Scenes At The Shore

Susan Scuderi

Departmental Affiliation: Art
College of Arts and Sciences

Project Code: ART - 1

The assignment in 2D and 3D Art was to construct a found object assemblage-sculpture that balances positive and negative space. Louise Nevelson's assemblage-sculpture style is the inspiration for this work of art titled, "Scenes At The Shore". The focus when laying out the rectangular components of the design was to maintain overall balance to the composition. Thoughts of time spent in the state of Michigan began to develop into mini pictorial scenes. Found objects such as picture frames, cork, glass, wood, paper, and stone were incorporated into the design. Each component was filled with objects to create independent scenes. Collectively, the scenes were arranged to complement each other with the underlying principle of positioning the lines to remain as vertical as possible. Louise was an abstract artist so the scenes were created to focus as much on interpretation as possible. Maintaining a balance to the design with complexity and simplicity was another focus as each scene was built. Images displayed reflect a sun, moon, beach blanket, grasses, sailboats, sand dunes, umbrella's, a concession stand, water, driftwood, stepping stones, piers, sandcastles, ship's masts, and grapes. The use of one color only for the assemblage-sculpture allows the eye to view the design without being drawn to a specific color. White is pure and light, it gives the viewer a heightened perception of space. Louise predominantly used either all white or all black in her sculptures. The final assemblage-sculpture achieved the goal of balancing positive form with negative space.

Information about the Author(s):
Creativity is important to me and expressing it in different ways is my current goal. The first college art class I took at V.U. was Sculpture. Paper sculpting was the main medium for this class which led to learning about sculpture artists and Louise Nevelson. This completed assemblage-sculpture required for 2D and 3D art is a progression of my sculpting skills.

Faculty Sponsor: Michael Barlow

Student Contact: Susan Scuderi susan.scuderi1@valpo.edu
Our Every Day

Ashley Borg

Departmental Affiliation:  Art
College of Arts and Sciences

Project Code:  Oral - ART - 2

Our Every Day is a photo book that focuses on the concept of mental illness (specifically anxiety and panic disorders) through photographs and experiences of those diagnosed. Ashley recruited multiple people who have been diagnosed with an anxiety and/or panic disorder and had them fill out a survey asking them about their experiences and coping mechanisms. Quotes from the surveys were put next to the photos in the final photo book created. The photographs are a visual representation of the various sensory perceptions people go through when dealing with high anxiety and panic. They prompt the viewer to look at the world from a viewpoint other than their own. Ashley's goal is to encourage the viewer to reconsider certain preconceived ideas they might have, or at the very least help them become aware of what assumptions they make on a daily basis. Not only is this project for those who haven’t been diagnosed, but it is also for others who have been diagnosed. She wants to help those who participate to know that they are not alone and that they are valuable and capable of so many things. Ashley has always been passionate about mental health awareness, especially since she has been diagnosed with a mental illness herself.

Information about the Author(s):
Ashley chose mental illness as the concept because it is a topic she has been passionate about for years having been diagnosed with anxiety. Her passion for art has been an essential coping mechanism, and that's what lead her to become a Digital Media Art major. Ashley thoroughly enjoyed combining her two biggest passions (mental health and photography) for this project and she hopes to continue to explore this concept further.

Faculty Sponsor:  Liz Wuerffel

Student Contact:  Ashley Borg ashley.borg@valpo.edu
Pain in Beauty: A Clothing Connection

Megan Seibert

*Departmental Affiliation:* Art
*College of Arts and Sciences*

*Project Code:* Oral - ART - 3

Everyone has at least one piece of clothing in their closets that serves as a secret weapon - an article that makes them feel like they can tackle the world. What sets this piece apart from average every day clothing? Does it hurt? As an artist discovering textiles for the first time, I was curious about the stigmas our society has when it comes to garments that "look good". Typically, these are items that make push up our breasts, and make us look taller and skinnier. In order to achieve this, we must endure some level of discomfort. However, these garments are sourced from a history of community and support, and because of this, we still have them today. I was inspired by the link history created between pain and beauty.

Within the Brauer Museum of Art will be a large display featuring more than 30 garments sourced from the community that creatively display this discomfort through the use of mixed media items such as razor blades, chains, and nails. In addition to the objects, several of the pieces include hand-embroidered phrases and poetry from artists who were integral parts of their communities, and which emphasizes the message of perseverance and group support.

The museum display includes 3 empty human silhouettes, and visitors are invited to place themselves in these spaces and contemplate our clothing, our sources, and our communities.

*Information about the Author(s):*
Megan Seibert has been perusing creative mediums her entire life, and aspires to try as many new artistic methods as possible. At the beginning of the 2018-19 school year, she began to experiment with textile mediums, and by extension, learning to sew. This lead to the creation of a dress, which in turn lead to the startling realization that garments that are seen as better than average or formal tend to be extremely uncomfortable. This inspired Seibert to create this series.

In the future, she plans to continue creating garments from scratch, and also hopes to discover other new and exciting mediums as well.

*Faculty Sponsor:* Sarah Jantzi; Liz Wuerfel

*Student Contact:* Megan Seibert megan.seibert@valpo.edu
Do I Have Your Attention Yet?

Drake Mattingly

Departmental Affiliation: Art
College of Arts and Sciences

Project Code: Oral - ART - 4

People tend to react in various ways when they encounter something that they do not understand, something that is where it should not be, or something that is invading their personal space. This project is a social experiment that seeks to evoke a response from its viewers and ask the questions of how will people respond when they encounter something as previously described. The series of posters displayed across Valparaiso University seek to ask these questions. Posters are images and designs that have meaning and convey information. The designs of this project however, are practically void of meaning and have no real information to present to the viewer. In this sense, they present the viewer with something they do not understand. The placement of these designs seek to invoke a sense of invasion of personal space and to appear where they cannot be missed, and in doing so, they must appear where typical posters do not. Each of these posters are accompanied by a small card that asks the viewer if they are curious and provides an Instagram hashtag for them to interact with, in the chance that they are curious and wish to find out more. The viewer is encouraged to interact through Instagram, and by doing so, they may see themselves become a part of a much larger show. The results of said show will be determined based on viewer response.

Information about the Author(s):
Drake Mattingly is a senior at Valparaiso University studying Digital Media Art. After graduation, he plans on spending a year working in Germany through a co-op program with Hochschule Aalen. His aspirations are to be a graphic designer and a translator.

Faculty Sponsor: Liz Wuerffel; Sarah Jantzi

Student Contact: Drake Mattingly drake.mattingly@valpo.edu
Take A Seat

Marc Boas

Departmental Affiliation: Art
College of Arts and Sciences

Project Code: Oral - ART - 5

“Take A Seat” is the Senior Thesis Art Project of Marc Boas. It consists of two parts, the first part being a mural located in the foyer of Neighbors Place. For this project, Boas worked in collaboration with Project Neighbors, an organization that aims to provide affordable housing to residents of Valparaiso. Neighbors Place is one of their biggest projects, serving as a home for women in need of affordable housing. Boas met and worked with these women to inform both the design and process of his mural. The project is focused around the theme of community and diversity. The work seeks to give a representation of what Project Neighbors and the community of Neighbors Place stand for. The spectator is encouraged to, metaphorically speaking, “take a seat” at the table of Project Neighbors. This imagery was inspired by Dutch genre paintings of the 17th centuries, by artists such as Gerard van Honthorst, where compositional elements are used to place the viewer in the same space as the subjects.

The second part of the art project is a digital animation, created by repeatedly photographing the progress of the wall in order to obtain a stop motion effect. It carries the same themes and messages as the mural itself, but seeks to heighten this narrative by highlighting/bringing to life certain aspects of what Project Neighbors represents. The final works will be on display both in Neighbors Place (permanent) and the Brauer Museum of Art (Senior Student Art Show).

Information about the Author(s):
Marc Boas is a Senior VU student from the Netherlands, majoring in Digital Media with minors in Creative Writing and Individualized Studies. He has been involved in the arts from a young age and has always loved working creatively. In the future he hopes to find a job that balances his interests in both the arts and the sciences.

Faculty Sponsor: Professor Wuerffel

Student Contact: Marc Boas marcus.boas@valpo.edu
PKC activation induces ubiquitination of the Na-K-2Cl cotransporter 1 in the human colonic epithelial cells T84

Payton Klosa, Marie Dix, Amanda Bazaldua, Emily Hughes

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 1

Gut clearance (i.e., fluid secretion) is one of the first lines of defense of the intestine against toxins and opportunistic bacteria. In the colon, fluid secretion is coupled to chloride secretion. Previous work has demonstrated that the basolateral Na-K-2Cl cotransporter 1 (NKCC1) represents a site for regulating fluid secretion independently of the apical chloride channels such as the cystic fibrosis transmembrane regulator. In addition, the lab has shown that protein kinase C (PKC) activation causes internalization of NKCC1, which in turn blocks chloride secretion. To date, the post-translational signal responsible for NKCC1 internalization during PKC activation remains unknown. Similarly, the fate of NKCC1 in the endocytic pathway has not been elucidated. In the present study, we investigated the role of ubiquitin as post-translational signal responsible for NKCC1 internalization. Experiments were performed on the human colonic T84 epithelial. Cells were incubated with or without 100 nM phorbol 12-myristate 13-acetate (PMA), a PKC activator, or in presence of 100 µM carbachol, a M3 muscarinic receptor agonist, for 15 or 30 min. NKCC1 ubiquitination was tested by western blot after immunoprecipitating NKCC1. Our preliminary results show that PMA and carbachol induced an increase of NKCC1 ubiquitination compare to control. In addition, blocking the lysosome with 5 µM NH4Cl did not prevent NKCC1 degradation during PKC activation by PMA. Our results suggest that PKC induces NKCC1 internalization through a ubiquitin-dependent pathway and may target NKCC1 for degradation in a lysosomal independent-manner.

Information about the Author(s):

Faculty Sponsor: Patrice Bouyer

Student Contact: Payton Klosa payton.klosa@valpo.edu
Analyzing Plastic Degradation from Winogradsky Columns of Two Sample Sources

Sarah Dilday, Jhanelle Spence

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 2

Microbial organisms are vital components of ecological systems in nature; and as the industrial age continues, plastic and its degradation is becoming an increasing problem. Within our research, we’ve utilized two different sample sources to test the effects microbial organisms would have on plastic straw decomposition. We used 22 Winogradsky columns for each sample source, lagoon and swamp. The Lagoon and the Swamp samples were chosen due to the diversity of microbial organisms within these habitats. The samples were homogeneous, each column was put under similar conditions, with a side continuously exposed to the light and the alternate side under little to no light conditions. Each side of the column, both light and dark, were given plastic straws near the edge. Approximately every month, we froze a column from each source to examine the straws and the microbial layers. The columns that were frozen were thawed and were cut into about 8-12 sub-samples. Those samples are then separated into tubes, “light vs. dark” for both the samples and the straws within each layers. The sub samples were important in ensuring individual habitat colonies in the various sections of the column were accounted for. The composition of plastic in the straws will be analyzed in order to determine if degradation has occurred due to the microbial organisms. Our results of plastics and the decomposition or lack of decomposition will enable others to better understand the severity that plastics can have on the environment.

Information about the Author(s):
Jhanelle Spence is a first year undergrad at Valparaiso University. She is a Biology Pre-Med major and is apart of Establishing Practices for Integrating Commuters (EPIC) science, technology, mathematics program at Valparaiso University. With her fascination of science she hopes to pursue her goal of going to medical school and becoming a doctor.
Sarah Dilday is a first year undergraduate student at Valparaiso University. She is in the five year BS/MS physician assistant program, with an undergraduate major in health science and a minor in biology. Her current endeavors have sparked an interest in continuing research of microbial organisms and their environmental effect throughout her undergraduate education.

Faculty Sponsor: Dr. Sara Dick

Student Contact: Sarah Dilday sarah.dilday@valpo.edu
Characterizing the Antimicrobial and Anticancer Activities and Several Associated Bioactive Compounds of Argemone mexicana

Teodora Najdeska, Estefany Bocangel Gamarra, Kelly Davidson, Tj Lefeber, Danielle Orozco-Nunnelly

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 3

Commonly called the Mexican prickly poppy, Argemone mexicana is a stress-resistant member of the Papaveraceae family of plants that has been used in traditional medicine for centuries by indigenous communities in Mexico and Western parts of the USA. This plant has been used to treat a wide variety of ailments, including skin diseases and intestinal infections, with reported antimicrobial and anticancer properties. However, these properties are poorly understood, with no associated bioactive compounds yet identified. Herein, we describe the germination conditions of A. mexicana and preliminarily characterize the antimicrobial and anticancer activities of different parts (seeds, leaves, inner vs. outer roots) of the plant. We show that when comparing 1 mg of each sample normalized to background solvent alone, the A. mexicana methanol outer root and leaf extracts possess the strongest antimicrobial activity, with greatest effects against gram-positive bacteria tested, and less activity against gram-negative bacteria and fungi tested. Additionally, we report that when using the MTT colorimetric assay, the outer root and leaf methanol extracts and the seed hexane extract have pronounced inhibitory effects against T84 human colon cancer cells. Using normal-phase column chromatography and subsequent mass spectrometry analysis of the outer root and leaf methanol fractions, we have begun to chemically characterize several candidate antibacterial compounds. These preliminary results warrant further research into defining the bioactive chemicals produced in the roots, leaves and seeds of A. mexicana and are especially significant given the growing global concern of antibiotic-resistant ‘superbugs’ and lack of new antimicrobial and anticancer drug discovery.

Information about the Author(s):

Faculty Sponsor: Danielle Orozco-Nunnelly

Student Contact: Teodora Najdeska teodora.najdeska@valpo.edu
Death Stinks: Characterizing the Volatiles that Attract Blow Flies During Decomposition

Raenah Bailey

*Departmental Affiliation:* Biology
College of Arts and Sciences

*Project Code:* BIO - 4

Blow flies (Diptera: Calliphoridae) are attracted to the volatile compounds (organic compounds that easily become airborne) given off by decomposing matter. Baits are often used as human substitutes in forensic entomology, and a bait should approximate the volatiles given off by decomposing human bodies as closely as possible. This fact has led us to investigate the different volatiles, and how the volatiles change throughout the process of decomposition in chicken liver. Based on this, we will assess how well chicken liver approximates the process of decomposition in a human body. Chicken liver was placed in a sealed mason jar for gases to accumulate in the headspace. A small hole was punctured in the lid of the mason jar and gases were drawn into one of three different solid-phase microextraction (SPME) fibers. After the SPME fiber was left in the jar for five minutes, Gas Chromatography-Mass Spectrometry was used to analyze the volatiles. Preliminary results that show the most common compounds being released from the liver are methyl disulfide, dimethyl trisulfide, dimethoxyflavone, and 1-(3-hydroxypropyl)-2-piperidinone. The results are being compared with published literature to identify important substances in gases that attract blow flies and which sample gives the most reliable results in comparison to a human cadaver. The knowledge gained will be used to assess the appropriate amount of time to age baits to best simulate human cadaver volatiles found in the literature.

*Information about the Author(s):*

*Faculty Sponsor:* Kristi Bugajski

*Student Contact:* Raenah Bailey raenah.bailey@valpo.edu
Identification of Unknown Blowfly Species

Tyler Grimes, Jeremy Seiler, Kayla Currier, Nathan Mcchesney

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 5

The identification of early arriving blowflies to a corpse is important for contributing to estimates of time of death in forensic investigations. Previously, identification of blowfly species was accomplished by growing the eggs masses through the life cycle for two weeks until reaching adult blowfly stage. Our goal is to shorten the identification process by analyzing the species differences in the cytochrome oxidase 1 gene of the six most commonly found blowflies in Northwest Indiana. DNA was isolated from egg masses collected by the lab of Dr. Kristi Bugajski, and species were identified using DNA sequencing. The goal of this investigation is to develop a protocol that could be done in a laboratory setting, which eliminates the need for complete sequencing of the different species. To accomplish this, six PCR primers have been developed that are specific to the six most common blowfly species in the area. After amplifying the isolated DNA with the six species specific PCR primers, agarose gel electrophoresis was used to identify which species the DNA came from based on what primer amplified the DNA. This procedure has successfully identified two separate species of blowfly from one sample of isolated DNA by utilizing the primers for both genes. This data helps support our theoretical procedure of identifying unknowns. Future experiments include testing this procedure’s ability to elongate three or more separate species from one sample with our primers. If successful, the protocol will be published for use in a laboratory teaching setting.

Information about the Author(s):
Jeremy and Tyler are current undergraduate students at Valparaiso University working on the project. Jeremy is a junior pre-med student double majoring in biology and chemistry. He is from Angola, IN, and is on the track and field team for Valparaiso. Tyler is a senior pre-med student who aspires to become a physician. He is double majoring in biology and chemistry and is from Indianapolis, IN.

Faculty Sponsor: Dr. Beth Scaglione-Sewell

Student Contact: Jeremy Seiler tyler.grimes@valpo.edu
Effects of Microfibers on Zebra Mussel (Dreissena polymorpha) Attachment Behavior

Thomas Paul, Cody Banks, Laurie Eberhardt

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 6

Microplastics and fibers are an ever-growing ecological concern which result from both the breakdown of plastic pollutants and from human activities. Little is known of the behavioral effects which these pollutants have on affected organisms. Zebra mussels (Dreissena polymorpha) are an ecologically important invasive species of filter feeders found in local freshwater systems which could help illustrate the ecological effects of microfiber pollution. Zebra mussels were collected from Stone Lake and Flint Lake and were exposed to treatments of blue polyester fleece fibers and polypropylene fibers from a rope to study the effects these typical pollutants have on attachment behavior of zebra mussels to substrates. Both types of pollutants were shown to have significant impacts on the amount of force required to remove a mussel from its substrate. This preliminary study indicates that attachment strength is a useful and measurable tool for studying behavioral effects of microfiber pollutants and opens up possibilities for further research and understanding of the larger ecological effects and implications of plastic pollutants.

