



Welcome to the 19th annual College of Letters and Science Undergraduate Research Symposium.

Today we celebrate student research. While a symposium may not feel or look like a celebration, with its rather formal structure of oral presentations and poster sessions, this is a time to enjoy the inspiration, dedication, and creativity of our young scholars. It's a moment when we step back from our academic routines to admire the accomplishments of our students and encourage them along the path of intellectual achievement. So much hard work is on stage today, and we should all be inspired by it.

As our former colleague Dean Chris Cirimo pointed out, today we "share how teaching and scholarship go together in the bond that develops between our faculty and their students. ... Our faculty, as experts in their fields, are the resource that our students most depend upon in experiencing a successful college career." So, today is also about the faculty who give their time to encourage, advise and direct student research. My deepest admiration and respect goes out to the faculty who give so freely of themselves to their students.

Congratulations to all of the scholars, teachers and learners who make this symposium such a special occasion!

A handwritten signature in cursive script that reads "Eric Yonke".

Eric Yonke
Interim Dean, College of Letters and Science
Professor of History

Oral Presentations 2:15-3:30 p.m.

Science Building (A-wing) 1st and 2nd Floors

Group 1

Room A107

Evaluation of the Antimicrobial Properties of Oil and Husk Extract from Hazelnut (Corylus avellana) - (Biology)

By: Sophie Moll

Faculty mentor(s): Terese Barta, Michael Demchik

Moderator: Terese Barta

Hazelnut growers are interested in finding new uses for their crop waste. The goal of this project was to evaluate antimicrobial activity of oil extracted from the fruit and phenolic extracts of the husk of hazelnut (*Corylus avellana*). The oil was prepared in a DMSO solution and tested using a disk diffusion assay. The husk extract was tested by placing it in a well in a plate of Mueller Hinton agar medium inoculated with bacteria or plates of Sabouraud dextrose agar with the yeast *Saccharomyces cerevisiae*. The bacteria included strains obtained from the American Type Culture Collection. The oil did not show inhibition of growth of the bacteria or yeast. However, the husk extract did appear to inhibit the bacteria, with a stronger effect on the Gram-negative bacteria, *Escherichia coli* and *Klebsiella pneumoniae*. Yeast was only minimally inhibited by the husk extract. This demonstrates that there might be antibacterial uses for hazelnut husk extracts.

Impacts of Xylella fastidiosa's Endoglucanases on Pierce's Disease Symptom Development of Cabernet Sauvignon Vines - (Biology)

By: Bailey Boudreau, Joseph Grosskopf, Maiyer Yang

Faculty mentor(s): Qiang Sun

Moderator: Terese Barta

Grapevine Pierce's disease (PD) caused by the bacterium *Xylella fastidiosa* (Xf) threatens the wine industry in the US. PD symptom development depends on Xf's use of cell wall degrading enzymes (CWDEs) to degrade pit membranes (PMs) in the xylem. Xf's CWDEs include endoglucanases (EGases) that attack hemicelluloses. Impacts of EGases on Xf's pathogenicity remain unclear. This study used two Xf single mutants ($\Delta\text{EngXCA1}$ and $\Delta\text{EngXCA2}$) lacking two EGases, respectively, and one double mutant ($\Delta\text{EngXCA1/2}$) lacking both enzymes. Cabernet Sauvignon vines were inoculated with a wild-type Xf and each mutant. The wild-type Xf-inoculated vines had moderate vascular occlusion, broken PMs and Xf spread, while the double mutant-inoculated vines had no vascular occlusion, intact PMs and localized Xf distribution. Vines with either single mutant had intermediate changes. This suggests that Xf need both EGases to cause significant structural modifications and PD symptom development in Cabernet Sauvignon.

A Comparative Analysis of Landcover Classification Techniques - (Geography and Geology)

By: Janelle Taylor

Faculty mentor(s): Eric Larsen

Moderator: Terese Barta

Various classification techniques are used to describe landcover. While no single method is completely accurate, we can assess and compare the accuracy of techniques to determine the most appropriate approach depending on the application. Supervised and unsupervised classification use spectral values to define landcover classes, principal component analyses may be used to further enhance differences within spectral classes, and heads-up digitizing requires the manual delineation of polygons across a landscape. Using Erdas Imagine and ArcGIS 10.5 I classified landcover of the Couderay watershed using each of these techniques. I then conducted ground truthing to assess the accuracy of my classification ($K = 0.814$) and make appropriate corrections. While not a direct comparison, to assess the unsupervised and supervised classification schema, I will create areas of interest using polygons from the accuracy assessment and to examine the landcover class proportions within each polygon.

Group 2 **Room A110**

Understanding the Parking Problem at UW-Stevens Point - (Computing and New Media Technologies)

By: Jodi L. Gellerman

Faculty mentor(s): Tim Krause

Moderator: Tim Krause

Students are struggling to find adequate parking. This research activity aims to quantify the demand for parking, qualify the impact of the shortage on morale and budgets, and suggest optimized solutions. This study leverages a quantitative approach to big data, and provides visualization in Power BI and Office 365. Data analyzed includes parking citation data from the City of Stevens Point, District 3, Wards 7, 8, 9 and the parking citation records of the university. This research opportunity aims to understand demand according to capacity and hope to minimize negative externalities with data optimized recommendations.

Using Frameworks to Develop Games - (Computing and New Media Technologies)

By: Graeme Bardon

Faculty mentor(s): Tim Krause

Moderator: Tim Krause

My project is a computer game built from scratch using only open-source tools. The goal of this is to show that it is very possible to create a game (or any project) as a single developer, as well as emphasize how important the development process itself is when tackling such a project alone. Efficient use of open-source tools, task prioritization and chronology, and overall mindset are all equally as important as technical and design

skills. These ideas are highly transferable to any type of development in a variety of fields.

Group 3
Room A111

Don't Marry for Money: Criticism of Victorian Marriage Norms in Charles Dickens's Fiction - (English)

By: Jacob Mathias

Faculty mentor(s): Robert Sirabian

Moderator: Robert Sirabian

“There can be no disparity in marriage like unsuitability of mind and purpose,” says Annie Strong in Charles Dickens’s *David Copperfield*, expressing a philosophy running through much of the author’s fiction. Whether marriage is to secure class station (Edith Dombey), financial opportunity (Beadle Bumble), or love (the Micawbers), seeking marriage acts as a narrative catalyst and endgame for many characters in Dickens’s novels. His depictions of failing marriages critique traditional reasons for marriage that create conflict rather than bliss, a criticism of his society’s mores and norms. By showing the failings of marriages caused by spousal dominance and mercenary objectives, and the consequences thereof, Dickens reveals problems with marriage practices in Victorian society and the lack of options, especially for women, for escape. However, through the less prominent marriages of some characters, Dickens shows the idea of marriage, a suitability of mind and purpose, can be fulfilled.

Victorian Education: The Ugly, The Bad, and the Very Good in Charles Dickens's Novels - (English)

By: Payton Bayer

Faculty mentor(s): Robert Sirabian

Moderator: Robert Sirabian

A time of immense change, the Victorian Era saw the rise of education as means of increasing literacy and preparing a workforce. Though the value of education increased, good teaching philosophies remained elusive in a variety of teaching environments. In *Dombey and Son* and *David Copperfield*, Charles Dickens addresses education, particularly of children, criticizing the “forcing” mode used by Dr. Blimber and Mr. Creakle, which focuses on the “product” by emphasizing facts rather than the “process” of learning at a pace suitable to individual students’ experience and ability. Dickens is critical of this product-based education system. However, after following the well-off Paul and Florence Dombey, the charity student Rob Toodles, and the middle-class David Copperfield, he shares the optimistic view that with dedication and compassion, teachers (Dr. Strong) can lead students regardless of social class, gender, and life experiences to high academic achievement and success as adults.

Group 4
Room A112

Virgin Thresholds & the Deathly Isolation of Three Southern Men -
(English)

By: Olivia DeValk

Faculty mentor(s): David Arnold

Moderator: Ross Tangedal

This paper explores the intergenerational, intertextual motif of the threshold in William Faulkner's *Absalom, Absalom!* and *The Sound and the Fury*, asserting that these real and imagined borders isolate the characters Thomas Sutpen, Charles Bon, and Quentin Compson, both socially and physically. Through this isolation, these three marginalized characters come to embody a threat to their own idealized image of a "virgin" South. Isolation becomes a validation of each marginalized character's decision to seek his own death – an act that recognizes the corrupting threat they pose to that which they most long for and ultimately are destined to destroy.

What Does that Make Me?: Southern Sexual Stereotypes in
Tennessee Williams's Cat on a Hot Tin Roof - (English)

By: Nathaniel Hawlish

Faculty mentor(s): Ross Tangedal

Moderator: Ross Tangedal

Tennessee Williams was one of the most influential Southern writers of the 20th century. He has been lauded by scholars and historians for being at the forefront of the LGBTQ's acceptance into mainstream entertainment and media. In *Cat on a Hot Tin Roof*, Williams is interested with the sexualities of archetypal roles of southern families, but he does not have the same narrow focus on homosexuality which he is credited with having. This case study examines the archetypal sexualities in Williams' play, including the presence of a son born of miscegenation, an argument never asserted before.

Group 5
Room A202

An Integer Linear Programming Model for Placing Children into the
YMCA Daycare - (Mathematical Science)

By: Jessica Harter, Robert Goszkowicz, Lucky Vang, Mohammed Albakr

Faculty mentor(s): Andy Felt, Tim Krause

Moderator: Andy Felt

The Stevens Point YMCA child care center needs to decide on a weekly basis which children at the center should move up to the next age group, in addition to deciding where there are spots open to allow children on the waiting list to join the center. These decisions must take multiple rules into consideration, such as the number of children allowed in a room based on the age of children and the number of teachers in that room, while also accounting for the developmental needs of each child. To make this process more efficient, we developed a mixed integer linear programming model to decide which

child should be placed in which child care center room during any given week in a six-month period.

Integer Linear Programming Model for Scheduling Judges for a Conference - (Mathematical Science)

By: Jessica Harter, Jacob Dreves, Martin McCurtis
Faculty mentor(s): Andy Felt
Moderator: Andy Felt

Each year, the College of Natural Resources Student Research Symposium features the work of approximately 100 undergraduate students who present their research projects to faculty and peers, with over 60 judges available to evaluate these presentations. To create an optimal schedule of this one day event effectively and efficiently, we examine a Mixed Integer Linear Program model to allocate judges within a disciplinary subject area and to respect time periods that judges are available for evaluating student projects. The model takes into account the available rooms, the wait time between presentations, as well as any other stipulations requested by the event.

Group 6 Room A207

The Fallacy of Ecosophy - (Philosophy)

By: Jeremy Wolfe
Faculty mentor(s): Jason Zinser
Moderator: Jason Zinser

The field of environmental ethics holds a variety of differing viewpoints as to what it means to live in harmony with nature. Whether we can achieve this harmony through technological innovation or by reverting to a simpler past, there has yet to be a satisfying answer as to why or how such harmony would come into place. Several writers – Arne Næss, Aldo Leopold, Paul Taylor – all present varying attempts to define what kind of moral and proper mindset one ought to have if we hope to live in harmony with nature. These different approaches all face a conflict with human nature. I will assert that ethics are grounded in logic and reality, but that human nature is external to morality and sympathy – and that constructing an ecosophy will not be able to alter our treatment of the natural world.

The Implications of Our Values - (Philosophy)

By: Ella Janson
Faculty mentor(s): Jason Zinser
Moderator: Jason Zinser

The different ways individuals regard and approach the environment can be traced back to an underlying system of values. This value system shapes our attitudes and opinions of the natural world, directly effecting the ways we interact with it. Due to these influences, cultivating a respectful attitude toward our environment is of the upmost importance. Much like how we value humans, our environment needs to be recognized as having intrinsic worth. Currently, much of our environmental policies fail to accept nature's value

independently of humans, rather it employs a strictly anthropomorphic lens. By limiting our concern to humans, we have begun to destroy the natural world. Our attitudes are neither sustainable nor ethical, and as a result many have worked to spark a change. No longer can we keep our concerns confined to human needs and desires, instead we must extend out our interests to include the entire biotic community.

The Effects of Euro-Skepticism on European Integration: Is Brexit the Catalyst for a Less Integrated European Union?- (Political Science)

By: Alexandra Miller

Faculty mentor(s): Mert Kartal

Moderator: Jason Zinser

Based on the United Kingdom's (UK) reputation of euro-skepticism and its announcement to withdraw from the European Union (EU), how does euro-skepticism affect levels of EU integration? I initially define the terms 'euro-skepticism' and 'integration' to ensure a comprehensive argument and to analyze the history of euro-skepticism in the UK. The rational assumption would be, and the hypothesis is, if levels of euro-skepticism are high, then levels of integration in the EU will be low. This study mainly uses the Eurobarometer, which is a series of public opinion surveys conducted under the jurisdiction of the European Commission, to look at support for the EU and EU integration in the UK and compares those findings with the EU member state average. Based on those findings, this study serves to provide a framework for other case studies that analyze euro-skepticism as a variable for European integration and to look at patterns which may forewarn of further disintegration.

