### ORAL PRESENTATIONS  SESSION I

**10:30 - 10:50 a.m.**

<table>
<thead>
<tr>
<th>Session</th>
<th>Facilitator</th>
<th>Title</th>
<th>Presenter</th>
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<tr>
<td>HS 103</td>
<td>Jessica LeTexier</td>
<td><em>Marketing Management Figure Skating Project</em></td>
<td>Kallie Hoplin</td>
<td>Kelly La Venture</td>
<td>During the months of January, February, and March, marketing materials were made for Bemidji Figure Skating Club’s upcoming figure skating show. I will be presenting on the marketing materials that were made for this show.</td>
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<tr>
<td>HS 105</td>
<td>Veronica Veaux</td>
<td><em>Transforming Your Passion into a Planned Business: Solar Powered Food Dehydration</em></td>
<td>Lyliane Tchouamo</td>
<td>David Towley</td>
<td>Food processing is the transformation of agricultural products into food of different forms, taste, and texture. I will present on the design, fabrication, and testing of a prototype food dehydrator that I developed using solar photovoltaic panels and standard household equipment.</td>
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<tr>
<td>HS 111A</td>
<td>Carl Isaacson</td>
<td><em>Star Island Forest Dynamics</em></td>
<td>Courtney Anderson, Nathan Anderson</td>
<td>Mark Fulton</td>
<td>We investigated forest dynamics on a one-hectare (100 m x 100 m) plot within Star Island, Cass Lake, Minn. The plot was established in 2001 and contains 926 trees that have been mapped and re-measured at 3- to 8-year intervals. We measured stem diameter and tallied mortality of previously measured trees and ingrowth of new saplings. Every stem greater than 5 cm was measured. Mode of mortality, such as tip-ups, pins, trunk snaps, and standing dead trees were noted. Red and white pines continue to dominate the plot. The highest proportional mortality rates occur in the smallest sizes of shade-intolerant species such as jack pine, paper birch, and red pine. Red and white pine experienced the greatest amount of growth, whereas paper birch had moderate growth. The red maple and balsam fir showed slower growth at larger sizes. Some ingrowth of intermediate to high shade tolerance species occurred since the last survey. The observed changes are consistent with classical forest succession driven by competition for light.</td>
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<tr>
<td>HS 111B</td>
<td>Sarah Cronin</td>
<td><em>Equitable Counseling Services: Focus Groups at BSU</em></td>
<td>Gillian Boily, Zoey Griffin, Haley Hardy, Ashley Kirchoff, Madison Ulrich</td>
<td>Sarah Cronin</td>
<td>This research is about the connection between retention and access to counseling on college campuses. The presentation consists of a literature review about the importance of counseling on college campuses and will discuss in-progress research. We will hold 90-minute focus groups with a semi-structured interview asking about student perceptions of the Student Center for Health and Counseling. We will hold three focus groups for three different student populations: students who have received counseling, indigenous students, and students who have not received on-campus counseling. Focus group data will then be transcribed and coded for themes. Results can help inform policies for student access to affordable counseling on campus. The findings can benefit BSU students and counselors.</td>
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HS 113  Facilitator: Jim White

Title: How Does Exercise Influence Quality of Life in Adults 50+ Years in Faith Communities?

Presenter: Reed Marohn
Sponsor: Jim White

Abstract: Mounting evidence indicates that older adults would benefit from regular physical activity. The purpose of my study was to explore trends and themes of the effects of exercise into the senior years. After receiving IRB approval, this study surveyed adults 50 years and older who are faith community members (FCMs) from the upper Midwest. Questions were asked about their physical activity levels from a demographic questionnaire (DQ) as well as their overall Quality of Life (SF-36). Responses were then tallied and analyzed to examine trends and differences in the data. Preliminary results suggest that a significant percentage of study participants felt that their health was limited by their inability to engage in vigorous physical activity. However, the results of the SF-36 and DQ suggest that regular physical activity and exercise positively impacts their career and work performance as well as their mental health and mood. Additional descriptive data of statistical differences between groups will be presented. This research investigated how gender, age and health status impacts FCM physical activity and exercise levels and quality of life. This research may help lend insight into the health and activity levels of older adults who are members of local faith communities.

HS 214  Facilitator: Patrick Donnay

Title: For-Profit Prisons: How Lobbying Has Affected the Way America Houses Prisoners

Presenter: Jacob Israel
Sponsor: Patrick Donnay

Abstract: There seems to be limited research and understanding as to why for-profit prisons exist in the United States. The initial selling points used to sell private prisons to states and counties were that they would reduce recidivism and cost. Recent peer-reviewed studies have found, however, that neither is the case. This could lead one to ask why for-profit prisons are still used in America. That is what I hoped to answer in this research. After research and analysis of campaign donations by the two largest for-profit prison corporations (collected from the National Institute on Money in State Politics) and changes in the population of prisoners held in for-profit facilities (collected from the Bureau of Justice Statistics), I found that the states that have seen an increase in the number of prisoners in for-profit facilities have a higher mean number of dollars donated to elected officials. This seems to indicate that decisions regarding incarceration may have more to do with campaign donations than justice.