Information about the Author(s):
Cody Banks is a biology and environmental science double major in his final semester at VU. He is interested in environmental restoration and ecology, which have lead him in the direction of research that deals with impacts of human inputs into natural systems, as well as towards the field of restoration and management in the Lake Michigan watershed. Growing up near Lake Michigan spurred an interest in understanding and protecting freshwater ecosystems.
Thomas Paul is a sophomore at Valparaiso University who is currently a Biology major and Chemistry minor. While Thomas is currently involved in the preMed program, he is also fascinated by epidemiology and hopes to possibly work one day with the CDC. This is the first research experience for Thomas, but he hopes to continue similar work throughout his undergraduate education.

Faculty Sponsor: Dr. Laurie Eberhardt

Student Contact: Thomas Paul thomas.paul@valpo.edu
Impact of Microplastic Fiber Pollution on Planorbella campanulata (Ramshorn Snail) Fecundity and Mortality

Kalleb Miller, Cole Philips

Departmental Affiliation: Biology
College of Arts and Sciences

Project Code: BIO - 7

Plastic pollution in bodies of water is an emerging environmental issue. As research towards plastic microfiber pollution (synthetic fibers <5mm shed notably from clothing and>carpeting) continues to be explored, multiple effects on marine life have been discovered. This study is a continuation and expansion of a summer research project on the potential effects of plastic microfibers on the freshwater organism Planorbella campanulata (Ramshorn Snail). The snails were exposed to polyester microfibers for six weeks, the same amount of time as the previous study. The mortality of parent snails, along with the amount of eggs, egg sacs, and offspring was recorded. An effect of exposure to microplastics was found, with a higher rate of mortality in parent snails (T=2.120, n=11, p=0.012). A trend in more eggs being laid was also observed in snails exposed to microplastics. Our results suggest that microplastic pollution can have negative effects on freshwater organisms.

Information about the Author(s):
Kalleb Miller- A junior Biology Pre-dental Major with minors in Chemistry and Psychology at Valparaiso University. Although I enjoy doing research, I work towards Dental School and opening a practice one day.
Cole Philips- A freshman Biology Research Intensive major at Valparaiso University. I hope to gain more research experience here at Valparaiso as I move forward in my academic career.

Faculty Sponsor: Dr. Laurie Eberhardt

Student Contact: Kalleb Miller kalleb.miller@valpo.edu
Effect of Estrogen on Morphological Change in Candida albicans and Neurospora crassa

Idalia Zachara, Chase Jones, Paige Camp, Hamza Hasan, Patrice Bouyer

Departmental Affiliation: Biology, College of Arts & Sciences
College of College of Nursing and Health Professions/ Health Science- PA Program

Project Code: BIO - 8

Within the human intestine, opportunistic pathogens, like Candida albicans (C. albicans), live in symbiosis with the host. Under certain stresses, C. albicans can change its morphology from yeast to filamentous and invade the body. During sepsis, estrogen levels dramatically increases, and are associated with poor patient outcome. We hypothesize that high estrogen levels may cause filamentous growth in C. albicans. Morphological changes in the filamentous fungus, Neurospora crassa, have been well characterized therefore, in addition to C. albicans we are using Neurospora as a model to test gut environmental factors on morphology.

C. albicans, was grown on liquid media YEPD, whereas Neurospora was grown on agar plates. Estrogen (1 µM, 1 nM, and 0.1 nM) was added to either the liquid media or to the plate and morphological changes were assayed by light microscopy.

Our preliminary data show that we are able to induce morphological change in C. albicans with N-acetyl-D-Glucamine, a positive control. In one experimental series, we tested increasing concentration of estrogen (0.1 nM, 1 nM and 1 µM) on filamentous growth in C. albicans and did not find a significant effect of estrogen compared to control (ANOVA P = 0.8, n = 8). Exposing Neurospora to 1 µM and 1 nM of estrogen caused Neurospora to grow more densely and erratically . Conversely, 0.1 nM estrogen caused Neurospora to grow not as dense but branch out farther onto the plate (triplicate experiment).

We have established experimental conditions to test the effect of estrogen on both C. albicans and Neurospora’s morphological changes. This will allow for rapid screening of other factors that may be prone to causing morphological changes, such as inflammatory cytokines.

Information about the Author(s):
Idalia Zachara is a first year student in the Health Science, Physician Assistant Program. Being on the path to a career in the medical field, she was very excited to be accepted to join Dr. Bouyer's research lab which studies various pathogens that live within the human body. Idalia credits her grandparents for encouraging her to be interested in health and biology as well as natural medicine. She hopes that her contribution in the lab can result in greater understanding of the pathogens being studied, such as Candida albicans, and teach her important knowledge for her future as a health professional.

Paige Camp, Chase Jones, and Hamza Hasan are all part of Dr. Bouyer's lab as well, and authors of this project.

Faculty Sponsor: Patrice Bouyer

Student Contact: Idalia Zachara idalia.zachara@valpo.edu
Student Perceptions of Valpo Basketball Joining the MVC

Alex Becker, Joshua Yonker, Cameron Behymer

Departmental Affiliation: Marketing
College of Business Administration

Project Code: BUS - 1

The purpose of this study is to identify factors causing low attendance at Valparaiso University Men's Basketball games after joining the Missouri Valley Conference (MVC). Additional variables that can improve student attendance at games will also be considered. The research objectives are to: 1) measure student perceptions of the MVC and examine factors that impact those perceptions, 2) determine why students do or do not attend games and what will influence that decision, 3) identify what will improve student perceptions, and 4) discuss implications of findings to attract more students to upcoming Valpo basketball games. A survey with 259 responses was implemented to achieve these objectives. Results showed that students believe the lower attendance is due to an increase in lost games and the lack of a rival after the conference change. Significant factors that would encourage students to attend a game are an increase in team performance, attending in a group, theme nights, and knowing the players on a personal level. These responses indicate that students want to experience comradery, whether it be with peers or players. Recommendations for improving attendance are to give group ticket deals, use social media to drive MVC rivalries, implement theme nights for games, and increase student-player interaction. These results must be interpreted within the confines of the study.

Information about the Author(s):
The authors completed this project for their marketing research class under the sponsorship of the VU athletic department.
Alex Becker is a senior finance major from McHenry, IL. He has done market research work for John B. Sanfilippo and Sons, Inc (JBSS) focusing on a company acquisition. Alex will be doing financial consulting in the medical field upon graduation.
Cameron Behymer is a senior marketing major from Shorewood Illinois. Cameron currently works for State Farm and became a licensed insurance broker last year. Cameron plans to work in medical sales after graduation.
Joshua Yonker is a senior marketing major from West Dundee, IL. Joshua will be working as a consultant for the Sigma Phi Epsilon Fraternity as a regional director upon graduation. He hopes to bring that consulting experience into the medical sales field in the near future.

Faculty Sponsor: Musa Pinar

Student Contact: Joshua Yonker alexander.becker@valpo.edu
Efficiency of the Valparaiso University Crusader Transit

Lauren Schneider, Anna Raimondi, Kortney Klipstine

Departmental Affiliation: Civil Engineering
College of Engineering

Project Code: CE - 1

The purpose of this project is to evaluate the effectiveness of riding the Valparaiso University Crusader Transit bus versus walking in order for students to get to different locations on campus. We will test this by timing ourselves and walking to different destinations and then also taking the bus from the same starting point to the same destination. Multiple trials are included in this project, including short range, medium range, and longer range of distances on campus. This will determine how far of a distance is most effective to take the bus or if it is even effective at all, when compared to walking. Testing will also include taking the Crusader Transit at various days and times of the week to see whether the timing of the university provided transit system has a larger variation. This is important when comparing the time it takes to get to a location by walking because walking will most likely be more consistent and dependable at all days and times. To keep walking to a location more controlled, we will develop a consistent walking speed of around four and a half feet per second, which is believed to be an average walking speed. This research has significant implications for college students given their limited time to get to classes or places on campus. It will help inform students about the fastest way to get from one place to another based on time of day, day of week and distance between origin and destination.

Information about the Author(s):
This project was selected because, as students of Valparaiso University, each of the authors have had differing experiences with the university provided transit system and the effectiveness of this transportation. The interest in this topic stems more directly from the authors having to walk long distances in short amounts of time across campus to make it to class on time. Each of the authors are a sophomore in the Civil Engineering Department at Valparaiso University, therefore they have interest in the study of transportation. All of the authors will be employed with civil engineering internships following this academic year. Future goals of the authors are to work in water resource engineering, environmental engineering, or possibly transportation engineering.

Faculty Sponsor: Jay Grossman

Student Contact: Anna Raimondi lauren.schneider@valpo.edu
The Stability of Unnatural Amino Acids within Mars Planetary Conditions

Christopher Smith, Claire Kovarik, Kelly Davidson

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 1

This research project was to test the stability of natural and unnatural amino acids following exposure to certain conditions found on Mars. Amino acids are the building block from which proteins are made in living organisms. The natural aromatic amino acids used first in this study were tyrosine (Tyr), tryptophan (Trp), and phenylalanine (Phe) because these amino acids contain C-C double bonds that can be detected with the UV detector on our instrument. Martian soil has a perchlorate concentration of approximately 0.5%, and this may cause water to hydrate in the soil. However, the toxicity from radiation and perchlorates on Mars presents a challenge to the viability of life as we know it, forming within those conditions. The objective of the study was to help answer if unnatural amino acids found on Earth are more stable than natural amino acids when exposed to the soil conditions found on Mars. Specifically, simulated Martian soil (termed Mars regolith simulant) was spiked with 0.5% sodium, magnesium, or calcium perchlorates salt and mixed with Tyr, Trp, or Phe amino acids dissolved in water. The amount that these amino acids degraded following these conditions was then quantified using an ultra-high performance liquid chromatography-mass spectrometry instrument (UHPLC-MS). In this study only natural amino acids were tested, but in the future aromatic unnatural amino acids will also be tested using the same conditions.

Information about the Author(s):
<sup>1</sup>IvyTech Community College, Department of Science, Valparaiso, IN
<sup>2</sup>Vaparaiso University, Department of Chemistry, Valparaiso, IN

Faculty Sponsor: Laura Rowe

Student Contact: Christopher D. Smith csmith1384@ivytech.edu
Stability of Proteinogenic Amino Acids in Martian Conditions

Claire Kovarik, Christopher Smith, Kelly Davidson, Laura Rowe

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 2

The study of the stability of amino acids in extraterrestrial environments could provide clues as to how life on other planets could have evolved. There are 21 amino acids used to construct proteins by organisms on Earth, and these are called proteinogenic amino acids. However, there are many amino acids that are not used to construct proteins, and these are called non-proteinogenic amino acids. In this project, the stability of a select few of the proteinogenic amino acids was tested when exposed to simulated surface conditions on Mars. Synthetic martian regolith (soil) was used to mimic the surface of Mars. The simulated Mars regolith is 93% similar to genuine martian regolith. In order to further mimic actual Martian surface conditions, three different perchlorate salts were added to the regolith, since rover data on Mars has indicated that the surface soil of Mars has approximately a 0.5% perchlorate concentration. Perchlorates are highly oxidizing species that can break bonds in chemicals. The stability of three aromatic amino acids after exposure to this perchlorate spiked Mars regolith simulant and water was analyzed using a liquid chromatography-mass spectrometry system (UPLC-MS). Future work will repeat this experiment with non-proteinogenic amino acids and results could provide clues as to whether or not life on other planets would evolve to use the same proteinogenic amino acids that are used on Earth.

Information about the Author(s):

Faculty Sponsor: Dr. Laura Rowe
Student Contact: Claire Kovarik claire.kovarik@valpo.edu
Development of a Novel Epoxide-Containing Trimethylenemethane Precursor for Palladium-Catalyzed Cycloadditions

Mara Paterson

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 3

Pd(0)-catalyzed trimethylenemethane (TMM) cycloaddition reactions have been used extensively to generate disubstituted 5-membered rings with high levels of regioselectivity, chemoselectivity, and stereoselectivity. We aim to improve upon existing methodologies by introducing an epoxide into the TMM precursor, which should yield more highly functionalized products. A three step synthesis of a TMM precursor has been achieved in 20% overall yield. Efforts are underway to determine the reactivity of this precursor in Pd(0)-catalyzed cycloaddition reactions with substituted alkenes.

Information about the Author(s):
Mara Paterson is a senior chemistry major and has been involved in undergraduate research since January of 2017. Her interests in both organic and inorganic chemistry led her to begin working on this project, which ultimately became the focus of her honors work in August of 2018. Next semester, she will be attending graduate school to earn her PhD in organic chemistry, followed by a career as a professor.

Faculty Sponsor: Dr. Kevin Jantzi

Student Contact: Mara Paterson mara.paterson@valpo.edu
Streamlining the synthesis of folate mimics as potential antifungal agents

Zachary Bennett, Kassidy Grumbles, Anna Bockman, Jeff Pruet

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 4

Methionine Synthase (MetSyn) is an enzyme that creates the amino acid methionine, which is essential for all organisms. There are key differences between the B12-independent fungal MetSyn enzyme and the B12-dependant mammalian form, especially with regard to the proximity of the two active sites. Taking advantage of these differences, an antifungal drug could be developed to exclusively bind the fungal enzyme and inhibit fungal growth while leaving the host (patient) unaffected. As MetSyn is a folate-dependent enzyme, we are currently exploring the synthesis of various pterin-based molecules as these mimic the essential folate substrate. We have developed optimized paths to allow for rapid generation of new folate-mimics and other pterin derivatives. We have expressed the MetSyn enzyme and begun testing these molecules for activity in a fluorescent assay for monitoring MetSyn activity.

Information about the Author(s):

Faculty Sponsor: Jeff Pruet

Student Contact: Jeff Pruet
Synthesis of an Unnatural Fluorescent Amino Acid

Moriah Carmel, Hannah Laatsch

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 5

The long-term goal of this project is to chemically synthesize an unnatural fluorescent amino acid (UFAA) that can later be used to build glow-in-the-dark proteins. UFAAs allow the visualization of a single protein in an otherwise transparent living cell. The specific objective of this project is to synthesize a 4-(N,N-dimethylamino)phthalimide-based environment-sensitive fluorescent amino acid. The first part of this synthesis was the preparation of an anhydride (4-Methyl-Aminophthalic Anhydride), which was then coupled with commercially-available Boc-Dap-OtBu Hydrochloride. Finally, trifluoroacetic acid was used to remove the protecting groups, yielding the desired product. The product was characterized using 1H and 13C NMR, and Liquid Chromatography-Mass Spectrometry (LC-MS). The remaining tasks include improving the purification and percent yield.

Information about the Author(s):
Moriah Carmel is a Senior Chemistry Major from La Porte, IN
Hannah Laatsch is a Senior Chemistry Major from Janesville, WI

Faculty Sponsor: Dr. Goyne

Student Contact: Moriah Carmel moriah.carmel@valpo.edu
Sure It’s Fine, We Checked 9 Years Ago: Surface Water Quality Testing of the Little Calumet River in Gary and Lake Station, Indiana.

Jessica Villegas, Langston Stalling, Drake Shearer, Donovan McGill, Nathaniel Parson, Derrick Combs, Noah Wilkes, Amber Garcia

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 6

Fresh surface water is monitored every nine years in the state of Indiana, likely due to the cost and resources required. With nine year gaps in testing, arising problems caused by pollution from new industries, heavy salting of roads, and other sources can quickly escalate in severity. This leads to adverse health effects for aquatic ecosystems. In collaboration with Indiana University Northwest’s hydrology class, Valparaiso University’s Chemistry 190 class investigated several important parameters used to assess the health of fresh surface water. The samples were collected from the Little Calumet River in Gary near the IU Northwest Campus and Lake Station on February 12, 2019. Parameters of investigation included cation (Ca\(^{2+}\), Mg\(^{2+}\)) and anion (F\(^{-}\), Cl\(^{-}\), NO\(_{3}^{-}\), Br\(^{-}\), NO\(_{2}^{-}\), PO\(_{4}^{3-}\), SO\(_{4}^{2-}\)) concentration, number of microfibers, total suspended solids (TSS), turbidity, ammonia concentration, pH, conductivity, dissolved oxygen, total phosphorus, and total dissolved phosphorus of the fresh surface water. A number of methods were used, including ion chromatography, multiple methods of filtration, the Fenton reaction, and spectrophotometry. The results offer a better understanding of the water quality in the areas sampled; however, it is only a glimpse of the current conditions of two sites as opposed to long term monitoring statewide. The best method of assessing water quality is to monitor several locations consistently, frequently, and continuously. Our final analysis will be presented among the known healthy levels for these parameters.

Information about the Author(s):
Students are enrolled in Chemistry 190, Introduction to Chemical Research

Faculty Sponsor: Dr. Julie Peller

Student Contact: Drake Shearer jessica.villegas@valpo.edu
Synthesis of an Unnatural Fluorescent Amino Acid

Madeline Johnson, Cassandra Niemeyer, Thomas Goyne

Departmental Affiliation: Chemistry
College of Arts and Sciences

Project Code: CHEM - 7

The long-term goal of this project is to chemically synthesize an unnatural fluorescent amino acid (UFAA) that can later be used to build glow-in-the-dark proteins. UFAAs allow investigators to visualize a single protein in an otherwise transparent living cell. The specific UFAA target for this project is L-alanine, 3-[7-nitro-2,1,3-benzoxadiazol-4-yl], which is an analog of the natural amino acid tryptophan. This synthesis consists of a coupling reaction followed by a deprotection reaction. Products have been characterized using 1H and 13C NMR, and Liquid Chromatography-Mass Spectrometry (LC-MS). Future tasks could include optimizing the yield and purity of this UFAA.

Information about the Author(s):
Madeline is a senior at Valparaiso University, majoring in chemistry, and minoring in biology.
Cassandra is a sophomore at Valparaiso University, majoring in biochemistry, and is pursuing Pre-Med.