Group 7

Room A210

Balance Matters: Artistic Inspirations, Language Barriers, Multicultural Benefits and Commercial Reality- (World Languages)

By: Rachel Cook

Faculty mentor(s): Vera Klekovkina

Moderator: Vera Klekovkina

A catchy tune will not make an artist or musical group globally successful. Seductive melody must complement the unique and inspirational elements of the artist's style. To capture the meaning of a song verbally while allowing the listener to feel it through the music necessitates both linguistic prowess and multi-cultural competency. Bilingualism in the world of music is a trait that comes with valuable opportunities as well as cultural obligations. Opting for bilingual lyrics, musicians face choices between artistic freedom and linguistic barriers, the advantages of multiculturalism and the commercial reality of music industry. To delve into these questions in attempt to resolve them, an investigation of several Anglophone and Francophone musical groups and their choices in song ensued. The linguistic analysis gave rise to unique ideas of how to overcome the obstacle of fusing together artists' inspirations of originality and their aspirations to attain global popularity.

Making Spiritual Connections: Agape France – CRU United States - (World Languages)

By: Rachel Zenisek

Faculty mentor(s): Vera Klekovkina

Moderator: Vera Klekovkina

As part of the UWSP CRU, in summer 2017 I visited Paris, the mythical birthplace of glamor and high fashion, refined cuisine and artistic avant-garde. Agape France, the French equivalent of CRU, has existed since the 1970s. During our trip, we worked with Agape members and visited three prominent campuses: Paris Diderot University, Pierre and Marie Curie University and Université Paris Nanterre. This presentation will describe how 17 students from Wisconsin and Minnesota tried to understand this exuberant culture and the spirituality shared and practiced by Parisian students to examine how human and spiritual connections form across cultures, cities, and generations.

Poster Presentations 3:30-4:30 p.m.

Science Building (A, B, C corridors)

The Humanities

A History of Queer Cultures in Hong Kong: A Political Exploration of LGBTQ+ Identity Expression in a Transnational City of the World - (History)

By: Allison Walker

Faculty mentor(s): Taylor Easum

What was it like to have an LGBTQ+ identity in Hong Kong throughout British occupation, the post-colonial admission of Hong Kong into the People's Republic of China, and within the transnational city today? What sorts of policies and laws affected the queer communities of Hong Kong during these periods? This project provides a historical overview of Hong Kong policy change and development regarding queer rights. From within these historical frameworks, the expression and experiences of queer communities is explored from a political and legislative vantage point. I argue that colonialism, post-colonialism, as well as modern globalization, have all influenced aspects of legislation in regards to LGBTQ+ rights and expression. This research intends to foster a broader understanding of queer communities globally, by examining Hong Kong as part of a local, Chinese narrative with a colonized history, as well as the transnational extensions of this history from within a queer context.

A New Era National Defense: Combating Cyber-Warfare through International Cooperation - (History)

By: Lukas Meske

Faculty mentor(s): Taylor Easum

This research project considers the implications and dangers of cyber-warfare in terms of national defense and international relations. Since the first Gulf War, cyber-attacks have

not been quelled by policies or strategies from the U.S. Department of Defense. While world powers remain leaders on the cyber-battlefield, all states connected to cyberspace are concerned by the same challenges. How can states without the resource capacity of the world powers effectively combat this ever-present threat? I argue that international cooperation must be the focus in dealing with cyber-warfare. By analyzing national cyber-security strategies, military doctrines, and the creation of cyber-defense units in multiple nations of varying global status since the Gulf War, my aim is to expose successful strategies, uncover the most pressing threats cyber-warfare poses to international relations, and emphasize the significance of international collaboration in defending against this global crisis.

A Rise in Violence: The Impact of Mexico-U.S. relations on the Border City of Ciudad Juárez - (History)

By: Lacy Harris

Faculty mentor(s): Taylor Easum

Ciudad Juárez is a complex city that sits right on the border of Mexico and the U.S., sharing part of that border with its sister city, El Paso, Texas. Although it is one of the largest cities in Mexico and a popular area for business, it is most well-known for its high rate of violent crimes. In this research project, I examine the current situation in Ciudad Juárez. More specifically, I argue that the rise in violence during the late 20th to 21st centuries is due to the complex relationship between Mexico and the United States. This relationship includes the execution of policies such as NAFTA, and the implications of maquiladoras. This research examines the problems of different policies, and the impacts of the maquiladoras, in order to give a better understanding of the issues at hand, how these problems are impacting people, and what could be done to address the violence.

Africa's Struggle, Sponsored by the United States - (History)

By: Anthony Kolodziej

Faculty mentor(s): Taylor Easum

It has been nearly 200 years since the Atlantic slave trade came to an end. Nevertheless, the effects of this profound act still leave an open wound on Africa to this day. Of the 58 countries that make up Africa, over 30 are considered least developed nations according to the United Nations Development Policy & Analysis Division. This project looks at the development of nations that make up the western coast of the continent. Through slavery and colonialism, the research will be addressing how the United States has played a direct role in the current state of these countries. As a result, The question must be asked, should the United States be held liable in aid relief due to their impact on the region?

Analyzing Gender Roles and Samurai Cultural Practices in the Tokugawa Era (1603-1868) - (History)

By: Nolan Pihart, Nikayla Schmidt, Dao Yang, Mai La Yang, Autumn Han

Faculty mentor(s): Valerie Barske

This project focuses on gender roles relevant to samurai cultural practices, specifically analyzing military actions, kabuki performances, and seppuku rituals during the Tokugawa era (1603-1868). We examine masculine and feminine expectations of men

and women, and how these gender expectations shaped the historical moment. We analyze archival images of Japan and Japanese warriors from the UWSP Nelis R. Kampenga University Archives and the National Diet Library Digital Collections in Tokyo. Drawing from the theoretical framework presented in historian Anne Walthall's work "Do Guns Have Gender?: Technology and Status in Early Modern Japan" (2011), we discuss the relationship between guns, samurai, and performing masculinity. We hope to gain a better understanding of the history of Japan through the lens of gender.

Analyzing Samurai Virtues and World War II Japan (1940-1945)- (History)

By: Christian Kage, Shantaya Schmidt, Jake Stumpner, Hanako Goto, Kaylin Wiater
Faculty mentor(s): Valerie Barske

Our project focuses on samurai virtues of honor and loyalty during World War II. We compare and assess the concept of bushidō from the Tokugawa era (1603-1868) with narratives during World War II. More specifically, we analyze historical primary and secondary sources such as Yamaga Sokō's "The Way of the Samurai" (ca. 1650), the U.S. War Department's Handbook on Japanese Military Forces (1944), and Oleg Benesch's *Inventing the Way of the Samurai* (2014). The significance of this research is to better understand virtues such as honor, courage, and loyalty practiced by samurai of the Tokugawa era and illustrate that such virtues were still present within 20th century soldiers after the reign of the samurai came to a close.

Challenging Orientalizing Images of Japan - (History)

By: Choua Lee, Sunshine Yang, Cassidy Dean-Wyman, Cory Rusch, Kyle Barena
Faculty mentor(s): Valerie Barske

This poster analyzes Orientalism through the lens of masculinity on three levels. The first describes how other countries Orientalize Japan in media, especially films such as *The Last Samurai* (2003), propaganda, music, and scholastic inquiry. The second describes how Japan self-Orientalizes in contemporary media depictions as well as political policies and cultural initiatives. In historical context, we consider primary sources such as edicts of the Tokugawa government and Meiji discourses on "bushidō" or the "way of the samurai." The final level attempts to disambiguate Japan as the lived and embodied experiences of individual Japanese people. Is there a "real" Japan? While it may be impossible to describe a "real" Japan, our research highlights aspects of Japanese cultural practices and cultural history that exist beyond stereotypical images of Orientalism.

Collective Memory of Communism in the Visegrad Group - (History)

By: Jolan Dishno
Faculty mentor(s): Taylor Easum

Within the Visegrad Group – a cultural and political alliance of Hungary, Poland, Slovakia, and the Czech Republic – there seems to remain a nostalgia for communism within society. This research examines this nostalgia by examining museums and demographic data of those from the era, both of which influence the collective memory of post-communism society. I argue that while there is a nostalgia of communism within the Visegrad Group today, the collective memory of communism represents a negative

trend in society. The Visegrad Group memory has been influenced by the 45-year period of communist regimes in the 20th century such as the “goulash Hungary” period that has contributed to nostalgia. The collective memory of post-Soviet rule differs among citizens, but the effects of communism remain prevalent today, and this continues to influence the Visegrad Group.

Comparing the Role of Honor in Seppuku Rituals and Kamikaze Suicides - (History)

By: Isabella Herr, Michelle Wilde, Fong Thao, Brandon Richardson, Kiana Marr
Faculty mentor(s): Valerie Barske

The concept of “honor” serves as a central invented tradition in narratives of Japan’s national history that often appropriate gender, masculinity, and ideals of “what it means to be a man.” We compare the role of honor in seppuku rituals and kamikaze suicides to connect different eras through a common thread: changing notions of bushidō (the way of the samurai). Both seppuku and kamikaze suicides wrestle with the idea that there is honor in sacrificing one’s own life. We utilize Bito Masahide’s article “The Ako Incident, 1701-1703” (2003) to examine the idea of honor, as well as other secondary sources that address the notion of a “noble death” in Japan. In addition, we analyze and explore primary images of kamikaze planes and cherry blossoms, which become the symbol of a short physical existence. In the end, we highlight the importance of recognizing and validating how invented traditions transform through centuries and continue to evolve in modern Japan.

Contemporary Curiosities - (History)

By: Madeline Abbatacola, Ella Janson, Jess Grunden
Faculty mentor(s): Sarah Scripps

In order to construct a comprehensive understanding of history, we must focus not only on major events, but the objects that we interact with on an everyday basis. These materials come with a story, speaking for our values, practices, and mindsets. The History 395 class chose objects to reflect this in our installation of a cabinet of curiosity in spring 2018 at the UWSP Museum of Natural History. With its focus on our present day, we have chosen objects that reflect a digital age. New technological advances have begun to dictate and shape the culture in which we live. Over the last 20 years, we have witnessed the creation the Internet, the invention of the iPhone, and the ability to step into a virtual reality. Our class broke into three teams: editorial, design and installation, and publicity. Each had an integral role in making this exhibition possible.

European Union on Human Rights: Where does the LGBTQ+ Community Stand? - (History)

By: Emily Crook
Faculty mentor(s): Taylor Easum

Why don’t all states within the European Union (EU) give basic human rights to their LGBTQ communities? Since the signing of the Lisbon Treaty, the EU has increased sanctions against human rights violators, yet countries within its own organization still don’t allow for activities such as gay marriage. In this research, I examine how and why

countries like Poland, Slovakia, and Greece are allowed to not recognize marriage between same sex couples with no repercussions from the EU, while other countries are being sanctioned for not respecting human rights.

Feminism and Islamic Female Embodiment in France: A Case Study of the Lallab Activists - (History)

By: Aisha Umar

Faculty mentor(s): Taylor Easum

The growth of Islamophobic sentiments toward women in France has been prominent over past few years. In this research I explore why this is so. French notions of laïcité or secularism, feminism, and freedom of expression – all common themes in contemporary French politics – helps answer this question. I examine my question through the case study of the Lallab activists: a group that helps to illustrate the controversial relationship between French secular politics and Muslims. This research is based on the premise that the source of growing anti-Islamic narratives among French audiences comes not from the veiling or physical embodiment of the Muslim woman, but from broader cultural and symbolic representations conjured up from France’s colonial past.

From Narcotics to Terror: The Infiltration of Narco-Culture in Mexico - (History)

By: Nicole Thorson

Faculty mentor(s): Taylor Easum

This research explores the effect of drug related terrorism on Mexican society. Historically speaking, drug-trade organizations (DTOs) have not crossed the boundary from inter-DTO violence to outright terrorism. However, since 2006 over 60,000 people have fallen victim to the cartels, and neither the Mexican or U.S. governments have been able to stop the violence. Cartels have entered a realm of psychological warfare, creating their own way of life around narco-culture through music, art, and media. The goal of this project is to provide a comprehensive view of the cartels in order to create policies to help stop the violence. Therefore, I begin by presenting a history of how DTOs have reached such an influential position in society and government. Second, I examine the effect their tactics have on the general population. Finally, I conclude by asking how they have been able to maintain such power and increase the effectiveness of their terrorism.