HS 228  Facilitator: Julie Curtis

Title: Isolation of a Novel Bacteriophage that Infects Biofilm Forming Bacteria; Pseudomonas Aeruginosa

Presenter: Krysta Sanders
Sponsor: Holly LaFerriere

Abstract: The human mouth has a diverse ecosystem that includes both bacteria and bacteriophages. When this ecosystem becomes unbalanced, dental issues arise such as dental caries, dental abscesses, gingivitis, and periodontitis. Antibiotics can be used to treat some of these issues; however, bacterial strains have evolved that are resistant to antibiotics. When resistance occurs, bacteriophages may be utilized to restore dental health. However, this requires well-isolated bacteriophages that are fully characterized to be used in a procedure called phage therapy. Through the discovery and characterization of bacteriophages that kill the most common, harmful bacteria that affect dental health, we may obtain a new treatment tool. This research focuses on the isolation of a novel bacteriophage that infects Pseudomonas aeruginosa, a common cause of infection. An enrichment procedure was performed using nutrient broth, filtered wastewater, and Pseudomonas aeruginosa. Bacteriophages were isolated using the soft-agar overlay method and selection of well-isolated plaques. Following multiple rounds of isolation, a single bacteriophage strain was obtained. Characterization of the bacteriophage included the determination of a one-step growth curve, thermostability testing, electron microscopy, and DNA isolation and sequencing.
HS 229 Facilitator: Tiffany Hommes

Title: Strengthening the Bridge Between Church Communities and Sustainability

Presenters: Kylie DeGrote, Michelle Holbeck
Sponsor: Jordan Lutz

Abstract: According to the Pew Research Center on Religion and Public Life, only 28 percent of Evangelical Christians believe that human activity is contributing to climate change. The majority of Evangelical Christians, 88 percent, believe that God does miracles. While this may be true, many Christians use this as a reason to not live sustainably, under the premise that God will intervene if climate change is really a problem. This ideology is also seen in plastic use, resource use, large scale meat production, and many other issues regarding sustainability. This study will outline this issue and provide possible solutions in bridging the gap between the Christian communities and science/sustainability based on current research, the researcher’s personal experience, and the work being done in the Bemidji community.

HS 230 Facilitator: Tammy Bobrowsky

Title: The Correlation Between Amphipod Density and Macroinvertebrates in the Minnesota Prairie Pothole Region

Presenters: Alissa Chalberg, Brad Morris
Sponsor: Richard Koch

Abstract: The densities of Amphipoda (Gammarus lacustris and Hyalella Azteca) have substantially declined across the North Central and Prairie Pothole regions located in the upper Midwest in the U.S. Despite the importance of these invertebrates, as detritivores and food for wildlife, factors affecting their distribution in Minnesota have yet to be thoroughly examined. This study assessed macroinvertebrate diversity in three wetlands containing amphipods compared to three that did not. The wetland sizes range from 2 to 13 acres. Preliminary results suggest that wetlands having higher concentrations of amphipods have statistically more macroinvertebrates and a higher overall diversity. This finding could suggest that amphipods may enhance wetland diversity of other macroinvertebrates, or that amphipods are responding similarly to other invertebrates to unidentified environmental conditions.

HS 231 Facilitator: Miriam Rivera-Hokanson

Title: Sonata Theory In Schubert

Presenter: Bailey Harkins
Sponsor: Miriam Webber

Abstract: This paper intends to explore Sonata Theory and how it could work in art song. Sonata Theory mainly deals with instrumental music without considering any texted genres. I will argue that this theory is also applicable to art song, given harmonic and formal similarities between the two. The art songs that will be discussed are excerpts from Franz Schubert’s song cycle title Winterreise (Winter Journey). I will be talking about how exactly sonata form could work with these, and how specific processes such as the medial caesura help prove this argument. A connection between text and meaning within the form will also support this reading.

HS 233 Facilitator: Angela Fournier

Title: Does Anyone Trust the Government Anymore? Or Does it Depend on Who You Ask and When You Ask Them?

Presenter: Marliana Yerbich
Sponsor: Patrick Donnay

Abstract: Political scientists have been curious about trust and its impact on the government for years. They have learned that governments who have earned the trust of their citizens are more effective in serving the people and are generally able to accomplish more. However, do levels of trust in government depend upon a person’s party affiliation and the party in power? Does partisan trust also vary depending on gender, race, education, or income level? I analyzed data from the American National Election Survey (ANES) over time and I concluded levels of trust in government rise and fall as the power in government shifts back and forth between the two major parties. I also found interesting variations to trust levels when I looked at the different demographics of the respondents. My research shows levels of partisan trust move up and down depending on which party controls the government. Further, there is not a significant level of change in trust for a 14-year period. This suggests the attention focused on the increasing polarization of society and how it affects our view of government may be overstated.
HS 245 Facilitator: Danielle Smith

Title: Student Spotlight

Presenters: Jared Henning, Timothy Nelson, Tia Neuharth, Donelle Omer, Rupesh Thapa
Sponsor: Michelle Frenzel

Abstract: Recognizing student success creates a positive culture at Bemidji State University, emphasizing the value of attending this institution. Each semester will highlight a diverse group of successful students who embody BSU’s Shared Fundamental Values:

- Civic engagement and leadership
- International and multicultural understanding
- Belief in the power of the liberal arts
- Environmental stewardship

Join representatives from the President’s Student Commission to learn more about how we will recognize students in the Student Spotlight.

HS 247 Facilitator: Amber Laffin

Title: A Cross-National Analysis of Gun Ownership Rates and the Incidence of Firearm-Related Deaths

Presenter: Codie Rasmussen
Sponsor: Patrick Donnay

Abstract: In the United States, gun control laws are a highly controversial topic. Some researchers have concluded that having more guns in a country makes it more likely that there are more crimes committed with these guns. Other researchers conclude that having more guns will allow more people to defend themselves from possible attackers. I examined this to test which theory proves to be the most accurate. Other research that I read tested variables such as Gross Domestic Product (GDP), inequality, and government rule. The data I used for firearm ownership came from a Small Arms Survey, by the Graduate Institute of International and Development Studies in Geneva, Switzerland, published in 2017. Data on firearm deaths is from the International Classification of Diseases (ICD-10) from the World Health Organization. Tentatively, the data has shown that the higher gun rates lead to fewer gun deaths, but just as significant is the score of democracy, the effectiveness of the governments, and the country’s GDP. This means that there isn’t one catch-all solution to high rates of gun deaths, but an array of causes into a country’s rate of firearm deaths.