Faculty Sponsor: Dr. Thomas Goyne

Student Contact: Madeline Johnson madeline.johnson@valpo.edu
The Age of 360

Steven Reed

*Departmental Affiliation:* Communications
College of Arts and Sciences

*Project Code:* COMM - 1

Recently, the Virtual Reality market has erupted, and its impact, on the media landscape, is rapidly forthcoming, yet the magnitude of the impact is difficult to predict. Nonetheless, the editorial and distributional options it brings are vastly numerous, at least in theory – bringing about a deeper, more empathetic connection to the subject matter. And while my research is bringing me to conclude it to be an editor’s dream technology, its applications are not fully known or realized. And that can be especially argued when compared to the entrapment of the single direction frame. Yet even with the freedoms that 360 may allow, it does have its limitations. There is no safe space; everything in the capture needs to be inserted with increased intent, meaning 3-point lighting and other traditional cinema rules are out.

Nonetheless, I expect that the increased marketability is not a mistake. Spherical panoramas take in all available data and given the quality of the camera can make incredibly difficult shots more ascertainable and more cheaply producible. And many of the big-name companies are getting into the game, either for making editing more available or producing the content. And with the production of Ready Player One, VR is here to stay. Yet, my goal here is to see how others will take to the revolution. Black-and-white gave way to color. Digital took the place of film. And sound took the place of silent film. While those mediums have not gone away, technology will give us ever-more options.

*Information about the Author(s):*
I, Steven Reed, am a Senior at Valparaiso University and my pursuits are propelling me towards Virtual Reality entertainment, something I have been surveying since April 2017, something I know well enough to become an independent producer. But my goal, beyond my career path, is to bring live-action cinematic VR to Valpo, continuing to expand upon existing content and personal understanding and showing it to a new stage.

*Faculty Sponsor:* Philip Powell

*Student Contact:* Steven Reed steven.reed@valpo.edu
A Qualitative Study: Caregiver Experience of Dementia

Emma Kamp, Guadalupe Ortiz, Maddissen Brookshire-Green, Olivia Smith, Kayleigh Willett, Keegan Maris, Isabella Portugal, Madison Ling

Departmental Affiliation: Nursing
College of College of Nursing and Health Professions/ Health Science- PA Program

Project Code: CONHP - 2

Purpose and Background/Significance: Dementia affects an estimated 5.5 million Americans (Czekanski, 2017) and has ramifications for those affected with the disease as well as their caregivers. More than 15 million Americans currently care for individuals with dementia without pay, most provided by their loved ones (Czekanski, 2017). Caring for a loved one with dementia is associated with emotional, physical, and financial repercussions (Warchol-Biedermann et al., 2014). The objectives of this qualitative study were to assess effects of being a caregiver for someone with dementia and the impact of using an adult day service.

Theoretical/Conceptual Framework: Caregiver resilience is the successful use of coping strategies that emphasize the perspective of resilience rather than burden (Roberts & Struckmeyer, 2018). Fitting with the conceptualization of resilience, caregivers experience subtle but long-term role changes, both physical and emotional (Roberts & Struckmeyer).

Method: The sample consisted of caregivers of people attending an adult day center. Undergraduate nursing research assistants conducted two focus groups of 6-8 participants each to assess the caregivers’ experiences with their loved one. Data were collected through a series of structured, open-ended questions. Each session was audio recorded and transcribed verbatim for analysis. All recordings and transcripts were destroyed after dissemination of the data.

Conclusion: Results demonstrated that caregivers experience role overload, role strain, and variable levels of burden depending on their resiliency to manage the care that is needed. Using an adult day service assists with role strain and provide respite for the caregiver.

Information about the Author(s):
All authors are undergraduate students and members of the College of Nursing and Health Professions Undergraduate Research team. The project was selected due to the interest of the authors in the stress caregivers undergo when caring for loved ones with dementia. Having an adult day service facility locally that has been utilized for clinical experiences focused the research on caregivers use of this type of facility. We hope to continue refining our work in this area by maintaining a relationship with the facility and its participants.

Faculty Sponsor: Dr. Terry Kessler PhD, RN

Student Contact: Emma Kamp emma.kamp@valpo.edu
Improving Health Equity in Rural Costa Rica Through a Community-Based Participatory Intervention: An Undergraduate Research Project

Brandon LaChappelle, Ty Snarr

Departmental Affiliation: Public Health
College of College of Nursing and Health Professions/ Health Science- PA Program

Project Code: Oral - CONHP - 3

Background: The purpose of this ongoing project is to improve health equity in rural Costa Rica through social transformation. In the partnership phase, the goal was to strengthen and establish partnership between academic researchers and community members through community-based participatory research.

Methods: Community-based participatory research methods were used to strengthen the partnership. Researchers engaged established partners in community-based capacity building, developed new partners in the community, and completed community health assessments with community members.

Results: Both established partners and new team members participated in community health assessment interviews (n = 63). Face to face interviews were guided by an assessment tool adapted from previously used instruments developed with community partners. The community health assessment interviews revealed the potential need for health education programs, a village health committee, and improved access to healthcare.

Conclusion: Results from the community health assessment will be used by the academic-community partnership to guide planning for a participatory educational intervention aimed at health promotion and disease prevention to reach the community’s health-related goals. Partnership in community health assessment provides a mechanism to engage community members in working toward a common goal—health for all.

Information about the Author(s):
Brandon LaChappelle and Ty Snarr are Junior Public Health majors at Valparaiso University with interests in pursuing careers related to global health. They both have experience working with underserved populations abroad. Throughout their curriculum, principles of community based participatory action research (CBPR) have been emphasized, guiding them towards the desire to lead underserved communities into a healthier future.

Faculty Sponsor: Amy Buckenmeyer

Student Contact: Brandon LaChappelle brandon.lachappelle@valpo.edu
Refactoring Meteorology’s Online Weather Center

Chris Zenieck, Dusten Knull, Colin Braun

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 1

The Valparaiso University Meteorology Department uses their own website to display radar and satellite image data as well as data from files students collect and generate. While the clickable menus and controllable animated image loops make this site functional and easily accessible, the design and layout of the current site is very inconsistent with the main Valparaiso website. Challenges faced when the project began, we attempted to breakdown the legacy code for the formatting of the home Valparaiso website, which included very unorganized style sheets and extraneous unused code. Also, some of the underlying functions in their current state are difficult to maintain and expand upon. We looked at multiple alternatives to fix the site’s underlying structure, mostly three modern web frameworks known as Rails, Spring Boot, and Django. The final choice was to utilize Django to restructure the site, because of how lightweight it is and because it is written primarily in Python, a versatile programming language that both our group and the Meteorology department had experience with. By providing a new back end using the Django web framework, the website now has clean, reusable, and easily understandable code that is built in modules with potential for ease of expansion. This was accomplished by identifying individual web pages as Django miniature applications, which represent sub-components of the website, and by making heavy use of the template generation engine provided by Django, which has allowed the front-end to also be easily reusable as well as being much more lightweight.

Information about the Author(s):
Chris Zeniecki, A Junior CIS major with a background in Python and C with an extensive background in HTML and CSS.
Dusten Knull, a hard-worker with as strong background in Python as well as a fair amount of experience with web development (HTML and CSS)
<br/>Colin Braun, a resident Crystal Lake, IL and I'm a Computer Science major taking CS-358

Faculty Sponsor: Nick Rosasco

Student Contact: Dusten Knull chris.zeniecki@valpo.edu
Exploring Slot Assignment Methods in Flexible-Grid Optical Networks

Kimberly Orr

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 10

Every day, large volumes of digital traffic are sent and received over networks. In this research, I focus on large-scale optical networks, which are networks that span cities that transmit data at light speed through waves of light on fiber optic cables. These light waves can be modulated to different frequencies, or slots, so that multiple connections can be sent along a single fiber at the same time. Methods for routing network traffic more efficiently are still being developed so that networks can handle more traffic. Dijkstra's shortest path algorithm is the standard for determining the shortest path for a connection to travel from its source to destination along the network. However, in a network prone to congestion, where every path is not guaranteed to be available, there are other decisions to be made. For example, there is no standard method for assigning a set of frequencies, or slots, to each connection. Simulation programs are helpful for studying the impacts of these decisions. I built and tested a simulation program that allows me to compare different slot assignment methods for dynamically-generated network traffic that is routed over large-scale optical networks. Performance of each slot assignment method is measured by comparing rates of rejected connections under different network scenarios.

Information about the Author(s):
Kimberly Orr is a senior at Valparaiso University majoring in computer science and statistics. She enjoys using data to tackle interesting problems and gain insights about the world around her. After graduating this spring, Kimberly plans to work as a data scientist or software engineer in Austin Texas.

Faculty Sponsor: Asegul Yayimli

Student Contact: Kimberly Orr kimberly.orr@valpo.edu
Network Graph Categorization Based on Features

Arezu Mansuri, Cody Packer, Gabe Fragoso, Frankie Vazquez, Prasuna Pillalamarri

Departmental Affiliation: Data Science
College of Arts and Sciences

Project Code: CS - 11

Having a large collection of varied network graph data is significant for research findings. We have revealed that complex networks of their respective categories (cheminformatic, ecology, and infrastructure network graphs) have distinct similar structural properties amongst themselves. The goal of this project is to be able to more effectively and accurately categorize different graph networks through various machine learning algorithms (logistic regression, lasso regression, linear SVC, decision tree, and random forest and obtained the most important feature of the graphs) based on underlying features within each respective category. In order to achieve a more accurate categorization, more graph features are being included in the machine learning algorithm. The tools we used are C++ for calculating features and python for parsing and organizing features.

Information about the Author(s):
Arezu Mansuri is an international undergraduate at Valparaiso University. Her major is Computer Science and minor is Mathematics. After she graduates in May, she will be attending to graduate school for a Masters in Computer Science, specializing in Software Engineering.
Cody Packer is a sophomore computer science major. He is going to intern this summer as a programmer. He intends on becoming a software developer once he graduates.
Prasuna Pillalamarri is an international graduate student. Her major is in information technology. Her interests are in software development. She specializes in web applications and database design.
Gabe Fragoso is a freshman at Valparaiso University. He is a Computer Science major and a Mathematics minor.
Frankie Vazquez is a freshman majoring in Data Science.

Faculty Sponsor: Karl Schmitt

Student Contact: Arezu Mansuri arezu.mansuriortiz@valpo.edu
Hesse Center Shift Exchange Portal

Raquel Haro, Megan Janickovic, Madeline Flynn, Josiah Metzler

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 2

There has been a longstanding need for the Valparaiso University College of Engineering Hesse Learning Resource Center to track exchanged slots in the shift schedule to ensure tutor coverage. A portal and backend specific to the Hesse Center’s specific requirements and desires has been built that allows for easy data entry and appropriate Center staff oversight. The unique data points including year, major, and subject-specific aptitude were particular considerations for the design, along with the routine needed for aggregation of specific pieces of information. This latter capability is particularly critical to supporting the staff desire to incentivize self-management and mutual assistance. The web page uses ReactJS for the front-end view to create the shift exchange board and the shift posting form pages. Drop down menus and a clickable calendar are provided for the shift posting form for ease of use. Users are able to log in to the system with their University Google Suite accounts. Express provides the back-end and data handling for this application.

Information about the Author(s):
Raquel Haro, Electrical Engineering and Computer Science, 2019;
Megan Janickovic, Computer Science, 2020;
Madeline O. Flynn, Computer Engineering, 2020;
Josiah P. Metzler, Computer Science, 2021;

Faculty Sponsor: Nick Rosasco

Student Contact: Raquel Haro raquel.haro@valpo.edu
The Lutheran Deaconess Association (LDA) currently maintains member information in an Excel spreadsheet. Each row of the spreadsheet contains a person’s name, email address, mailing address, and phone number. In order to share this information with various other members, a list is compiled and emailed out to the LDA once a year. Unfortunately, this makes it difficult to share any newly updated information. In response to this issue, the LDA requires that their member information be hosted and visible on a website, where information is easily searchable and quickly modifiable. The information will be displayed in a list which can be updated manually by uploading the most recent copy of the spreadsheet, or automatically by linking to Microsoft OneDrive or Google Sheets. The application functions by taking data from the Excel spreadsheet and breaking them down into JSON objects. These JSON objects are then formatted and displayed onto the body of the webpage. Users can search for keywords (names, addresses, phone numbers) in a search bar, and the information that is displayed will be filtered according to the user's search. This website was created using the Java programming language, according to the application framework Spring. Other languages and frameworks were considered, but Java and Spring were chosen because of their system portability and familiarity with the application’s developers. The main challenge faced with this website is keeping the information private and secure to non-members, but also making it easily accessible to the LDA members.
Institutional Review Board Management System

Mitchell Burgess, Abdullah Aljobeh, Jack Worman

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 4

The goal of this project is to design and implement a business process management system for Valparaiso University’s Institutional Review Board. Rather than extending the Google Forms-based system that the IRB is currently using, it was determined that a from-scratch application tailored to their needs would be a preferable alternative for the customer. This is a web-based application created using HTML5, CSS, JavaScript/jQuery, and PHP. We are utilizing Google’s login API to allow reviewers easy and convenient access to the information without having to create additional accounts to keep track of. The application will allow administrators (members of the review board) to create and edit various forms for applicants to fill out, as well as view all of an applicant’s stored information in a convenient view page. The customer specifically requested that the site notify them via email when a valid application was submitted, and allow them to keep their internal discussions correlated with specific applicants for organization’s sake.

Information about the Author(s):
Abdullah Aljobeh is a junior Computer Science major and minoring in Mathematics. Mitchell Burgess is a senior Computer Science major who plans to find work in software engineering. Jack Worman is a sophomore Computer Engineering major.

Faculty Sponsor: Nicholas Rosasco

Student Contact: Mitchell Burgess mitchell.burgess@valpo.edu
The Digitalization of the Valparaiso University Residential Hall Check-In Process

Adam Morrison, Sam Rookstool, Alec Cole

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 5

Valparaiso University housing facilities support hundreds of students each year in a variety of campus residence halls. A primary function for security and general operations is tracking students and guests who enter and exit these facilities. To support that need, the school employs Desk Attendants who maintain paper rosters that support three tasks: student verification and check-in, guest check-in, and item check-out. This project intends to provide a digital replacement for this system in order to enable added speed and ease of use. The software will built on the Python-based Flask web framework joined to MySQL databases. The system will allow desk attendants and higher-access-level staff to sign into their respective residential hall and access a variety of information linked to each service area. Additionally, the aggregated electronic logs and other accumulated information will enable larger scale analysis of patterns and routines as desired.

Information about the Author(s):
Alec Cole and Adam Morrison are both senior Computer Engineering majors. Samuel Rookstool is also a senior and a Computer Science major. All three authors are passionate about technology, writing code, and working with computers on a daily basis. In addition, each author utilized the residence halls at Valparaiso University for both living and visiting friends. Thus, each author understands the benefit to the halls that digitalizing the check-in process would provide. As a Resident Assistant for 2 years, Adam Morrison even had deeper knowledge of residential hall life from a staff perspective and used that information to help inform the team of decisions when creating the software. Using knowledge of residential hall life, garnered software knowledge and skills, information learned from collegiate courses, as well as communication skills, the authors worked toward solving the problem of digitalizing the residential hall check-in process.

Faculty Sponsor: Nicholas Rosasco

Student Contact: Adam Morrison adam.morrison@valpo.edu
Digitizing and Streamlining Valparaiso University Student Senate's Organization Recognition Process

Kayla Herrera, Sawyer Patrick, Alec Hauck, Jackson Heise

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 6

Valparaiso University (VU) Student Senate’s current comingling of paperwork and excel spreadsheets to maintain and manage a record of student-led organizations on-campus has proven to be highly inefficient and unhelpful. Not only is it difficult for those on Student Senate to manage the annual recognition and re-recognition process, but the organizations themselves also have no access to their information once it has been submitted. This system will employ a MySQL database that will maintain a record of all organizations with information on their officers, contact information, links to their constitutions, and final budget values. One notable challenge is the need to store historical information for organizations that may come and go from year to year. The interface will allow Student Senate and the organizations themselves to access information for each organization using Python’s Flask framework. This framework will also include an automated version of the form each organization is required to fill out and turn in as part of the recognition or re-recognition process, as well as forms to inform Student Senate of changes to an organization. Access to viewing organization information will be controlled via the Google login infrastructure already utilized by VU.

The finished result will be a database with web access that the VU Student Senate can use for a period of several years, with an emphasis on robust internal construction and longevity. Through this database, Student Senate will be able to manage and maintain a record of all on-campus, student-led organizations, both current and previous, as well as maintain records of their officers, contact information, and final budget.

Information about the Author(s):
Kayla Herrera, Senior Computer Science major with a focus in Cyber Security.
Jackson Heise, Senior Physics major.
Alec Hauck, Senior Mathematics major with minors in Computer Science and Physics.
Sawyer Patrick, Senior Computer Science and English double major with a Humanities Minor

Faculty Sponsor: Nicholas Rosasco

Student Contact: Kayla Herrera kayla.herrera@valpo.edu
**Greek Life Application Project**

Cody Packer, Terry Wade, Mardonio Diaz, Alexandar Habjan, Robert McIntyre, Brandon Ancona

*Departmental Affiliation: Computing and Information Sciences*  
College of Arts and Sciences

*Project Code: CS - 7*

The goal of this project is to implement and deploy a mobile application for Valparaiso University Greek Life organizations. Several frameworks were considered for the project, including Xamarin, React Native, and Ionic. Ultimately, Ionic was chosen for its similarity to previous programming languages such as Ruby on Rails. The application is built on the Ionic platform using a combination of implemented HTML and Javascript, alongside an extension to Firebase services and Google calendar API. The Google calendar API has been implemented to allow only Valparaiso University emails to view personal and Greek Life’s public calendars. Other features include a message board alert system, event notifications, and application tabs for ease of navigation through the applications menus. A major request, and basis for the project was for an ease of use and convenient localization for Greek Life related document, which have been organized into a table sorted by category. By inclusion of the former mentioned functions, the consumer’s requests are met.

*Information about the Author(s):*  
Cody Packer is a sophomore computer science major involved with data science research over network graphs as well as experience involving backend web development. Mardonio Diaz is a sophomore computer science major with a psychology minor. Brandon Ancona, a junior, is a student-athlete and computer science major at Valparaiso University. Robert McIntyre is a senior computer science major with a mathematics minor. Alex Habjan is a sophomore computer science major with a Spanish double major. Terry Wade is a sophomore computer science and data science double major with a mathematics minor.