From Stevens Point to Doi Moi: Efforts to Produce Effective Higher Education in Vietnam - (History)

By: Tanner Finnell

Faculty mentor(s): Taylor Easum

During the Vietnam War a team of teachers from WSU-Stevens Point took part in a program to help the South Vietnamese make plans to produce a well-functioning higher education system. This project failed, with North Vietnamese government winning the war and the U.S. leaving Vietnam. After about another decade of war the Vietnamese government implemented a new set of reforms called the doi moi, which were implemented in order to help the country start to rebuild itself. These reform efforts have led to Vietnam boasting one of the best higher education systems in Southeast Asia. What

I wish to show is the potential link of the Wisconsin team's proposed plans being implemented into the doi moi reform efforts. This only played a little part in planting the seed of doi moi. Such tools that will be using are the written plans of the Wisconsin team, texts covering the doi moi period, and texts covering the education systems of Vietnam throughout the 20th century.

Germanophobia in Wisconsin and Its Implications on the Rights of German-Americans - (History)

By: Jacob Tlachac

Faculty mentor(s): Taylor Easum

My research for this project centers around how, in the years before American entry into World War I, a potent combination of nativism and super-patriotism/nationalism threatened to violate the sanctity of the constitutional laws of German-American citizens. The scope of this study focuses on Wisconsin and Milwaukee in particular in the years between 1915 and 1917 and asks the essential question of "To what extent did the attack on one's constitutional rights actually occur and to what extent did it not?" Using archive material and prior published research work, my research will show that the constitutional rights of Americans were infringed during this time. The importance of my research to the reader is to clearly identify a moment in American history that emphasizes a stark departure from American ideals that few people are aware of and indicates an egregious constitutional crisis, though on a localized scale.

Manifestations of Happiness from Traditional to Modern Day Denmark - (History)

By: Maria Gorski

Faculty mentor(s): Taylor Easum

This project examines how Denmark became the happiest country in the world. I will research the history of Denmark and how social classes shaped not only Denmark, but Europe as well. Scholars have researched this, such as Meik Wiking, the CEO of the Happiness Research Institute in Copenhagen, Denmark. I will include Wiking's research with my own, but I also have my own evaluations to contribute, such as the Bhutan happiness quotient and the Thailand government policies that "force happiness." I will discuss how the traditional Danish terms *hygge* and *lykke* contribute to the Danes' modern lives, their overall happiness, and how even though other countries have similar terms to these, these two factors could determine the happiness that others are missing. These terms are cultural and specific to Denmark, so I will further explain them and evaluate how those terms and concepts have spread happiness to other parts of the world.

Manifestations of Masculinity in the Armor of Tokugawa Japan 1603-1868 - (History)

By: Maria Gorski, Haley Simons, Kimberly Thomas, Brady Simenson, Jared Burkart

Faculty mentor(s): Valerie Barske

This project analyzes the armor worn by the men of the Tokugawa Era (1603-1868) in Japan, and how armor contributed to specific performances of gender and identity. We seek to explain how virility, sexuality, power, and wealth were reflected in what was

worn during this historical time period. We analyze whether what samurai wore played a function for battle or if the adornments were purely to show status. Our work builds on secondary sources including Clive Sinclair's "Samurai: The Weapons and Spirit of the Japanese Warrior" (2001), as well as primary sources such as "The Edicts of The Tokugawa Shogunate: Laws of Military Households (Buke Shohatto)" (1615). In addition, we investigate the way that portrayals of early modern samurai and masculinity are still reflected in modern Orientalizing depictions of Japanese cultural history.

***Northern Ireland After the Troubles* - (History)**

By: Sara Koch

Faculty mentor(s): Taylor Easum

This research project examines the current cultural and social environment in Northern Ireland by exploring the city of Belfast and the aftermath of the Troubles. Northern Ireland experienced a conflict in the 1980s between the minority Catholics and the majority Protestants. The latter wanted to remain part of the UK while Catholics were historically in favor of a united Ireland. The Troubles involved violence and animosity between the two groups that in some ways still survive today despite the current peace. The city of Belfast is still extremely segregated, and I am interested in how this segregation affects the social and cultural aspects of this conflict. I am interested in collective memory of the Troubles, how people are moving forward from this conflict, and how the city's iconic murals affect the people of Belfast. By looking at these aspects of collective memory, I hope to analyze the current situation in Belfast.

***Oppressive Progress: The Effects of Colonial Rule on Transgender Populations in Southeast Asia* - (History)**

By: Katarina Ewing

Faculty mentor(s): Taylor Easum

This research project examines non-cis gender identities and gender expressions in Thailand – and how they compare over time to other Southeast Asian countries– during the period of European colonization in Southeast Asia up to the present. Thailand has been known for openly acknowledging and generally accepting the existence of transgender minority groups within their population, despite the fact that they are barred from participating in some areas of civic life as their true selves nowadays. Though Thailand is the only country in Southeast Asia not directly colonized by a foreign power, it experienced socioeconomic pressure and "self-colonization." Because of this, Thailand was relatively isolated from the anti-colonial movements that swept Southeast Asia in the 20th century. In comparing changing definitions of gender and gender roles in Thailand with its neighbors, we can see how both overt colonial rule and more informal empire effected the roles and acceptance of transgender people in the region.

***Populism: The Good, the Bad, and the Brexit* - (History)**

By: Melanie Heibler

Faculty mentor(s): Taylor Easum

This research explains the rise of populism in Europe and its effect on the Brexit referendum. Brexit is a political issue, but it also affects economics, cultural norms and

will potentially devastate the European identity that has been growing since 1952. Populism, at its base, is a party that fights for the voices and rights of the common people. However, when it radicalizes it can become xenophobic/racist/anti-immigrant or develop far-right tendencies. In many countries, it has led to anti-immigration policies or increases in hate crimes. Despite these facts, some refuse to acknowledge that radicalized populism will negatively affect Britain and the rest of Europe. Many scholars have yet to discuss the ties between populism and job loss, worsening economies and education levels. My research shows that countries in which the above-mentioned issues are present, populism rises, but those issues do not go away, showing that populism does not solve the issues that it claims it does.

Preservation in a MAD World: How Washington and Moscow Instructed Their People to “Duck and Обложка” - (History)

By: Christian Kage

Faculty mentor(s): Taylor Easum

This project compares how the U.S. and U.S.S.R. approached the preservation of their people and national identities under the threat of nuclear annihilation between 1955 and 1963. This project’s aim is to analyze and explain the differences and similarities between each superpower’s civil defense initiatives as they sought to achieve these preservation goals. Ultimately little is known about the Soviet civil defense initiatives and how they were orchestrated. This project aims to shed light on this topic. In doing so, this research provides better understanding on how the two Cold War superpowers intended to preserve themselves domestically under the threat of Mutually Assured Destruction. The use of several archival, government, and secondary sources create a background for comparison upon which this project lies. Among them are several period documents from the Office of Civil and Defense Mobilization as well as books written by leading Soviet specialists, such as Leon Gouré.

Samurai in Transition: Bakumatsu to Meiji (1853-1883) - (History)

By: Ashley Schneider, Shane Sorg, Stacey Javier, Xiao Yang

Faculty mentor(s): Valerie Barske

In the records of history, the transition between the Tokugawa and the Meiji eras has brought about many cultural changes to Japan both to the people and the country as a whole. Our project focuses on how this transition from 1853 to 1883 affected the roles and views of the samurai. This moment of bakumatsu, the end of the Tokugawa bakufu (tent government) into early Meiji highlights a time of struggle for samurai to re-establish their place in modern society or fade into the pages of history. Our research considers primary sources including kabuki plays and accounts of the infamous Ako Incident (1701-1703). We consider depictions of honor and masculinity as represented in visual arts, performing arts, as well as cultural discussions and government policies. In the end, we argue that an analysis of samurai in transition serves as a useful lens for unpacking modern Japan.

Solving the Refugee Crisis: A Comparative Study of Germany and Turkey and Their Responses to the Refugee Crisis - (History)

By: Alexandra Miller

Faculty mentor(s): Taylor Easum

This study compares German and Turkish state responses to the current European refugee crisis, which exploded in 2015 as a result of the start of the Syrian conflict and continued conflict in the Middle East and North Africa. Turkey, a non-European Union (EU) member state, hosts three times the number of refugees that Germany, a key member state of the EU, hosts. This study analyzes three contributing factors that may explain disparity: geographical location, historical context of migration policies, and overall attitude toward the intake of refugees. The term 'refugee' is also defined through an international perspective. The objective is to provide a comprehensive analysis of both EU member and non-member state responses to global crises, which will be applicable to other case studies, rather than Germany and Turkey alone. The goal is to expose the gravity of the European refugee crisis and the international impact of the unshared burden of hosting refugees and displaced persons.

Spanish Tile: A Case Study of Cultural Appropriation Through Architecture and How It Has Destroyed the Idea of Global Architecture - (History)

By: Monica Castillo

Faculty mentor(s): Taylor Easum

Cultural appropriation is something that has been brought up by many, whether it is in our music, clothes, television programs, etc. One area in which this has been passed over would be architecture. Cultural appropriation through architecture is something that happens over and over again, excluding cultures and continuously praising the same cultures. It is important to not only acknowledge but also praise the multiple cultures that have inspired these styles and techniques that are only being associated with one or two of the countries that created them. Spanish tile and its use are mainly seen as a style strictly related to Spanish architecture. However, through this research project, I will help shed light on the other cultures that have helped shape this style. Appropriation through architecture is everywhere, and Spanish tile and its style is only the tip of the iceberg.

State and Revolution: Rebellious Ideas - (History)

By: Shane Sorg

Faculty mentor(s): Taylor Easum

This research examines state building, Leninist-Marxism, and revolution by analyzing the book *State and Revolution* by Vladimir Lenin, which brought him the influence needed to build the Union of Soviet Socialist Republics after the Bolshevik Revolution. I argue his less violent acts to unify the republics that became the Soviet Union were more effective than his more violent methods used to unify Russia after toppling Tsar Nicholas II and the Romanov family. The results of the research will show how Lenin's political philosophy influenced Russia and the world. *State and Revolution* has influenced many individuals around the world and led to many leaders identifying themselves as "Marxist-Leninists." Vladimir Lenin is still highly regarded in Russia nearly 100 years

after his death; therefore, it is worth asking whether it is because of his role in a bloody revolution and civil war, or his success in convincing others to follow him through ideals.

Sugar: The Exchange of Humans - (History)

By: Marshall Stieber

Faculty mentor(s): Taylor Easum

Soon after Columbus arrived in the New World, sugar found its way into the unknown land. Once only affordable to the elite, sugar soon became a food everyone wanted. Demand rose and production followed. Sugar production boomed as Caribbean islands themselves became plantations. High production kept prices low, allowing everyone in Europe to get a taste – a taste they never wanted to lose. However, these people lost the ability to see the exchange of humans, an exchange that was needed to sustain their consumption of sugar. This project is about the economic and social aspects of sugar and the ability of Europeans to overlook the prevalence and necessity of slavery on sugar plantations. Europeans' ignorance and increased consumption resulted in more plantations and slaves. Simply, the economics of sugar started and sustained the need for slaves, but Europeans' inability to recognize or react to the social tragedy of slavery kept it thriving.

The Impact of the Negative Attitudes Toward German Immigrants and Alcohol on the Passing of the 18th Amendment to the Constitution - (History)

By: Michael Weister

Faculty mentor(s): Taylor Easum

Alcohol consumption was seen as immoral and many breweries and pubs were owned and operated by German immigrants. Because of the negative attitudes during and after the First World War, temperance groups were able to gain more ground in their fight against alcohol. I argue that a large contribution to the passing of national prohibition was the fact that the Germans, who brought much of the beer brewing and drinking culture with them when they immigrated to America, were now seen as enemies of the United States and in a reactionary move against them, the argument for national prohibition gained much ground and eventually was passed. This project examines both the point of view of prohibition supporters, as well as the perspective of supporters of the alcohol industry. This is important because Wisconsin has a history in the beer brewing industry and much of the population in the state draws its heritage from German immigration.

Tragic Legacy: Reflections of the Atomic Bomb - (History)

By: Brandon Richardson

Faculty mentor(s): Taylor Easum

My project will examine different Japanese memorials and services conducted regarding the dropping of the atomic bombs in Nagasaki and Hiroshima. I begin by looking into the reasons why the bomb was dropped, and then I consider the global aftermath. By exploring the different perspectives and memories of this tragic event from both the U.S. and Japanese vantage points regarding the dropping of the bombs, and through a close look at why these differing perspectives are held, I hypothesize that these memorials have a much deeper meaning in Japan, and that this meaning is lost on those who purely see it

in pictures from across the globe. I believe this is important to learn about since it is such an awful event to have transpired in human history. Knowing more about the history of this weapon and its legacy can help everyone, whether in Japan, the U.S., or anywhere around the globe today, understand this issue better.

Transnational Identity Politics: Status Law, Hungary, and its Neighbors - (History)

By: Hailey Baumann

Faculty mentor(s): Taylor Easum

This research examines the Status Law of Hungary through a cultural and political lens in order to understand the motives and benefits of the law for a nation and its people. The law allows educational, economic and health benefits to those belonging to the ethnic diaspora of Hungary, however inflicts fear of irredentism in neighboring states. The controversy surrounding the status law involves ideological and symbolic content driven by members of the right wing and then governing group. The cultural and economic benefits seem clear; however, Ukraine and Romania provide a variant of diaspora laws showing differentiation through ethnic nationalism and political motives. The controversy involves not only the details and questionable political motivations behind the status law, but also the responsibility of a nation to provide for members of its ethnicity. Through these problems of the status law remains a strong sense of nationalism and history for transnational Hungarians.