HS 248A Facilitator: Gabriel Warren

Title: Capstone Project: Building a BSU 100 Year Anniversary Clock

Presenters: Jake Dahlheimer, Derrick DeBoer, Tristin Linn, Nicholas Ogden, Trevor Zeppelin
Sponsor: Mahmoud Al-Odeh

Abstract: For our capstone project, we are a group of five TADT students working on Bemidji State anniversary clocks. We chose a pendulum clock design, which will sport the original 1919 Bemidji State logo along with aesthetic shopbot technology. The purpose of this presentation is to discuss the process of material selection, design, collaboration, and construction. Throughout the duration of the project, we used advanced problem-solving skills and applied various engineering and management techniques. We will be sharing with the audience our experience in using Solidworks 3D design, V-Card, Coral Draw, and the use of the shopbot technology. Project management skills were used to develop a schedule and budget, and to control potential risks.
Title: **Capstone Project: Building a Customized Coffee Table**

**Presenter:** Jeff Korpi, Zoe Lindgren, Casey Sura, Evan Edmundson, Matthew Rugloski  
**Sponsor:** Mahmoud Al-Odeh

**Abstract:** During the spring semester of 2019, a team of four project management students and I will be building a customized coffee table for the lounge located on the second floor of Bridgeman Hall on the Bemidji State University campus. This coffee table will feature a steel support system, a hardwood tabletop, and a BSU logo that is routered into the top that will be filled with green epoxy. While the table will remain an accent piece to the lounge for long after we graduate and leave BSU, the process will remain with us forever. During this project, we were fortunate enough to reach out to several local vendors, suppliers, and contractors to fund the project. We were highly successful in this, as we managed to have our entire material list donated, thanks to the generous support by Northwoods Lumber Company, Bemidji Steel Company, and Ace on the Lake. I would like to take the time to offer proper gratitude to our wonderful BSU faculty, our dedicated students, and our gracious community that is always willing to lend a hand and provide for our students.

Title: **Benthic Carbon Accumulation and Macroinvertebrate Colonization on Artificial Zebra Mussel Substrate**

**Presenter:** Samuel Peterson  
**Sponsor:** Debbie Guelda

**Abstract:** Conflicting reports on zebra mussel (Dreissena polymorpha) roles of benthic carbon accumulation and macroinvertebrate colonization requires further investigation. Literature predicting how D. polymorpha may fundamentally alter benthic communities and carbon is rare. Lake Bemidji, an open mesotrophic system currently uncolonized by D. polymorpha, had 160 artificial D. polymorpha communities at zero, low (1.06 / cm²), medium (1.84 / cm²), and high (2.63 / cm²) (densities placed onto suitable sites (n=10) for 4- and 8-month intervals. Carbon accumulation was measured using the ash free dry mass method on macroinvertebrate biomass and organic material. Preliminary results show a significantly positive response between overall carbon accumulation and artificial D. polymorpha densities (p-value = 0.02). Macroinvertebrate counts also had a significant increase between artificial treatments (p-value = 0.001). Amphipods, the dominant macroinvertebrate taxa, increased by 61% between control and artificial treatments. Zebra mussel engineering capabilities can lead to profound negative impacts on aquatic systems. However, this research suggests that macroinvertebrate communities are enhanced, providing beneficial resources to many other aquatic functions.

Title: **Hagg-Sauer Waste Audit**

**Presenters:** Jonathan Barcenas, Aili Kultala  
**Sponsor:** Jordan Lutz

**Abstract:** After conducting multiple years of waste audits on trash and recycling in Hagg-Sauer Hall at Bemidji State University (BSU), data shows there is a large percentage of recyclable items thrown in the trash. In Beltrami County, landfill waste costs $218.49 per ton of material whereas the cost for clean recyclables is $150.55 per ton. These associated costs of landfill waste can be a burden for BSU. Improving recycling rates at BSU would reduce the cost paid to dispose of landfill waste. The presenters worked on a recycling project where they analyzed contamination trends of compostable materials, fibers (paper products), containers (plastic), liquids, and brown paper towels introduced into the garbage destined for the landfill. They found these products all have potential to be diverted from the landfill and instead be recycled or composted. Therefore, they believe there is potential to further reduce the percentage of recyclable items ending up in trash receptacles and ultimately the landfill. The presenters will share their project experience and will provide recommendations and tips on practices to improve recycling rates.
**HS 111A**

Facilitator: Sarah Cronin

**Title:** Building Mineral Packets to Measure Magnetic Susceptibility as Indicator of Biochemical Degradation of Oil in the Subsurface

**Presenters:** Emily Rapp, Alexandra Torrance

**Sponsor:** Miriam Rios-Sanchez

**Abstract:** Contamination by oil spills have long-term consequences and affect water resources. When the oil is spilled and contaminates groundwater, bacteria present in the subsurface use the oil as a food source. In using this food source, the bacteria generate strong redox gradients and promote the precipitation of iron minerals, creating conditions similar to the electrochemical cell in a battery (in this case a biogeobattery). A collaborative project between Bemidji State University, Rutgers University, and the USGS was awarded a National Science Foundation grant to develop geophysics-based methods to measure degradation of oil spilled into the subsurface. The project area is Pineview, Minn., which is one of the most studied oil spills in the country. Packets of minerals were assembled and installed in selected wells, to carry out magnetic susceptibility logs. Magnetic susceptibility has been used as an indicator of bacterial activity. This presentation will explain the methods to build the packets and the hydrological criteria to select the wells, establish the depth of installation, and some initial results.