*Faculty Sponsor: Nicholas Rosasco*

*Student Contact: Cody Packer cody.packer@valpo.edu*
The Valparaiso University Association of Computing Machinery’s Mobile Application

Juan Arellano

Departmental Affiliation: Computing and Information Sciences
College of Arts and Sciences

Project Code: CS - 8

The Association of Computing Machinery (ACM) and ACM-W chapters at Valparaiso University needed a tool for publishing schedule information and providing digital meeting attendance tracking. An application supporting this need and facilitating communication between current members will be built using the Ionic cross-platform framework, and include a digital forum suite. This will enable users to communicate with each other, improve membership accounting and accountability, and ease of access to organization documents and other materials. To achieve multiple device/platform capabilities, the Ionic frontend is being employed. The Firebase tool was selected to power the backend, as it supports both ease of use and to simplify long term upkeep. A recent change in the related libraries has created some challenges on authentication, and a local secondary system has been employed to support login and identification needs.

Information about the Author(s):
Juan Arellano - Computer Science and Math Double Major from Chicago Heights, IL
Justin Mann - Computer Science and Math Double Major from Chicago, IL
Alex Brewer - Computer Science Major from Omaha, NE

Faculty Sponsor: Nicholas Rosasco

Student Contact: Juan Arellano juan.arellano@valpo.edu
Mobile Application for University Programming Council (UPC) Events

Brady Bell, Carly Armor, Melissa Buss, Ryan Kleszynski, Miguel Valdez, Nicholaus Dettmer, Daniel Christensen,

**Departmental Affiliation:** Computing and Information Sciences
**College of Arts and Sciences**

**Project Code:** CS - 9

University Programming Council (UPC) at Valparaiso University puts on over 80 events for students per year. In order to make it easier for students to keep up with events and decide which ones they wish to attend, an application was developed that allows students to use UPC’s calendar of events. This includes adding events to their personal calendar, getting updates and/or cancellations due to weather or other unforeseen circumstances, navigating campus to event locations. This application also allows UPC to keep track of how many events students have attended so they can award prizes for attending a number of events. Students will also be able to use their Valparaiso Google accounts to access the personalized aspects of the application—personal calendar and attended events. This application was developed using the Ionic Framework which allows development for iOS and Android concurrently using AngularJS, HTML, and CSS programming languages. Additionally, the application’s data is managed using Firebase. The challenges faced during this application’s development include, making the application appealing and easy to use for our peers, explaining the inner workings of the development to our customers (who are not as accommodated to the language), and connecting the application to an already well established Google student network. This application will help students stay up to date on all of the UPC events and ensure they are able to get the most out of them.

**Information about the Author(s):**
Brady Bell is a Computer Science major graduating in Spring of 2021
Carly Armor is a Computer Science major graduating in Spring of 2020
Ryan Kleszynski is Computer Science major graduating in Fall of 2019
Melissa Buss is a Computer Science major graduating in Spring of 2020
Miguel Valdez is a Computer Science major graduating in Spring of 2020
Nick Dettmer is a double major in Computer Science and German graduating in the Summer 2019
Daniel Christensen is a Computer Science major graduating in 2019

**Faculty Sponsor:** Nick Rosasco

**Student Contact:** Carly Armor brady.bell@valpo.edu
Macropartisanship, the distribution of political party affiliations in the population, is usually thought to be stable, but groups with higher number of immigrants seem to be prone to more fluctuation than is typical. The increased fluctuation is thought to be caused by factors such as weaker party attachment and differences within populations (median age of Latinos is much lower than some other groups). This project analyzes how aggregate level partisanship has changed over the last three decades across racial and/or ethnic groups. Moreover, we investigate what factors are driving the high volatility in Latino macropartisanship.

Using public opinion survey responses from CBS and the New York Times, we apply Stimson’s Dyad Ratio Algorithm to construct an ideal time series from the scattered survey marginals. Along with changes across the racial/ethnic groups themselves, we examine additional variables that could be affecting macropartisanship volatility, such as presidential approval, consumer confidence, the frequency and tone of immigration press in national news, and the descriptive representation of Latinos in national government.

Information about the Author(s):
Dan Herschel is a senior Data Science major at Valparaiso University. This project resulted from Dan's experience in Professor Gregg Johnson's POLS 210: Research Methods in Political Science class. There, Professor Johnson's focus on data driven research drew Dan to the political science field for his senior capstone project. After graduation, he will be participating in the CAPS Fellowship program through Valpo's Institute for Leadership and Service.

Faculty Sponsor: Gregg "Bagel" Johnson

Student Contact: Dan Herschel daniel.herschel@valpo.edu
Robotics Swarm Algorithms: Dispersion Using Gradient Descent Algorithm

Jonathan Bayert

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Project Code: ECE - 1

Since swarm robotics can involve hundreds of robots, this research was able to simplify the algorithms for robots, namely in dispersion, and thus bring down the cost of swarm robots. This algorithm is a more versatile approach to dispersion because it only relies on one sensor and can be cheaply implemented. This research developed an algorithm to autonomously control a swarm of robots in many different environments and help them evenly spread out. Furthermore, this research shows several tests and the data shows that the algorithm consistently works. The tests show how this algorithm can be used across many different robots and it will decrease the cost of robots. These development highlights improvements for the robots in their ability to spread out effectively and quickly.

Information about the Author(s): Currently, I am a computer engineering sophomore at Valparaiso University's College of Engineering. I have been involved with several robotic projects including two with the kilobots, and I have lead projects as the Vice President of Valpo Robotics ranging from robotic football to an autonomous robot. I hope to learn about robotics so that I can pursue a career in robotics and automation.

Faculty Sponsor: Sami Khorbotly

Student Contact: Jonathan Bayert jonathan.bayert@valpo.edu
Design of a Mobile, Low-Cost Spectrum Analyzer

Jacob Harrison

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Project Code: ECE - 2

New technology that detects the presence of cars at intersections utilizes wireless radios. Prototypes of this technology are sensitive to interference. Before these prototypes can be evaluated, radio activity in test sites must be screened to ensure that the devices will be able to operate properly. Our team designed a low-cost, battery-powered spectrum analyzer capable to monitor radio activity around intersections in the 850 - 950 MHz band. The spectrum analyzer uses a software-defined radio controlled by a Raspberry Pi to measure signal power in this frequency band and log measurements as a function of time.

Information about the Author(s):
Jacob Harrison is a senior Computer Engineering major at Valparaiso University. He started working with Dr. White's "WIRED" laboratory in 2017 to research ways to improve the performance of software defined radios in satellite ground stations for the community-driven SatNOGs project. He will attend the University of Florida in the fall of 2019 to begin work toward a PhD in hardware/software security.

Faculty Sponsor: Dan White

Student Contact: Jacob Harrison jacob.harrison@valpo.edu
Curricular Analytics: A Probabilistic Approach

Erik Schuchardt, Georges El-Howayek, Ahmad Slim

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Project Code: ECE - 3

Many universities are putting graduation and retention rates under intensive inspection. This is motivated by various elements, including but not limited to the way that a bachelor’s degree has turned into an inexorably important necessity for prosperity in the labor market. To that end, colleges are gathering data related to student progress and achievement and implementing more data-driven frameworks in attempts to decide the most imperative features that impact attrition and persistence.

In this research, we study student progress by exploring the basic properties of individual curricula and its relation to completion rate from a probabilistic approach. We applied a Monte Carlo method to assess curriculum efficiency by enrolling a large number of virtual students in a degree plan, statistically determining whether each student passes each course, reevaluating a student’s degree trajectory based on course failures and successes, and recording the amount of time it takes each student to complete a degree plan.

As an example, we have considered two computer engineer degree plans offered by the Department of Electrical and Computer engineer at Valparaiso University. Even though these programs have identical program learning outcomes, it is readily apparent that their structures are quite dissimilar. In our simulation, we quantify these differences in a manner that leads to useful analytical results. For instance, what is the expected graduation rate for similarly prepared students in each curriculum? What is the most important course in each curriculum, and by how much would the success rates improve with small improvements in these courses?

Information about the Author(s):

Faculty Sponsor: Georges El-Howayek
Student Contact: Georges El-Howayek erik.schuchardt@valpo.edu
Wireless, Battery-Powered Node for ValpoSensorNet

Muhammad Naveed

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Project Code: ECE - 4

The research project was to engineer a Sensor Node that could collect readings of temperature, humidity, time of measurement and battery voltage. The challenge was to make it power efficient as it must run on AA batteries. Since, it was a network of Sensor Node that has to be deployed all around campus therefore it was must for the battery to last at least 9 months before replacement otherwise the very purpose of power efficient would be of no use. Research involved both hardware and software integration as it included programming, designing circuit board and assembling various components together. I also setup MQTT server to receive data packets collected via Sensor Node. The packets stored in database could be used for a graphical representation of data for further analysis. Analysis could be done such as generating warning message at a specific temperature. The Sensor Node was programmed in such a way that even user could communicate with it to change its mode of operation which has many advantages. The size of the device was also considered, and it was made as small as possible to make the device portable and robust. The Sensor Node is not just restricted to measure temperature and humidity but could also be integrated to measure other parameters such as proximity, light intensity etc. Future research includes to design custom circuit boards, purchase database and develop a prototype with proper casing like a box to make it look more appealing.

Information about the Author(s):
My future goal is to work with an instrumentation-based automation industry. Secondly, to work with integrated circuits and internet of things has always attracted me. For both two reasons I opted to work on this project to get a hand on experience on the stuff I want to do and gain expertise from Professor. The project extensively enhanced my skills and gave me a good insight how to develop a power efficient device.

Faculty Sponsor: Dan White

Student Contact: Muhammad Ahmed Naveed
The Colonization of Mexico and the Effect on the Nahuatl Dialect

Daniela Rios Aguilar

Departmental Affiliation: English
College of Arts and Sciences

Project Code: ENGL - 2

History is a part of who we are and how a society is shape. Every detail, every event in history has an effect on how we communicate and how the language differs from place to place. In this presentation I will focused on the Aztecs great civilization, how they were forced to learn the colonizers language and adopt their religion as well. Before Spaniards arrived in Mexico, there was a great civilization called the Aztecs. When the colonizers arrived in 1521, they claimed to come in peace, saying that they only wanted to educate the Aztecs. The Aztecs had no interest in learning the language nor the religion, because of that they were torture and made into slaves, not only that but many died due to the diseases that Spaniards brought with them. Since many Aztecs died after the colonization, their language became almost extinct. People in the valley of Mexico speak the modern version of Nahuatl called Nahuan. The modern version of Nahuatl is basically made of the original and a mixture of Spanish. Now days, Spanish is spoken in Mexico, Central and South America but it differs from region to region. Everyone has a different vocabulary and ways of using the language. For example, I am from Mexico and we called children niños, while in El Salvador they called children Cipote or Bicho, although we both speak Spanish our speech community is different because we were colonized in different times and our great civilizations were also different.

Information about the Author(s):
My name is Daniela Rios Aguilar; I am a sophomore at Valparaiso University, majoring in Spanish and Secondary Education. I was born and raise in Mexico and I am really close to my roots that is why I have decided to talk about the Aztecs and how colonization had an impact in their speech community. Because of my roots and my heritage I find fascinating to know more about the history of my ancestors. It is also amazing to me the variety of the language depending on the region and how much the region is changing culturally. After college I hope to teach Spanish and to teach my students that even though every region speaks Spanish, they all speak differently and that its beautiful in every way.

Faculty Sponsor: Erica Sponberg

Student Contact: Daniela Rios Aguilar daniela.riosaguilar@valpo.edu
Contemplating Paradoxical Doctrine Through Formal Structure in the Holy Sonnets

Katherine Germann

Departmental Affiliation: NCUR research presentation
College of Christ College

Project Code: Oral - ENGL - 2

This paper discusses the relationship between form and function within John Donne’s Holy Sonnets. It engages scholars such as Gardner, Kuchar, and Low who have examined the Sonnets as a means to understand various aspects of Christian doctrine. This paper argues that the specific sonnet form that Donne uses, as opposed to other traditional poetic forms, is especially effective at communicating paradoxes in Christian doctrine. First, the paper briefly engages other scholars who maintain that the Sonnets effectively contemplate paradoxes within Christian doctrine. Second, the paper identifies the specific form that Donne utilizes throughout his collection of sonnets. This investigation reveals that Donne consistently uses a combination of the Petrarchan and the Shakespearean sonnet, with the octave following the Petrarchan form and the sestet combining the Petrarchan sestet with the Shakespearean couplet. In this, the paper anticipates how characteristics of these forms might generally function to communicate complex messages. For instance, two lines with seemingly incompatible ideas might be held neatly together by an envelope rhyme. Finally, the paper closely examines the sonnets “Oh, to vex me” and “Batter my heart,” identifying how the form of each composes their paradoxical content. The implications of this study are important for the genre of religious poetry because modern poets often forgo traditional form in favor of free verse as a means of grasping complex ideas. This paper illustrates the value of traditional form for conveying complex ideas, particularly for poems with spiritual content.

Information about the Author(s):
I am a junior Biology and Spanish double major and Chemistry minor. I am also a Christ College student. I plan to go to medical school after graduating from Valparaiso University. I run for Valpo's Cross Country and Track and Field teams. I also work for the Academic Success Center and am involved with SALT.

Faculty Sponsor: David Western

Student Contact: Katherine Germann katherine.germann@valpo.edu
The Impact of Ice Versus Ischemic Compression on Muscle Recovery Post Resistance Training

Brian Pecyna

*Departmental Affiliation:* Exercise Science  
*College of Arts and Sciences*

*Project Code:* EXS - 1

The objective of this study was to analyze the impact of ice, compression, and no modality on the outcome of muscle recovery post resistance training. The question to be answered was “will ice, compression, and no modality produce different outcomes on exercise induced muscle soreness?”. The hypothesis was that ice therapy would yield a better result in muscle recovery than compression and no modality. The null hypothesis was that no significant difference in recovery method would be found between the ice and compression group. Twelve participants (M=12, ages 18-22) from a Northwestern Indiana university participated in this study. Participants first identified their initial subjective muscle soreness of their non-dominant biceps brachii by circling their rating on a Likert Scale from 0-5 (0=no soreness, 5=extreme soreness). One repetition maximum resistance was determined for the participants non-dominant arm. To induce muscle soreness participants completed a resistance training workout of seated bicep curls. Four sets of bicep curls were performed for two minutes or until maximal fatigue with a two minute rest between sets. Immediately after training, participants applied the recovery modality. Participants identified their subjective soreness 24 and 48 hours post training and tested their bicep curl max weight 24 hours post training. Data was analyzed through single factor ANOVA. No significant differences in any of the assessments were found between groups. Twenty-four-hour soreness was not significant (P = 1, F = 0), 48 hours was not significant (P = .81, F = .21), nor was percent of maximum curl weight maintained 24 hours post resistance training (P = .75, F = .29). The null hypothesis that there was no difference in muscle recovery between ice, compression, and control groups was accepted. The author concluded that ice and compression did not differ significantly in their effect on recovery. Further research should be performed with a larger sample size.

*Information about the Author(s):*
Brian Pecyna is a senior exercise science major, human biology and communications minor. He is currently a member on the varsity tennis team. Brian is interested in all facets of health, fitness, and athletic performance. He will be continuing his academic and athletic career at Valparaiso University in the fall of ’19 enrolling in the MBA graduate program while competing on the tennis team.

*Faculty Sponsor:* Kelly Helm

*Student Contact:* Brian Pecyna brian.pecyna@valpo.edu
Surface Electromyography Analysis in Division 1 Female Soccer Players During Dynamic Movements

Tyler Curylo

Departmental Affiliation: Exercise Science
College of Arts and Sciences

Project Code: EXS - 2

The purpose of this study was to analyze muscle activation in dynamic movements through sEMG assessment in the right and left legs of female D1 freshman soccer players. The question to be answered was “What is the difference in muscle amplitude in right and left legs during dynamic movement as measured by sEMG?” Seven freshman female soccer players from a Northwest Indiana university participated in this study by completing dynamic movements. The participants were instructed to come to the study clean shaven as the electrodes were placed above the muscle belly. The dynamic movement analyzed in this study was the lateral double hop. In this movement the participants jumped back and forth laterally four times over an eight-inch hurdle. Statistical analysis showed no significant differences in the right and left legs of the female soccer players. The muscles included were the rectus femoris, tensor fasciae latae, adductor longus, lateral and medial gastrocnemius, and the lateral and medial vastus lateralis.

Information about the Author(s):
Tyler Curylo is a student-athlete at Valparaiso University on the mens soccer team from the northwest suburbs of Chicago. He has always had an interest in injury prevention as well as learning about muscle activation. Tyler is an exercise science major and eventually wants to pursue medical sales or go onto graduate school for occupational therapy. Tyler became interested in this topic when my advisor, Kelly Helm, brought it to my attention as they would be analyzing the female soccer players for all four years at Valparaiso. Tyler has enjoyed learning about surface electromyography and how to analyze the muscle activation during dynamic movements.

Faculty Sponsor: Kelly Helm

Student Contact: Tyler Curylo tyler.curylo@valpo.edu
Interpretations of the “Gretchen-figure” in the Works of Classical Composers

Sara Eveler

Departmental Affiliation: Foreign Languages and Literatures (German)
College of Arts and Sciences

Project Code: Oral - FORL - 1

Johann Wolfgang von Goethe (1749-1832) and his drama Faust have provided inspiration for various other works of art for over two centuries, including for musical productions. Alongside this success, Goethe’s Gretchen-figure has been a character of interest and source of inspiration herself, often portrayed as an image of innocence, naivety, and piety during her devilish relationship with the infamous Faust figure. This research project aims to compare and analyze Goethe’s Gretchen-figure in multiple operas, including Louis Spohr’s “Faust,” Charles Gounod’s “Faust,” Hector Berlioz’s “La Damnation de Faust,” and Ferruccio Busoni’s “Doktor Faust,” with a special focus on Franz Schubert’s compositions “König in Thule” and “Gretchen am Spinnrade”.