What Lies Behind the Painted Face: Kabuki, Edo, and Samurai - (History)

By: Morgan Snyder, Nicholas Kositzke, Haley Budrow, Kyle Murie, Maxwell Zeitler

Faculty mentor(s): Valerie Barske

This project examines the similarities and differences between fictionalized versions of samurai fighting techniques and their counterparts in reality. We analyze several sources from the Edo period (1603-1868) including paintings of the Tale of Heike (1650-1700) and various pieces from the Tokugawa Art Museum. In addition, we look at the portrayal of samurai conflict in kabuki plays and the idealized image that they represent. This research is significant because it is important to distinguish the difference between fact and fiction when looking at the history of the samurai, especially when considering modern invented traditions that often romanticize the past. By researching and unpacking the complexities of idealized images, we develop a better understanding of the samurai and their significance to Japanese cultural history, including the ways samurai shaped the past and present.

The Social and Behavioral Sciences

Cannabis Relative to Alcohol and Tobacco - (Sociology and Social Work)

By: Joshua Rosenkranz

Faculty mentor(s): David Barry

The objective of this poster is to examine the health effects of alcohol and tobacco compared to cannabis. We will demonstrate the fundamental operation of the dose response curve and how it is used in pharmacology to determine the overall safety of a drug. A public opinion section will focus on three topics. The first will focus on the stepping-stone theory and how current literature seems to contradict this theory; there will be a section that focuses on dependence liability and will contain a study that examines the variance in dependence liability between drugs. The second will focus on the medicinal benefits of cannabis. The third topic is a brief summary of drug schedules and the substances that have been categorized by the Controlled Substances Act of 1971. The ultimate purpose of this poster is to provide credible scientific data that demonstrates that cannabis is a safe recreational substance, and a safe medicinal substance.

Determinants of Incarceration Rates in the U.S. - (Political Science)

By: Christina Drinville

Faculty mentor(s): Mert Kartal

What determines a state's incarceration rate within the United States? This paper explores the explanatory power of six factors that have been popularly used in the existing literature: a state's minority population, poverty rate, voting preferences, homeless population, mental illness population, and juvenile delinquency rate. The statistical findings show that poverty has the most substantial impact on a state's incarceration rate, and that the two variables are positively correlated. The five other explanations, however, fail to reach statistical significance. The quantitative findings are supported by an in-depth analysis of incarceration rates in Louisiana.

Exploring What Makes a Good Universal Healthcare System - (Political Science)

By: Samantha Wirkus

Faculty mentor(s): Mert Kartal

This research project explores what makes a good universal healthcare system by exploring data from the King's Fund and National Health Service Programme. Further evidence will be collected by speaking to knowledgeable professors who have inner workings of the National Health Service in Britain and research papers that evaluate the program. To test the theory, I compare the National Health Service with other universal healthcare systems by looking at data on mortality rates, wait times and other key aspects that make a good healthcare system. By analyzing this data, I show why the National Health Service is one of the best healthcare systems. I hope to find why the National Health Service is having financial difficulties and explore the role of private financing. I

conclude by discussing what the National Health Service should do to overcome its financial troubles to maintain their status as a healthcare provider.

HiFi vs. Regular Music: Perceptual Difference or Placebo – (Psychology)

By: Ethan Englund, Hannah Olson, Damon Salm, Marisa Skajewski
Faculty mentor(s): Jiayi Wang

High fidelity music – high-quality reproduction of sound – has been gaining popularity. During the compression process, HiFi sound files keep all original data. In comparison, normal sound files (e.g., MP3) lose some data during compression to achieve a smaller file size. However, no study investigated whether we can actually perceive the difference. In experiment 1, 50 students listened to both MP3 and Flac (HiFi) files of three music pieces and then asked to evaluate the listening experiences. They were not told which format they were listening to. Results show that the students evaluated the two file types roughly the same. In experiment 2, 62 students listened to the MP3 files twice. They were told one of them was Flac. Results show that the listening experience was higher when participants were told they were listening to HiFi. This study showed that our preference to HiFi music might be psychology instead of perceptual.

Modern Nationalism in Poland - (Political Science)

By: Alexandria Bolle
Faculty mentor(s): Mert Kartal

What causes the increase of nationalism in Poland? Literature focuses on two factors: Solidarity labor union and EU regulations. During the 1980s, Solidarity had created an environment where nationalism became more accepted in society. Interestingly, EU regulations have created a resurgence of these attitudes. The Polish national elections serve as a marker of nationalism while opinion polls show the attitude towards the EU. To find the relationship between Solidarity and modern nationalistic groups, the study analyzes platforms of the groups, compares the rhetoric groups use, and finds that public opinion of the EU has affected election results for nationalistic parties. As approval of the EU decreases, the number of nationalistic candidates elected increases. Qualitative evidence suggests that Solidarity in the 1980s used more ethnonationalistic wording to gain supporters and that Prawo i Sprawiedliwość (PiS) today follow similar strategies.

Perceptions of Car Accident Severity: How Subtle Cues Shape Perceptions - (Psychology)

By: Jack Krueger, Ian Polzin, Natalie Romo, Rachel Frank
Faculty mentor(s): Erica Weisgram

Our study replicates and extends a classic study by Loftus and Palmer (1974) that measured participants' estimation of vehicle speed when witnessing a car accident. When the researchers asked participants how fast the car was going when it "smashed" into another car, estimations of speed were higher than when the verb used to describe the accident "contacted" or "bumped." Our study will replicate this study by manipulating the terms used to describe the car accident (e.g., "crashed," "bumped"). In addition, we are manipulating the gender of the driver that causes the accident using pronouns of "he,"

“she,” or “they.” Participants will rate their perceptions of speed and responsibility for the accident. Participants are undergraduate UWSP students from an introductory psychology course. Data collection has begun, and data analysis is forthcoming.

Risk Factors on College Student Retention at the University of Wisconsin-Stevens Point - (Sociology and Social Work)

By: Michael Topping

Faculty mentor(s): Maggie Bohm-Jordan

This study examines the importance of retention among undergraduate students in higher education. Retention is an area of study that has grown over the years, where universities' rate of persistence may affect the reputation of the institution. Three theoretical frameworks were utilized: Tinto's (1987) model of student retention, Astin's (1984) theory of student involvement, and Durkheim's (1976) concept of anomie and social integration. The aim is to explore the question, What is the relationship between risk factors and the likelihood of persistence in college retention? We examined 10 risk factors (i.e., financial strains, social integration, advising effectiveness) drawn from the College Persistence Questionnaire (CPQ). Logistic regression was utilized to analyze the data collected from the undergraduate students at the University of Wisconsin-Stevens Point. Future implications and limitations are addressed.

Social Change in Prejudiced Affect: An Initial Test of the Emergent Ingroup Model - (Psychology)

By: Alison Clark, Mason Kuchenbecker, Michelle Wilde, Leah Gastonguay, Bianca Skortz, Sydney Wayner

Faculty mentor(s): Mark Ferguson

Ferguson, Branscombe, and Reynolds (2018) developed the emergent ingroup model to understand a wide range of prejudices in society, as well as how such prejudices change over time. They suggest that people are more likely to perceive prejudices toward groups who have been widely recategorized as ingroup members. In an initial test of this model, 229 UWSP students completed an online card-sorting task in response to the following question: have Americans' feelings toward this group changed over the past 50 years? They sorted 245 social groups into one of four boxes: 1. always negative feelings (established outgroups), 2. more negative feelings (emergent outgroups), 3. more positive feelings (emergent ingroups), and 4. always positive feelings (established ingroups). As expected, participants more frequently sorted historically marginalized groups (such as ethnic and sexual minorities) into the emergent ingroup box. Overall, these results provide support for the emergent ingroup model.

Superheroes and Fairies: Gender-Typed Play Styles and Play Preferences among Preschool Children - (Psychology)

By: Kaitlan Kilgore, Holly Erpenbach, Carolyn Bodus

Faculty mentor(s): Erica Weisgram

This study examines gender differences in play style and toy preferences. Gender differences in toy preferences are large and consistent (Weisgram & Dinella, 2018), and research suggests that boys and girls may play with toys in different ways. The play

styles we focused on were building behaviors and “rough-and-tumble” play – play behaviors more often ascribed to boys. Participants were preschool children (n=27) ages 3-5 years old randomly assigned to play with either masculine toys (superheroes) or feminine toys (fairies). We observed their building or rough-and-tumble play and then asked a variety of questions involving their stereotypes of gender-typical toys as well as their personal interest in the toys themselves. Lastly, we asked participants about their interest in several familiar developmentally appropriate toys. Our hypothesis is that masculine toys would result in more “rough-and-tumble” play than the feminine toys.

The Beauty is Good Hypothesis: Perceptions of Individuals Based on Attractiveness and Gender - (Psychology)

By: Kara Pittman, Bethany Lewandowski, Cassandra Davis
Faculty mentor(s): Erica Weisgram

Our research project seeks to replicate and extend Dion, Berscheid and Walster’s (1974) study on the “beauty is good” hypothesis. This hypothesis states that when someone is perceived as more physically attractive, others are more likely to attribute positive personality traits and better life outcomes to the attractive individual than to less attractive individuals. In our research, we wanted to see if there were any differences between people’s ratings of high attractive and low attractive individuals on perceived traits and life outcomes. In addition, we are varying the gender of the targets assessed. We selected six photographs previously rated on attractive scales from the Chicago Face Database and created an online survey through qualtrics.com. We also collected demographic information on participants to examine confounding variables.

The Effects of Person-First Language on Perceptions of Individuals - (Psychology)

By: Kyle Wallace, Aspen Duffin, Jack Difino
Faculty mentor(s): Erica Weisgram

This study investigates the effects of person-first language on individuals’ perceptions of people with autism. Participants will be randomly assigned to one of three vignettes that describe someone with autism who is applying for a job, but the label of how the person with autism is described will be differently across the three vignettes (no labeling, person-first language, non-person first language). After reading their randomly assigned vignette, participants will complete a questionnaire that aims to measure their perception of whether the person with autism is competent for a job based on the given information. Demographic information will be collected.

The European Union’s Financial Sanctions on Human Rights Violators: Are They Aiding or Ailing the Protection of Human Rights? - (Political Science)

By: Emily Crook
Faculty mentor(s): Mert Kartal

How do financial sanctions affect human rights within the sanctioned country? The literature suggests that targeted sanctions have not helped the effects on the local

population nor deferring human rights violations. This study examines the impact of financial sanctions on human rights, which is quantified according to the Freedom House's democracy measure, stance of a country on the Political Terror Scale, amount of political imprisonments within a country, as well as the amount of enforced disappearances. I argue that financial sanctions cause more human rights violations because, without funding, a government is unlikely to change how it treats its people; if it violated human rights before, the government still will after it no longer receives money to promote better human rights practices. The study focuses on Iran, Burundi, and Venezuela as case studies, which suggest that there is a negative effect of financial sanctions on countries' human rights records.

The Influence of Shared Identity and Morality Salience on Sustainable Dietary Preferences - (Psychology)

By: Mason Kuchenbecker, Sydney Wayner

Faculty mentor(s): Mark Ferguson, Erica Weisgram

Why do people choose to eat sustainably? Previous research suggests that the salience of human mortality leads people to eat animals because it encourages feelings of power and invulnerability. Our work examines whether the salience of animal mortality leads people to avoid eating animals because it leads them to consider animals' rights, particularly when thinking about the similarities between humans and animals. To test this hypothesis, 77 UWSP students completed a manipulation of shared identity (between humans and animals, humans only, or a control condition) and a manipulation of morality salience (animal or human mortality). They then completed measures of animal rights and dietary preferences. Preliminary analyses provide some support for our hypothesis. We discuss the implications of our results for the promotion of sustainable dietary behavior.

What Affects High School Dropout Rates? Evidence from the 2011-2015 American Community Survey 5-year PUMS Data - (Sociology and Social Work)

By: Morgan Bauer, Sarah DeGuire, Serafina Scurto

Faculty mentor(s): David Chunyu

Using data from the 2011-2015 American Community Survey (ACS), this research investigates school attendance among Wisconsin youth and seeks to understand how high school dropout rates in Wisconsin can be affected by race, homeownership, and parental economic status. We also review the pertinent literature that discusses the impacts of race, socioeconomic status, and school environment on a student's ability to attain a high school diploma. Our own data analysis suggests that in Wisconsin there are substantial gaps in educational attainment based on the aforementioned factors; specifically, students in Wisconsin who are African American, whose parents rent a home and whose parents have a low income are more likely to drop out of high school than individuals who are Caucasian, whose parents own a home and whose parents have a high income. To further confirm our findings we will also implement a case example from the city of Milwaukee and expect to see similar patterns of disparity.