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**HS 111B**

Facilitator: Sarah Cronin

**Title:** Healthy Minds Survey

**Presenters:** Lamour Damar, Adrianna Horien, Anna Levene, Courtney Smith

**Sponsor:** Carl Isaacson

**Abstract:** This presentation will outline a collaborative research effort between BSU students and a faculty member. Together they have created a research lab called PRICE (Promoting Retention, Improving Counseling Equity). The current study in this lab is to observe the relationship between mental health and retention. The Healthy Minds Survey (HMS) is a multi-faceted survey that measures topics about mental health, persistence, and retention. A random sample of 4,000 students will be invited to complete the HMS. The survey consists of the following modules: Persistence and Retention, Knowledge and Attitudes About Mental Health and Mental Health Services, Mental Health Status, Mental Health Service Utilization and Help-Seeking, and Demographics. Multiple regression analyses will predict what mental health factors lead students, especially students of color and low-income students, to seek services as well as persist in their academic progress. It is hypothesized that mental health symptoms and personal stigma about seeking counseling services will have a significant, inverse relationship with retention. That is, students who report more mental health symptoms and a stigma of seeking help will report lower likelihood of retention. Results will help us to understand BSU’s retention and its relationship with student mental health.

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**HS 113**

Facilitator: Jim White

**Title:** Passive Solar Greenhouse and Aquaponics to Address Local Food Security

**Presenter:** Rachel Schaap

**Sponsor:** Anna Carlson

**Abstract:** Growing produce in northern Minnesota has always been a challenge given short summers and long winters. Usage of passive solar greenhouses allows for year-round vegetable production with little external utility input. By utilizing aquaponics, it further reduces the input loop and helps stabilize inside greenhouse temperatures. The year-round growing capabilities will allow for continued availability of farm fresh, locally grown leafy greens, head lettuce, root vegetables, and much more. With this ability of year-round production, we can start to address food security in the local area. My presentation will address how this project will help resolve many of the barriers community members face when trying to provide healthy foods for their families. During the summer growing season, many local farmers are able to provide a great selection of fresh produce at a very reasonable price point. By using passive solar greenhouses and an aquaponic system, local food production and low costs can continue throughout the year. I also will show how this approach will grow vegetables more rapidly with less water and energy consumption than traditional soil growing. My sustainability project design will be the first step in providing a solution to local food security while being responsible environmental stewards.
## Title: Languages Are Identity

**Presenter:** Serena Graves  
**Sponsor:** Vivian Delgado

**Abstract:** I am a sophomore at Bemidji State University, majoring in Indigenous studies. I am a peer advisor and tutor, and I host Ojibwe language table on campus. In addition to student work and being a full-time student, I also work at the Red Lake Immersion School. My presentation will provide direct insight into my road of being an Ojibwe student navigating academia, while simultaneously learning my language, inside and outside of school. With the identity that my language has given me, it has been the vessel to my success here at Bemidji State. I will be providing research that showcases what languages can do for indigenous students, as well as how much Indigenous students thrive when they have their languages, which results in having their identities. The significance in implementing my story into this presentation would showcase not only suggested research, but also a product of that research. In addition, my presentation is also relevant to Bemidji State’s geographic location, as it is in Ojibwe territory.

## Title: CARE Training: A Bystander Intervention Program

**Presenters:** Sydney Anderson, Breanna Baker, Jheanelle Channer, Autumn Huju, Corey Stockman  
**Sponsor:** Jay Passa

**Abstract:** Scheduled Presentation CARE training is a sexual violence prevention program. We feel that it is on us to create an environment at Bemidji State University in which sexual assault is unacceptable and survivors are supported. Topics that will be discussed in this training will include steps to ending rape culture, what consent is and is not, bystander intervention, confidential campus, community resources, and reporting options. Bystander intervention is when someone steps in and interrupts a potentially harmful situation. This training is geared toward helping you to develop the knowledge and skills to intervene. This training is sponsored by the Lifestyle Educators, a peer education organization on campus that promotes health, wellness, and safety of students. Please join us to learn more about sexual violence prevention and how you can help promote a safe campus community.

## Title: We are Human PSA

**Presenters:** Arianna Adams, Carissa Decko, Allyna Storms, Morgan Weller  
**Sponsor:** Kate Larson

**Abstract:** For our project, we interviewed two different parties that had experience with a mental disorder. We asked about their experience with the disorder, stigma, how they feel that the stigma could be reduced, and how people with a disorder could be treated better. The first individual was a female in her mid-twenties who was incorrectly diagnosed with depression at age 16 and the other party we interviewed were a set of parents who gained legal custody of a fourteen-year-old child within the last five years. The child has a history of sexual and physical abuse and has behavioral problems that have led to a juvenile criminal record. In both interviews, the subjects felt that they were isolated and that people avoided them. Common themes between both parties were issues of professionals not taking their cases on an individual basis and over-generalizing, and seeing the disorder instead of the person. As a result, our PSA video inspires audiences to see the person instead of the disorder. Our presentation will consist of discussing our interviews, group dynamics, a showcasing of the PSA video, and the key takeaways we learned from conducting our “We are Human” public service announcement.