Information about the Author(s):
Sara Eveler is a senior German and Chemistry double-major and is pursuing a career in optometry. She studied abroad in Tübingen, Germany during the 2017-2018 school year to further her knowledge of the German language and culture. She has been tentatively accepted into the Southern College of Optometry in Memphis, TN (pending completion of her degree), where she will continue her education starting in Fall 2019 to become a doctor of optometry.

Faculty Sponsor: Josiah Simon

Student Contact: Sara Eveler sara.eveler@valpo.edu
To Caffeinate a Revolution: The Historical Importance and Necessity of the Parisian Café Before and During the French Revolution

Julia Bowlds

Departmental Affiliation: French
College of Arts and Sciences

Project Code: Oral - FORL - 2

My research involved discovering the influence of Parisian cafes on the French Revolution. This research reveals some of the less well-known aspects of Parisian cafes and how they influenced many people during this time by being a public space in which one had the power to speak freely. I discuss how these cafes were founded, what kind of coffee was served within them, who frequented these cafes, and various events in which cafes helped the people start and finally sustain the Revolution. The purpose for this research is to explore the origins of Parisian cafes and how a culture’s food and dining places can contribute to a country’s history. The results of my research reveal how the café environment in Paris helped nourish the ideas and the movement behind the French Revolution. Each café allowed free thought and speech, which encouraged debates and arguments. Much like the salons which philosophers such as Voltaire and Descartes frequented, new ideas emerged. Although similar to salons, the café allowed more than just scholarly intellectuals a voice. Students, workers, and even women voiced their ideas and opinions in these cafes. This free movement of ideas in a city fueled with discontent at the monarchy allowed the café to become the backbone of the French Revolution.

Information about the Author(s):
I decided to choose this topic as my French senior seminar project because it combined my two loves, coffee and French. Currently, I am wrapping up my last semester at Valparaiso University as an international business and French double major as well as a member of Valpo's Christ College. I intend to use my French and business skills in my career after graduation.

Faculty Sponsor: Timothy Tomasik

Student Contact: Julia Bowlds julia.bowlds@valpo.edu
Knowledge versus Religion: The Tension in Goethe's Faust

Sarah Crowe

Departmental Affiliation: German
College of Arts and Sciences

Project Code: Oral - FORL - 3

The topic of my research project was to investigate the relationship between knowledge and religion in Johann Wolfgang von Goethe’s drama Faust (1806). In my project, I showed how knowledge and religion are often conflicting forces and questioned in what manner they may be reconciled. I provided historical context to this topic by exploring the contentious role of religion during the enlightenment and through Goethe’s own complicated relationship with religion and Christianity. I then selected key scenes from the drama and analyzed these scenes with regard to the tension between knowledge and religion and its representation in the main characters of Faust and Gretchen. Through my research and close analysis of the text, I concluded that the pursuit of worldly knowledge and leading a religious life are incompatible in Faust.

Information about the Author(s):
Sarah Crowe is a senior IECA and German double major. Her primary academic interests include immigration, economics and international studies, but she also has a passion for literature and for the German language and culture. She read Goethe’s Faust in her German senior seminar class and grew interested in the topic of knowledge versus religion because of its relevance to Valparaiso University and other liberal arts institutions.

Faculty Sponsor: Josiah Simon

Student Contact: Sarah Crowe sarah.crowe@valpo.edu
Written Language and Cultural Identity: The Use of Traditional and Simplified Hanzi in the People's Republic of China

Lukas. Torgerson

*Departmental Affiliation:* Chinese and Japanese Studies
College of Arts and Sciences

*Project Code:* FORL - 4

Appearing in its earliest form more than 3,000 years ago, Chinese writing was used to write the majority of the world's books until the 19th century. Named after the first dynasty, Hanzi (literally meaning Han characters) retained a similar form since the third century. In the 1950s and 60s, the People's Republic of China introduced simplified forms of many characters to try to boost literacy rates. Since then, there has been a debate about the use of Simplified vs Traditional Hanzi. Some have argued that the abandonment of the traditional forms makes it harder for young people to read classical literature and erodes traditional Chinese culture. The return of Hong Kong and Macau in 1997 added a new dimension of cultural identity. Since both cities continued to use traditional characters, attempts to introduce simplified characters are seen as another attempt to crush local identity (one politician referred to the use of Simplified Hanzi on a McDonald’s sign as symbolizing the death of the spirit of Macau). I am interested in looking at the relationship between written language and cultural identity, and will research this by looking at both scholarly articles and newspaper editorials from modern China. I think that written language, like its spoken counterpart, can become an important part of how people identify themselves. I also expect to find the prestige attached to Traditional Hanzi to play a part in some people’s desire to preserve it. While this may seem like a minor issue to western audiences, proposals to re-introduce Traditional Hanzi to public schools were made in 2004 and 2008, and it remains an important issue in Hong Kong and Macau. Further research might involve the similar ongoing debate in South Korea about the use of Hanja (the Korean adaptation of Hanzi) in public schools.

*Information about the Author(s):*
I am Lukas Torgerson, a Sophomore and Valparaiso University majoring in Mathematics, Astronomy, and Chinese and Japanese Studies. My interest in Hanzi comes from my interest in East Asia and linguistics, particularly writing. Next semester, I will do a study abroad at Kansai Gaidai University in Osaka, Japan. After graduation, I plan to pursue a graduate degree in theoretical mathematics.

*Faculty Sponsor:* Erica Sponberg

*Student Contact:* Lukas Torgerson lukas.torgerson@valpo.edu
Where Does it All Go?: An Analysis on the Communities Surrounding Illinois Landfills

Emma Chelsvig

Departmental Affiliation: Geography
College of Arts and Sciences

Project Code: GEO - 1

Landfills have the capacity to inflict adverse health, property value, and quality of life impacts, whether the magnitude of such impacts is beyond the variability inherent in any society is unknown. This research considers the placement of Illinois landfills to assess whether they are disproportionately sited in low-income and minority neighborhoods and to assess the degree of separation between host and non-host neighborhoods. Multiple Python scripts using the ArcPy module were written to facilitate rapid, repeat analyses with census and geographical boundary data in ArcGIS. Census data were analyzed for 1990, 2000, and 2010 with host and non-host neighborhoods defined as census block groups within a 3-kilometer radius of a landfill while non-host neighborhoods were those beyond that radius in order to assess impacted versus non-impacted demographics. Upon running two-sample t-tests, there is evidence to conclude that the average median household income of host neighborhoods is significantly lower than non-host neighborhoods for 1990, 2000, and 2010 at the 0.05 significance level. The average percentage of Black residents in host neighborhoods is significantly higher than in non-host neighborhoods for 1990, 2000, and 2010 at the 0.05 significance level. Exploratory visual analyses using boxplots did not convey the possibility of a significant growth in minority populations of host neighborhoods overtime.

Information about the Author(s):
Emma is a senior Geography and Statistics double major.

Faculty Sponsor: Jon-Paul McCool

Student Contact: Emma Chelsvig emma.chelsvig@valpo.edu
An Analysis of Road Salting Impacts on Soil Salinity Along Two Rural Roadways

Deirdre James, Cody Banks

Departmental Affiliation: Geography
College of Arts and Sciences

Project Code: GEO - 2

The practice of road salting to maintain safe winter road conditions can have potential negative impacts on soil salinity. The accumulation of salts can produce highly saline conditions in soils which pose a threat to vegetation by lowering a soil’s osmotic potential, thus making it difficult for both water and nutrient uptake by plant roots. In addition, it has been found that the retention of salts on a soil’s ion exchange sites, even in humid regions with rainfall sufficient to dissolve and wash away these salts, may threaten aquatic life due to sustained higher salinity levels in downstream waterways and waterbodies. This study seeks to analyze the impacts of road salting along two rural roadways in Northwest Indiana to determine whether road surface run-off and traffic spray produce a measurable difference in local soil salinity. Gridded soil cores taken along the shoulder and within adjacent agricultural fields are analyzed for electroconductivity and pH to determine salinity to test the effect of distance on salt contamination. Though it may be expected that salts would only effect soils in close proximity to roadways, studies have found spray from traffic can exhibit a continued observation of highly saline conditions.

Information about the Author(s):

Faculty Sponsor: Jon-Paul McCool

Student Contact: Deirdre James deirdre.james@valpo.edu
Developing an Impact-Based Strength Index for the Classification of Derechos

Donald Long, Jeremy Corner

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Project Code: GEO - 3

Derechos are large, and often disastrous, convective storms that have the potential to cause expansive swaths of wind damage. At the high end, straight-line winds associated with these storms can exceed 120 mph, well above the severe wind threshold. Using nine historic derecho events from 1991 to 2014 of various intensities, an impact-based scale is created. These events were selected using local news media reports and National Weather Service (NWS) overviews. In addition, these sources provide relevant information regarding societal impacts and estimates of surface-based winds at point locations. Next-Generation Radar (NEXRAD) reflectivity and velocity data from the Iowa State University Archive were utilized to further analyze the wind speeds and storm structure for each event. Based on all gathered information, these events were then grouped into low, medium, and high strength categories. The development of this index will allow a common nomenclature for scientists and the public to distinguish and analyze derecho events.

Information about the Author(s):
Donald Long: I am a senior meteorology major. My interests include synoptic-scale meteorology, convective/severe weather, and societal impacts. In the future, I plan on pursuing graduate study and earning my Ph.D. Afterwards, I am considering either going into education or operational meteorology.

Jeremy Corner: I am a junior meteorology major. My interests include mesoscale meteorology and severe weather. In the future, I plan to go into research or operational meteorology.

Faculty Sponsor: Kevin Goebbert

Student Contact: Donald Long donald.long@valpo.edu
Analyzing the History of School Closings/Delays in the Past 40 Years Due to Extreme Wintertime Weather in Northwest Indiana

Emily Mazan, Nathan Healy, Jilliann Dufort, Seth Tacke, Natalie Vernon

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Project Code: GEO - 4

Winter weather can be unpredictable and dangerous if precautions are not taken in a timely and orderly manner. Along with the hazard of snow, there are also the threats of frigid wind chills, accreting ice on roadways and other surfaces, as well as a wintry mix of sleet and rain. These conditions are the cause for many school delays and closures across much of Northwest Indiana. The current criteria for winter-weather related school closures in Northwest Indiana were reviewed and compared to archived meteorological data in an attempt to determine the frequency of such closures over a span of 40 years. Information for snow fall, ice accretion, temperature, and wind chill were gathered from METAR surface observations and compared against the regional school cancellation criteria. The number of assumed yearly closures will be assessed in a variety of ways including the average over the 40-year span of data to determine what number of winter-weather related closures Northwest Indiana should anticipate each year. Further analysis of the observed data will work to identify trends for inclement weather types to assess and compare their individual influences on school closures. Having a concise pool of data and descriptive statistics would assist school districts in better preparing for yearly winter-weather related closures.

Information about the Author(s):
Seth Tacke is a Junior Meteorology major at Valparaiso University with interests in Aviation and private weather forecasting.
Nate Healy is a Junior Meteorology major with a passion for extreme winter weather and winter climatology.
Jilliann Dufort is a Junior Meteorology major at Valparaiso University interested in lake effect snow and severe weather.
Natalie Vernon is a Freshman Meteorology major who is exploring the different possibilities in the field of meteorology, with an interest in winter weather.
Emily Mazan is a Junior Meteorology major with a special interest in arctic climatology and climate change.

Faculty Sponsor: Kevin Goebbert

Student Contact: Emily Mazan emily.mazan@valpo.edu
A Precipitation Climatology of Major Atlantic Basin Hurricanes from 2002-2018

Savannah Jorgensen, Eric Goldenstern, Brenda Herman, Angela Mose

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Project Code: GEO/MET - 1

Objective assessment of tropical cyclone precipitation has proven to be a significant challenge due mainly to the lack of observations over the open ocean. Advancements in satellite observations, such as those with the Geostationary Operational Environmental Satellite (GOES) suite, have allowed forecasters to quantify the precipitation capacity and tracking of these systems with greater accuracy. However, despite the improvements in hurricane tracking via satellite, there is a relative lack of research regarding the precipitation characteristics of hurricanes in the Atlantic Basin. This study aims to utilize the GOES Precipitation Index (GPI) to relate the distribution of rainfall throughout major Atlantic Basin hurricanes through several perspectives, such as categorical ratings and climatic trends. The study will focus on hurricanes that occurred between the years of 2002 and 2018 to develop a short climatology of major Atlantic Basin hurricanes. Such a climatology may be informative upon the potential rainfall risks associated with the observed trend in tropical cyclone intensity.

Information about the Author(s):
Savannah Jorgensen is a senior Meteorology major with minors in Environmental Studies and Mathematics at Valparaiso University. She is aspiring to attend graduate school to research climate dynamics and their impacts.

Eric Goldenstern is a senior Meteorology major and Mathematics minor at Valparaiso University. He is aspiring to graduate school to study the applications of satellite meteorology in operational forecasting.
Brenda Herman is a junior Meteorology major with a minor in Geographic Information System (GIS) at Valparaiso University. She is working on getting an internship for the summer.

Angela Mose is a junior Meteorology major and German minor at Valparaiso University. She plans to spend her summer working on a research project at the NWS Office in Rapid City, SD.

Faculty Sponsor: Kevin Goebbert

Student Contact: Savannah Jorgensen savannah.jorgensen@valpo.edu
Influence of the Environmental Moisture Field on the 17 November 2013 Outbreak

Kristen Axon, Ellie Venteicher, Rachel Kennedy

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Project Code: GEO/MET - 2

This work investigates the connection between relevant environmental parameters, such as the low-level moisture field, and the evolution of convective systems. In order to isolate this relationship, the 17 November 2013 severe outbreak is studied in detail. This was a significant event that resulted in numerous reports of damage from strong winds, large hail, and 75 confirmed tornadoes. Utilizing the North American Regional Reanalysis (NARR) data as initial and boundary conditions, a series of Weather Research and Forecasting (WRF) model simulations were produced to isolate the impact of moisture on this outbreak. An unaltered control run was produced to closely replicate the environmental conditions of this outbreak. Additional simulations modify the moisture content of the initial environment to identify the influence this adjustment exerts on the event’s evolution. Moisture plays a considerable role in forecasting the onset and intensity of convective systems; thus, understanding this relationship further is essential to improving forecasting skill for similar outbreaks in the future.

Information about the Author(s):
The authors of this work include two senior and one sophomore meteorology majors who have a long standing passion for severe weather. After graduation their interests are focused on pursuing severe storm dynamics research as well as working in operations forecasting for hurricane events.

Faculty Sponsor: Kevin Goebbert

Student Contact: Ellie Venteicher kristen.axon@valpo.edu
An Investigation of the Landfall and Extratropical Transition of TC Narelle (2013) in the Southeast Indian Ocean Basin

Samantha Schletz, Jacob Janssen

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Project Code: GEO/MET - 3

This research is investigating the extratropical transition (ET) of tropical cyclones in the southeast Indian Ocean (SEIO) basin. While ET has been studied extensively in other TC basins, the SEIO has not been thoroughly investigated. This work specifically looks at the potential ET of tropical cyclone Narelle (2013) including the impact that the cyclone had on the Australian continent. Using global reanalysis data it will be determined how closely the track of TC Narelle matches its actual track to ultimately determine whether or not the cyclone partially or fully went through ET. Track comparison will be completed by correlating latitude, longitude, and pressure (in hPa) between the reanalysis and observed tracks. From this, the motion vector can be determined from the reanalysis data compute the cyclone phase space over its lifecycle, which will determine the extent to which TC Narelle completed ET. In addition, particular attention will be focused on the state of transition during the cyclones landfall and an assessment of the impact will be made. The results of this study will initiate the development of a climatology of SEIO ET that will identify important aspects related to the forecasting of such events that can help lead to improvements in forecasts of extratropical storms and the warnings given to those with life and property within the impact of these storms.

Information about the Author(s):
Samantha Schletz is a sophomore meteorology major from New Lenox, Illinois. She has been interested in the weather since she was a young child. Her interest for tropical weather began when she had a family member impacted by a hurricane. In the future, she would like to forecast and research tropical systems. She is also perusing a minor in mathematics at Valparaiso University.
Jacob Janssen is a freshman meteorology student from Homer Glen, Illinois. He is interested in advancing warning systems for all different types of severe weather, including but not limited to tropical cyclones. He hopes this project will help him have a better understanding of the warning systems for tropical cyclones.

Faculty Sponsor: Dr. Kevin Goebbert

Student Contact: Samantha Schletz samantha.schletz@valpo.edu
The late nineteenth century saw a dramatic increase in the media attention given to suicides in American cities. Papers regularly decried ‘suicide manias,’ ‘suicide clubs,’ and graphic, detailed descriptions of suicides regularly ran across the front page of papers nationwide. By the turn of the century, a stretch of cities running across the Midwest from Pittsburgh to Omaha was referred to in the press as the ‘Suicide Belt,’ cities where suicides were perceived to be on the increase. This sensationalism coincided with immense cultural and social changes brought on by industrialization, e.g., rapid urbanization, the rise of consumerism, wage labor. The sensationalism surrounding 19th-century American suicide saturated broader cultural discourses on social order, gender, and modernity brought on by industrialization. Using the method of cultural history, I reconstruct several narratives of suicide in these cultural arenas. The 1887 suicide of anarchist Louis Lingg was used to express competing concerns over the social order in American cities; the suicide of Chicago women in the 1880s was used in a cultural discourse that sought to curb new spaces for agency that had opened up to American women in the late 19th century; and public debates in 1890s over the connection between suicide and civilization point to concerns about the effect of modernity on American moral and physical health. Overall I argue that suicide, as a powerful public symbol of agency, indicated Americans’ deep anxieties about the direction the nation had taken in the Gilded Age.
Impact of Blood Flow Restriction on Resistance Training of the Biceps Brachii

Drew Snouffer

Departmental Affiliation: Kinesiology
College of Arts and Sciences

Project Code: KIN - 1

In an attempt to optimize and accelerate the effects of resistance training, athletes started using blood flow restriction (BFR) as a modality to enhance training intensity. Occlusion (BFR) cuffs made of polypropylene are designed to limit perfusion distal to the cuff to maximize hypertrophy, muscular strength, and muscular endurance gains. The purpose of this research was to analyze the impact BFR had on the upper arm during biceps training. Twenty Division I football players at a small, midwestern university were randomly assigned to a BFR group that wore BFR bands during training sessions, and a control (NBFR) group that did not wear BFR bands during training. All data was collected over a four-week period in the team’s strength and conditioning facility. Participants were tested for upper arm circumference, one-repetition maximum (1RM), and muscular endurance for the biceps brachii before and after the training sessions using the standing barbell biceps curl. Data was analyzed using a one-way independent t-test of mean scores for each test. Results indicated that both groups were able to increase upper arm circumference, 1RM, and muscular endurance scores. Data analysis revealed no statistically significant difference between the BFR and NBFR groups, however, the results indicated that the BFR group had greater improvements in upper arm growth and muscular strength, suggesting a practical benefit from BFR may exist.