The Natural Sciences/Math and Computing

A Bacterial Pectinase Alone Cannot Contribute to Pierce's Disease Symptom Development of Cabernet Sauvignon Vines - (Biology)

By: Bryce Hall, Gregory Weals, Graig Fisher
Faculty mentor(s): Qiang Sun

The causal bacterium of Pierce's disease (PD), *Xylella fastidiosa* (Xf), is introduced to a vine by insects, and its subsequent spread in the vine may eventually lead to death of infected vines. It is believed that Xf use cell wall degrading enzymes (CWDEs) to break down pit membranes (PMs) to facilitate Xf's spread. PG, a pectinase, is one CWDE. However, any connection of PG to Xf's virulence is not clear. On the other hand, vascular occlusion occurs in a PD-infected vine and may affect the vine's susceptibility to PD. In this study, we used Cabernet Sauvignon vines inoculated with a buffer, a wild-type Xf strain (Fetzer) and a Xf mutant (Δ pgI, incapable of producing PG) to analyze Xf-vine interactions. We found that all the vines had no or little vascular occlusion and very few broken PMs. Xf cells were not seen in the vines inoculated with Δ pgI Xf and buffer, but observed in the Fetzer-inoculated vines. These data suggested that with PG alone, Xf might not cause vines' PD symptoms.

A Comparison of Fine Particulate Matter (PM_{2.5}) Concentrations Measured during Biomass Burning Events - (Chemistry)

By: Kimberly Knispel, Christian Krause, Shane Goettl, Michelle Petkovsek
Faculty mentor(s): David Snyder

Ambient fine particles with aerodynamic diameters of 2.5 microns and below (PM_{2.5}) were measured in proximity to several biomass burning emission sources, including residential wood burning devices, prescribed burns conducted by the UWSP Fire Crew, a backyard fire pit, and leaf burning. PM_{2.5} concentrations measured from these studies were compared with ambient concentrations measured by the California Air Resources Board (CARB) at air quality monitoring sites during the Thomas and Creek wildfires that affected Ventura and Los Angeles Counties in 2017. Areas impacted by residential wood burning devices showed similar levels of fine particles (average and maximum concentrations measured as hourly averages) as those impacted by wildfires. PM_{2.5} concentrations measured during prescribed burns, near the backyard fire pit, and near leaf burning were highly variable, but provide insight into occupational exposure and exposure during leisure activities.

A Reverse Biased LED Used As a Single Photon Detector - (Physics and Astronomy)

By: Kaylie Cartwright
Faculty mentor(s): Palash Banerjee

We describe the use of a low cost light emitting diode (LED) as a single photon detector. The LED is operated under reverse bias conditions, and produces a measurable pulse of current for every photon detected. The analog current signal is converted into a digital pulse using a comparator circuit. A high voltage summing amplifier is used to apply the

reverse bias. These analog circuits are controlled using a custom LabVIEW software. Preliminary experiments show that a threshold voltage of approximately 22 – 23 V is necessary to obtain a measurable count rate. We find that this threshold depends on the wavelength of light incident on the LED. The reverse biased LED together with our analog circuits can also be combined with standard pulse counting modules. This allows us to measure the distribution of pulse heights as well as their arrival times. These distributions provide additional insight into the behavior of a reverse biased LED.

An AC Hall Effect Apparatus to Measure the Electrical Properties of Zinc Oxide Thin Films - (Physics and Astronomy)

By: Adam Opperman

Faculty mentor(s): Palash Banerjee, Seth King

Doped zinc oxide (ZnO) thin films have potential use in photovoltaic applications. We have built an AC Hall effect apparatus to measure the electrical properties of these films. This apparatus uses the van der Pauw method to measure both the resistivity and the charge carrier concentration. The apparatus consists of a current source, nanovoltmeter, a home-built switching matrix, and a large electromagnet. The switching matrix is controlled by digital signals and a four-probe sample holder is used to make electrical contact. Data acquisition for the apparatus is controlled by custom LabVIEW software. We calibrated this apparatus by measuring a fluorine-doped tin oxide film, and a silicon wafer. For the silicon wafer, the resistivity was $9.4 \pm 0.2 \text{ } \Omega\text{cm}$ and a charge carrier density of $(2.25 \pm 0.07) \times 10^{15}$ per cm^3 . Our preliminary measurements of intrinsic ZnO film show the resistivity to be $54 \pm 2 \text{ } \Omega\text{cm}$ and the charge carrier density to be $(1.10 \pm 0.06) \times 10^{15}$ per cm^3 .

An Operative Model for Reptilian Thermoregulation - (Biology)

By: Ben Milzer

Faculty mentor(s): Pete Zani

Reptiles survive in different climates due to their ability to maintain their temperature homeostasis via thermoregulation. There is extensive research on reptilian thermoregulation, yet identifying a model that possesses the same rates of heat exchange can reduce animal usage in research. Two different models to approximate heating and cooling rates of common side-blotched lizards were used. One model was a datalogger in plastic and duct tape while the other was a datalogger in plasticine (modeling clay). Both model temperatures were compared against a live animal's temperature when under a heating lamp or cooled in a refrigerator. Results show both models gained heat from the heating lamp more readily than lost during the cooling phase, this is consistent with patterns in the live animals. While both models had a rate of temperature change similar to the live animals, results demonstrate that the clay lizard model had approximately 1:1 rate of temperature change with a live lizard.

Analysis of Growth, Sex, and Neascus infestation (Black Spot Disease) in Wisconsin Johnny Darters (Etheostoma nigrum), a 60-year perspective - (Biology)

By: Jason Lins, Jennie Krusiec

Faculty mentor(s): Justin Sipiorski

We are analyzing potential similarities and differences among age, growth and ectoparasitism patterns across historical Johnny Darter (*Etheostoma nigrum*) populations in Wisconsin. The current dataset consists of over 300 specimens, collected over the past 60 years from lentic and lotic waters throughout Wisconsin. We are measuring total length, preserved mass, sex, gonadal weight and number of encysted *Neascus* parasites. Specimen locality information is georeferenced. Regression analyses will be conducted to evaluate potential spatiotemporal relationships among number of infestations, length, weight, gonadal somatic index (GSI) and body condition. Johnny Darters can occur in nearly any aquatic habitat in Wisconsin – cool to warm water, lentic or lotic, polluted or unpolluted, heavily developed or pristine. We are curious about potential growth, body condition, and ectoparasitism rate variation across populations over the past 60 years.

Analysis of Nanoparticle Inks for Their Use in Thin Film Solar Panels - (Chemistry)

By: Cassidy Volm

Faculty mentor(s): Shannon Riha

Nanoparticle inks are colloid solutions that contain nanometer-sized particles suspended in a solvent. These inks have many uses for consumer products and technologies, including their contribution to the advancement of the solar energy market. In this study, we consider the use of copper antimony sulfide nanoparticle inks for thin and flexible solar panels given the material's ability to absorb sunlight, its element abundance, and its non-toxicity. Long chain organic molecules were used in the preparation of the nanoparticle inks to prevent the nanoparticles from forming bulk solids. The thin films were then made using a doctor blading method and subject to different post-processing methods to replace or remove the long-chain organic molecules for better electron transfer. The doctor bladed thin films were characterized by UV-vis spectroscopy, ATR-IR analysis, scanning electron microscopy, and photo-electrochemistry.

Application of the Molecular Tailoring Approach to Halogen Bonds - (Chemistry)

By: Garrett Bartelt, Benjamin Loef

Faculty mentor(s): Erin Speetzen

Intramolecular forces such as hydrogen and halogen bonds are interactions between atoms within a molecule, and help dictate molecular shape. These interactions are important in the design of catalysts and molecular electronics and in crystal engineering. The study of the energetics of intramolecular forces is challenging, as there is no unambiguous way to calculate the interaction energy. The Molecular Tailoring Approach has been used to accurately determine the strengths of intramolecular hydrogen-bonded systems. To determine the applicability of MTA to halogen-bonds we have carried out a

benchmarking study using MTA to calculate interaction energies for a dataset of intermolecular halogen-bonded complexes, for which the exact interaction energy has been calculated. The data indicate that the MTA can accurately reproduce these energies making it appropriate for use in determining intramolecular halogen-bond energies.

Characterization of An Antibacterial Compound Produced By a Fungal Epiphyte Isolated from the Liverwort Conocephalum conicum - (Biology)

By: Dominic Gunderson

Faculty mentor(s): Terese Barta

This study investigated the antibacterial properties of an extract isolated from an epiphytic fungus previously identified as Epicoccum. This fungus was isolated from the liverwort Conocephalum conicum. Crude extract was concentrated by ethyl acetate extraction. This concentrated extract was tested against 11 different species of bacteria by placing the extract into wells of beef extract peptone agar medium inoculated with bacteria. Gram-positive bacteria, including Staphylococcus aureus, were more sensitive than Gram-negative bacteria. The effect of extract on bacterial growth and viability is being tested. Preliminary results showed that the extract reduced late growth phase Staphylococcus epidermidis cell numbers within 20 minutes of being exposed to the extract. Experiments are underway to determine how sensitive the bacteria are to this compound while in the active growing phase.

Comparison of Plover River Watershed Soils and Streambed Texture - (Geography and Geology)

By: Kayla Faskell, Ernest Jorgensen, Kyle Kleinschmidt

Faculty mentor(s): Karen Lemke, Neil Heywood

Our project focused on sediment in the Plover River and the soils in its watershed. Rivers transport sediment every day and deposit it in different places. We examined whether the texture of the sediment on the bed of the Plover River related to the texture of the soils adjacent to the river channel. To determine this, we collected sediment from the riverbed at seven sites and used a GPS to identify our locations. We analyzed the particle size distribution (texture) by drying and sieving the river sediment. We obtained information on the texture of soils in the watershed from the USDA Natural Resources Conservation Service and compared those to the texture of the riverbed sediment. We used GIS to examine how upstream soil texture in the watershed related to downstream sediment.

Computational Fluid Flow Around Barriers Using Lattice Gas Cellular Automata - (Physics and Astronomy)

By: Eddy Doering

Faculty mentor(s): Brad Hinaus

Physics based modeling of a system of fluid like particles has been computationally programed for some time now. We use Lattice Gas Cellular Automata (LGCA) to computationally calculate the flow of fluid particles through a tube. In LGCA, discrete fluid particles flow through a series of nodes. When particles collide at a node, their final

state is determined by a simple set of rules that conserve both momentum and energy. We then repeatedly apply these collision rules to simulate fluid flow around various barrier geometries and measure both lateral and transverse forces on the barrier.

Creating Molecular Pyramids from Simple Starting Materials - (Chemistry)

By: Thomas Polaske, Eden Laska
Faculty mentor(s): Nathan Bowling

Organic ligands with multiple Lewis base sites have the potential to conform to desired shapes when complexed with an appropriate transition metal via coordinate covalent bonding. We strive to synthesize and characterize novel organic ligands that fold into a tetrahedron shape when complexed with a transition metal. The cavity created by this pyramid has the potential to trap small anions in the interior. The dimensionality of the tetrahedron necessitates the use of a transition metal with trigonal planar coordination geometry. Here we use an aryl-alkyne motif as the foundation of the pyramid and pyridines as the Lewis bases which complex to a silver atom forming the apex of the pyramid. ¹H NMR titration studies support the existence of the tetrahedron complex in solution. We are focused on extending this pyramid concept to the design and synthesis of ligands with the ability to fold into symmetric and asymmetric bipyramid structures.

Defective Gene Splicing with Mutant Alleles of the Ankyrin 1 Gene Isolated from Patients with Hereditary Spherocytosis - (Biology)

By: Victor Alencar, Jacob Elliott, Jacob Klemm, Arthur Tondin
Faculty mentor(s): Diane Caporale, Thomas Lentz, Ashley Driver

Hereditary spherocytosis (HS) is a genetic disorder characterized by altered morphology of red blood cells (RBCs), whereas the typical biconcave shape becomes spherical in HS patients. Defective ankyrin proteins have played a role in this disease. In collaboration with Prevention Genetics, a number of intron mutations were found in the *ank1* gene of affected patients, which were predicted to cause defects in splicing of mRNA during gene expression. These would end up coding for non-functional ankyrin and, thus, contribute to the misshapen RBCs. To test this hypothesis, we investigated whether cells containing each mutated intron create transcripts with different genetic codes from their respective wildtypes. Plasmids containing each mutation were transfected into cells, and RNA was isolated and converted to cDNA for sequencing. Wildtype and mutant cDNA sequences were compared to identify whether the mutations altered splicing. We identified several splicing defects that may cause HS.

Designing Porous Solids - (Chemistry)

By: John Flood, Dominion Fredericks
Faculty mentor(s): Joseph Mondloch

Metal-organic frameworks (MOFs) are a class of porous solids built up from metals and organic linkers. These solids contain void spaces which can function as sponges and “soak up” guest molecules. This can improve materials-based technologies such as the storage and separation of gases and metal capture from solution. One strategy to synthesize MOFs is to start with a known MOF, place it in a solution with a new

(desirable) linker, and allow the linkers to exchange. This process is called solvent-assisted linker exchange (SALE). In this work we investigate how the choice of solvent affects SALE and what organic linkers can be incorporated into our MOFs via SALE. This will allow us to take advantage of a wide variety of processing conditions to create new and improved MOFs.