## Title: Electoral Competitiveness and Social Media Strategies: Who Goes Negative, When and Why?

**Presenter:** Connor Brown  
**Sponsor:** Patrick Donnay

**Abstract:** Social media is becoming more integrated into every politician’s career. Previous research suggests that throughout an election, a challenger is the one who is more likely to use negative campaigning while running for office. I analyze what strategies are being used by challengers and incumbent candidates. The data I use is provided by Zachary Auer and Jeffrey Fine (2016) accessed through the Harvard Dataverse. Their data looks at both the 2008 and 2010 elections where we began to see politicians use Facebook ads in their campaigns. I find that a challenger is more likely to adopt negative messages while they are running and are behind in the polls. I also examined several campaigns from 2018 and found similar social media strategies. This confirms the increasing importance of social media in American elections.
HS 231 Facilitator: Miriam Rivera-Hokanson

Title: Mexican-American War Through the Lens of Southern Newspapers

Presenter: Miles Jensen
Sponsor: John Ellis

Abstract: This presentation will analyze the newspaper coverage of James K. Polk’s presidency to explore how southerners viewed the causes and consequences of the Mexican American War. It will compare the commentaries of Whig and Democratic newspapers published in the slaveholding South in order to determine each party’s contrasting opinions on the war and the tensions over slavery that emerged in its aftermath. This presentation will also analyze how the opinions of both southern Whigs and southern Democrats differed from those of their northern counterparts. President Polk spent most of his presidency making controversial decisions in his pursuit of territorial expansion. His contemporary critics and recent historians both agree that he stoked southerners’ support for the war by fostering their greed and racism and promising them new slave territories. This presentation will contend that the interregional and inter-party tensions that resulted from Polk’s presidency planted the seeds of the American Civil War.

HS 233 Facilitator: Angela Fournier

Title: Is Less Really More? Evaluating the Potential for Combination Therapies in Ovarian Cancer Treatment

Presenters: Savannah Corradi, Alaina Larson
Sponsor: Mark Wallert

Abstract: Chemotherapy drugs continue to be the main therapy utilized in ovarian cancer treatment. However, the universal praise of these pharmaceuticals is often compromised due to their adverse side effects. Such a reality fostered the development of this project. It is believed that the pairing of chemotherapeutics with direct and indirect NHE1 protein inhibitors, will procure a synergistic effect in which the combination is more proficient at reducing cancer growth than either compound can alone. The success of this combination therapy is primarily measured through XTT proliferation assays. These assays allow for a quantitative assessment of each inhibitor-drug combination and are used to facilitate dose-response profiles. Current data indicate that the inhibition of NHE1 may serve as a potential therapy in ovarian cancer treatment, allowing for a reduction in the required drug dosage and subsequently patient discomfort. Such combination therapies may also limit the rate of disease recurrence that is experienced by nearly 70% of ovarian cancer patients.

HS 245 Facilitator: Danielle Smith

Title: Does Students United Matter? Analyzing the Strength of the Student Senate Association’s Effect on State Higher Education Funding

Presenter: William McNeely
Sponsor: Patrick Donnay

Abstract: I look at the impact Student Senate Association types have on higher education funding at the public university and college level across all 50 U.S. states. Many factors affect higher education funding during a funding cycle, and there are many competing theories such as the business cycle model and the balance wheel model. These theories work to explain the amount of higher education funds allocated.

I address and compare these theories while seeking to analyze the influence of Student Senate Association on higher education funding. Data sources include Grapevine data from Illinois State University on higher education spending in the states from 2013 through 2018. Data from the Student Empowerment Training Project that identifies individual state Student Senate Association type was also used. My findings conclude there is no significant result of Student Senate Associations increasing higher education funding on average across the states. However, despite these mixed results, some individual state Student Senate Associations may aid in higher education funding.
ORAL PRESENTATIONS  SESSION II

10:55 - 11:15 a.m.

HS 247  Facilitator: Amber Laffin

Title: A Graph Theory Problem to Engage Students in Generalizations

Presenter: Kylie Higgins
Sponsor: Jenna O’Dell

Abstract: Learn how I used an unsolved graph theory problem to help students create generalizations and engage in mathematical discussions. I will share an interesting problem and how students worked through solutions. Leave with ideas of how to challenge your students’ thinking!

HS 248A  Facilitator: Gabriel Warren

Title: Evaluating the Role of NHE1 Palmitoylation in the Regulation of Cell Proliferation and Migration

Presenter: Stephanie Hanowski
Sponsor: Mark Wallert

Abstract: The Na+- H+ Exchanger Isoform I (NHE1) is a key regulator of cell proliferation and migration in a range of cell types. Activation of NHE1 is an initial step in the development of the transformed phenotypes of cancer cells and therefore a key driver for tumor development and cancer progression. NHE1 contributes to two of the hallmarks of cancer; the activation of invasion, and metastasis and sustained proliferative growth. We have identified for the first time, that NHE1 undergoes reversible palmitoylation, the addition of a palmitic acid residue to the cytoplasmic regulatory domain of NHE1. This suggests that targeting the potential palmitoylation sites on NHE1 may provide a therapeutic target for cancer treatment. This research evaluates the role of NHE1 palmitoylation in two cell lines: 1) Chinese hamster lung fibroblasts expressing human NHE1 (PSN) and 2) Human embryonic kidney (HEK293). We hypothesize that inhibiting palmitoylation will alter the regulation of NHE1 and decrease the rates of cell proliferation and migration. Cell growth and migration were evaluated in the presence and absence of two different chemical inhibitors: 1) 2-bromopalmmitate (2BP) and 2) cariporide. These data demonstrated that inhibiting the palmitoylation of NHE1 decreases both cell proliferation and the rate of cell migration.