Information about the Author(s):
Drew Snouffer is a former collegiate football player, applying what he learns from being an Exercise Science degree to improve the overall health and athleticism of himself, the University’s football team, and his peers. Drew intends on using what he has learned to become a Certified Strength and Conditioning Specialist, and a Strength and Conditioning Coach for collegiate athletes.

Faculty Sponsor: Dr. Kelly Helm

Student Contact: Drew Snouffer drew.snouffer@valpo.edu
Relationship Between Ankle Injury History and Ankle Dorsiflexion in Division I Athletes

Steven Sutkay

Departmental Affiliation: Kinesiology
College of Arts and Sciences

Project Code: KIN - 2

Ankle sprains are the most common injury seen in athletes. Research has shown approximately 11.5 ankle sprains per 1000 athletes across all sports. The Functional Movement Screen (FMS) is a way for trainers and coaches to determine injury risk for athletes. The screening is also designed to identify major limitations and imbalances that occur in individuals during basic levels of movement. The objective of this study was to investigate the relationship between ankle injury history and ankle range of motion (ROM), specifically dorsiflexion, among collegiate athletes before and after a hurdle step test. The question to be answered was, “Is there a difference in ankle dorsiflexion before and after exercise between collegiate athletes with previous ankle injuries and those who have not had ankle injuries?” Thirteen male Division I athletes (I=7, NI=6, ages 18-22) from a Northwest Indiana university participated in this study. ROM was taken for each participant in both ankles before and after the FMS hurdle step intervention. A one-way repeated measures ANOVA was conducted to compare the impact of injury on ROM. There was not a significant effect of the independent variable, injury, (non-injured=Wilks’ Lambda=0.943, F (1, 11) =0.668, p=0.431; Injured, Wilks Lambda=0.995, F (1, 13) =.069, p=0.796). These results suggest that there was no impact on ROM after the intervention was conducted.

Information about the Author(s):
Steven Sutkay has played sports his entire life and always had a passion for expanding his knowledge about exercise and fitness. Through sports, he suffered many injuries to his ankles. This sparked the inspiration behind his research. Steven is a senior and a member of Phi Sigma Kappa fraternity. He will be pursuing a future in athletic training and possibly coaching after graduation.

Faculty Sponsor: Dr. Kelly Helm

Student Contact: Steven Sutkay steven.sutkay@valpo.edu
Correlation Between Jump Foot Force Production and Distance Jumped in Collegiate Long Jumpers

Malik Riley

*Departmental Affiliation: Kinesiology
College of Arts and Sciences*

*Project Code: KIN - 3*

The purpose of this study was to investigate the relationship between the jump foot force off the long jump board and the distance jumped while performing a long jump. The question to be answered was, "What is the relationship between the jump foot force and the distance jumped for collegiate long jumpers?" Six long jumpers (M=4; F=2), participated. The study was performed on an outdoor track in the spring of 2019. The participants started with warm up exercises. Orpyx® shoe pods were placed inside the athlete's shoes in order to measure foot pressure. The participants completed three four stride, eight step approach jumps into the sand pit, one at a time. The distance jumped was measured for each participant using a measuring tape. The Orpyx® measured the force per square inch of the foot off the long jump board. Data from the Orpyx® saved automatically to the cloud via Bluetooth. A Spearman’s correlation was completed to determine the relationship between mean jump foot force and distance jumped. An evident weak, positive monotonic correlation between mean jump foot force and distance jumped was shown.

*Information about the Author(s):*
Malik Riley is an exercise science major with a minor in human biology. He is also a track and field student-athlete, which was one of the main reasons he is interested in this topic. Malik plans to earn a master's degree in athletic training.

*Faculty Sponsor: Kelly Helm*

*Student Contact: Malik Riley malik.riley@valpo.edu*
Comparison Between the Left and Right Shoulder Range of Motion During a Supine Dumbbell Fly Press

Abigail Johnson

Departmental Affiliation: Kinesiology
College of Arts and Sciences

Project Code: KIN - 4

The purpose of this study was to compare the range of motion in the right and left shoulders, while performing a supine dumbbell fly press. Hypothesis one stated there would be a significant difference in the range of motion in the right and left shoulder. Participants included 13 (M=8; F=5) traditional college aged students who did not have current shoulder injuries. Data consisted of video recording a supine dumbbell fly press. Analysis of shoulder range of motion was completed on Dartfish Human Motion Analysis. A paired sample t-test indicated no statistically significance difference in right and left shoulder range of motion with p = 0.511. The hypothesis is therefore rejected. The second hypothesis was there would be a significant difference in the torque between right and left shoulders. A paired sample t-test indicated a significant difference in the right and left shoulder torque with p = 0.045. Hypothesis two is accepted. While range of motion may not be significantly different between right and left shoulders while performing the supine dumbbell fly press, a significant difference in torque at the shoulder is present.

Information about the Author(s):
Abigail Johnson became interested in exercise science at an early age. She was active in athletics at a young age and continued on throughout high school. In her junior year, she noticed a difference in the range of motion in the shoulder during the supine dumbbell fly press in her biomechanics class. She is interested in learning more about the shoulder and the effects of limb dominance on range of motion.

Faculty Sponsor: Kelly Helm

Student Contact: Abigail Johnson abigail.johnson@valpo.edu
Wolf Domestication: An Agent-based Simulation

Ryan Kulwicki, Alex Capaldi

Departmental Affiliation: Mathematics and Statistics
College of Arts and Sciences

Project Code: MA - 1

Wolves are among the earliest known animals to be domesticated. However, the mechanism by which gray wolves were domesticated into dogs is still unknown. The prevailing domestication hypothesis is that humans selectively bred the gray wolves that were more docile. However, there is a more recent hypothesis which states that wolves which were less hostile towards humans would essentially domesticate themselves by naturally selecting for such wolves because of the availability of food near human settlements. Simulating the process would help demonstrate whether it was possible wolves were domesticated simply via natural selection. Previously published mathematical models are based on systems of differential equations, and these models have critical simplifications such as homogeneous and randomly mixed populations. Therefore, we created an agent-based model which has single trait evolution, user-defined and literature-based parameters, and sexual reproduction. We used Latin hypercube sampling to conduct a sensitivity analysis on the model to determine the robustness of our results. Under certain conditions, the model predicts domestication via natural selection.

Information about the Author(s):
Ryan Kulwicki is a senior Mathematics and Computer Science student at Valparaiso University who plans to pursue a PhD in Computer Science. With the prevailing hypothesis that humans bred wolves for their own personal benefit being mostly uncontested, it was interesting for Ryan to look at the hypothesis that wolves naturally selected themselves for domestication instead.

Faculty Sponsor: Alex Capaldi

Student Contact: Ryan Kulwicki ryan.kulwicki@valpo.edu
Analysis of the Motivations and Perceptions of Cheating among High School Students

Emma Chelsvig

Departmental Affiliation: Statistics
College of Arts and Sciences

Project Code: MA - 2

“Keep your eyes on your own paper.” Despite this common statement and others like it that are given by teachers to discourage cheating, students still engage in cheating behavior. This study examines high school students’ perceptions of cheating and motivations behind cheating. Using questionnaire responses from a sample of 600 students from a Midwestern high school, this study analyzes the factors contributing to students’ total number of cheating incidences. In particular, this study employs one-way ANOVA and multiple regression analyses to determine the significant predictors of a student’s propensity to cheat. We found that students’ beliefs that cheating is wrong and their perceptions of a cheating culture in their school were correlated with their inclination to cheat. From the multiple regression analysis, students who strongly agreed that cheating is wrong and who did not believe there to be a cheating culture within their school were predicted to commit fewer cheating incidences than those who strongly disagreed that cheating is wrong and who believed a cheating culture existed. Other variables that were thought to have a possible impact on the number of cheating incidences, such as GPA, grade level, gender, and annual household income, were not significant predictors of the total number of cheating incidences committed.

Information about the Author(s):
Emma Chelsvig is a senior geography and statistics double major.

Faculty Sponsor: Lissa Yogan

Student Contact: Emma Chelsvig emma.chelsvig@valpo.edu
Determining the Optimal Design of Collegiate Ballroom Competitions

Jonathan Metcalfe

Departmental Affiliation: Statistics
College of Arts and Sciences

Project Code: MA - 3

Collegiate ballroom competitions are a pastime that many students enjoy when they are not busy with academic work. This research seeks to evaluate collegiate ballroom competitions in a few categories: song length impact on judge agreement, investigation of round structuring, and factors that influence variation in judging. Various statistical tests are applied to evaluate these questions using data from collegiate competitions in the Midwest from 2015-2017 from O2cm.com. It is often assumed that longer song lengths in the first round would be beneficial to increasing judge agreement, but perhaps other factors such as number of heats, number of judges, and age of judges could have some influence. The results of this research could result in modifications to the structure of Valparaiso University's next home competition, ValpoComp 2020.

Information about the Author(s):
Jonathan Metcalfe is a Statistics and Economics double major who enjoys spending his free time competing in collegiate ballroom competitions. His experiences in ballroom have led him to wonder if competitions are designed optimally. He hopes this research contributes towards the future success of collegiate ballroom competitions in the Midwest.

Faculty Sponsor: Tiffany Kolba

Student Contact: Jonathan Metcalfe jonathan.metcalfe@valpo.edu
Who will win the Stanley Cup?

Nicholas Hollis

Departmental Affiliation: Statistics
College of Arts and Sciences

Project Code: MA - 4

Many sports have reported statistics in hope of accurately depicting what produces a “good” player or team. Just having a good team does not mean that you have a championship team, therefore what makes a championship team? Is it heart? Is it the team’s love for the game, or is it modern calculated statistics that determine just how close a team could be to winning a championship? Specifically, in hockey, statistics are calculated, but many would refuse the fact that statistics matter in determining a winning team. In this study, we strive to demonstrate that statistics can be used to correctly calculate the true winner of the Stanley Cup. To do this, we will take a random sample of Valparaiso University students to choose the correct statistics to predict the Stanley Cup championship winner, while comparing and contrasting what experts have picked in the past with their statistics.

Information about the Author(s):
Nick Hollis is a big fan of hockey and was excited to learn that he could use his skills and statistical knowledge to test theories and run tests in something he was passionate about.

Faculty Sponsor: Tiffany Kolba

Student Contact: Nicholas Hollis nicholas.hollis@valpo.edu
Problem of Scoring Gerrymandering

Austin Schnoor

Departmental Affiliation: Mathematics
College of Arts and Sciences

Project Code: MA - 5

Gerrymandering is the act of redrawing district lines to advantage or disadvantage a group of voters. Districts that resemble a circle, the most compact shape, are said to be less gerrymandered. We have created a multivariable model that compares four compactness scores for the State Senate districts in the United States. It is often assumed that districts with coastlines have the disadvantage of receiving a low compactness score. Our statistical analysis gives evidence against that claim.

Information about the Author(s):
Austin Schnoor: Austin is a Sophomore Mathematics and Secondary Education double major from Pearl City, IL. On campus, he is also a member of Phi Mu Alpha Sinfonia.
Junta Callahan: Junta is a Sophomore Mathematics major from Okinawa, Japan. On campus, he is a member the men’s Soccer Team.
Jonathon Metcalfe: Jon is a Statistics and Economics double major with interests in pursuing a PhD program in both fields. He enjoys assisting with research projects as a way of both exploring and developing his skills in these fields.

Faculty Sponsor: Mindy Capaldi

Student Contact: Austin Schnoor austin.schnoor@valpo.edu
Update of the Solar Furnace Hopper and Feeder System

Katherine Bassett

Departmental Affiliation: Mechanical Engineering
College of Engineering

Project Code: ME - 1

Valparaiso University’s Solar Furnace reduces Co3O4 to CoO, capturing and storing the energy of the sun in chemical form. The CoO is then able to aid in the production of hydrogen through electrolysis. In the Fall of 2018, the feeder system that delivers the powdered Co3O4 to the solar furnace was redesigned to streamline the feeding process. The redesign consisted of modifying the hopper, simplifying the old two-auger system to a single-auger and calibrating the new system to a known feed rate. The new hopper has the ability to be placed directly adjacent to the furnace as its steel composition is capable of tolerating high operating temperatures of over 900 degrees Celsius. The new configuration simplifies the augers and shortens the distance that the Co3O4 powder needs to be transported before entering the furnace from approximately 12.5” to 5.5”. The redesigned hopper and feeder system will be used in research experiments during the Summer of 2019 that will test the efficiency and conversion rate of the furnace at higher feed rates.

Information about the Author(s):
Katherine Bassett is a Junior Mechanical Engineer with minors in Electrical Engineering, Mathematics and Environmental Studies. On campus she is involved in Valpo Robotics, Earthtones, Tau Beta Pi and SWE. Last summer, Katherine worked in ComEd’s Smart Grid Department and will be staying on campus this upcoming summer to take part in Valpo’s solar research. After graduation, Katherine plans to pursue a career in the renewable energy field.

Faculty Sponsor: Luke Venstrom

Student Contact: Katherine Bassett katherine.bassett@valpo.edu
Solar Thermochemical Energy Storage: The Formation of Sized Metal Oxide Samples

David Mackey

Departmental Affiliation: Mechanical Engineering
College of Engineering

Project Code: ME - 2

Energy storage is a key enabling technology for the deployment of solar energy to produce electricity. Energy storage allows solar energy that shines during the day to be stored up and used at a later time when there is demand for electricity but no sunlight. While short duration storage within a day is now a mature technology, there long duration storage to enable storage and release of solar energy over the course of days, weeks, or months remains a challenge. Solar thermochemical energy storage is a promising approach to meet the need for long-term storage. It stores solar energy chemically by reacting metal oxide particles with air using high-temperature, concentrated sunlight.

The particle size of metal oxides is a critical design factor in the optimization of the efficiency of solar thermochemical energy storage. While it is understood that larger particles slow the reduction reaction rate due to decreased surface area and available heat transfer, the size limits of cobalt oxide (Co3O4) and manganese oxide (Mn2O3) have not be identified. In order to determine the effects of particle size on the metal oxide reduction rate, multiple sizes must be fabricated. In this research project, metal oxide particles of various sizes were formed through a combination of sintering and sieving. The results show that cobalt oxide and manganese oxide can be formed into particle sizes between 4000 µm and 40 µm. This research and manufactured samples will be to used to study the effects of varying particle size on solar thermal efficiency.

Information about the Author(s):
David Mackey is a Mechanical Engineering Major anticipating graduation in 2019. This is his first year with the Solar Research team but he is interested in the application of renewable energy technologies. Specifically he has been impressed by the potential and progress within solar thermochemical storage.

Faculty Sponsor: Luke Venstrom

Student Contact: David Mackey david.mackey1@valpo.edu
Raspberry SCI: An Inexpensive High Performance Computing Cluster for WRF Simulations within the Valparaiso University Meteorology Program

Maxwell Grover, Isaac Arseneau, Kevin Goebbert, Eliott Foust, Terry Wade, Nick Rosasco

Departmental Affiliation: Meteorology
College of Arts and Sciences

Project Code: MET - 1

An inexpensive high performance computing cluster constructed of Raspberry Pis is compared to a standard multi-core computer server that is capable of running the Weather Research and Forecasting (WRF) Model to simulate various weather phenomenon from severe weather outbreaks to high impact lake effect snow bands that blanket Valpo in snow. The initial idea for this project came from similar work being done at the National Center for Atmospheric Research (NCAR). Numerous Raspberry Pis, small inexpensive computers, are connected to each other, resulting in a total of 40 to 50 cores. The high computing power allows for substantial weather simulations to be completed. The Raspberry Pi cluster is then compared to a 15-core server to assess the effectiveness of running the WRF. The clock-time completion of the WRF simulations serve as a comparison between the two systems. This poster describes the variability of using the Raspberry Pi cluster for use in an educational setting and research within the meteorology program at Valparaiso University. We thank the University Guild for their funding that made this project possible.

Information about the Author(s):
This project was inspired by the National Center for Atmospheric Research. After attending a conference last spring, Isaac and I decided to make a cluster of our own. We applied for a Guild research grant and were granted one. With their support, we worked with both the meteorology and computer science department at Valpo to complete this project.

Faculty Sponsor: Kevin Goebbert

Student Contact: Maxwell Grover maxwell.grover@valpo.edu
Liszt Transcriptions

Moriah Carmel

Departmental Affiliation: Music
College of Arts and Sciences

Project Code: MUS - 1

Some critics of the nineteenth century argued that transcriptions are merely unoriginal copies of original works. However, the transcriptions of Franz Liszt (1811-1886), one of the greatest pianists and composers of the century, add to the context of the work. Thus, the original work is changed, and so is its meaning, thereby making transcriptions "original" works (Jonathan Kregor, Liszt as Transcriber [Cambridge, 2010]). Kregor states: “Liszt created tonal connections and motivic cross-references all of his own invention.” In my research I describe and trace Liszt's motivic cross-references and pianisms in several examples from his earlier and later works. I illustrate Liszt's originality in his adaptations, showing that rather than being exact copies, Liszt's transcription reinterpret the originals and reframe the focus and meaning of the original work.