Designing Novel Viologen Compounds for Use in Organic Electronic Devices - (Chemistry)

By: Brian Karl, Hannah Downs

Faculty mentor(s): Nathan Bowling

Viologens are a class of compounds consisting of alkylated N,N'-bipyridyl salts that have the ability to exist in three different, stable oxidation states. This property, uncommon for organic molecules, can be exploited via reversible redox reactions, presenting the opportunity for many potential applications in organic electronic and memory devices. We anticipate that electronic interactions between viologen compounds will allow us to dictate by redox chemistry the preferred conformations of a conjugated molecule, and control its electronic properties. We report the synthesis and preliminary characterization of novel viologens prepared by Sonogashira coupling of various alkyne components to a previously prepared 2',2'-diiodo-4',4'-bipyridine. Subsequent alkylation provided viologen compounds, which were then investigated by cyclic voltammetry to better understand what effect alkyne substituents have on the electronic properties of viologens.

Determining a Nutrient Threshold of Change in Freshwater Algal Communities - (Biology)

By: Adam Ruka

Faculty mentor(s): Krista Slemmons, Robert Bell

In aquatic ecosystems, algae are primary producers subject to environmental conditions including: temperature, light and nutrient availability. In areas of excessive nutrient runoff, algal blooms have occurred with costly repercussions. Determining a nutrient threshold at which growth and community composition are altered may aid in predicting adverse conditions. To analyze the effect of nutrient availability in local algal communities, water and algae were sampled from the Stevens Point Water Treatment discharge. After nutrient testing, algal communities were placed in test tubes of gradient diluted water samples and compared with diluted concentrations of Alga-gro, a commercial algae additive. Preliminary results will be discussed. The results of our study may aid in the counteractive ability to forecast adverse conditions due to excess nutrients.

Differentially Expressed Proteins Are Caused By Increased Chemokine Ligand 2 in Mice Hippocampi After Alcohol Treatment - (Chemistry)

By: Rachel Cook, Holly Krey, Mike Krause, Leah Egan

Faculty mentor(s): Jim Lawrence, Jennifer Bray

When alcohol enters the central nervous system it produces several negative effects, specifically in learning and memory. It has been shown that the neuroimmune protein Chemokine Ligand 2 (CCL2), perturbs these effects in the hippocampus. Although the

signaling cascade initiated by CCL2 is unknown, identification of proteins responsible for the effects is possible through SDS-PAGE and high-resolution mass spectrometry. Using these techniques, a molecular fingerprint was produced by identification of differentially expressed proteins located in hippocampi of CCL2-transgenic mice compared to wild type mice. Over 10 days mice consumed ethanol each day. The hippocampus was extracted for analysis. ELISA was used to quantify CCL2 concentration. Proteins were resolved using SDS-PAGE analysis. Differentially expressed proteins were identified by Quadropole-Time of Flight tandem mass spectrometry. Identification of proteins was done using MassHunter Qualitative, ProFinder, and NCBI databases.

Does Over-expression of CCL2 Influence Follicular Populations in Mice? - (Biology)

By: Amarra Zehms, Cora Thompson

Faculty mentor(s): Karin Bodensteiner

Chemokine ligand 2 (CCL2) mediates inflammatory processes and may act as a neuroendocrine modulator. Mice transgenic for CCL2 under control of the human glial fibrillary acidic protein (GFAP) promoter overexpress CCL2 in astrocytes and develop encephalopathy with impaired blood brain barrier function. GFAP is also expressed in hypothalamic cells, suggesting an influence of this transgene on reproductive function. To examine reproductive parameters in female mice transgenic for CCL2, experimenters blind to genotype examined follicular populations of transgenic (n = 11) and non-transgenic (n = 21) mice. Ovaries were fixed in 10% neutral buffered formalin (SARL Scientific, Kalamazoo, MI) paraffin embedded, serially sectioned at 5-8 μm , and stained with Hematoxylin and Eosin. Follicular populations in prepubescent and peripubertal mice were also evaluated. Data analyses are ongoing, but preliminary findings suggest CCL2 does not affect follicular populations in prepubescent mice.

Dominance Status Does Not Affect Zebra Finch Mate Choice - (Biology)

By: Jade Piper

Faculty mentor(s): Sarah Jane Alger

Zebra finches are among the most highly studied models of monogamy, pair bonding and mate choice. We tested if dominance plays a role in zebra finch mate choice by observing same-sex dyads for two weeks to determine relative dominance status. We then co-housed each dominant/subordinate male dyad with a dominant/subordinate female dyad in a single cage with two nest boxes and observed pair bond-related behaviors (PBRBs) for five weeks. We analyzed both the numbers and proportions of PBRBs directed toward each cagemate. In general, zebra finches did not form clear monogamous pairs. Males were more likely than females to direct their PBRBs towards more than one cagemate and in a more proportionally even manner. Of the 15 cages, only four formed two clear breeding pairs, 10 formed one pair and one formed no pairs. Dominance status did not influence PBRBs nor mate choice. These data suggest that the zebra finch mating system, at least in captivity, is heavily influenced by gregariousness.

Encapsulating Molecules in a Metal-Organic Framework - (Chemistry)

By: William Nelson

Faculty mentor(s): Joseph Mondloch

Metal-organic frameworks (MOFs) are a class of porous solids built up from metals and organic linkers. These solids contain void spaces which can function as sponges, and “soak up” guest molecules. This can improve materials-based technologies such as the storage and separation of gases and metal capture from solution. Some MOFs exhibit large void spaces, but small apertures or openings to access those void spaces. In this work we exploit synthetic conditions that allow us to capture molecules within these void spaces that are larger than the aperture of access. This could be particularly useful for the design of new and improved heterogeneous catalysts.

Evaluating Information Content in SDSS Quasar Spectra as a Function of Signal-to-Noise - (Physics and Astronomy)

By: Karsten Hintz

Faculty mentor(s): Sebastian Zamfir

Quasars are some of the most energetic astrophysical phenomena, extracting copious amounts of energy from matter accreted onto supermassive black holes. Unresolved via direct images, spectroscopy offers the best tools to study their physics and structure. Quasars spectra exhibit broad emission lines (widths of 103 – 104 km/s), used to measure the black hole mass. We measure broad line widths, strengths, and internal shifts, as they are key parameters in constructing a quasar model. The goal is to test how sensitive such measures are to spectral quality. We select 600 cataloged spectra, group them into bins based on line width and strength, and combine them into median spectra. We degrade each median spectrum in steps, each time consistently applying the same procedure of measuring widths, strengths and shifts. We fit nine Gaussians for emission lines at/around Balmer H β , minimizing χ^2 . Surprisingly, most measures hold robustly against the degradation process of same median spectrum.

Examining the Influence of Groundwater Withdrawal on Lake Habitat and Diatom Communities Using Lake Level Modeling and Paleoecological techniques - (Biology)

By: Cayla Covey

Faculty mentor(s): Krista Slemmons

Sustainable use of Wisconsin’s groundwater is vital to the health and prosperity of aquatic ecosystems. With the installment of high capacity wells this resource is threatened. In particular, available lake habitat to aquatic organisms is altered by augmented groundwater withdrawn and further exasperated by a changing climate. We examined a lake sediment core from Long Lake, Wisconsin to determine how algal communities have changed over the last 100 years. We further examined changes in the planktonic:benthic diatoms over time and compared this with lake level modeling. Water chemistry was performed for total nitrogen and phosphorus, and reactive nitrogen and phosphorus. Preliminary findings indicate shifts from planktonic communities to benthic communities indicating a recent drop in lake level. With limited long-term ecological

data on groundwater extraction, analysis of lake sediment cores and lake level modeling can provide a means of understanding long-term ecological.

Exploring “Nature versus Nurture” in a Fourier Photometric Analysis of Spiral Arms in Late-Type Spiral Galaxies - (Physics and Astronomy)

By: Logan Hess

Faculty mentor(s): Adriana Durbala

We explore properties of the spiral arms of disk galaxies as a function of environmental density. Two samples of spiral galaxies of morphological classification Sb/Sbc/Sc are considered. These galaxies are drawn from two populations found in vastly different environments: isolated versus loose groups of 4-10 members. We measure and model the spiral arms' properties using Fourier photometric decomposition/analysis. We investigate the effect environmental density has on the formation and evolution of late-type spiral galaxies, and compare to a similar study on early-type S0a/Sa/Sab spiral galaxies.

Expression of GFP from the Arabinose Promoter - (Biology)

By: Katie Weddle

Faculty mentor(s): Matt Rogge

Arabinose and lactose promoters are commonly used to control recombinant gene expression. The lactose promoter can be problematic because some expression can occur without induction by the presence of lactose. The arabinose promoter is more tightly regulated and allows for better control of gene expression. Green fluorescent protein (GFP) is a reporter gene used to demonstrate promoter activity so GFP will be fused to the arabinose promoter. GFP was amplified by PCR and cloned into the multiple sites on pBAD, which is downstream of the arabinose promoter. The recombinant plasmid was used to transform E. coli Top10 cells, and the transformants were screened for expression of GFP in the presence of arabinose. Successful transformants can be compared to E. coli cells expressing GFP from a lactose promoter to determine which fusion construct is most applicable to demonstrate regulatory control of promoters in microbiology labs.

Genetic Factors Associated with Autoimmune Thyroid Disease: A Family Study - (Biology)

By: Kristen Hraban

Faculty mentor(s): Diane Caporale

Autoimmune Thyroid Diseases (AITD's), such as Graves' Disease (GD) and Hashimoto's Thyroiditis (HT), affects approximately 5% of the American population. These diseases affect the thyroid gland, whereas a person's ability to maintain homeostasis is compromised. Symptoms of AITD's vary, but all need lifelong treatment. Multiple genes may contribute to and possibly increase severity of disease. The purpose of this case study was to identify, within a family of Mexican descent, possible genetic associations with AITD, by screening known disease-causing polymorphisms within CTLA4, PTPN22, TGF-Beta 1, CD247-zeta, and HLA-DRB1 genes. Volunteers provided a medical history and their saliva. Their DNA was sequenced and polymorphic sites from each gene were identified within each family member. Here I report possible

genetic associations with AITD and the inheritance pattern with this family. Their genotypes can be used as predictors of thyroid disease for the youngest generation.

Highest and Best Land Use Analysis of the Bickford Property, Stevens Point, Wisconsin - (Geography and Geology)

By: Austin Lieburn, Luke Brendemuehl, Jerett Robinson, Zachary Halbach, Benjamin Gutknecht

Faculty mentor(s): Ismaila Odogba, Christine Koeller

In 2017, the City of Stevens Point purchased the Bickford property, a 65-acre property (that has state designated restorable wetlands within its boundaries) for approximately \$650,000. The objective of this study is to determine the most viable and suitable use for the property. Determining the best use for the property involves a consideration of various factors such as the hydrology, topography, vegetation, adjacent land uses, land use regulations, etc. Simply put, the most suitable use must be legally permissible, environmentally responsible, financially feasible, and maximize economic productivity. Using the Conservation by Design method, GIS modeling, and ESRI's City Engine, we carried out an analysis of the suitability of the property for four different land uses (residential, commercial, mixed use, and conservation). Based on our findings, we make recommendations on the highest and best use for the Bickford property.

Influence of Walleye (*Sander vitreus*) Stocking Density on Plant Growth in an Aquaponics System - (Biology)

By: Taylor Feucht, Noah Langenfeld, Lucy Jones, Colton Branville

Faculty mentor(s): Chris Hartleb

Aquaponics is the combination of hydroponics and recirculating aquaculture. Bacteria convert fish waste into nutrients for the plants. This sustainable production system has the potential to increase crop yield while eliminating the concern of soil-borne pathogens. There are limited varieties of fish that have been successfully raised in aquaponics with the most popular being tilapia, but they are less desirable than native Midwest fish. At UWSP's Aquaponics Innovation Center, six replicate aquaponic systems were stocked with three different densities of walleye (0.25, 0.50, and 0.75 fish/gallon). Each fish was measured for growth once per month for 12 months and each plant was measured for growth at harvest age (six weeks). Nitrate-N, nitrite-N, and ammonia-N tests were conducted every week and other nutrient levels were assessed on a biweekly basis.

Lenticular Galaxies in Different Environments - Isolated versus Group Environment - (Physics and Astronomy)

By: Sarah Parker, Alyssa Likeness

Faculty mentor(s): Adriana Durbala

We explore the properties of lenticular galaxies in different environments (isolated galaxies versus crowded environments, i.e., groups with 4-10 galaxy members). Using a Fortran code (BUDDA – Bulge Disk Decomposition Analysis), we model the photometric parameters that describe each lenticular galaxy in terms of size and light profile. We then compare the derived model-dependent measures between the two samples of galaxies to test if they are statistically different, which would hint at

gravitational influences of the neighbors. This process would allow us to gain more insight into the formation and evolution of lenticular galaxies.

