Solving Algorithm
Turman, Erin C; Zugschwert, Heather L	2b	20	BIOL	Development of Quantitative PCR Assay to Determine Presence of Borrelia burgdorferi within *Ixodes scapularis*
Venne, Emily A; Taylor, Jasmyne T; Pearson, Matthew N	2a	27	ENGL	Satori Literary Magazine

Presenters	Sess	#	Dept.	Title
Wilson, Weston C; Cho, Honggun; Nielsen, Anders	2a	29	CME	Impact Properties of Continuous Fiber Reinforced Thermoplastic Composites
Zill, Olivia B; Osteraas, Krista L; Hoyt, Christiana L; Johnson, Kaitlin I	2a	31	CHEM	Elucidation of solution state structures of $CoCl_2$ in assorted Lewis basic solvents

Music Performance – Oak Rooms E&F

Presenters	Time	Dept	Title
Schumacher, Jake E; Upham, Tyler M	1:15 PM	MUS	Liberation by Joel Love, and Black by Marc Mellits

Recorded Oral Presentations
https://openriver.winona.edu/wsurrc/2022/

Presenter	Dept	Title
Brist, Korey M	BIOL	Viral Fibroblast Growth Factors Tagged with Maltose Binding Protein can be Purified using Cationic Starch Derived from Corn
Pierre-Toussaint, Kennedy L	ART	Stamp of Action
Wuensch, Jordan; Trask, Abby D;Aung, Ei Myatnoe	ART	Restaurant UX Service App

Faculty Research Presentations – Oak Rooms E&F

Presenter	Time	Dept	Title
Tammy Swenson-Lepper	11:00 AM	CMST	Social Media, COVID-19, Misinformation, and Ethics: A Descriptive Study of American Adults' Perceptions
Erik Heinrichs	11:20 AM	HIST	Fighting Plague and Heresy in Early Modern Bavaria
Thomas Nalli	11:40 AM	CHEM	Determination of rate constants for hydrogen abstraction by phenyl radicals from fatty acid esters
Eric Kerr-Anderson	12:00 PM	CME	Accelerated Tensile-Tensile Fatigue Testing of Long Fiber Thermoplastic Materials

Events throughout the Week

Monday, April 18

Percussion Ensemble Concert - DuFresne Performing Arts Center Recital Hall - 7:30 pm

Wednesday, April 20

Ramaley Research Celebration – 9:00 am to 3:00 pm - Kryzsko Commons Ballroom and Oak Rooms

Create Your More® Case Competition Finals Presentations – 1:00 to 3:00 pm Business Engagement Center, Somsen Hall

Early Years Research and Creative Mentoring Grant Recipients Presentations – Kryzsko Purple Rooms 10:30 - Noon

Thursday, April 21

Community Creative Achievement Day 2022
Rochester Campus Virtual Event
1:00 – 4:30 pm

Friday, April 22

WSU Jazz Ensemble - DuFresne Performing Arts Center - Vivian Fusillo Main Stage Theatre
7:30 pm

Sunday, April 24

WSU Symphonic Wind Ensemble & Symphonic Band 2:00pm @ Winona State University - DuFresne Performing Arts Center - Vivian Fusillo Main Stage Theatre

Monday, April 25

WSU Jazz Combos 6:00pm @ Winona State University - Kryzsko Commons - Zanes

Index: Presenters and Faculty Mentors