Information about the Author(s):
Moriah Carmel is a senior Music Major from LaPorte, IN.

Faculty Sponsor: Katharina Uhde

Student Contact: Moriah Carmel moriah.carmel@valpo.edu
Evolution of the Sonatas of Dame Ethel Smyth

Julie Howe

Departmental Affiliation: Music
College of Arts and Sciences

Project Code: Oral - MUS - 2

My research investigates stylistic evolution in a range of instrumental sonatas by Ethel Smyth, one of the most important women composers of the 19th century. Smyth was born in England but spent a significant amount of her early adult years in Germany, where she was immersed in a network of musicians close of Brahms. Observing Smyth's time as a student in Leipzig provides insight as to how her style emerged. Between 1877 and 1887, Smyth composed six sonatas. She composed three piano sonatas in 1877, a sonata for piano and cello in 1880, and two sonatas in 1887: a sonata for cello and piano and a sonata for violin and piano. Using established musicological approaches to sonata form analysis, including Hepokoski & Darcy's theory proposed in Elements of Sonata Theory (2006), my research investigates how Smyth's sonatas respond to traditional formal "events," including specific details found within most sonata form expositions (for example, primary theme; caesura before the secondary theme; and others). By providing a close reading of these events and comparing them with earlier classical and late-Romantic norms, Smyth's sonata style crystallizes in more detail, showcasing her mastery at the old but right classical form.

Information about the Author(s):
Julie Howe is a senior music major at Valparaiso University. As a woman cellist, she has always been passionate about women in music. Her aspiration is to shed light on "forgotten women" in music history and recognize the talents of women musicians. Julie started studying the music of Ethel Smyth, a 19th century woman composer, in fall 2018. She completed a paper in December 2018 titled Beyond Brahmsian Fog-Ethel Smyth's Sonata for Cello and Piano Op. 5 which investigated the influence of Johannes Brahms in Smyth's Sonata for Cello and Piano Op. 5, which was composed in 1887. Julie will be continuing her musical education at Indiana University Jacobs School of Music this fall for a Master of Arts in Musicology. After completing her Master's degree, Julie plans on earning a PhD in musicology.

Faculty Sponsor: Dr. Katharina Uhde

Student Contact: Julie Howe julie.howe@valpo.edu
Beethoven's Impact on the Piccolo: Earning a Soloistic Position Within the Orchestra

Sarah Zakowski

Departmental Affiliation: Music
College of Arts and Sciences

Project Code: MUS - 3

The piccolo flute is known for its high and powerful register. Very few solo works and orchestral parts were written for the piccolo until about 1800. Before the Romantic period, the only known works for the piccolo were three piccolo concertos by Antonio Vivaldi (1678-1741) and military pieces with minor piccolo parts in orchestral and chamber works. No one understood the piccolo's potential until Ludwig van Beethoven (1770-1827), a pianist and composer from Bonn, Germany. Because of Beethoven, the piccolo finally became a part of the orchestra, gained importance as an instrument, and even gained recognition as a solo instrument.

Focusing on Beethoven's use of the piccolo in the fourth movement of his Fifth Symphony (1808), my research compares Beethoven's innovative treatment of the piccolo within his output. I investigate the use of timbre, register, thematic engagement, and texture to show how Beethoven revolutionized the piccolo's symphonic treatment. In orchestral works, the piccolo evolved into an important, necessary member of the woodwind section. Unlike some contemporary critics of the early 1800s, Beethoven saw the piccolo as an expressive, vibrant, and crucial member of the woodwind section. He demonstrated the piccolo's wide dynamic contrast and range, and highlighted its potential as an orchestral soloist. The fourth movement of Beethoven's Fifth Symphony gave the piccolo a chance to outshine other traditionally more important instrumental members of the orchestra and earn its well-deserved soloistic position.

Information about the Author(s):
Sarah Zakowski is from South Bend, Indiana, and is a senior music education major at Valparaiso University. While focusing on her academics, she actively performs in VU's Chamber Concert Band and Jazz Ensemble, playing the flute, piccolo, and baritone saxophone. Prior to graduating in May, Sarah will debut as a soloist with the Chamber Concert Band at the upcoming Sousa Concert. As a future music educator, she looks forward to inspiring students to love music!

Faculty Sponsor: Dr. Katharina Uhde

Student Contact: Sarah Zakowski sarah.zakowski@valpo.edu
Specific Heat of Gases

Sarah Bradash

*Departmental Affiliation: Physics*
College of Arts and Sciences

*Project Code: PHYS - 1*

The purpose of this project is to measure the specific heat capacities of monatomic and diatomic gases (specifically helium and nitrogen) at constant volume, in order to compare these values with predictions made for ideal gases. Equipment utilized includes a Styrofoam container, a resistor to transfer thermal energy to the gas, and a thermocouple in order to measure the temperature as a function of time for the gas as it absorbs heat. From the slope of the T(t) graph, the specific heat capacity can be determined. Error corrections include accounting for thermal energy losses through the walls of the container as well as the heating of the resistor and the thermocouple.

*Information about the Author(s):*
Name: Sarah Bradash
Year: Senior
My background in chemistry and physics dates back to the fall of 2012 (introductory high school chemistry), which provided introduction to thermodynamics, expanded upon throughout my collegiate studies. My project involves experimentally solving for specific heat of monatomic and diatomic gases, which was one of my favourite topics to study. In terms of my future academic pursuits, I plan on studying either particle or nuclear physics with a focus on collider experimentation.

*Faculty Sponsor: Stan Zygmunt*

*Student Contact:* Sarah Bradash sarah.bradash@valpo.edu
Investigating the Viability of a $\gamma$-Al$_2$O$_3$ Support on Catalytic Propane Dehydrogenation Using Transition Metal Clusters

Christopher Bean

Departmental Affiliation: Physics
College of Arts and Sciences

Project Code: PHYS - 2

Recent studies of the reactivity of single atoms and small atomic clusters has created interest in the effect of different support materials on the effectiveness of transition metals as catalysts for propane dehydrogenation. As a continuation of previous work carried out in the Summer of 2017 and Spring of 2018, I will utilize density functional theory as implemented in the VASP program to model an Alumina (Al$_2$O$_3$) surface. Then building on previous work, I will use the surface as a support for single transition metal (TM) atoms and small TM clusters and will use the climbing-image nudged elastic band (CI-NEB) algorithm in order to calculate the minimum energy pathway for the reaction. I will then compare the calculated activation energy with both the unsupported systems as well as the graphene-supported systems to determine the effect of the support material on their relative suitability for propane dehydrogenation.

Information about the Author(s):
Christopher Bean is a senior undergraduate physics and secondary education major who began working with the computational catalysis research group during the summer of 2017. He is planning to teach physics at a high school level and use his research experience to enrich his students' educational experience and opportunities.

Faculty Sponsor: Stan Zygmunt

Student Contact: Christopher Bean christopher.bean@valpo.edu
Computational Study of the Electronic Structure of Various Cobalt (Hydroxy) Oxides in Electrolysis Reactions

Marcus Ochsendorf

Departmental Affiliation: Physics
College of Arts and Sciences

Project Code: PHYS - 3

In their electrolysis reaction to produce H\textsubscript{2} fuel, the Solar Thermal Decoupled Electrolysis group at Valparaiso University observed increased reaction rate as time goes on and proposed that the deposited products on the Ni anode might be conductive and acting as a new electrode surface. It is of great interest to gain a better understanding of the underlying mechanism. In this study, the structure and stability of various cobalt (hydroxy)oxide species on a Ni (111) surface were determined from first-principles calculations to see if the observations made by the Solar Thermal Decoupled Electrolysis group are consistent with theoretical results and what could be responsible for the extended conductive electrode. From the known bulk crystal structures of various cobalt (hydroxy)oxide species, mono-layers of each of these materials were constructed. These monolayers were then placed on a Ni (111) metal support and optimal configurations of the combined systems were determined. The electronic structure of the cobalt (hydroxy) oxide monolayers and bulks will be reported.

Faculty Sponsor: Haiying He, haiying.he@valpo.edu

Student Contact: Marcus Ochsendorf marcus.ochsendorf@valpo.edu
Sub-Nanometer Catalyst Clusters for Propane Dehydrogenation

Joshua Duensing, Jacob Allred, Christopher Smith, Stan Zygmunt

Departmental Affiliation: Physics and Astronomy
College of Arts and Sciences

Project Code: PHYS/ASTR - 1

Propane dehydrogenation (PDH) is used to produce propene, which is the primary building block for many commercial plastics. The catalyst most commonly used for this reaction is platinum. Due to rising demand for propene, an alternative catalyst is being sought due to platinum’s high cost. Alternatives might involve very small platinum particles as well as particles composed of different atoms. For this purpose, we have performed a computational study of the PDH reaction with a 4 atom platinum cluster (Pt$_4$) and several different 4-atom transition metal cluster (TM$_4$) catalysts on a graphene support. We have computed the equilibrium structures of the Pt$_4$ and TM$_4$ clusters on both single- and double-vacancy sites and have calculated the complete PDH reaction pathway for each case. This allowed us to study the effect of the graphene support on catalytic activity. We have also calculated the PDH reaction pathway for larger Pt$_x$ clusters, where $x = 5-14$, in order to study the effect of particle size on catalytic activity. These results help clarify the relationship between the PDH activation energy and the propane binding energy and overall reaction energy and may aid in the design of new potential catalysts for the PDH reaction.

Information about the Author(s):

Faculty Sponsor: Stan Zygmunt

Student Contact: Joshua Duensing josh.duensing@valpo.edu
How Age Impacts Reasons for Migration: Examining Migration from Northern Latin America to the United States

Hilary Van Oss

Departmental Affiliation: Political Science
College of Arts and Sciences

Project Code: POLY - 1

Previous studies on migration lack a focus on how age is a variable in the understanding of why individuals migrate when they do. This research provides a comprehensive examination on how age determines one’s reason for migration. Using the process of content analysis, I evaluated 30 interviews collected and transcribed by the Minnesota Digital Library for individuals that migrated to the United States from Northern Latin America during the time frame 1960 to the present. I examine to see if children (ages 0-17) migrate for family reunification, young adults (ages 18-30) migrate for economic reasons, adults (ages 31-60) migrate due to community causation/social networks, and if older adults (ages 61+) migrate for family reunification. My analysis showed that children migrate for family reunification and young adults migrate for economic reasons; however, my analysis was unable to confirm why adults migrate as there was no majority reason and I was not able to explain why older adults migrate due to a lack of data within that particular age category. Age is an important factor in studying migration as it allows for a detailed understanding of who is migrating to the United States and their reasons behind their action.

Information about the Author(s):
My name is Hilary Van Oss, and I am currently a senior at Valparaiso University where I study Political Science and Global Service with a history minor. My interests in migration patterns and reasons for migration stem from working with refugee populations in the United States and Costa Rica. I found it particularly interesting that very little research done on examining the correlation between age and migration. After college, I hope to work for a non-profit that services the refugee or immigrant population in the United States.

Faculty Sponsor: Kimberly Fields

Student Contact: Hilary Van Oss hilary.vanoss@valpo.edu
The Effects of Language on Salary: South Africa

Caroline Pratt

Departmental Affiliation: Economics/ Political Science and International Relations
College of Arts and Sciences

Project Code: POLY - 2

In this paper, I explore the relationship between the language spoken outside of the household with monthly salary in South Africa, using data from the University of Cape Town’s 2016 general household survey. Most of the literature on language economics focuses around immigration and language. Previous literature on English language proficiency and earnings in South Africa has provided a foundation for my study, though I took it a step farther to test the expected monthly salary of each indigenous language, compared to English. The study is rooted in the fact that language is capital. My study finds that if you speak any indigenous language outside of the household, your expected monthly salary is significantly less than if you speak English.

Information about the Author(s):
My name is Caroline Pratt, and I am currently a senior International Relations and Economics double major with a minor in Communication at Valparaiso University. Through working at several international NGOs and studying abroad in Southern Africa, I developed an interested in international education. Through my experience abroad and coursework in TESOL and sociolinguistics, I questioned what the effects of teaching English abroad had on indigenous populations. Following graduation, I will be teaching English in South East Asia.

Faculty Sponsor: Sara Gundersen

Student Contact: Caroline Pratt caroline.pratt@valpo.edu
Pluralistic Nationalism: The Example of the Kurds

Rachel Silcox

*Departmental Affiliation:* Political Science  
College of Christ College

*Project Code:* Oral - POLY - 3

It has become commonplace to think that nationalism is a social problem—a source of group identity and, therefore, of hegemonic claims, exclusion, and conflicts. This view of nationalism emerges from an exaggerated focus on European nationalisms and the manner in which these ideas established their national identity as dominant, through the marginalization of others. However, when we shift our focus to minority nationalisms beyond Europe, we can start to see the pluralistic potential of nationalism. In this paper, I explore one such case: Kurdish nationalism in Iraq. This minority group and their narratives surrounding national identity complicate previously presumed pictures of nationalism in important ways. Specifically, Iraqi Kurdish nationalists do not exclude or exert themselves over others. Rather, they are working to open a conversation about respect as an element of national identity, which includes questions on gender equality and how to support, but not stifle, minorities. The Iraqi Kurds developed this nationalism not to reduce the world to themselves, but to tell the world not to reduce them. As the Kurds have faced centuries of repression, it is important to them to develop a profound national identity that ultimately leads to peace among conflicting ethnic groups. Therefore, Kurdish nationalism, formed from the region’s intense conflict, is something very different from previously studied nationalisms. In this paper, I will argue that Kurdish nationalism reveals the progressive and tolerant potential of nationalism, where the narratives of national identity do not have to be about intolerance or exclusion, but about the acknowledgment of others.

*Information about the Author(s):*  
Rachel is pursuing a degree in mechanical engineering and the humanities. She is currently the President of Tau Beta Pi and actively encourages an open atmosphere in engineering by co-founding an organization called the Council for Engineering Inclusion and Equity. She completes research in solar thermal technology and electrochemistry and plans to attend graduate school for renewable energy technology.

*Faculty Sponsor:* David Western

*Student Contact:* Rachel Silcox rachel.silcox@valpo.edu
Discussing Across the Aisle: The Effect of Civic Reflection on Political Discrimination

Jonah Koetke

Departmental Affiliation: Psychology
College of Arts and Sciences

Project Code: Oral - PSY - 1

We are measuring the effect of a humanities-based discussion model called Civic Reflection on participants’ opinions and feeling about those who differ in political stance. We hypothesize that, through civil discussion on values, participants will gain a better understanding about each other, thus reducing their discrimination against them.

Information about the Author(s):
Jonah Koetke is a Psychology major at Valparaiso University. He has minors in Sociology, Theology, and the Humanities. His research interests include Social Psychology, especially related to social justice, and the intersection of Psychology and Religion. He hopes to go into a Social Psychology graduate program after graduation.

Faculty Sponsor: Geoff Wetherell PhD

Student Contact: Jonah Koetke jonah.koetke@valpo.edu
The Impact of Reminders of Racial Inequality and Ethnic Identification on Perceptions of Racial Protest Groups

Elisabeth Noland

Departmental Affiliation: Psychology
College of Arts and Sciences

Project Code: PSY - 2

Major and colleagues (2016) describe ethnic identification as the extent to which race or ethnicity is a central aspect to one’s identity. Furthermore, when an individual is highly identified with a group, they may not oppose systems of inequality from which their group benefits. This is because no group wants to admit to having unequal advantages to which their success can be contributed (Branscombe et al., 2007). When highly ethnically identified White participants were told of an upcoming racial shift in which the national population of non-White racial groups will exceed that of Whites before the middle of this century, it led to an increased sense of group status threat, increased support for presidential candidate Donald Trump as well as anti-immigration policies (Major et al., 2016). The goal of the present study is to examine the interactive relationship between reminders of racial inequality and White ethnic identification on support for the Black Lives Matter (BLM) and All Lives Matter (ALM) movements among White participants. Although such a relationship may be mediated by group status threat, this study also aims to examine additional mechanisms that could explain these relationships should they occur such as colorblind ideology, guilt, and attitudes towards Blacks. I expect that participants low in ethnic identification will show higher levels of support for BLM when reminded of racial inequality than in the control condition. Furthermore, participants high in ethnic identification will show lower levels of support of the BLM movement when reminded of racial inequality. I expect this interaction to be mediated by White guilt, colorblind ideology, and attitudes towards Blacks.

Information about the Author(s):
I am a current senior Psychology and Spanish Double Major. I will be attending Purdue University in the fall pursuing my PhD in Social Psychology. My research interests include stereotype threat, implicit/explicit biases, and prejudice reduction strategies. My interest in this topic stems from continued discrimination against people of color and the use of racial protest movements to draw greater awareness.

Faculty Sponsor: Geoffrey Wetherell

Student Contact: Elisabeth Noland elisabeth.noland@valpo.edu
Utilizing Stress: Manipulating Student’s Stress Mindsets Determines Their Health and Functioning Outcomes

Abigail Fate

Departmental Affiliation: Psychology
College of Arts and Sciences

Project Code: Oral - PSY - 3

In modern society, the overwhelming cultural narrative proclaims that stress is detrimental to health and should be avoided, or at least limited, as much as possible. However, a groundbreaking study by Crum et al. demonstrates that one’s stress mindset, rather than one’s stress level, the duration of stress or the magnitude of stress, determines health outcomes, both psychological and physiological (Crum et al., 2013). Mindsets are ubiquitous in daily life. Because we experience too much information from the world to process at any given time, mindsets are lenses by which we more simply order the world with proven influence on daily behaviors, and cascading effects on health, happiness, and success. Crum et al. posit two major categories of mindset: stress-is-debilitating (the culturally reinforced mindset) and stress-is-enhancing (the less common but more beneficial mindset). This study demonstrates that these mindsets can be manipulated, and that a stress-is-enhancing mindset has significant beneficial effects on performance, productivity, health, and learning. Given the cultural narrative, and that modern students are more stressed out and overwhelmed than ever before, it stands to reason that college students are a population with significant room for growth. The present study evaluates the body of literature on stress and mindsets, tests the feasibility and impact of a mindset intervention for university students by tracking their academic performance and psychological health over the course of an academic year, and further examines the effect of stress mindset interventions on students’ willingness and ability to grow from stressful experiences.