Loose Language: The Term “Promiscuous” is Not Used Consistently in Academic Journal Articles - (Biology)

By: Lisa Fowle, Christina Hartley
Faculty mentor(s): Sarah Jane Alger

Despite its wide use, the word “promiscuous” does not have a clear definition when applied to mating systems of animals (including humans). It is unclear whether promiscuous is tied to mating with multiple partners, lack of mate choice or lack of a relationship with a sexual partner. We analyzed 346 journal articles from 2015-2016 with mating keywords and looked for uses, attributions, and definitions of each. We also searched for evidence of number of sexual partners, mate choice and a relationship between partners. Animals were attributed as “promiscuous” more often when they had more than one partner at a time (24%) compared to one partner at a time (17%) or to one or more partner at a time (10%). This effect was more pronounced for females compared to males. The attribution “promiscuous” showed a trend of being used more when there was a lack of evidence of relationships and mate choice, but the presence of this evidence did not prevent this attribution.

Morphometric Variation of Iowa Darters (*Etheostoma exile*) in Lotic and Lentic Environments in Wisconsin - (Biology)

By: Noah Daun, Justin Kowalski, Maxfield JonasKrueger, Jeanne Thibodeau
Faculty mentor(s): Justin Sipiorski

The Iowa Darter is an important part of the benthic community in many Wisconsin lakes and streams. They are an important indicator species of good water quality – a high index of biotic integrity (IBI) value. Iowa Darters are fairly common across their range, but little ecological research has been done on the species. Our research showed that Iowa Darters have length-based growth. We proceeded to determine if growth differs between lotic and lentic populations. We used standard truss measurements and calculated gonadal-somatic index (GSI) to determine if morphologies differed between the populations. We compared GSI's to determine if there was a difference in reproductive investment between populations. PCA analysis was conducted on the morphometric data. Understanding growth in Iowa Darter populations in lotic and lentic environments could help us further understanding of this indicator species and help managers understand what makes this species a vulnerable member of foodwebs.

Mutation W209R in Human D-amino Acid Oxidase Protein - (Chemistry)

By: Garrick Birdsong
Faculty mentor(s): Amanda Jonsson

Human D-amino acid oxidase (hDAAO) is an enzyme found in the brain that is responsible for breaking down the signaling molecule D-serine. hDAAO has two identical subunits that each bind FAD as a cofactor. Increases in hDAAO activity will lead to too much hydrogen peroxide being produced as a product and a decrease in

activity will lead to high levels of D-serine. Mutations in hDAAO are linked to several disorders such as schizophrenia or amyotrophic lateral sclerosis. One particular mutation involves residue 209, which is located at the dimer interface, far from FAD and the active site. In the wild-type, residue 209 is a tryptophan and in the mutant it has changed to an arginine; this W209R mutation increases the activity of the enzyme. Molecular dynamics simulations were used to analyze how the protein structure changes over time for both the wild-type and W209R mutant hDAAO enzyme to help determine how changing a single residue far from the active site can impact protein function.

Neutron Star Modeling- (Physics and Astronomy)

By: Austin Schlechta

Faculty mentor(s): David Tamres

Neutron stars represent the final evolutionary stage of stars born with a mass in the range of 8 to 20 solar masses. Despite the considerable attention that they have received from astronomers and astrophysicists over the past half century, their structure is still not fully understood. In large part, this is because the correct equation of state for neutron star matter remains an unsettled issue. In the present work, we construct neutron star models for three proposed equations of state. We employ a 4th-order Runge-Kutta algorithm for numerical integration and take account of general relativistic effects by using the Tolman-Oppenheimer-Volkoff equation. Rotation effects are neglected, and neutron star matter is assumed to be cold. Implications of our modeling for the masses and radii of nonrotating neutron stars will be presented and discussed.

OGT Protein Recognition and Catalysis- (Chemistry)

By: Noah Langenfeld, Garrick Birdsong, Cheemeng Lee

Faculty mentor(s): Amanda Jonsson

O-linked N-acetylglucosamine transferase (OGT) is an enzyme that transfers N-acetylglucosamine (GlcNAc) to many protein substrates, called GlcNAcylation. OGT works by identifying an appropriate target protein, and transferring the GlcNAc from UDP-GlcNAc to a Ser or Thr residue on the target protein. A mystery lies with how OGT recognizes the target protein. For HCF-1, Glu is in the position where OGT would normally attach GlcNAc, and OGT will instead cleave the backbone of HCF-1. When the HCF-1 Glu is mutated to a Ser, OGT will transfer GlcNAc instead of cleaving the backbone. Our project aims to better comprehend OGT protein recognition using a structure of a portion of HCF-1 fused to OGT. Our model shows that the same five Asn residues in the tetratricopeptide repeat domain of OGT that are important in recognizing traditional target proteins are also involved in recognizing and binding HCF-1, allowing the Glu residue to bind to the same active site in OGT used for GlcNAcylation.

Nitrate Load in the Plover River, Wisconsin - (Geography and Geology)

By: Sam Kasten, Cole Massie, Dylan Aretz

Faculty mentor(s): Karen Lemke, Neil Heywood

Our objective was to assess water quality in the Plover River, Wisconsin through measurement of nitrate load. We measured stream discharge and collected a 250 mL sample of river base flow at nine sites along the Plover River, following established

guidelines set by the United States Geological Survey (USGS) and the Environmental Protection Agency (EPA). We selected sites that mirrored those of a water quality study done by Freihofer (2001). Our water samples were analyzed at the UWSP Water and Environmental Analysis Lab. We used standards set by the USGS and the EPA for drinking and swimming to assess the water quality in the Plover River. We examined relationships between nitrate load and land use in the Plover River Watershed, we examined changes in nitrate load in a downstream direction, and we compared our nitrate measurements to those of Freihofer (2001) to assess changes in nitrate load over time.

Polling Locations as a Form of Oppression: Comparing Public Transportation and Access in Milwaukee - (Geography and Geology)

By: Tiffany Becker

Faculty mentor(s): Lisa Theo

Throughout history society has placed obstacles that inhibit citizens' ability to participate in and advocate for what they want for their future. Minority groups are usually the target of the obstacles (i.e., poll tax, literacy tests), and the government has enacted different laws that prohibit these explicit types of obstacles. Previous research has demonstrated the optimal distance that polling locations should be from citizens' places of residence, that minority groups are more heavily affected when polling locations are changed, and that polling locations with higher voter turn-out are less likely to be relocated. This project examines Milwaukee's public transportation system and polling locations regarding voter turn-out. A circular relationship is examined regarding the location, lack of attendance, and the relocation of the polling location.

Relationship Quality Does Not Affect Zebra Finch Social Behavior Network Response to Partner Calls - (Biology)

By: Mackenzie Davidson, Mikayla Schaalma

Faculty mentor(s): Sarah Jane Alger

Exposing a monogamous animal to its mate's calls activates many social behavior brain regions. Little is known about how relationship strength affects neural coding of animals responding to their mates' calls. We paired zebra finches (monogamous songbirds) with two consecutive partners. For each pair, we measured affiliative behaviors and calculated affiliation scores. We then exposed birds to vocal recordings from their previous partner, current partner, or an opposite-sex stranger. We indirectly measured brain activity by staining the immediate early gene protein, ZENK, in 14 social behavior brain regions. Zebra finches had higher affiliation scores with their first partner than their second partner or a stranger. The number of ZENK-labeled cells was unaffected by treatment in all brain areas measured and did not correlate with affiliation scores. These data suggest the brain regions we measured do not play a role in the selective response to mating partners in zebra finches.

River Geometry Measurements of the Plover River, Wisconsin - (Geography and Geology)

By: Ben Gardner, Jon Dawson, Chad Goretski

Faculty mentor(s): Karen Lemke, Neil Heywood

Our objective was to determine if a 10-meter digital elevation model (DEM) and high-resolution orthophotos could accurately model the Plover River watershed and accurately locate the centerline of the Plover River channel, and could provide a means of accurately measuring stream channel width. We used ArcGIS to model the watershed boundary and to determine the river channel centerline from the 10-meter DEM. We assessed the accuracy of our delineated watershed by comparing it to the boundary as defined by the Wisconsin Department of Natural Resources. We digitized the Plover River channel centerline from high-resolution orthophotos and used this centerline to assess the accuracy of the centerline derived from the 10-meter DEM. We measured the channel width from the high-resolution orthophotos and compared those measurements to measurements obtained in the field. This research assesses the potential to use GIS derived measurements instead of relying on field measurements.

Sprinters vs Endurance Athletes, A Genetic Advantage - (Biology)

By: Alex Nack

Faculty mentor(s): Diane Caporale

The performance of skeletal muscle is due, in part, to a fast twitch skeletal muscle protein called alpha-actinin-3 (ACTN3). A single nucleotide polymorphism (SNP) of the actn3 gene was found to be linked to a lower level of expression, due to an early stop codon. The loss of the protein causes impaired skeletal muscle performance in sprinters, but seems to correlate with endurance in female athletes. The purpose of this study was to develop a DNA technique for students, enrolled in Human Genetics, to identify their actn3 genotypes. Primers were designed to amplify both allele types using a multiplex PCR assay. The DNA of 20 students were then genotyped. All possible genotypes were represented in this population. This assay can now be used by future students to identify their own genotypes, to gain insight into their potential to become a sprinter or an endurance athlete.

Survey to Determine Prevalence of Ranavirus in Wisconsin Wildlife - (Biology)

By: Nicole Muench

Faculty mentor(s): Thomas Lentz

Ranaviruses are pathogens of ectothermic vertebrates (e.g. amphibians, reptiles, and fish) that have caused large scale die-offs in several species. These die-off events can have ecological and economic impacts. Ranaviruses have not yet been reported in Wisconsin, but have been found in surrounding states. We have established a quantitative PCR assay for detection of amphibian- and fish-associated (e.g. epizootic hematopoietic necrosis virus) Ranaviruses. Using a molecular standard we are able to quantify viral DNA in a sample down to about 1,000 virus particles. We have initiated a statewide survey to detect Ranavirus and will include analysis of fish, amphibians, and reptiles. We have

analyzed several fish samples, all negative for Ranavirus. Additional samples are currently in processing and results of these analyses will be reported.

The Effect of Fire on Bryophyte Communities in the Berard Oaks, Schmeeckle Reserve - (Biology)

By: Adam Ruka

Faculty mentor(s): Virginia Freire

Ecosystems subject to frequent fires often revert to earlier successional stages, favoring the growth of pioneer and/or more tolerant species. One group of organisms often overlooked when studying the effects of fire are bryophytes. In this study, we aimed to analyze two bryophyte communities of the Berard Oaks area in Schmeeckle Reserve that differed in time elapsed since most recent burn. Communities were assessed on the northern face of Oak tree bases with a DBH between 20-50 centimeters. Using a grid made of 108 squares, percent coverage and species abundance were recorded. The more recently burned East unit had a mean percent coverage of 47.1, while the undisturbed West unit had a mean percent coverage of 61.1 ($p = 0.1375$). Dominant species were identified (*Platydictia subtilis* spp., *Platydictia subtilis* and *Pylaisia polyantha*); two of which are possible indicators of successional stage. This study is a baseline inventory for future studies of fire effects on bryophytes.

The Geography of Socio-Economic Difference in Mississippi - (Geography and Geology)

By: Danielle Ninedorf, Jarrod Trice

Faculty mentor(s): Lisa Theo

This project explores the causes and spatial distribution of socio-economic differences in Mississippi. Incorporating history, civil rights, educational access, and industrialization, we will determine the spatial differences of socio-economic advancement throughout the state of Mississippi. Our project will include the impact and legacy of slavery, sharecropping, Jim Crow, and "Separate but Equal" laws on educational attainment and economic advancement. We identify the connections between a legacy of slavery and long-term economic disparity.

The Importance of Interdisciplinary Experiential Learning Courses - (Geography and Geology)

By: Quentin Rickert, Devin Fleck, Jerett Robinson, Mohammed Albakr

Faculty mentor(s): Lisa Theo

Our project sheds light on the importance of funding off-campus learning experiences for our students through interdisciplinary studies. Currently field experience offered by classes such as Geography 387 (Environment and Culture of the Mississippi Delta), is supported almost entirely through special course fees assessed to the student participants. Meanwhile various campus entities, such as Athletics and several College of Natural Resources classes, receive funding to ensure students have additional opportunities to learn through field experiences. The opportunity to experience sites such as the National Civil Rights Museum in Memphis, the National Military Park at Vicksburg, or the Forks in the Road Memorial in Natchez allow students to connect with the world around them

in ways otherwise inaccessible through a textbook. Increasing funding for these life-changing off-campus, multidisciplinary learning opportunities will help foster a more engaged and socially conscious student body.