HS 248B  Facilitator: Larry Swain

Title: Engineering a Native American Style Flute

Presenters: David Harris, Riley Pettit
Sponsor: David Towley

Abstract: In fall semester 2018, we were engaged in a project to research, design, and manufacture Native American-style flutes for Bemidji State University. This was for an experimental class headed by Dean Barta to teach students both how to play the flute and the cultural significance behind it. Part of the curriculum was allowing the students in the class to make their own flute, which required us to proceed from initial design through the fabricating process in less than a semester. The result was a batch of 30 flutes produced through a controlled but labor-intensive process that provided the students each a tuned flute of their own to which they could add their individual finishing touches. This semester we are designing a new mechanism to make the process faster, more accurate, and more repeatable. We will go over our progress and explain what we changed between the initial run of flutes and the improved process. There is certainly a lot to cover with lessons learned through this project.

HS 249  Facilitator: Ryan Sayer

Title: Biodiesel for Bemidji State University

Presenter: Lane Lipscy
Sponsor: Anna Carlson

Abstract: My project is about Biodiesel for Bemidji State University. Biodiesel is a form of diesel fuel that is converted from crop oils, waste oils, and animal fats into usable fuel in any diesel engine. Many universities have kitchens producing waste oil, so why not turn waste oil into fuel? The process can range from a university with basic chemistry tools being able to produce a beaker full of biodiesel, to large scale university investments pumping out fifty-gallon drums or more. The most important reason why I believe biodiesel is critical for Bemidji State University is our pledge to be carbon neutral by 2050. Biodiesel is a much less polluting diesel fuel meaning less carbon emissions. Everything in the process I am currently proposing has been tested and conducted by the University of Idaho. Insight from our faculty and students along the way may benefit from advancements in the process. We can implement the procedures to produce biodiesel in the lab courses that chemistry students take so they get hands-on experience producing fuel for Bemidji State University and the material is applicable to what the students are learning from chemistry class.
HS 103  Facilitator: Jessica LeTexier

**Title: Portfolio Show**

**Presenter:** Matthew Sauser  
**Sponsor:** Monika Lawrence

**Abstract:** I will present a photography portfolio which centers around my work as a photographer of campus activities, sports in particular. My presentation captures different aspects of student life in general with a focus on student athletes as well as events in the broader Bemidji community. In a video, I will demonstrate the process of editing of photos to give viewers an idea about how these images have been transformed. Students will be invited to ask questions about the entire photographic process from planning to capturing the images, to selecting the best, and to do the final edit.

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HS 105  Facilitator: Veronica Veaux

**Title: Light Board**

**Presenters:** Nathan Gramse, Nicholas Ogden  
**Sponsor:** Michael Lund

**Abstract:** In this presentation, we will be introducing our light board project, which is our senior project in Applied Project Management, TADT 4893. The light board is a transparent, frontward facing clear dry erase board, designed for use as a teaching tool for online courses. Lectures are recorded and, after some post-video processing, uploaded to YouTube or D2L for online students. The purpose of this presentation is to discuss the process of material selection, design, collaboration, and construction. Throughout the duration of the project, we used advanced problem-solving skills, applied various engineering tools, such as SolidWorks, and put project management methodologies to practice.

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HS 111A  Facilitator: Sandra Kranz

**Title: Historical Trends in People of the Environment Enrollment and Why this Class is Important**

**Presenter:** Courtney Anderson  
**Sponsor:** Erika Bailey-Johnson

**Abstract:** People of the Environment is an interdisciplinary course that has been offered since 1998 to fulfill Goal Area 10. Goal Area 10 objectives are to have students understand the relationship between ecosystems and human activity, patterns of bio-physical and socio-cultural systems, institutions various approaches to handling environmental issues, having students think critically about these issues, propose solutions or lifestyle changes to issues, and being able to defend the actions they take on environmental issues. The University previously offered this class as the only option to fulfill this goal area. Beginning in Spring 2014 the university allowed other courses such as biology or geology to fulfill this area with a companion sustainability class. Starting in Spring 2016 other courses were permitted to fulfill this goal area without the companion sustainability class. Students were able to take Biology I, Geology, Environmental Math, or Intro to Environmental Science instead. Because of these changes enrollment in People of the Environment has decreased. The learning outcomes of People of the Environment are different from other courses in Goal Area 10. Based on student surveys, People of the Environment has a stronger outcome of forming a pro-environmental mindset than the other courses.

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HS 111B  Facilitator: Sarah Cronin

**Title: Evaluation Regarding the Barriers to Seeking Counseling**

**Presenters:** Danielle Maijala, Alyssa Pajari  
**Sponsor:** Sarah Cronin

**Abstract:** Due to various barriers, students often avoid seeking out counseling services. This evaluation recruited students via email and word of mouth to complete an online evaluation survey. The survey asked about barriers students experience if they desire to seek help at BSU’s Student Center for Health and Counseling. The purpose of this evaluation was to identify demographically which students are less likely to use counseling services and to examine barriers that inhibit students’ use of counseling services, especially for native students and students of color. This project is focused on the relationship between retention and student well-being. Preliminary results (n = 343) show evidence that students of color report being less likely to seek counseling services when insurance is billed, $X^2(12, 343)=21.95, p<0.05,$ and that low-income students report being more likely to seek counseling when services are no cost to them, $X^2(8, 343)=14.64, p<0.05.$ By understanding more about mental health and well-being on campus and barriers that currently exist to BSU students who want to seek services, BSU’s Student Health and Counseling Services could improve their model to serve more students in need. Thus, creating greater opportunity for students to receive the support they need.
## ORAL PRESENTATIONS  SESSION III

### HS 113 Facilitator: Jim White

**Title:** Title IX: Reframing the Three-Prong Test to Assess Bias Against Male Athletes

**Presenter:** Abigail Niles  
**Sponsor:** Patrick Donnay

**Abstract:** Since its creation in 1972 Title IX has been, in theory, about giving equal opportunity to all. The Three-Prong Test was created to give institutions the “guidelines” they needed to comply with Title IX. Research has shown that since the creation of Title IX, the number of men’s athletic teams and participants in college sports have greatly declined, while women’s sports and the fight for “equal opportunity” have continued. Using data from the Equity in Athletics Data Analysis (EADA) I have compared the years 2006/07 and 2016/17. Over this decade, you can see an increase in male athletic participation. Using the institutional data from the EADA, I analyze institutional compliance via each of the three prongs of Title IX and find complex effects on male athletic opportunities.