Information about the Author(s):
Abigail is a psychology and humanities double major with a minor in Spanish. She is part of Christ College. This research was completed as a senior honors thesis in psychology.

Faculty Sponsor: Michelle Abraham

Student Contact: Abigail Fate abigail.fate@valpo.edu
Effect of Multisensory Information on Memory in Delayed Recognition

Inga Majewska, McKayla Deleon, Nick Cline, Andrew Butler

Departmental Affiliation: Psychology
College of Arts and Sciences

Project Code: PSY - 4

Multisensory information can assist our perception of the world, but does multisensory perception also aid our learning and memory? Previous studies show that multisensory information can enhance continuous recognition memory (Murray et al., 2004), but less data is available on this enhancement working at longer delays. In the current study, we sought to test memory for multisensory information at longer delays than found in previous studies. During the encoding phase, all participants (N=292) were presented with a series of conditions including: multisensory audiovisual learning (one visual image paired with a semantically congruent sound), single unisensory visual learning (one visual image), and double unisensory visual learning (two examples of the same visual image). During the recognition phase, participants were presented with 75 unisensory visual images and given an old/new recognition task. A one-way ANOVA showed a significant difference across these encoding conditions (F(2, 582) = 66.11, p<.001, partial eta squared =.19). Multisensory audiovisual learning led to the highest proportion of correctly recognized items (M = .88, SD = .14), followed by the single unisensory visual learning (M = .81, SD = .17), and then double visual learning (M = .78, SD = .18). Another recognition test given several weeks later showed that the memory advantage of multisensory encoding persisted. These findings support previous studies demonstrating the enhancing effect of multisensory information and show this effect remains at longer delays. Furthermore, our control condition suggests that the memory advantage for multisensory information is not due to the fact that it simply provides extra information during encoding.

Information about the Author(s):

Faculty Sponsor: Dr. Andrew Butler
Student Contact: Inga Majewska inga.majewska@valpo.edu
The United States boasts more ethnic diversity than other countries, largely due to numerous waves of immigration. As a relatively heterogeneous nation, there is a wide variety of opinions when it comes to the morality and legality of immigration, especially within the two-party system. Certain ethnic groups may face more animosity than others during the immigration process. The purpose of this study is to investigate whether one's perceived genetic diversity has a relationship to support for immigration, including from Europe, South America and Mexico, Asia, and Africa. It is predicted that if one thinks they are more diverse, they may be more sympathetic to those immigrant groups with shared identity. Measured variables of interest include Need for Closure, Right Wing Authoritarianism, and Social Dominance Orientation. Need for Closure measures one's preference towards order, structure, and routine in life. Right Wing Authoritarianism measures one's opinions on following norms and authority figures. Social Dominance Orientation concerns one's support for social hierarchies, or one group having power over another. We believe that scoring higher on these items will predict greater beliefs in Biological Determinism, or the belief that certain groups are genetically superior in ability, as well as lower levels of perceived genetic diversity. Finally, Need for Closure, RWA, and SDO may predict less support for immigrant values and immigration overall, especially for undocumented immigrants. The information from this study will be used to inform how attitudes towards one's own diversity may predict support for others' diversity.

Information about the Author(s):
Professor Wetherell is a social psychologist who studies stereotypes and their impact on public policy, ideological conflict, and ideology as a source of meaning. In his spare time, Professor Wetherell enjoys interdisciplinary reading, running, and spending time with his family, wife, dog, cats, chickens, and sometimes bees. Emily Nelson is a Junior Psychology major interested in pursuing a career in Social Justice. She enjoys studying languages, including Spanish and Japanese, and traveling. Emily currently works in the Office of Multicultural Programs as a student aide, facilitating conversations on diversity and inclusion.
Normalization in Schools: Foucault & the Mental Health Crisis

Jennifer Feutz

Departmental Affiliation: Psychology
College of Christ College

Project Code: Oral - PSY - 6

Around half of Americans will suffer from a mental health disorder within their lifetime. The American Psychological Association's DSM-V recognizes 297 mental health disorders, deemed disorders because of their universal ability to severely disrupt individuals' lives. Given the extensive number of cases and different disorders with the ability to impair lives, finding causes behind mental health disorders proves crucial. Examining Michel Foucault's idea of normalization using his text *Discipline & Punish*, I propose normalization may serve as an underlying cause for some mental health conditions, particularly with children. Examining the effects of normalization in schools on students' mental health, I argue that normalization affects students' mental health through socializing students into fitting in with societal norms and promoting the judgement of other students; as such, normalization in schools should be minimized. Analyzing the school system through Foucault's work, I argue that normalization is present in schools through class schedules and grading systems. These systems seek to strip students of their individuality and conform to societal expectations to promote social order and stability. In the process, normalization strips students of the ability of choice and creates a fear of being viewed as different and being outcast. Enforcing norms creates a duality between the existence of a right and a wrong way to live, encouraging individuals to judge one another for failing to fit into the norms. This standard of perfection is truly impossible for students to achieve. The participation of schools in normalization practices exacerbates mental health problems in society.

Information about the Author(s):
Jennifer Feutz is a political science major with minors in Spanish and humanities. She is involved with Christ College and the Valpo Ballroom Dance team. She is interested in the realm of mental health. She strives to do humanitarian, non-profit work in the future serving underprivileged populations.

Faculty Sponsor: David Western

Student Contact: Jennifer Feutz jen.feutz@valpo.edu
Sexual Assault on College Campuses: A Policy Analysis at Valparaiso University

Chloe Castelluccio

Departmental Affiliation: Sociology
College of Arts and Sciences

Project Code: SOC - 1

There are two parts to my current research. The first is a content analysis of Valparaiso University’s sexual assault policies and the policies of the fourteen other universities that Valparaiso considers to be its peer institutions. In this part of the study, I look for both gendered language and victim-centered language that could indicate potential bias in the policies. I also looked to see if there were any systematic differences between Valparaiso and its peers. The second part of this study is an analysis of the results of a survey administered to Valparaiso University seniors to assess their views of Valparaiso’s sexual assault policies and their feelings of safety on campus. The survey also looks at students' general opinions about and experiences with sexual assault. The goal of both studies is to look for problems with sexual assault on the Valparaiso campus and use student responses to formulate a potential way to address them.

Information about the Author(s):
As a woman who lives in our gendered society today, issues of gender and equality have always been one of the primary interests on the forefront of my mind. I began to think about the issue that is rampant rape culture and sexual assault, especially on college campuses. This naturally brought to mind a research project I had done in 2017 where a group of other students and I looked into sexual assault policies on Valparaiso’s campus and crafted a memo of suggestions for improvement on this campus that we then sent to several university representatives. Unfortunately, we did not receive a response from most of the university officials it was sent to, and this led to the idea for this project. In the future, I would like to work in a public policy role, working with either incarcerated individuals or women, particularly victims of domestic violence or sexual assault.

Faculty Sponsor: Andrew Raridon

Student Contact: Chloe Castelluccio chloe.castelluccio@valpo.edu
Domestic Violence Among University Women

Michelle Andersen, 2019; Zedrea Thomas, 2019; Makyma Webb, 2019

Departmental Affiliation: Social Work
College of Arts and Sciences

Project Code: SOCW - 1

Domestic violence (DV), or intimate partner violence, is defined as "violent or aggressive behavior within the home, typically involving the violence abuse of a spouse or partner." This study examined if there are statistically significant differences between the rates of domestic violence experienced by women of color and by white women who have been in heterosexual relationships. Our research question was "Do college-aged women of color experience higher rates of DV than their white counterparts in heterosexual relationships?" We hypothesized that our research would find that college-aged women of color were more likely to experience DV than their white counterparts in specifically heterosexual relationships. The data for our study was collected from heterosexual women at Valparaiso University from different racial backgrounds.

Previous studies found a statistical difference between how different groups, whether by race or by gender, define domestic violence. Women of color in heterosexual relationships were found to experience greater rates of domestic violence than white women. This presentation will examine if that trend holds true among university women who have been in heterosexual relationships as well.

Information about the Author(s):
Michelle, Zedrea, and Makyma are 3 senior year social work majors. In selecting this project on domestic violence, they wanted to focus on a topic that is important to them and that would identify changes that need to be in society and in their campus community. Michelle has interned in a domestic violence shelter and Zedrea and Makyma also recognize the relevance of domestic violence in our society and how it needs to be addressed.

Faculty Sponsor: Matthew Ringenberg

Student Contact: Michelle Andersen michelle.andersen@valpo.edu
Binge Drinking Among College Students in Relation to Depression, Experienced Homelessness, and Parental/Guardian Relationships

Daniela Trajceski, Samyra Leonard, Denise Arce, Meredith O'Connor

Departmental Affiliation: Social Work
College of Arts and Sciences

Project Code: SOCW - 2

Binge or heavy drinking among students is prevalent at many American universities. Researchers have placed the most common reasons why college students engage in binge drinking into three categories: drinking to induce positive mood, to be more outgoing, and to avoid negative emotions. Many studies have found that college students engage in binge drinking typically to enhance their mood, but there have been mixed results about which factors are most strongly correlated to heavy drinking behavior. This study explores the effects of binge drinking in college students as it relates to experienced homelessness, depression, and parental/guardian relationships. We administered our survey to Valparaiso University undergraduate students both online and in-person using questions from the Student Alcohol Questionnaire (SAQ), the Parent Adult Child Relationship Questionnaire (PACQ), and the Patient Health Questionnaire-9 (PHQ-9). We analyzed our data using SPSS and used a Correlation to compare each independent variable to binge drinking. We hypothesized that students who have a history of depression, have experienced homelessness, and/or have a negative relationship with one or both of their parents/guardians, will report engaging in binge drinking at higher rates than their peers. There has been a gap in the research that explores the effects of experienced homeless and negative parental/guardian relationships on heavy drinking in college students, and our study will help to identify the relationship between these variables and binge drinking.

Information about the Author(s):
Daniela Trajceski is a 4th year Social Work and Political Science double major. After graduation, she will be attending graduate school to obtain her Masters in Social Work. She is interested in this research topic because there is much advocacy work to be done regarding binge drinking and mental health.
Samyra Leonard is a senior Social Work and Sociology double major. After graduation, she will be attending the University of Chicago's SSA master's program. She is interested in this research topic because she has worked with many clients who have experienced homelessness, as well as struggled with drug abuse and mental illness.
Denise Arce is a fourth year Social Work and Psychology major. After graduation, she hopes to work for a non-profit serving children and youth. She is interested in this research topic because the social issue can be seen across several other populations. This can be helpful to her to be able to understand the underlying relationships of binge drinking when working with individuals.
Meredith O'Connor is a fourth year Social Work major who will be going a fifth year here at Valparaiso. After graduation she will be going to get her masters in Social Work. She is interested in this research topic because she personally has history with binge drinking and mental health and is interested to learn about what other factors can contribute to this problem that is expanding in colleges today.

Faculty Sponsor: Matthew Ringenberg

Student Contact: Daniela Trajceski daniela.trajceski@valpo.edu
Demographic Factors and Encounters with Law Enforcement

Debra Miller

Departmental Affiliation: Social Work
College of Arts and Sciences

Project Code: SOCW - 3

When students enroll in an institution of higher education, they each bring their own experiences and resulting ideology to campus life. The purpose of this study was to see if different populations have encountered police brutality at different rates. Are high school-aged Black men from urban areas more likely to be victims of police brutality than their white counterparts? This study was also designed to determine if there are demographic factors or trends that provide an explanation for varying rates of police brutality between populations. The data was collected from each researcher's high school of origin. The data collected will be representative of the current student bodies at each high school. The results of this study will provide valuable information to law enforcement regarding their interactions with diverse populations and ways in which they can integrate the results into their training programs.

Information about the Author(s):
Debra Miller '19 is a senior social work major. Next year, she will be pursuing a masters in social work at Dominican University. This project is important to her because police brutality is an important societal issue that does not have an easy solution.
Sydney Griffin '19 is a senior social work major. Next year, she will be pursuing a masters in social work at Boston University. This project is important to her because police brutality is affecting our youth and without some kind of implementation, it will continue to occur.
Katie Mentone '19 is a senior social work major. Next year, she will be pursuing a masters in social work at Dominican University. This project is important to her because police brutality is an important issue that has been affecting much of our society.
Jenna Cartwright '19 is a senior social work major. Next year, she will be pursuing a masters in social work at the University of Illinois-Chicago. This project is important to her because it is a prevalent issue and more research needs to be done to find a solution to the problem.

Faculty Sponsor: Jenna Cartwright

Student Contact: Debra Miller jenna.cartwright@valpo.edu
The purpose of this research was to analyze how campus resources at Valparaiso University affect first-generation college students. Specifically, this study looked at the effect campus resources have on feelings of belonging on campus and academic success. First generation college students are defined as students whose parents have not obtained a four-year degree.

This study used a questionnaire that was emailed to every known first-generation college student at Valparaiso University. This consisted of five sections: demographics, campus resource use, the campus community, academic preparedness, and experience. The use of campus resources section used a Likert scale to see how often students used different campus resources. The campus community and academic preparedness sections also used a Likert scale to see how much students related to questions such as, “I feel like I fit in at Valpo”. Finally, the experience section allowed for students to write in specific challenges they have faced on Valparaiso University's campus. These results can help further develop the Persistence and Success Program (PSP), a first-generation college student program on campus.

Faculty Sponsor: Matthew Ringenberg
A Contested Concept: The Image of God in Islam

Jenna Rifai

Departmental Affiliation: Theology - The Image of God Seminar
College of Christ College

Project Code: Oral - THEO - 1

Muslims throughout the world might be surprised to learn that Islamic scholars have considered the “image of God” a central term for thinking about theological anthropology. For, unlike the sacred scriptures of their Jewish and Christian neighbors, the phrase “image of God” never appears in the Holy Quran and has not played a prominent role in either of Islam’s two largest communities, Sunni and Shia. And yet, in his concept of al-Insan al-kamil, translatable as “the perfect man” or “the complete man,” the prominent Islamic mystic and Sufi scholar Ibn al-‘Arabi argues for an Arabic term that is analogous to some Christian and Jewish interpretations of “image of God.” In order to support his philosophy, Ibn al-‘Arabi pulls evidence from Muslim sources – the Quran, Islamic teachings, and one of the most authoritative schools of hadith, including Hadith Bukhari 6227 which states that God created Adam “in his image” – and yet, despite the way Ibn al-‘Arabi’s works have captivated the minds of Western scholars and theologians, his studies remain controversial among Muslims. This paper examines the holy Quran’s prohibition of anthropomorphizing God and an exegetical examination of Hadith Bukhari 6227 to argue that while a certain aspect of Ibn al-‘Arabi’s “perfect man” is in accordance with Islam, other aspects of Ibn al- ‘Arabi’s “perfect man” go against basic Islamic teachings. In the end, whereas the phrase “image of God” is esteemed in other monotheistic faiths, this paper concludes that it ought not be embraced in Islam.

Information about the Author(s):
Jenna Rifai is a Christ College Scholar at Valparaiso University. She is majoring in history with a minor in chemistry. Her research interests include Islamic religious anthropology. Rifai presented this research at the National Conferences on Undergraduate Research (NCUR) in Georgia this April.

Faculty Sponsor: Dr. Matthew Puffer

Student Contact: Jenna Rifai jenna.rifai@valpo.edu
The sin of the woman in Genesis chapter 3 has been used throughout history as a means of condemning women. It has been used to support arguments that women are easily tempted to sin or that they themselves are temptresses. But in Genesis, how much responsibility lies upon the woman to not fall prey to this temptation? For if the serpent that tempted the woman is Satan, as tradition suggests, then this is not the only time in the Old Testament that Satan’s tactics succeed. Utilizing a literary approach to the Bible, I demonstrate a similarity between Eve’s temptation and an encounter between God and Satan in the book of Job. In Genesis, the serpent offers the woman access to knowledge by means of the fruit. In Job, Satan offers God access to the knowledge of whether Job is truly His faithful servant. Both the woman and God give in to their curiosity. And yet, the woman is chastised by God and by tradition as a sinner. But, if the woman was acting as God would, then this condemnation seems misguided. In fact, if God is supposed to be all-knowing, His culpability seems greater than that of the woman’s. By looking at these two narratives and reexamining the woman’s actions, we see that by acting in a manner similar to God, she affirms the image of God in which she was created. And because of this, rather than castigating the woman for her actions, we should celebrate her.
The Imago Dei and CRISPR cas9: A Christian Case for Genetic Alteration

Joshua Duensing

Departmental Affiliation: Christ College
College of Christ College

Project Code: Oral - THEO - 3

In 2013, scientists at the University of California, Berkeley revolutionized biology and medicine forever when they utilized an enzyme, CRISPR cas9, to elegantly remove and replace sections of genetic code in animal cells. Though it originated in bacteria, it was clear to researchers that CRISPR cas9 could someday be used to alter the genetics of other life forms, even human beings, which is exactly what happened in 2017, when the Oregon Health and Sciences University carried out several successful tests on nonviable human embryos. At that moment, it was clear to even the most skeptical in the scientific community that human genetic engineering was on its way, and likely sooner than previously believed. In the wake of this discovery, an increasingly polarized chasm has grown between conservative theologians and the burgeoning transhumanist movement. But what if there didn’t need to be a divide in the first place? Close analysis of both scripture and contemporary theology indicate that a strong case can be made for the ethical application of CRISPR cas9. This paper seeks to use contemporary theological principles to address several concerns regarding the potential misuse of genetic modification to diminish, or even remove the image of God from humanity. I will contend that, used properly, CRISPR represents a powerful tool to not only preserve but strengthen the Imago Dei in humankind.

Information about the Author(s):

Faculty Sponsor: David Western

Student Contact: Joshua Duensing josh.duensing@valpo.edu