The Role of EsrB and EsrC in the Regulation of Virulence in Edwardsiella ictaluri - (Biology)

By: Megan Rutkowski, Monica Sheber

Faculty mentor(s): Matt Rogge

Edwardsiella ictaluri is a bacterium that causes substantial mortality in farmed channel catfish (*Ictalurus punctatus*). *Edwardsiella ictaluri* produces a type III secretion system (T3SS) necessary for replication within host cells. Two T3SS regulatory genes, *esrB* and *esrC*, were mutated via deletion and were sequenced to verify correct construction. Promoters from *E. ictaluri* virulence genes were amplified by PCR and fused to GFP, and confirmed using PCR and DNA sequencing. The confirmed constructs were cloned into the expression vector pBBR1MCS-4. The fusion plasmids were electroporated into *Escherichia coli* for conjugation to wild type and mutant strains of *E. ictaluri*, which will be cultured under various environmental conditions. The promoter activity, determined by measuring GFP expression, will be evaluated to define the effects *EsrB* and *EsrC* have on the activity of *E. ictaluri* virulence gene promoters.

Thermal Imaging of Buried Heterostructure Quantum Cascade Lasers (QCLs) by Thermoreflectance Microscopy - (Physics and Astronomy)

By: Nicholas Becher

Faculty mentor(s): Maryam Farzaneh

Quantum Cascade Lasers (QCLs) are a class of semiconductor laser diodes capable of high optical energy outputs, typically emitting in mid infrared. The high energy output of QCLs comes at the cost of high current threshold demands for operation. Excess heat has a significant impact on the performance of a QCL, and its high power output and efficient operation depends greatly on its thermal management. A temperature profile of these QCLs can be extremely useful in determining possible points of failure and developing an optimized thermal management system. This presentation will discuss the effects of supplied power on the temperature of a buried heterostructure mounted QCL. In order to gather thermal data on this device, we use thermoreflectance microscopy technique, which measures relative changes in reflectivity of the QCL, in direct proportion to the changes in its surface temperature.

Updated Assessment of the Biodiversity of Freshwater Mussels in Minnesota, Wisconsin, and Michigan - (Biology)

By: Ryan Dykstra

Faculty mentor(s): Daniel Graf

We are gathering mussel specimen distribution records into a database. The database consists of more than 36,500 analyzed records from Minnesota, Wisconsin, and Michigan. These records were compiled from nine museum collections as well as observations reported by the Wisconsin DNR. Each record was georeferenced to township and placed in the drainage hierarchy. The data have been used to determine

species richness by county and drainage basin. Species richness is highest in counties along the Mississippi River and its major tributaries, with secondary hotspots in the Fox (WI), Grand (MI), and Lake Erie basins. These data will be used to evaluate patterns of distributions and correct misidentifications and other errors. We can also use the data to generate hypotheses on the various species associated with the river basins of the upper Midwest, determine species diversity among the basins, and perhaps also test hypotheses regarding post-glacial patterns of mussel species in the region.

Using SEAL and HARPOON to Search for Suitable Water-Splitting Electrodes - (Physics and Astronomy)

By: Theron Wilkinson, Kwame Adam

Faculty mentor(s): Ken Menningen, Shannon Riha

The search for suitable electrodes for photoelectrochemical water splitting extends across the periodic table. While III-V semiconductors exhibit superior light gathering properties, metal oxide semiconductors generally cost less and are more robust. The Solar Energy Activity Laboratory (SEAL) and the Heterogeneous Anodes Rapidly Perused for Oxygen Overpotential Neutralization (HARPOON) are simple experiments that can quickly scan for suitable oxide semiconductors. The SEAL experiment measures photocurrent and the HARPOON experiment measures oxygen production efficiency. Electrodes made of oxides of Al, Bi, Co, Cr, Cu, Fe, Ni, V and Zn were produced in our laboratory and evaluated using the SEAL and HARPOON experiments.

Verifying Deletion of the *esrB* Gene in *Edwardsiella ictaluri* - (Biology)

By: Monica Sheber, Megan Rutkowski

Faculty mentor(s): Matt Rogge

Edwardsiella ictaluri is a bacterial pathogen that causes enteric septicemia of channel catfish (*Ictalurus punctatus*) and contributes to significant mortality in catfish aquaculture. *EsrB* is a regulatory protein in *Edwardsiella ictaluri* and is involved in the regulation of a virulence type III secretion system. An *esrB* mutation was constructed by deleting an internal portion of the coding region, and confirmation of the expected sequence was determined using PCR and DNA sequencing. PCR optimization was performed to prepare the DNA for sequencing. However, nonspecific amplification occurred resulting in poor sequence quality. Gel purification was attempted with similarly poor results. The amplified product was cloned into a plasmid vector to eliminate nonspecific DNA contamination, and the plasmid will be sequenced. Sequencing is necessary to confirm that the mutation was properly transferred to the chromosome before proceeding to studying the phenotypic effects of the mutations.

Viability of Furrow Irrigation in Three Topographically Similar Environments - (Geography and Geology)

By: Cole Massie, Alyssa Sims, Brian Bunes

Faculty mentor(s): Lisa Theo

Our objective is to assess the viability of furrow irrigation vs. other types of irrigation in the three topographically similar agricultural environments – the Mississippi River Delta, the Central Valley of California, and the central region of Wisconsin (formerly occupied

by Glacial Lake Wisconsin). By incorporating soil, topography, water availability, and primary crop data into our spatial analysis, we intend to better understand the similarities and differences between these three areas, and ultimately see if furrow irrigation is a feasible option for farmers located there. Since furrow irrigation uses water more efficiently, we hope to provide these farmers with an alternative to their current irrigation systems that may save them time, money, and decrease their environmental impact.

VKORC1 Genotype as Predictor of Proper Warfarin Dosage - (Biology)

By: Alyssa Pritchard

Faculty mentor(s): Diane Caporale

Warfarin, commonly known as Coumadin, is prescribed to patients with a high risk of developing blood clots, especially after surgery. More than six million Americans are currently taking this popular anticoagulant that, if given the wrong dosage, can cause severe internal bleeding. Warfarin dosage is dependent on one's *vkorc1* gene product. A person's *vkorc1* genotype can be a predictor of the proper dosage. This study has been developed to create an assay that assists students in Human Genetics (Biol 312) in understanding the importance of genetic testing. A primer pair was designed using NCBI PRIMER BLAST to highlight an area in the genome where two *vkorc1* polymorphisms (both associated with slow Warfarin metabolism) can be found. Control DNA was used to optimize the DNA sequencing assay. Then DNA samples from 20 students were genotyped. Here I report the amount of genetic diversity discovered within this population and how each genotype relates to recommended Warfarin dosage.

Winds and Jets Mutual Suppression in Quasars? - (Physics and Astronomy)

By: Zhengzhan Shang

Faculty mentor(s): Sebastian Zamfir

Quasars are the most energetic types of Active Galactic Nuclei. Spectroscopy is the best tool to resolve their structure at cosmological distances. Quasars are powered by matter falling onto supermassive black holes. The material spirals in an accretion disk and relativistic jets are launched. The overheated disks can produce radiation winds. We test the hypothesis that jets and disk winds are mutually suppressing. Quasar spectra show broad emission lines, $10^3 - 20 \times 10^3$ km/s velocity fields. We use catalogued data of optical spectra obtained with a 2.5m telescope and follow the Balmer H β Hydrogen line. We crosscheck the list of optical spectra with a radio catalog and identify all radio-detected sources. In our framework, the emission lines that exhibit internal blueshifts are indicative of disk-winds, whereas sources with radio jet-like morphology would show internally redshifted or not-shifted broad lines. We report our findings.

Synthesis of the Substrate to be Used in the Development of a Nitrogen Heterocycle Forming Reaction - (Chemistry)

By: Celena Josephitis, Brigit Flynn, Greg Regazzi

Faculty mentor(s): Kathryn McGarry

Many biologically active natural products and pharmaceuticals contain nitrogen atoms and nitrogen heterocycles. Improved synthetic methods which introduce nitrogen into a

carbon scaffold or achieve formation of a nitrogen heterocycle could provide more efficient access to known molecules or new derivatives that may prove medicinally useful. One such method would be the intramolecular copper-catalyzed aminoxygenation of an amine-tethered alkene precursor. This method would achieve the formation of the ring structure through the creation of a nitrogen-carbon bond and an oxygen-carbon bond across the carbon-carbon double bond in one reaction step as opposed to separate steps for the ring closure, nitrogen-carbon bond formation, and carbon-oxygen bond formation. In order to investigate the viability of this method, an amine-tethered alkene precursor was first synthesized using a known four-step sequence. Synthesis and characterization of the precursor will be presented.

Understanding the Enrichment and Persistence of Magnesium and Other Metals in UWSP Parking Lots - (Chemistry)

By: Shane Goettl, Michelle Petkovsek, Kimberly Knispel, Julia Reigh
Faculty mentor(s): David Snyder

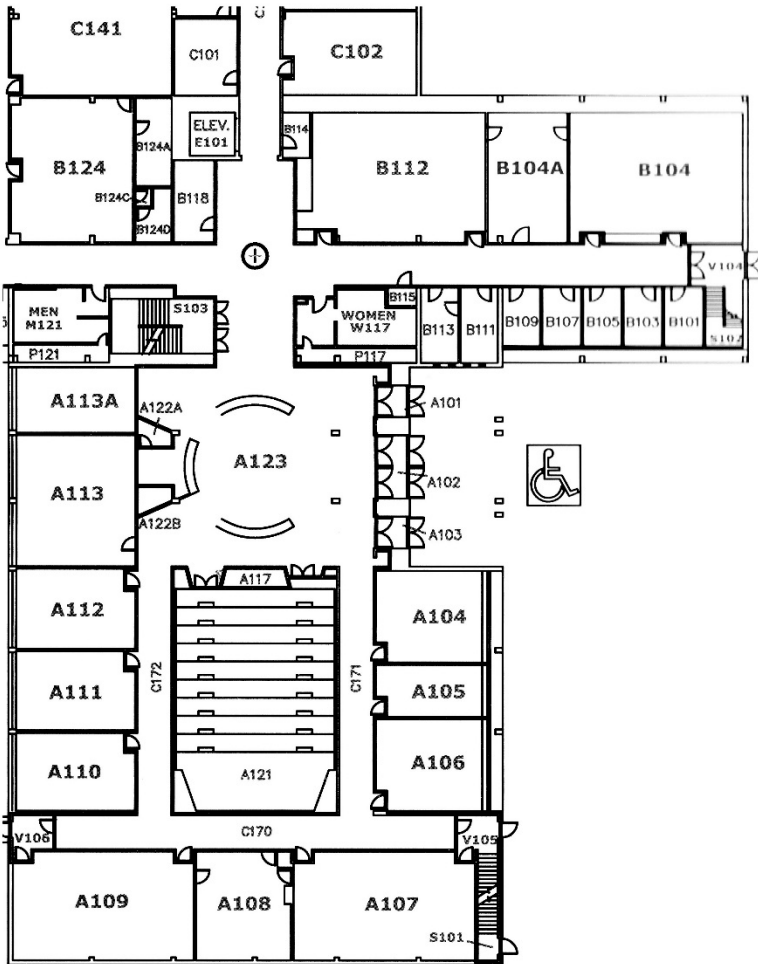
Soil samples (street sweepings) were collected in selected parking lots on the UWSP campus and were analyzed for Mg, Ca, Fe, and Zn by flame atomic absorption spectrometry. The results were compared with background samples in order to determine whether parking lots' soils were enriched in these metals. Mg concentrations in all parking lot samples exceeded 2,000 ppm, with some samples exceeding 10,000 ppm. In contrast, Mg concentrations averaged only 52 ppm in the background samples. Ca, Fe, and Zn levels were also significantly enriched. A strong correlation between Mg and Ca concentrations was also noted suggesting a common source. This close correlation may be a result of the application of road salts such CMA or may result from the application of agricultural lime on neighboring soils. If the enrichment of magnesium and calcium in the samples is a result of the application of road salts, the results of this study suggest that these metals are highly persistent in parking lots soils.

Using Electrochemistry to Detect THC Metabolites - (Chemistry)

By: Natalie Sellnau
Faculty mentor(s): Shannon Riha

The use of cannabis edibles and smoke, which contain tetrahydrocannabinol, THC, and other cannabinoids, are on the rise, but there is a lack of simple and quick testing methods to identify the substances at low concentrations. Here we demonstrate that monitoring oxidation of the phenol group on THC and its metabolites using square wave voltammetry allows for simple and rapid testing of micromolar concentrations. The rapid response of electrochemistry could allow for road-side or work-site testing for THC and its metabolites in saliva, which is an alternative to traditional tests of urine, blood, and hair that often must be sent off-site for analysis. The metabolite studied here was the carboxylic acid derivative, THC-COOH, because this is one of the most common metabolites from THC. Method development includes optimizing experimental parameters, identifying limits of detections, and creating calibration curves.

Science Building – First Floor



Science Building – Second Floor