### HS 214 Facilitator: Mark Christensen

**Title:** Poetry Reading: Stoking the Shadow

**Presenter:** Christopher Sanderson  
**Sponsor:** Mark Christensen

**Abstract:** I am a Graduate Student pursing an M.A. in English. I have worked with published authors during the Northwoods Writers Conference put on by the University for the last two summers. This presentation is a poetry reading using selected poems from my in-progress Creative Thesis. Stoking the Shadow, the working title of my project, is a poetry collection that interrogates the construction of human identity in our digitized world. The Shadow is an archetype described by Carl Jung; it refers to the malicious, pessimistic, or depraved aspects of ourselves that we shun from society. The poems I will read probe the clashes between the human body, the queer, primal characteristics of the Northwoods, and the shadows of identity that we project on social media in an attempt to recover a silver lining in a world that sometimes feels desolate and empty.

### HS 228 Facilitator: Julie Curtis

**Title:** "I, Like the Arch Fiend, Bore a Hell [ish Enlightenment] Within Me": and the Subversion of Patriarchal Science

**Presenter:** Peter Coffin  
**Sponsor:** Jessica Durgan

**Abstract:** Mary Shelley’s Frankenstein has a long-standing critical tradition of revealing the novel’s commentary on prevailing nineteenth-century social anxieties concerning new scientific methodology. However, few, if any, scholars extend this criticism to the way in which the novel and its characters interact with other texts that are themselves overt scientific commentary. Namely, I refer to the significant intertextual relationship Frankenstein shares with John Milton’s Paradise Lost. In contrast with Shelley’s apparent distrust of scientific endeavor, Paradise Lost has its own critical tradition as a pivotal endorsement of Enlightenment-era scientific progressivism. Here I intend to bridge the gap between these two critical traditions. In my presentation, I will propose that Milton’s Paradise Lost represents a disruption to Frankenstein’s manifest Promethean symbolism, a disruption that makes Frankenstein a potential threat to the scientific discourse it enters. Further, I show that by utilizing scientific connections between the two texts in their criticism of organized religion, political rebellion, and domestic hierarchies, Mary Shelley highlights the nature of this scientific discourse as an ideological structure, patriarchally constructed, and ultimately as artificial and monstrous as Victor’s creation itself.

### HS 229 Facilitator: Tiffany Hommes

**Title:** Form in Opera

**Presenter:** Kari Norheim  
**Sponsor:** Miriam Webber

**Abstract:** Nathan Martin has noted increasing scholarly interest around the topic of formal function in music theory. Still, he notes that little attention has been paid to vocal genres, especially opera. His analysis of Haydn’s works represents an important step toward reconciling this need. This paper will continue Martin’s work by looking into arias from the works of Mozart. I will only cover Martin’s methodology but will expand his research into Mozart’s broader and more complex Don Giovanni.
HS 230  Facilitator: Patrick Donnay

Title: State Campaign Finance Reform: Policies That Most Effect Electoral Competitiveness

Presenter: Drake Wawro
Sponsor: Patrick Donnay

Abstract: Campaign finance reform has been a topic of debate for some time now, with recent judicial decisions and state policy reforms having significant impacts on state-level campaign financing. The amount of money flowing into state politics continues to reach unprecedented amounts and this is potentially increasing incumbent advantages. This clearly shows the need for an in-depth look at state campaign finance regulation. Using data provided by the Campaign Finance Institute and Holbrook and Van Dunk’s (1993) measure of electoral competitiveness, I evaluate state campaign finance regulation, specifically, public financing to candidates, public financing to parties, contribution limits for political action committees, and contribution limits for individuals. The effects of these regulations have differing impacts on the electoral competitiveness among the different states.

HS 231  Facilitator: Keith Gora

Title: How Blockchain Technology Can Revolutionize Wall Street

Presenters: Eshfaq Ullah, Zachary Thompson, Cole Schmitz, Kenneth Moen
Sponsor: Zhe Li

Abstract: Since 2009, with the introduction of Bitcoin, more than 4,000 alternative cryptocurrencies have been created. As people started trading cryptocurrencies and the hype around it grew, the future of decentralized digital currencies has been surrounded by both skepticism and optimism among market participants. What is most interesting about the future of “crypto” is not the currency itself but the technology behind it – Blockchain. In this research, we study some of the macroeconomic effects of decentralized currencies and how blockchain technology is used by cryptocurrencies. Although the most interesting find of our study is the potential of blockchain technology to revolutionize financial transactions in the market. The rest of our research is entirely focused on the functionality and security features of blockchain technology. Our findings indicate that the decentralized ledger technology in blockchain can be the answer to eliminating several security risks and back-office costs for financial institutes in Wall Street. Moreover, the technology can streamline the way Wall Street processes its transactions using smart contracts, thereby eliminating the two major challenges of digital transactions today – controlling the information and avoiding duplication.

HS 233  Facilitator: Angela Fournier

Title: “Æther”

Presenter: Samuel Galatz
Sponsor: Season Ellison

Abstract: Written from September 2016 to present, “Æther” is a multi-genre work following Jeremy, a young adult hospitalized after a mental breakdown. The initial writing stages revolved around the title: “Æther.” Before writing “Æther,” I had written two short stories, “Don’t Blame the Ether” and “Submergence; or, Good Hope Lake,” that revolved around Jeremy struggling with his mental health, college life, and his constant search for escapism. The word “ether” birthed this project as a prequel, with the idea of writing a “triptych” of fiction, non-fiction, and poetry that encompassed the “ether.” “Æther” is the transition of Jeremy’s darkness (his hospitalization) to light (his self-acceptance). The original intended audience was the BFA capstone instructor and honors committee that would review my piece, as it serves as a culmination of my BFA writing and honors studies, however the future intended audience will be young adults, approximately 16-25, looking to learn about mental illness from the perspective of a survivor and written by someone with firsthand experience with the topics discussed. The importance of disabled and underrepresented voices is the reason the non-fiction piece at the end is included; to demonstrate the experiences in my personal life that led to this manuscript.
HS 247  Facilitator: Amber Laffin

**Title:** Retention Survey: President’s Student Commission

**Presenters:** Kristin Farris, Jalen Frye, Kallie Hoplin, Joseph Richmiller

**Sponsor:** Jesse Grant

Abstract: Students on the President’s Student Commission were interested in examining student retention and satisfaction with a focus on the Gillett Wellness Center, Student Center for Health and Counseling, Academic Success Center, Dining Services, and the Outdoor Program Center. Using Qualtrics, an online survey research instrument, we gathered data from sophomores and juniors (30-90 credits) enrolled at Bemidji State University. Data collected from this study will be interpreted and presented.

HS 248A  Facilitator: Gabriel Warren

**Title:** The Effect of Gender on the Recall of Occupations

**Presenters:** Danielle Nelson, Nicholas Weidell

**Sponsor:** Travis Ricks

Abstract: This research investigates how gender of the participant affects the recall of stereotypical male and female occupations. Participants were presented pictures of faces selected from the Chicago Face Database paired with stereotypical male or female occupations. Participants were then presented either matching or mismatching pairings of gender-specific occupations with male or female pictures. Following the presentation of the face/occupation pairings, participants recalled the occupations to the best of their ability and attempted to recognize previously presented faces. It was observed that when male participants were presented pictures of females paired with occupations, they recalled the occupations less than when the occupations were paired with pictures of males. In addition, male participants when presented pictures of males recalled male occupations better than female occupations. These findings indicate that male participants presented a memory bias towards female stimuli by presenting lower recall of all occupations paired with pictures of females. This gender bias of males was also observed with decreased recall of female occupation paired with males.

HS 248B  Facilitator: Larry Swain

**Title:** Grotesque or Actually Relatable? Disability in The Heart is a Lonely Hunter

**Presenter:** Sarah Williamson

**Sponsor:** Gary Rees

Abstract: Disabled characters are often interpreted as symbols of the grotesque, especially in Southern literature. However, in the great Southern novel *The Heart is a Lonely Hunter* by Carson McCullers, characters with different disabilities surpass the stereotype of simply being symbols of the Southern grotesque. The experiences that come from having disabilities actually give characters strong connections to the complex issues of race, reform, and passing. My research explores how nonconformity to social constructs of normalcy makes these disabled characters relatable to a wide audience of readers rather than grotesque or different.
HS 249 Facilitator: Ryan Sayer

Title: Winter Stress on Conifer Needles

Presenter: Kaylee Henagan
Sponsor: Mark Fulton

Abstract: Conifers continue to carry their leaves through the winter, though they become dormant due to the cold harsh environment. Dormant needles perform minimal photosynthesis and transpiration because their photosynthetic biochemistry has nearly stopped. Dormant needles are more likely to experience higher stress caused by exposure to light than needles that are consistently shaded. In the spring, dormant needles begin to activate their photosynthetic biochemistry due to rising temperatures. Relative water content (RWC) and a measure of potential photosynthetic activity (QY) are two measures of needle physiology that respond to the stress of sunlight. For this experiment, the RWC and QY for a White Pine, a White Spruce, and a Balsam Fir were monitored from the end of February through the month of April. The focus of this experiment is how water content and physiological activity will adapt to light exposure (light vs. shade) through the changing seasons of winter to spring. It is hypothesized that needles exposed to light will be drier than needles in shade and, therefore, will have a lower relative water content. It is further hypothesized that needles exposed to light will activate their photosynthetic biochemistry faster than the shaded needles.

POSTERS

Time: 1 p.m. – 3 p.m. Hobson Memorial Union Lakeside
Facilitators: Julie Larson, Travis Ricks

Title: Capstone Project: Little Free Library

Presenters: Saige Glaser, Jeffrey Harris, Cooper Heimark, Raymond Rohl
Sponsor: Mahmoud Al-Odeh

Abstract: Capstone is a class that offers students the opportunity to take what they have learned throughout their undergraduate technology, engineering, or management programs and apply this knowledge in an integrative experience. We are a group of four TADT students working on a project to support the residents of Bemidji, Minn. We are working on building “Little Free Library.” Little Free Library is a nonprofit organization that inspires a love of reading, builds community, and sparks creativity by fostering neighborhood book exchanges around the world. We decided on a canoe-design library. This design is chosen to reflect the lake life in Bemidji. The library will serve as a place where the community can gather and keep traditional book-reading alive. After meeting with representatives from the City of Bemidji, they have agreed to have three of our little libraries around town in the city parks. We will explain and discuss the process of developing and implementing this project from start to finish. We will share some of the challenges that we have faced during the process.